

# Management Plan Indus Dolphin Game Reserve



A part of  
**Central Indus  
Wetlands Complex**



September 2011

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**September, 2011**

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# List of Acronyms and Abbreviations

°C	.....	Degree Celsius
CBD	.....	Convention on Biological Diversity
CBO	.....	Community Based Organisations
CCB	.....	Community Citizen Board
CIWC	.....	Central Indus Wetlands Complex
CITES	.....	Convention on International Trade in Endangered Species of Flora and Fauna
EPA	.....	Environment Protection Agency
EU	.....	European Union
FAO	.....	Food and Agricultural Organisation
Fig.	.....	Figure
GCA	.....	Gharial Conservation Alliance
GIS	.....	Geographic Information System
IUCN	.....	International Union for the Conservation of Nature
Kg	.....	Kilogram
NRSP	.....	National Rural Support programme
NTFP	.....	Non Timber Forest Products
PA	.....	Protected Area
PCRET	.....	Pakistan Council for Renewable Energy Technology
PDDC	.....	Punjab Dairy Development Council
PMNH	.....	Pakistan Museum of Natural History
PWP	.....	Pakistan Wetlands Programme
Rs	.....	Pakistan Rupees
Sp	.....	Species
TRAFFIC	.....	Wildlife Trade Monitoring Network
UN	.....	United Nations
UNCCD	.....	United Nations Convention on Combating Desertification
UNFF	.....	United Nations Forum on Forest
VWCC	.....	Village Wetlands Conservation Committee
WHO	.....	World Health Organisation
WWF-Pakistan	.....	World Wide Fund for Nature – Pakistan
ZSD	.....	Zoological Survey Department

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Umer Waqas & Dr. Masood Arshad  
September, 2011

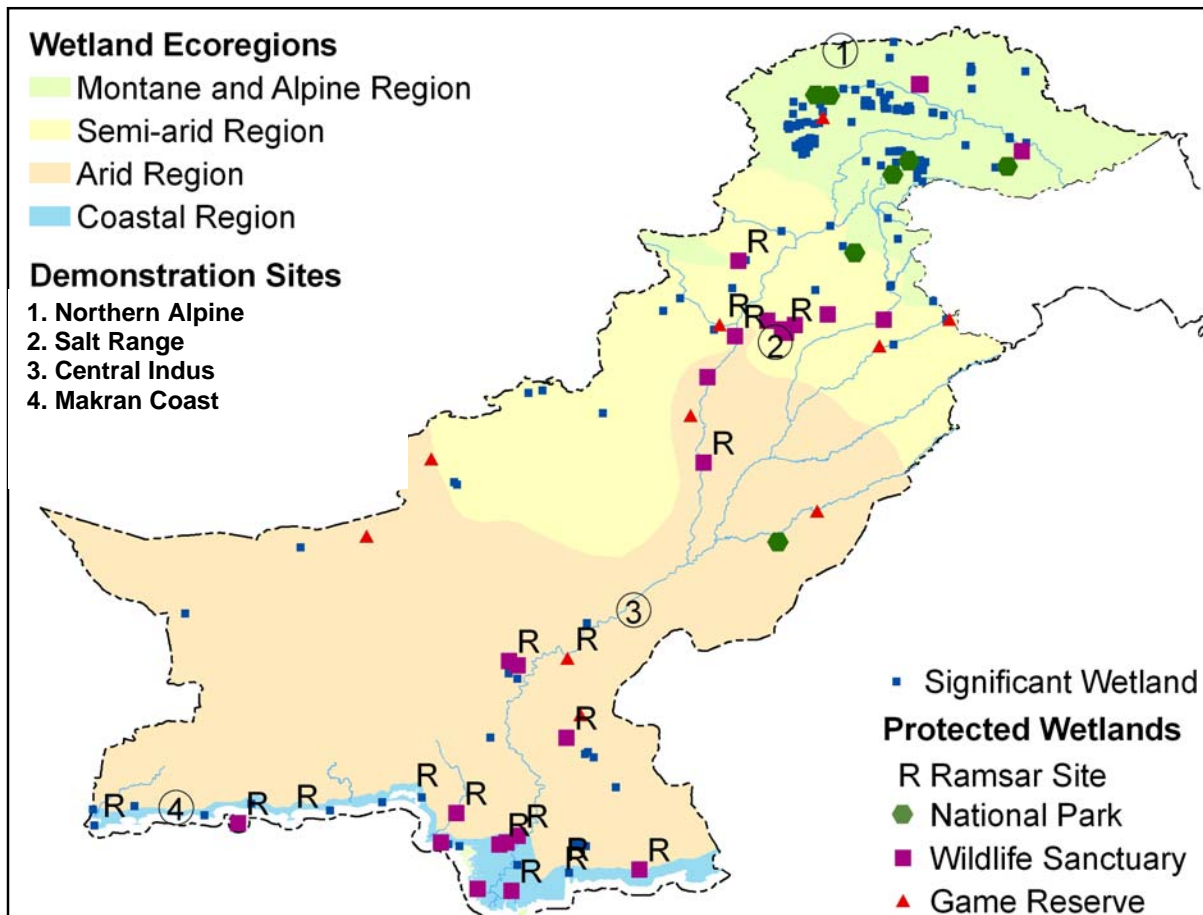
# 1.0. Introduction

## 1.1. Why are wetlands important?

Wetlands are often significant for their ecological, hydrological, social and economical values. Functioning wetlands can be a critical part of the environment as they support a high level of biological productivity and diversity, provide habitat for *flora* and *fauna* including rare and threatened communities and species, maintain local and regional hydrological regimes, remove nutrients and pollutants, act as stores for rain and flood waters and support human activities and values.

## 1.2. Wetlands of Pakistan

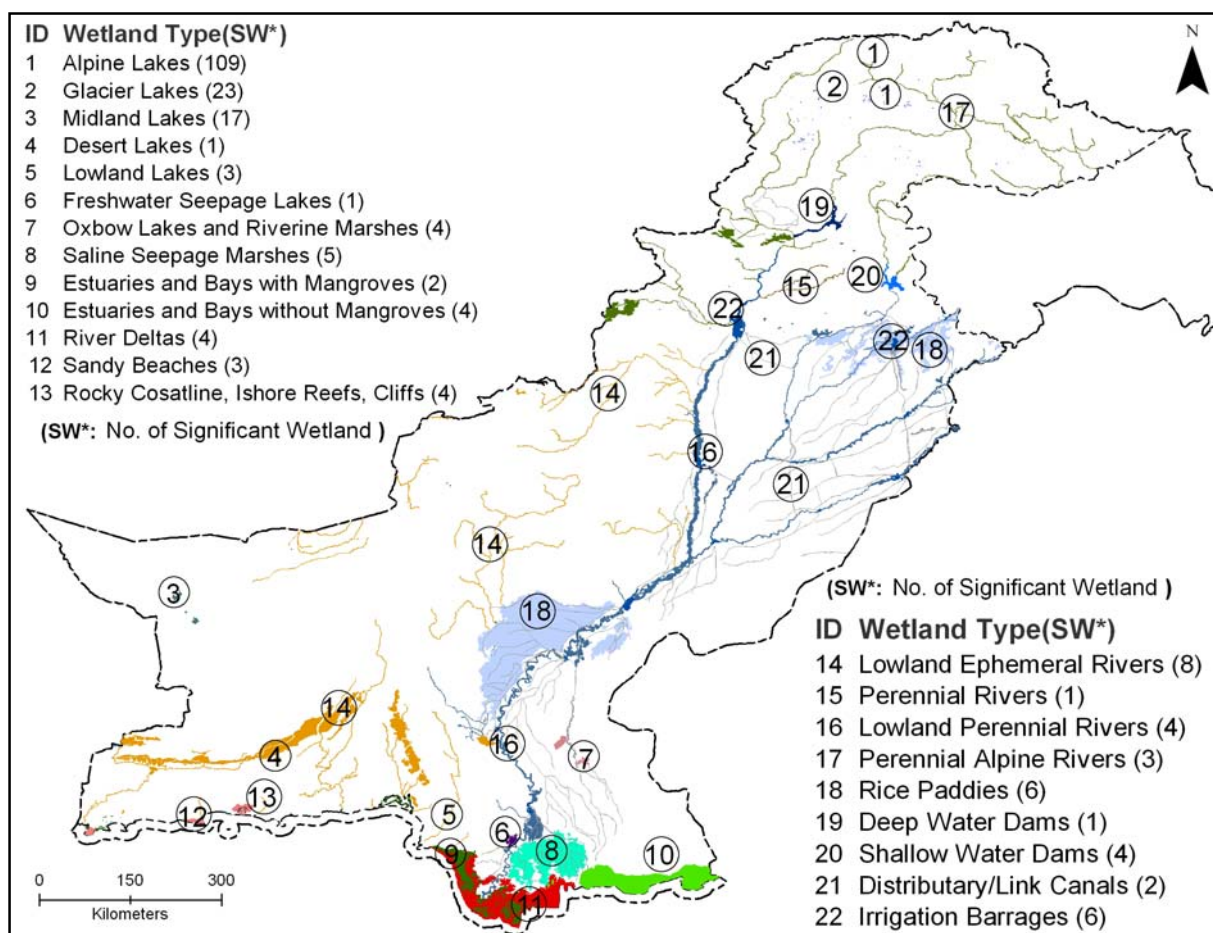
Pakistan is hosting more than 225 significant wetlands of diverse nature and environment ranging from marine habitats to snow deserts of Himalayas and Karakorum; these wetlands are seasonal and permanent, covering about 9.7% of land surface. The country has 19 internationally recognised Ramsar Sites (Fig. 1) so far that are of great ecological significance, supporting unique habitats and associated biodiversity. Beside these, about 134 million human beings are benefited from these different types of wetlands (Fig. 2).



**Figure 1.** Distribution of Significant Wetlands, Wetlands Eco-regions and Ramsar Sites of Pakistan. R denotes Ramsar Sites (19 in number).

### 1.3. National and global environmental context

Geographical location and boundary of Pakistan, regardless of its small size, represents a large variety of ecological conditions and is characterised by nine major ecological zones. Three major ecological realms such as *Indo-Malayan*, *Palaeartic* and *Ethiopian* (African) amalgamate in the country and support the biodiversity of all these ecological regions. Pakistan is an arid country, which was once water sufficient but now it has become a water scarce country and if same situation prevail it may be included in the list of water deficit countries. The wetlands are one of the main sources of water for human such as agriculture, domestic use and for industrial purposes. These wetlands also provide habitat to a range of wetlands biodiversity which is of great economic value to human being and is directly related to the livelihoods of the dependent communities. The plenty of wetlands is crucial to dilute the flood intensity and infrastructure losses in addition to their importance to govern the agriculture-based economy of the country. These wetlands are of immense ecological importance for their unique ecosystems which are supporting the biodiversity of international concerns. About eighteen threatened wetlands dependent mammal species are found in the country including endemic Indus River Dolphin (*Platanista minor*) and the Punjab Urial (*Ovis vignei punjabiensis*). These habitats are host to 20 threatened bird species; 12 reptiles; 2 endemic amphibian species; and 198 freshwater including 15 endemic, and 788 marine and estuarine fish species.



**Figure 2.** Wetlands Types of Pakistan



#### 1.4. Issues and problems of the wetlands in Pakistan

Pakistan's wetlands and associated *flora* and *fauna* are facing a wide range of threats that can be categorised into three major groups; (1) **Unsustainable anthropogenic use of wetlands**: these activities include the over-exploitation of wetlands resources such as destructive fishing practices, over-harvesting of wetlands vegetation, over-grazing and illegal hunting of birds, mammals and reptiles. (2) **Physical changes to wetlands on an ecosystem level**: land reclamation, deforestation, expansion of agricultural fields in the close vicinity of wetlands and over-grazing are causing much severe structural threats to wetlands. (3) **Off-site activities that cause physical and chemical changes to wetlands**: these are practices that do not take place directly on or around wetlands and carried out in some other locations but they have significant impacts on wetlands. Threats of this category include the changes in water volume like water flow and water pollution.

#### 1.5. Gaps and weaknesses in the Policy Environment / Legislation

Pakistan has a difficult policy environment. This is particularly true of policy level interactions and planning interventions associated with environmental protection, conservation, or recognition of poverty-environment linkages. However, the situation is changing. In recent years, the Government of Pakistan have initiated policy and planning measures to rectify the situation. However, appropriate institutional design remains missing particularly in terms of delineation of authority, adequate resource provision (human, physical, financial) and accountability mechanisms. The Government of Pakistan has through the Poverty Reduction Strategy Paper and the 10<sup>th</sup> 5-year Development Plan, also known as the 'People's Development Plan' (formerly the Medium Term Development Framework 2005- 2010) attempted to integrate environment in its long-term planning documents. However, this recognition of the importance of conservation and the value of environmental sustainability remains restricted to specific sectors such as agriculture, water, pollution, and forest (and associated natural resources). The activities and programmes proposed in these documents fail to make the link with appropriate poverty environment indicators and present a fractured image of state level natural resource management.

Policy documents such as the National Conservation Strategy (1992), the National Environmental Action Plan (2001), the National Environmental Policy (2005) and the proposed National Water Policy play an important role in describing the state's perspective on environment and natural resource management. They provide a roadmap for future policy and practical engagements. However, concrete impacts of these policy documents, the actions and planning trajectories they outline remain nebulous.

The Government of Pakistan is party to 5 natural resource related Conventions i.e. Convention on Biological Diversity (CBD), UN Convention to Combat Desertification (UNCCD), Convention on Migratory Species, Ramsar Convention on Wetlands, and Convention on International Trade of Engendered Species of Wild Fauna & Flora (CITES). In addition to these Conventions, Pakistan is also an active party to UN Forum on Forests (UNFF). While at the federal level, there is some awareness and understanding of the obligations, duties and opportunities emanating from these agreements but at the provincial and district levels, stakeholders, responsible for actively implementing targeted actions, collecting necessary data etc in line with these agreements remain largely uninformed.

In terms of legislation, the cornerstone of Pakistan's environmental legislation is the Pakistan Environmental Protection Act of 1997. The Act works under the presumption of environmental federalism wherein it creates the authority for the delegation of environmental management functions and powers to Environmental Protection Agencies at the provincial level. The provincial governments, in turn, have the authority to further delegate these powers. They also have the scope to adopt more stringent environmental regulations rather than adopt the bare minimum of standards and engage in a race to the

bottom. The presumption of environmental federalism is further supplemented by the Local Government Ordinance of 2001. The Ordinance promotes responsibility and accountability at the local level and was designed to engage citizens in public political life from the smallest unit of government – the Union Council.

While the benefits of environmental federalism are plentiful, its application in Pakistan remains challenging on two fronts. First, the Pakistan Environmental Protection Agency remains charged with developing appropriate oversight and monitoring guidelines for the functions and activities of all provincial environmental protection agencies. Second, the Pakistan Environmental Protection Agency is responsible for building capacity and allocating sufficient resources to provincial agencies necessary to meet their delegated responsibilities. In general terms, government institutions, ministries, departments and associated public bodies are responsible for enforcing policies and ensuring the appropriate implementation of sanctioned plans. However, in order to do this effectively, institutional mandates need to be clear and transparent and implementing bodies require sufficient human, physical, and financial resources buttressed by legislative authority. Finally, an effective and transparent accountability mechanism should exist to evaluate institutions on how effectively they meet their respective mandates and utilise their resources.

The preceding discussion holds true for the Province of Sindh. Linking environmental conservation and sustainable natural resource use, Sindh's wealth of natural resources and diversity of ecosystems is a significant part of its overall development, particularly since large rural populations is dependent on these natural resources for their livelihood. Deterioration of these natural assets such as reduction in freshwater flows, habitat destruction, deforestation, pollution, water logging and salinity may be indicative of poor natural resource management, weak enforcement of environmental protection legislation, and feeble policy actions. Both civil society and several government departments exhibit a grave lack of awareness of environmental laws and rights. While this may be attributed to the fact that environmental law is a comparatively new area in Pakistan; it should also be attributed to poor dissemination of information and outreach. One of the cross cutting issues that affect forest and wildlife management in Pakistan is the existing legal framework which does not provide incentives for the local communities and corporate sector on the one hand, and provides no scope for the adoption of emerging concepts and management innovations. Moreover, the laws are obsolete in terms of the fines levied and the penalties imposed for poaching, fishing during prohibited seasons, infrastructure development in protected areas, unsanctioned logging, encroachment on forested land and other protected areas etc.

#### **1.6. Pakistan Wetlands Programme: concept and design**

However, these precious habitats are facing severe threats of degradation due to human interference, over-exploitation and mismanagement, which demands special cure. In order to safeguard and protect these precious wetlands, the World Wide Fund for Nature Pakistan (WWF – P) in consultation with other partner organisations in the year 2000 undertook conservation initiatives, which resulted in the form of an inception of the Pakistan Wetlands Programme (PWP) in 2005.

The overall aim of the PWP is to promote wetlands conservation and their associated globally significant biodiversity through poverty alleviation of wetlands dependent human communities. In order to achieve the major aim of the project, two major set of objectives were defined:

- Create and maintain an enabling environment for effective and sustainable conservation of natural wetlands at federal, provincial / territorial and local levels through public awareness, capacity-building and identifying gaps in policy and legislation at national level;

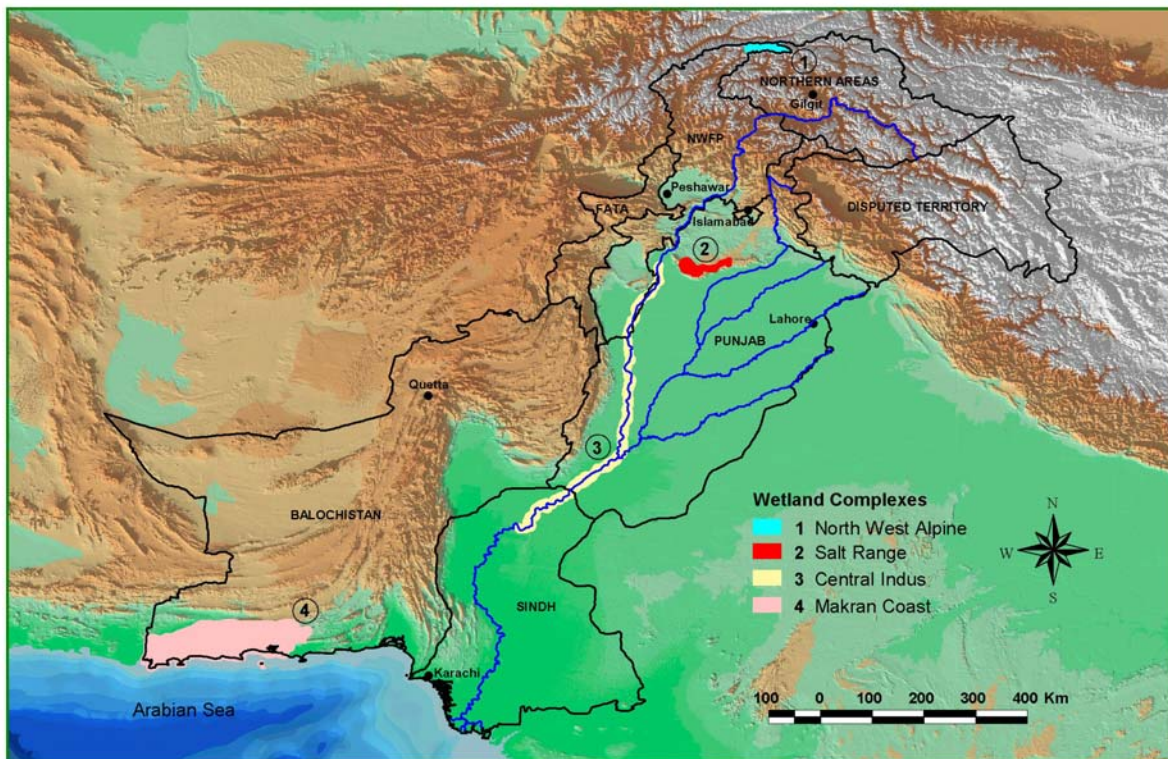
- Implement sustainable wetlands conservation at four representative sites that will serve as replicable models for subsequent nationwide wetlands conservation initiatives through development and application of wetlands management plans;

### 1.7. Wetlands Complexes Management Plans

The four wetlands complexes (Fig. 3) were included in the PWP after a series of consultation with national, provincial and local stakeholders. The sites were specifically chosen to be broadly representative of prevailing conditions and typical wetlands conservation problems in each of four separate ecological regions. These wetlands complexes include:

- Northern Alpine Wetlands Complex
- Salt Range Wetlands Complex
- Central Indus Wetlands Complex
- Makran Coastal Wetlands Complex

The major aim of each of the wetlands complex is to sustainably conserve wetlands biodiversity by designing and implementing a comprehensive management plan.



**Figure 3.** Four major wetlands complexes covered under Pakistan Wetlands Programme

### 1.8. The Management Plan Concept

The management plan is a product of the planning process, documenting the management approach, the decisions made, the basis for these, and the guidance for future management for an entire PA over a given period of time. It should contain information on what is to be achieved by management and the rationale behind the management decisions made. The management plan can be defined as:

*“a written, circulated and approved document which describes the site or area and the problems and opportunities for management of its nature conservation, land*

*form or landscape features, enabling objectives based on this information to be met through relevant work over a stated period of time” (Eurosites, 1999)*

These should be succinct documents identifying key features of the site, clearly establishing management objectives based on the associated risks and threats, the number of competing interests, the level of stakeholder involvement and the associated social issues and indicating actions to be implemented. The task of preparing plans is challenging, keeping in view the multiple objectives i.e. biological and cultural, a wide array of social preferences and values, institutional structures and barriers, philosophical outlooks, forms of knowledge and conflicting opinions. In addition, plans also need to be flexible enough to cater for unforeseen events which might arise during the duration of the Plan.

The level of operational detail to include in a management plan is a decision for the respective Department to determine. How detailed the plan should be in terms of its operational content will most probably depend on whether there are other systems set up within the Department or whether the management plan is expected to provide the detailed day-to-day guidance to the Park authority.

The need for having a management plan is emphasised by the following statement:

*“If there is no general management plan; preservation, development and use activities in a Park will occur in a haphazard basis, often in response to political pressures with little consideration as to the implications for the future. This result is likely to be lost opportunities and irreversible damage to park resources and values”*

### **1.9. Management Plan for Indus Dolphin Game Reserve**

The Indus Dolphin Game Reserve (Fig. 4) is one of the prime habitats of Blind Indus Dolphin (*Platanista gangetica minor*) with maximum population left between Guddu and Sukkur Barrages. The management plan for Indus Dolphin Game Reserve will consist of: Introduction to the area, details of Biophysical and Social Environment, process involved in the development of management plan, potential issues and threats, vision for the Indus Dolphin Game Reserve, management plan and the implementation and monitoring mechanism.

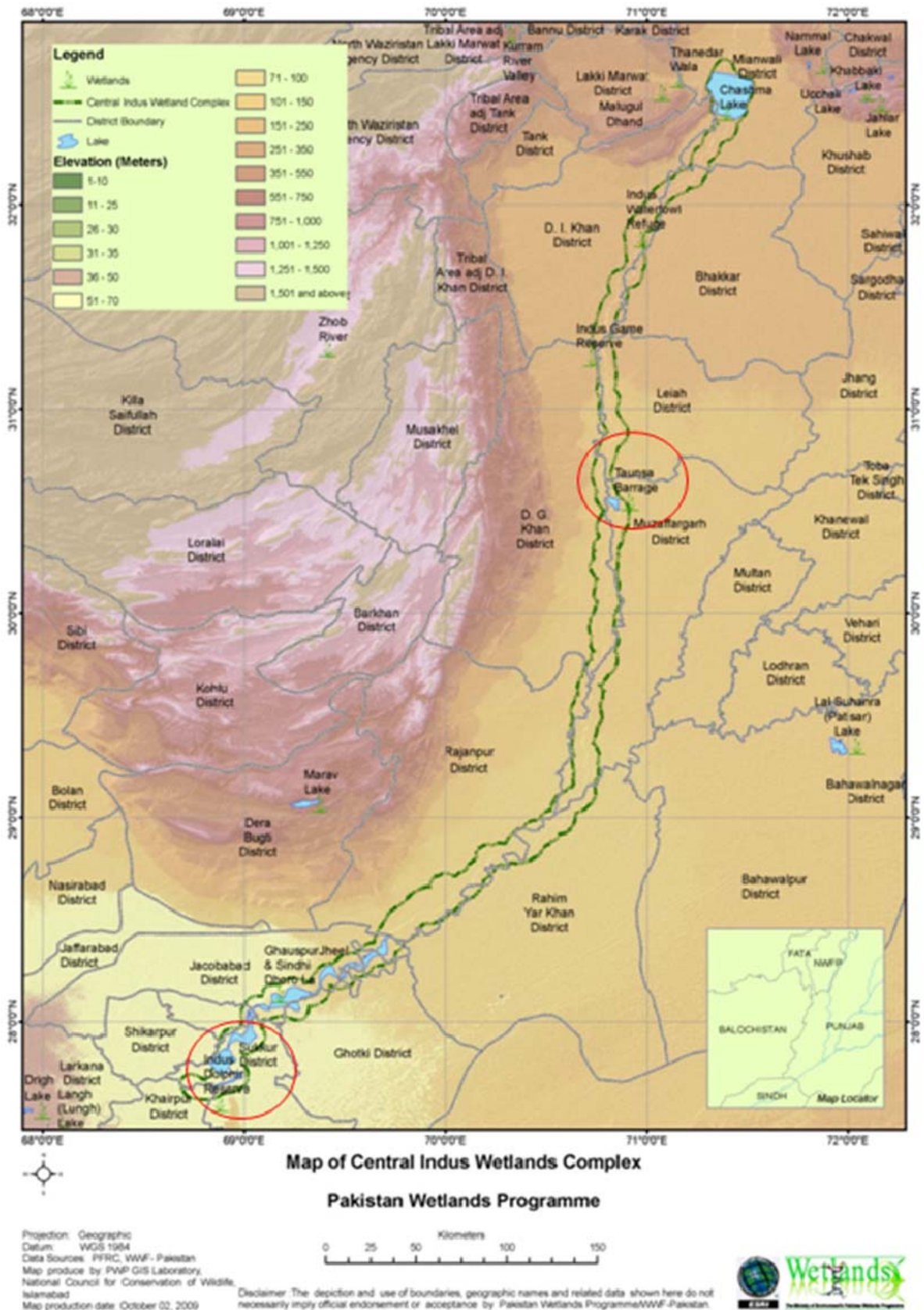


Fig. 4: Map showing the Central Indus Wetlands Complex, sites.

## 2.0. Indus Dolphin Game Reserve

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### 2.1. Introduction

Indus Dolphin Game Reserve boundaries cover an approximate area of 44,200 ha and are about 210km stretch between Guddu and Sukkur Barrage. This area covers Jacobabad, Ghotki, Shikarpur and Sukkur Districts. There are two main barrages in the stretch starting from Guddu Barrage and Sukkur Barrage at the other end. Guddu Barrage controls the flow of water for irrigation and flood. This barrage has 68 bays and it feeds Ghotki feeder, Begari feeder and Pat and Desert canals. Sukkur Barrage was built by British and has 66 pans with heavy gates feeding the largest irrigation system of the world with more than 5 million acres.

### 2.2. Indus Dolphin Game Reserve

The Indus Dolphin Game Reserve is a natural wetland declared as Reserve for protection of Indus Dolphin in 1974 and was later notified as a Ramsar site in May 2001. The River channel between Guddu and Sukkur provide habitat to largest population of Indus Dolphin that is one of the most threatened species (Braulik, 2003).

This particular stretch of the river is very important for the survival of more than 1331 remaining individuals of *P. minor*. This species is listed on CITES Appendix I and the IUCN Red List 2000 (Hilton-Taylor, 2000).

This wetland is important due to the presence of a large variety of fish, reptiles, birds and mammals and especially due to the presence of wetland threatened species the Hog Deer (*Axis porcinus*), Indus Dolphin (*Platanista minor*), Smooth-coated Indian Otter (*Lutrogale perspicillata*), Marbled Teal (*Marmaronetta angustirostris*) and Pond Spotted Turtle (*Geoclemys hamiltonii*).

The wetland is also an important breeding site for the Lesser Whistling Teal (*Dendrocygna javanica*), Ruddy Crake (*Laterallus ruber*) and Pheasant-tailed Jacana (*Hydrophasianus chirurgus*). The Bar-headed Goose (*Anser indicus*), Ruddy Shelduck (*Tadorna ferruginea*), Painted Snipe (*Rostratula benghalensis*) and Pallas Fishing Eagle (*Haliaeetus leucoryphus*) are other important species found at this wetland. Other local bird species found are Black Partridge (*Francolinus francolinus*), Grey Partridge (*Francolinus pondicerianus*), Quail (*Coturnix coturnix*), Blue Bird (*Sialia sialis*), Jungle Pigeon, Sun Bird, Doves, House Sparrow (*Passer domesticus*), Warblers, Russian Sparrow, Crow (*Corvus splendens*), Owl, Parakeet (*Psittacula krameri*) and Crow pheasant (*Centropus sinensis*).

Other large mammal species of concern are Jackal (*Canis aureus*), Cape Hare (*Lepus capensis*), Porcupine (*Hystrix indica*) and Wild boar (*Sus scrofa*).

### 2.3. Land Tenure

The Barrages in the Reserve are government owned property while the surrounding areas is partially private, owned by the local communities. This long stretch is maintained as Indus Dolphin Game Reserve by the Sindh Wildlife Department.

The definition of a Game Reserve according to the Sindh Wildlife Protection Ordinance reads that:

*“Government may declare any area to be a game reserve where hunting and shooting of wild animals shall not be allowed, except under a special permit, which may specify the maximum number of animals or birds that may be killed or captured and the area and duration for which such permits shall be valid”*

This rule of law has also set penalties against offence that are as follows:

1. Whoever contravenes or attempts to contravene:
  - (i) any provisions of sections 10,11,12 and 13 shall be punished with imprisonment which may extend to a period of one year or with fine which may extend to one thousand rupees, or with both, and any licence or permit granted or issued to him under this Ordinance shall be suspended for a period of two years;
  - (ii) Any provisions of section 7 shall be punished with imprisonment, which may extend to two years, or with fine, which may extend to one thousand rupees, or with both.
  - (iii) Any provisions of sections 8, 9 and 24 shall be punished with a fine which may extend to five hundred rupees; and,
  - (iv) Any provision of this Ordinance or any rule for the contravention of which no special penalty is provided, shall be punished with imprisonment for a term which may extend to six months, or with fine which may extend to five hundred rupees, or with both.
2. Whoever interferes or attempts to interfere in the performance of any functions or in the discharge of any duties under this Ordinance, shall be punished as in clause (i) of sub-section (1).
3. Whoever, having already been convicted of an offence under sub-section (1) or sub-section (2) is again convicted there under, shall on every subsequent conviction, be punished with imprisonment which shall not be less than twelve months or fine which shall not be less than one thousand rupees or both, and his firearm, vehicle, appliance or anything used in the commission of the offence and his hunting licence shall be confiscated and he shall not be entitled to a hunting licence for a period of ten years.

#### **2.4. Principal Management Objectives**

Based on the regulations defined for the improved management of Indus Dolphin Game Reserve, the principal management objectives are to:

- ensure the long-term conservation of the wetlands biodiversity and associated significant habitat;
- monitor and examine water quality, impacts and ways in which to maintain good water quality and prevent potential contamination of the water entering the system over the long term;
- undertake effective liaison between the various stakeholders and community regarding the appropriate environmental management for the area in balance with the area's recreational objectives;
- restore and rehabilitate riverine communities to ensure the long-term viability of existing *flora* and *fauna*;
- educate local residents and the wider community in relation to natural resources of the area; and
- Maintain and upgrade a baseline environment data set and overall biodiversity inventory for the Indus Dolphin Game Reserve, on a regular basis.

## 3.0. Biophysical Environment

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### 3.1. Physical features

The Indus and its main tributaries are perennial, the volume of water discharged varying in relation to seasonal melt water and rainfall. The maximum volume (50%) of the annual discharge of the Indus is observed in the summer monsoon months of July - September and only 15% in the winter season from October to March, when its width varies from 50m to 1km, its current speed from 0.1 to 1.5m per sec and its depth is not less than 6m. As a result of the very gentle gradient of the Indus in the Punjab and Sindh, and the enormous quantity of detritus borne downstream, the river bed is raised above the level of the surrounding plains. The river bed comprises of mud and sand. Owing to the high amount of detritus, the water is extremely turbid and the visual range from the surface downwards is only about 5cm (Pilleri and Zbinden, 1973-1974).

### 3.2. Edapho-climatic conditions

The Indus Dolphin Game Reserve is comprised of alluvial plains and comprising of fine to grained soil dominated with deposits of calcareous nature. The Electrical Conductivity (EC) of the normal soil; ranges from 0.4 to 3.9 ms/cm and for saline soils 4.1 to 220 ms/cm. The pH of normal soils ranges from 7.9 to 8.9 and that of saline / sodic soils can be as high as 9.1. The soils are generally deficient in available phosphorus and organic matter.

The climate of the region is characterised by hot and hazy weather during summer days with dry and cold weather in winter. During January, the temperature ranges from 7 – 22°C. The summer (month of June before the monsoon) temperature averages 35°C through it often reach up to 42°C. Generally the summer season commences in March-April and ends before October. The average rainfall of the region is 88mm, and ranges from 0.59mm to 25.62mm per month.

Water temperature in winter ranges from a minimum of 12°C at night to a daytime maximum of 24°C, while the air temperature varies from 2°C to 35°C (Pilleri and Zbinden, 1973-1974.)

### 3.3. Vegetation of Indus Dolphin Reserve

The following plants are associated with areas of inundation and marshland along the Indus: *Saccharum spontaneum*, *Phragmites communis*, *Tamarix dioica*, *Typha elephantina*, *T. angustata*, *Arundo donax*, *Paspalum ditichum* and *Erianthus* spp. The freshwater flora is limited to planktonic forms. In the Kacha area, Babul (*Acacia nilotica*) is found, which have a high commercial value.

### 3.4. Fauna of Indus Dolphin Game Reserve

The Indus dolphin is a blind cetacean endemic to the Indus River and found in greatest numbers between Guddu and Sukkur barrages. About 150 were censused in January 1974 (Pilleri and Zbinden, 1973-1974), 187 in April-May 1977 (Pilleri and Bhatti, 1978), 241 in May 1978 (Pilleri and Bhatti, 1978), 292 in June 1979 (Pilleri and Bhatti, 1980), 346 in April 1980 (Bhatti and Pilleri, 1982) and 429 in 1986 (Khan, 1986). Recent surveys of 2001, 2006 and 2011 have shown a marked increase in the population density of the species in its entire range of occurrence. There is some doubt as to the comparability of these census data due to differences in the reliability of survey techniques; nevertheless, it is believed that the population has actually increased following the strict protective measures afforded to the species since 1974 (Khan and Niazi, 1989). Other aquatic vertebrates include six species of freshwater turtles. Historically, Gharial *Gavialis gangeticus* used to occur in this region, which locally is almost extinct.



Aquatic birds include large colonies of Laridae and egrets.

Common species of fish are mali *Wallago attu*, singari *Macrones aor* and marakho *Catla bchanani*, all of which are taken by the Indus dolphin (Pilleri and Zbinden, 1973-1974) as a food resource.

## 4.0. Social Environment

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### 4.1. Background

Human activity like hunting, shooting and any kind of disturbance to wild animals is not allowed in Indus Dolphin Game Reserve but only under special circumstances with specific terms and conditions according to the Sindh Wildlife Protection Ordinance, 1972. However in practice, most PAs in Pakistan are subject to extraction of natural resources by local people to meet their livelihood needs. The high level of poverty in the country and continued dependence on natural resources for rural livelihoods (e.g. agriculture, fishing etc) means that PAs are often perceived as common property resources especially for poor and marginalised groups. The biodiversity earmarked for protection in these areas is not only the source of direct cash income for local people but also provides materials that act as inputs for productive income (e.g. fodder) and meet needs for shelter and food consumption (e.g. timber, *Typha spp.* and *Tamarix spp.* is used for house construction and vegetables and NTFPs are extracted to meet dietary needs). While beneficial for local livelihoods, the extraction of these resources often leads to disastrous results on the biodiversity of the PA.

#### 4.1.1. Evidence of human use inside Indus Dolphin Reserve

The main rationale for this study is to primarily ascertain the level of natural resource extraction within the Indus Dolphin reserve and assess if human activities in close proximity to the Dolphin Reserve are also affecting its resources.

**Deforestation:** This is evident in the Indus Dolphin Game Reserve that local communities not only cut the forest trees for their own use to meet the fuel needs but also sell the wood at regular and large scale to people outside who are part of timber mafia. This practice is going on under the umbrella of local influential lords. Poor people living inside the forest area sell their services in this chain as labour.

**Agriculture use of forest land:** There is an increasing trend of using forest land for agriculture use particularly in areas close to river channel. This is mainly because of fishermen switching their livelihood source from fishing due to less catch of fish. The lands near the river are rich and productive and water is easily available as they use to extract the water directly from river using engines and pipes. This is a common practice and being carried out all along the river on both sides. The practice of agriculture use of land does not come alone but accompanies many other acts like use of chemicals and fertilisers to increase the yield of cotton and wheat.

**Grazing Pressure:** Majority of the people living along the Indus Dolphin Game Reserve keep livestock and they set their animals free to graze most of the day time. The vegetation is under extreme pressure. Herds of cattle can be observed along the main river. There is no limit and restriction to this human activity which results in unsustainable consumption of forest and vegetation.

There is also indiscriminate cutting of *Typha* and *Tamarix* in the Dolphin Reserve and piles of these can be seen stacked along the river channel. This is one of the causes of habitat disturbance and results in reduction of vegetation that is necessary for the survival of species. *Typha*, *Tamarix* and *Saccharum* are used to make mats, baskets and other household items. They are a source of supplemental income for most fishing households.

Fishing is one of the major activities in the Indus Dolphin Game Reserve. Illegal netting cross the channel and sometimes abandoned inside the river are direct threats to the survival of Indus Dolphin.

Indirect human impacts on the Indus Dolphin Game Reserve are difficult to assess but can be identified from human activities within a one kilometre radius. These include agrochemical use from agriculture in the surrounding area. Common crops grown in the region are cotton, wheat and sugarcane. Agrochemical use for agricultural production is common. Cotton, in particular, requires high applications of fertilisers and pesticides that is a major source of water pollution due to leaching into the ecosystem.

#### **4.1.2. Broader Factors affecting human use**

Despite the controls levied by the Sindh Wildlife Protection Ordinance, 1972, the Indus Dolphin Game Reserve's natural resources are used indiscriminately for various purposes that are a direct result of the lack of clarity between the responsibilities and jurisdiction of various government departments. The presence of important mammals like Indus Dolphin in main river channel has set great responsibilities on Sindh Wildlife Department but the fisheries resources are managed by Sind Fisheries Department. The fishing practices like use of illegal nets and stretching the net across the river at different locations that are also hotspot for Indus Dolphin causes a direct conflict and confusion between the two authorities. Some political decisions like issuing of fishing licences under Benazir card system has worsen the situation as there are no terms and conditions set in that system for the card holder. A card holder operates with all the illegal ways to catch the fish regardless of what fisheries acts reads. These practices are direct threats to the animal like Indus Dolphin. The similar situation prevails when timber mafia operates in forest area along the river and they cut the trees and cause the habitat loss to most of species.

Although an assessment of human impact will answer the question "how much" in terms of natural resource use, the "why" aspect of extraction also remains to be determined. To answer the "why" aspect, an analysis of the social structure of stakeholder communities is essential since the reasons behind the current level of natural resource extraction are embedded in the social influence and importance of stakeholders. This influence and importance governs the access to and use of natural resources inside the Reserve area by stakeholder communities.

### **4.2. Stakeholder analysis**

#### **4.2.1. Stakeholder Influence and Importance**

Stakeholder analysis indicates a general consistency of views on the importance and influence of stakeholder. The importance of stakeholders is defined through the nature and intensity of their interaction with the Reserve area while influence is defined by actual control over access and use of the Indus Dolphin Reserve's resources. Stakeholder analysis was conducted through semi-structured interviews with government organisations.

Interviewees were asked to provide an overall assessment of the level of stakeholder importance and influence and rated it as high, medium or low. Reasons were elicited for each rating to base the analysis on concrete examples and in some instances interviewees changed their overall rating when probed to provide examples/reasons to support it. This exercise signified the relative importance of stakeholders in terms of interaction and power. Stakeholders were then ranked according to their importance or power within the Village in general and in relation to the Dolphin Reserve in particular.

#### **4.2.2. Analysis of data on Stakeholder Roles**

*Importance (Use) of stakeholders:* Sindh Wildlife Department and Sindh Forest Department have equal strength and presence in the area but Forest Department covers most land in operation and exercise of authority. The area is under influence of Police Department as well who indirectly operates with the consent of local landlords. Both Forest and Wildlife Departments complain of police force as cross cutting to their authority.

*Influence (power) of stakeholders:* In terms of influence or power over the use of the Indus Dolphin Reserve's resources, the highest rating was given to landowners and local lords, *Wadaira's* among different casts like *Acharr, Chacharr, Chandio, Narejo* etc.

### **4.3. Anthropogenic factors causing degradation to natural resources**

The discussion of pressure and threats on Indus Dolphin Game Reserve are inclusive part of the analysis. While our talks with local people, stakeholders and authorities, a few issues emerged that we could enlist as threats to Indus Dolphin Game Reserve. Deforestation for fuelwood and timber industry use was an issue highly raised. Secondly the use of forest area for agriculture purposes that involves use of chemicals. Practice like Illegal hunting of freshwater turtles, and garbage and diesel pollution particularly due to boat shuttles at river cross points called "*Patans*". The use of chemicals including act of poisoning of water channels for catching turtles and fish have severely affected the quality of water that is prime habitat of Indus Dolphin and other wetlands associated species.

Benazir fishing card system has drastic impacts on fisheries resources and with the increase fishing nets in the river, has increased mortality rates of Indus Dolphin than ever before. Fishing, grazing and fuelwood collection were identified as pressures by all the respondents.

An assessment of threats indicated that grass collection, fishing, fuelwood cutting and grazing are the most impending threats in the next five years. The extent of tree cutting is expected to be throughout the Indus Dolphin Game Reserve in the Kacha area. Significant impacts are posed by threats such as grazing, *Typha spp, Tamarix spp* and fuelwood collection and perceived flooding due to heavy rains. Fishing, flooding and fuelwood collection were also reported as having long-term effects on the ecosystem.

Hunting is predicted to remain as a constant pressure and threat given that the social and political conditions which supported it were not likely to change in the next five years.

#### **4.3.1. Socio-economic Importance**

An assessment of socio-economic importance of Indus Dolphin Game Reserve yielded fairly consistent responses. The area is seen as an important source of livelihood for local communities and meets subsistence needs. Although it has no religious or cultural value, it provides an important scientific and educational value mainly as a staging ground for migratory birds. Its value as a habitat of animal/plant species that have a social or cultural value was moderate and as a place of aesthetic and recreational value, it was rated on an average level. However, its importance as a contributor to ecosystem services and benefits was high since it supported birds that feed on crop pests and river is prime habitat of Indus Dolphin with maximum population left within the boundaries of this Reserve.

#### **4.3.2. Vulnerability, Management and Finances**

Our talks with stakeholders identified that difficulties in monitoring law enforcement were mainly attributable to the lack of equipment and staff skills. The area is seen to lack financial support to enable better enforcement practices through staff employment and training.

## **5.0. Process adopted for the Management Plan**

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### **5.1. Literature Review**

An extensive literature review was carried out in order to collect relevant information for the site. All sources of information such as: WWF – Pakistan’s library, Internet, previous records of Sindh Wildlife Department and reports from other projects being operational in the area, were used to collect and analyse relevant information for the development of management plan for the site.

### **5.2. Ramsar Guidelines**

The Indus Dolphin Game Reserve is designated as Ramsar Site. Ramsar Guidelines were followed for the development of this management plan in order to keep the uniformity of the documents and plans. The Ramsar guidelines consisted of three different sections: (i) Description of the area, (ii) Evaluation and objectives; and, (iii) Action Plan, which were used for the development of management plan of Nammal Lake Game Reserve.

### **5.3. Previous Management Plans**

There has been no management plan available for the site. There is also lack of baseline scientific studies of Indus Dolphin Game Reserve.

### **5.4. Field Observations and Meetings**

WWF – Pakistan has been involved in the conservation and management of significant wetlands of the country through enhancing awareness, capacity-building programmes and improving management. The Pakistan Wetlands Programme has been working in this region and has its presence in the region for the last two decades while working with communities and other government and non-government partners. During this time, several issues have emerged as a result of unsustainable use of the natural resources. These issues have been clearly highlighted in the present document.

### **5.5. Community Consultations and Partner Meetings**

During the implementation process of the Pakistan Wetlands Programme, extensive consultations are being made, which has helped in redefining issues and the suggested solutions. Several detailed consultations with the staff of the Sindh Wildlife Department, Sindh Irrigation Department, Sindh EPA, Sindh Forest Department and others have already been organised but some issues still need more discussion as our knowledge and information improves.

## **6.0. Potential Issues and Threats**

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### **6.1. Management Issues**

#### **6.1.1. Lack of coordination between different line agencies**

The land included in the Indus Dolphin Game Reserve officially belongs to Sindh Irrigation Department, Fisheries to Sindh Fisheries Department, whereas, flora and fauna belongs to Sindh Forest and Sindh Wildlife Departments respectively. Sindh Fisheries Department issues fishing contracts and cards within the Indus Dolphin Game Reserve without any consultation with the custodian Department (Sindh Wildlife Department). Interestingly the Indus Dolphin that is entangled in fishing nets of card or licence holder, when dies, comes up as a negligence of Sindh Wildlife Department. Whereas the field staff of Sindh Wildlife Department has no authority to stop a card or licence holder from fishing in the dolphin reserve area. There is a clear lack of coordination between the two authorities particularly on fishing nets and dolphin mortalities.

#### **6.1.2. Lack of training and capacity of the field staff**

The area is long stretch and needs adequate and trained staff to handle and address the issues. Moreover the staffs of Sindh Wildlife and Fisheries Department are not only less in numbers to cover the area but also lack technical capabilities in order to meet the duty requirements.

#### **6.1.3. Lack of necessary field / technical equipment**

The field staff is inadequately equipped with technical equipment e.g. binoculars, spotting scope, camera and GPS, which is a pre-requisite for effective monitoring and management of natural resources during recent times. In addition, the field staff does not have the capacity to record and subsequently report wildlife crime data on a regular basis, where population trends of important wildlife species of the region can be monitored for improved management decisions. . In addition, the mobility of the protection staff in the field is hampered due to the lack of transport facilities and the lack of security weapons has also encouraged the poachers to some extent.

#### **6.1.4. Lack of clear understanding of the Laws, Acts and Ordinances**

The field staff has little knowledge about the Fisheries Law, Forest Act and Wildlife Ordinance, which is an essential component of management. As most of the legal documents are in English, so the understanding is low among the lower staff.

#### **6.1.5. Inadequate field staff of the line agencies**

During the time of preparation of this management plan, there are insufficient number of dedicated Wildlife Watchers for the overall protection of the resources of the Indus Dolphin Game Reserve, keeping in view its extant and the related issues. This also results in weak law enforcement in the entire region, as the staff has to thin out in the entire region.

### **6.2. Ecological Issues and Threats**

#### **6.2.1. Degradation of Riverine Forests, habitat shrinkage / fragmentation**

Wood cutting in Kacha areas, forcible encroachment in floodplains, illegal allotment of forest areas, and lack of water for riverine forest regeneration and extension of agricultural practices to the river bank are all the specific factors contributing towards the degradation of riverine forests and thus resulting in habitat shrinkage and fragmentation of major wildlife species of the Protected Area.

### **6.2.2. Illegal and harmful fishing practices**

Unauthorised fishing – fishing without licence, illegal use of nets, fishing during closed and ban seasons, poisoning in deeper pools for maximum fish catch, illegal net mesh size and the introduction of Shaheed Benazir Bhutto Fishing Card has resulted in over-exploitation of fish resources of the area, which is a prime habitat for the Blind Indus Dolphin.

### **6.2.3. Inadequate species conservation efforts and over-exploitation of wildlife species**

Inadequate baseline information of major wildlife species, lack of regular monitoring mechanism, lack of species specific management plans, lack of awareness amongst the masses regarding the species and ecosystem's significance, lack of participatory planning and management, lack of scientific research studies and programmes related to species of special concern, inadequate information regarding changes in land use affecting species habitat are a few issues that has hampered the effective conservation and management in the Protected Area.

### **6.2.4. Non-biodegradable pollution originating from a broad range of human activities**

Industrial effluents, sewage discharge and agro-chemical pollution are the three major factors contributing towards degradation of habitat of the Blind Indus River Dolphin. Major towns and industries are located on the bank of the river, which are directly

## **6.3. Socio-economic Issues and Threats**

### **6.3.1. Lack of community empowerment, mobilisation to take ownership of resources**

Except a very few initiatives, community mobilisation process has been very weak especially from the natural resource conservation and management perspectives. A few existing community based organisations are in place organised by different agencies but have little role to play in NRM.

### **6.3.2. Tribal conflicts**

Local communities belonging to different castes have conflicts over resource uses, which are resulting in degradation of natural resources of the Protected Area. Dolphin mortality due to extensive netting, poisoning, wood cutting etc. are some of the issues being faced due to these conflicts in addition to their social and cultural issues

### **6.3.3. Lack of alternate sources of energy**

Excessive wood cutting from the remaining riverine forest is also a threat to its associated biodiversity. People living on the edges of the Protected Area have no access to alternate energy programmes except the use of wood

### **6.3.4. Lack of alternate livelihood opportunities**

The local communities living on the edges of the Protected Area are extensively dependent on the natural resources for generating their livelihood, which has resulted in loss and local extinction of certain species. The Indus Dolphin Game Reserve is an important source of livelihood for local people who meet their daily subsistence needs through various uses. Having scarcity of the diversified livelihood options in the face of rising poverty, local people illegally extract maximum resources e.g. timber, fuelwood, fish, NTFPs and forage to fulfil their domestic and other needs by earning money through sale of the extracted resources. In addition, lack of such opportunities in the region has led to a great increase in subsistence hunting amongst the local people. This phenomenon continues to be unattended for the last several years, which has degraded the ecological integrity of the Dolphin Reserve.

### **6.3.5. Lack of public awareness and education**

No such initiative exists in the region except a few education programmes were conducted in joint collaboration of Sindh Wildlife Department and WWF – Pakistan. These are not enough keeping in view the wide range of issues and extent of problems being faced by the ecosystem and the communities.



## **7.0. Vision for the Indus Dolphin Game Reserve**

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### **7.1. Strategic Objectives**

#### **7.1.1. Management Planning**

Management planning is a subset of the more general discipline of planning, applied to PAs across the globe but with varying degrees of success. It is a tool rather a process for guiding Park authorities on how an area should be managed, today and in the future. This process does not end with the production of the plan, but it requires that on-going monitoring takes place to test the effectiveness of the plan. Lessons learnt from monitoring should be used to review the appropriateness of management purposes and policies. This feedback loop may thus lead to amendments to the original plan, to keep it on the right track, or in additions to the next version of the plan that is produced.

Before embarking on the design of a Management Plan, a clear idea of the costs and available resources should be gathered, particularly where there are to be resource and user surveys, public consultation and engagement of consultants. A realistic appraisal needs to be made to ensure that all costs associated with the plan can be fully met, bearing in mind that the planning process may take some years to complete. In the case of Indus Dolphin Game Reserve, the financial allocations for the implementation of the management plan have been included in Pakistan Wetlands Programme to some extent. This further provides opportunities of implementation of interventions through partnerships and raising additional funds from national and international donors primarily to sustain PA operations and community interventions.

The time needed to prepare a Management Plan, for even a small site, is rarely less than 24 months due to the need for extensive consultations and surveys for addressing complex issues and subsequent drafting of the document. A realistic estimate of the time required should be made at the beginning of the process and allowed for.

Management by objectives is proactive rather than reactive and also 'results oriented' emphasising accomplishments and outcomes. Four distinct steps have been identified within this type of management and decision making:

- Formulation of clear, concise statements or objectives;
- Development of realistic action plans and implementation guidelines;
- Systematic monitoring and measuring of performance and achievement through reviewing the action plans and the implementation status of the guidelines; and,
- Taking corrective actions necessary to achieve planned results.

#### **7.1.2. Guidelines for a good Management Plan**

A management plan should be:

- Clear and accessible: easy to read, jargon free and well presented;
- Concise and comprehensive: no longer than is absolutely necessary;
- Accurate and objective: without major errors or statements likely to date;
- Systematic and logical: with management policies derived from an assessment of the site;
- Acceptable and motivating to all those with interests in and emotional attachment to site;
- Precise and practical: with clear objectives, realistic methods for achieving them;
- Focused and effective: fulfilling its purpose as a tool for site management;
- Precise with flexibility;
- Comprehensive with simplicity; and,
- Management oriented with ease of understanding by the public.

## **7.2. Developing management vision for Indus Dolphin Game Reserve**

The management planning process should develop and articulate an ideal condition, state or appearance for the future of the PA. Vision statements describe the desired or envisaged result of the policies for the conservation of the PA and provide coherent direction for management objectives. Importantly a vision statement should be aspirational and should:

- Describe the kind of PA that the plan is seeking to achieve in the long-term. This will help people to understand what it is hoped the area will be like in the future, the reasons for this, and the action needed to achieve the vision;
- Be a long-term statement which is unlikely to change significantly over time. It should therefore provide continuity in the process of managing PA in a sustainable way; and,
- Include environmental, recreational, cultural, social and economic aspects of the area.

Objectives follow from the management vision. They are more specific statements of intentions, setting out the conditions that management aims to achieve. They are thus statements of outcomes rather than how to achieve them. To the extent possible, these objectives should be prioritised to guide subsequent decisions and there is a need to reconcile the different objectives through appropriate planning responses.

In developing initial management objectives, a three-staged approach can be used:

- Design overall management objectives;
- Develop issue-specific management responses; and,
- Prepare initial management options that define management interventions

The following guidelines for writing generic and specific objectives helped to define objectives of the Indus Dolphin Game Reserve for its long-term sustainability:

- Precise/specific;
- Measurable, achievable and realistic;
- Reflect PA purpose, significance and exceptional values;
- Spell out the ends desired, but not the means to those ends;
- Adequately address the issues;
- Accompanied by a rationale; and,
- Written in priority order.

## **7.3. Describing management objectives for Indus Dolphin Game Reserve**

Typically the specific management objectives for Indus Dolphin Game Reserve would be formulated to cover the following major aspects of PA planning and management:

- Human resource management;
- Effective law enforcement;
- Indus Dolphin emergency services;
- Establishment, upgrading and maintenance of essential infrastructure and services;
- Wildlife management programmes;
- Ecological surveys and monitoring programme;
- Public information programme and awareness raising;
- Community outreach programmes;
- Research studies; and,
- Development of partnerships and linkages

### **7.3.1. Generic objectives of the Management Plan**

Keeping in view the objectives of the establishment of Indus Dolphin Game Reserve, following management guidelines are presented for the effective improvement of PA and its resources:

- To have management policies that are oriented towards the conservation of natural resources of the region in general and Indus Dolphin Game Reserve in particular, and are based on realities with sufficient flexibility to accommodate existing human uses until alternatives are available for local subsistence;
- To have clear, specific and problem-oriented management objectives for the Indus Dolphin Game Reserve which, if achieved, could greatly help in meeting the overall objective of the PA; and,
- To have specific and feasible management action programmes for achieving individual objectives of the plan that could be easily monitored and evaluated at various stages of implementation.

### **7.3.2. Specific objectives of the Management Plan**

The specific objectives of the Indus Dolphin Game Reserve management plan for effective implementation of the policies, objectives and action programmes are mentioned below. Success indicators and timelines may be assigned to these objectives during the development of workplans.

- To provide guidelines and set priorities for a baseline biodiversity assessment and to make the data accessible to the stakeholders for future management and research;
- To provide management planning and operational guidelines to the PA staff for the achievement of specific objectives for enhanced management;
- To help implement existing wildlife legislation in addition to meeting international conservation obligations;
- To protect and improve local status of the wildlife species of the reserve area in general and endangered and flagship species and their associated habitats in particular;
- To maintain close liaison with PA authorities for the improvement of existing infrastructure, communication and administration for effective law enforcement;
- To provide opportunities for engaging communities in planning and management for effectiveness of the conservation and protection efforts in the Dolphin Reserve;
- To create alternate sources of income and energy for the traditional users to improve their quality of life and minimise their subsistence and dependence on the natural resources;
- To help build the professional capacity of the staff for effective administration and natural resource management;
- To enhance eco-tourism and improve visitors' facilities and services;
- To help improve scientific research on species and habitat management;
- To explore new avenues for improved management of the PA through developing partnerships and establishing linkages with local, national and international donors and partners; and,
- To enhance awareness of local communities and to build their capacity for improved resource management and exploring alternative livelihoods.

## **8.0. Strategic Plan for Management**

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Indus Dolphin Game Reserve faces a number of anthropogenic pressures. Several pressures are rooted in social and economic issues that are far too wide ranging and endemic for any meaningful intervention at a site specific level. Poverty, for instance, is pervasive in the region as is social class. Political influence, too, is rooted in land ownership and encroachment. However, a few meaningful steps can still be initiated to promote an improved condition of the Indus Dolphin Game Reserve.

### **8.1. Management interventions**

#### **8.1.1. Objectives of management interventions**

The major objectives for these management interventions are to:

- Clarify roles and responsibilities of various government line agencies at the provincial level to resolve issues of resource ownership conflicts in wetlands conservation;
- Enhance coordination between various partners in wetlands conservation in order to effectively address site level management issues; and,
- Help build the technical skills and knowledge of the staff of government line agencies and other partners in improved management of wetlands.

#### **8.1.2. Strategic Interventions**

##### **8.1.2.1. Enhancing coordination between stakeholders at all levels of management**

###### **8.1.2.1.1. Enhancing coordination at provincial level**

Sindh Provincial Wetlands Management Committee should be formulated to promote wetlands conservation at the highest level within the province. This will not only facilitate the implementation of various wetlands management international conventions, national policies and provincial rules and regulations but will also effectively enhance coordination among various stakeholders in order to clarify their roles and responsibilities, which should be clearly defined in the Terms of References of the Committee. The Committee members include nominations from various Departments including Sindh Irrigation Department, Sindh Forestry, Wildlife and Fisheries Department, Planning and Development Department, Sindh Tourism Development Department, Sindh Environmental Protection Agency and representatives of WWF-Pakistan under the Chairmanship of provincial Secretary, Government of Sindh.

###### **8.1.2.1.2. Enhancing coordination at site level**

The Site level Wetlands Management Committee named as “Indus Dolphin Game Reserve Conservation and Coordination Committee” should be formulated to help implement wetlands conservation interventions at the local level. The Committee will be responsible for increased coordination at the site level which will promote partnerships and linkages in order to strengthen wetlands conservation. The Committee members include nominations from the local representatives of various Departments and community members preferably under the Chairmanship of respective Deputy Conservator Wildlife, as wetlands conservation is the provincial agenda to be tackled by Sindh Wildlife Department. The Terms of References for the Committee should be clearly defined in order to improve the status of individual wetlands, which will meet more regularly to discuss management, ecological and social issues.

#### 8.1.2.1.3. Enhancing coordination between law enforcement agencies

A well organised coordination mechanism between senior police officers and the Conservator/ DFO of Sindh Forest Department, in the region, needs to be established for avoiding the allotment of lands to encroachers and promote sharing of information

#### **8.1.2.2. Improving the knowledge and technical skills of the field staff**

8.1.2.2.1. Organise specific trainings for the staff of Forest, Wildlife and Fisheries in defining Laws, Ordinance and Acts

8.1.2.2.2. Train local community activists in watch and ward to support wetlands and biodiversity conservation in and around the Protected Area. Help in notification of community activists as “Honorary Game Watchers” for enhanced protection.

8.1.2.2.3. Train field Wildlife Watchers in “Wildlife Identification Techniques, Survey Techniques, Data Recording and Compilation, Use of Binoculars and Spotting Scope, First Aid, Emergency Services, Dolphin Handling and Stranding and Effective Watch and Ward”

#### **8.1.2.3. Strengthening field staff for effective performance**

8.1.2.3.1. Fish testing labs needs to be established for enhancing the capacity and skills of the Sindh Fisheries Department, which may help them in analysing specimens for identifying threats to the Protected Area.

8.1.2.3.2. Provision of necessary field equipment to the field staff of the Protected Area especially deputed at Guddu Dolphin Centre, Kandhkot field office and Indus Dolphin Centre based at Sukkur. The equipment may include Binoculars, GPS, Camera and others.

8.1.2.3.3. EPA field staff should be provided with field testing labs (mobile) in order to provide on spot check of the various water parameters affecting the quality of Indus River water. This should be carried out on a regular basis.

#### **8.1.2.4. Enhancing understanding of the rules and regulations**

8.1.2.4.1. Sindh Wildlife Protection Ordinance (1972) should be translated in Sindhi and Urdu languages in order to provide a clear understanding of various clauses of the Ordinance to the field staff, for its effective implementation.

8.1.2.4.2. The Fisheries Licence (Shaheed Benazir Bhutto Fishing Card) does not contain necessary details related to fish catch, fishing duration and the specific area, where the fishing is carried out. The Card system needs to be replaced with the previous Contractor System where one person is held responsible for all the activities related to fishing, dolphin mortality, freshwater turtle catch and trade, and to avoid harmful fishing practices.

8.1.2.4.3. The relevant staffs of the Fisheries Department is not taken into confidence when the licenses are issued to individuals regardless of their information related to their previous occupation, which needs to be determined in collaboration with all the stakeholders.

8.1.2.4.4. In order to implement Forest Act 1927 in this region in true spirit, it is highly recommended to the Government of Sindh to establish a “Riverine Forest Protection Force” in order to establish the writ of the Government of Sindh, Sindh Forest Department and to have a minimum deterrence.

8.1.2.4.5. Departmental training workshops need to be organised for the field / technical staff of the different departments for their understanding, defining their roles and responsibilities and implementing legislations.

### **8.1.2.5. Improving watch and ward through additional field staff**

8.1.2.5.1. Three field offices of the Sindh Wildlife Department are located on the right bank of the Indus River with a total field staff capacity of approx. 20 watchers and inspectors to cover a huge stretch of the Protected Area ( 200 km in length). Additional field staff is needed to cover the gaps and to maintain an effective link with the tribal leaders to avoid harmful fishing practices in the Protected Area which is not only a threat to the endangered Indus Dolphin, fish and freshwater turtles but also adds to the degradation of the water quality.

8.1.2.5.2. Fisheries Department has an existence in Sukkur with its few field staff, which is not enough to enforce the legislations in the entire Protected Area. Additional staff needs to be recruited at Dolphin hotspots in order to avoid mortality due to use of illegal netting and harmful fishing practices. In addition, local community activists also need to be trained in above mentioned issues.

## **8.2. Ecological interventions**

### **8.2.1. Objectives of Ecological Interventions**

The major objectives of ecological interventions are to:

- Establish monitoring protocols for the regular assessment of ecological needs and upgrade information in the national and international databases regarding Indus Dolphin Game Reserve;
- Maintain and improve the ecological integrity of the Game Reserve through improved ecological interventions related to reducing harmful practices (pollution, hunting / poaching, illicit cutting, illegal fishing practices, unsustainable extraction of NTFPs, forest fires etc.); and,
- Promote the sustainable use of natural resources for the local communities living in and around the Indus Dolphin Game Reserve.

### **8.2.2. Strategic interventions**

#### **8.2.2.1. Improving riverine forest cover**

8.2.2.1.1. Wood cutting in Kacha areas – The riverine communities of the Protected Area need to be provided with alternate energy units (biogas plants, solar energy) in order to reduce pressure on riverine forests, which not only serves as an effective floodplain but also provides an important habitat for hog deer in addition to other biodiversity.

8.2.2.1.2. Forcible encroachment in floodplains – Negotiations at the highest level needs to be established with the influential landlords to create awareness of the role of floodplains in managing risks and disasters. In addition, operations may also be launched to establish the writ of the government in such areas.

8.2.2.1.3. Illegal allotment of forest areas – The local influentials have allotted riverine forest lands to different people in their constituencies for different land uses. Negotiations with these influentials need to be initiated for vacating the forest lands which is an essential component of the riverine ecosystem.

8.2.2.1.4. Lack of water for riverine forest regeneration – Water is a scarce commodity in the downstream Indus River and additionally illegal encroachments in the forest lands have further exacerbated the problems related to forest regeneration. Extensive water uses for various agricultural crops have reduced the water that is required for forest regeneration. Existing land use practices within the floodplains need to be discussed and negotiated with the local tribal leaders to recover the ecosystem.

8.2.2.1.5. Extension of agricultural practices to the river bank – The local communities have cleared forest lands for agricultural uses and have reached to the bank of the river in the Protected Area. Disaster and flood risks are obvious and may cause significant damage to the agricultural crops and other infrastructure. A well targeted awareness campaign coupled with livelihood development initiatives need to be discussed with communities to avoid altering the natural landscape, which is equally important for their long-term survival.

### **8.2.2.2. Ensuring sustainable fishing practices**

8.2.2.2.1. Unauthorised fishing – A few communities living on the edge of the Protected Area are involved in fishing in the region without licenses, which is an illegal activity. The locals should apply for a proper license with the Fisheries Department and should observe all the restrictions imposed by the Department, with regards to fish catch, duration and areas.

8.2.2.2.2. Illegal use of nets – Different kinds of nets, which are prohibited and the timings of the nets used to catch maximum fish are not being observed accordingly. This causes a significant threat to the Dolphins, which is caught following its prey. Due to the longer duration, the dolphin gets trapped and dies. This is effectively handled through watch and ward by field staff, negotiations with fishermen and local tribal leaders and education through awareness campaigns and meetings.

8.2.2.2.3. Fishing during closed/ban seasons – Local communities and fishermen do not observe closed seasons, which is a threat to the next generation of fish population, which is a breeding season. May – August are closed seasons and fishing during these seasons are highly prohibited. Strict watch and ward mechanism should be established with local activists of the region.

8.2.2.2.4. Poisoning in deeper pools for maximum fish catch – harmful fishing practices are on the rise in the Protected Area through poisoning and other baits for maximum fish catch. This should be strictly monitored in collaboration with local community activists, partners and influential tribal leaders to ensure sustainable fish catch, maintain water quality and improve the riverine ecosystem.

8.2.2.2.5. Illegal net mesh size - Illegal nets of various mesh sizes are being used in the Protected Area, which is a threat to the existing populations of fish, dolphins and freshwater turtles. Training and an awareness campaign should be launched to generate awareness regarding the issue in addition to an effective watch and ward mechanism coupled with implementation of fisheries law to avoid the problems.

8.2.2.2.6. Shaheed Benazir Bhutto Fishing Card – The communities who even do not qualify for the license acquires them leading to over exploitation of resources through all means. This practice has exacerbated the dolphin mortality and also has resulted in an increased capture and trade in freshwater turtles. Sindh Fisheries Department has strongly opposed this idea of licenses, which has degraded the resources. The contract system needs to be revived, where the responsibility of harmful fishing practices lies on a single contractor which is held for all the activities. The contractor observes areas, duration and seasons through its well organised network. It may also be suggested that the Government of Sindh may also think of banning fishing activities in the Protected Area to help conserve the world's largest Indus River Dolphin population, which needs lot of negotiations at the decision and policy level actors.

### **8.2.2.3. Promoting conservation and sustainable use of the natural resources**

8.2.2.3.1. Inadequate baseline information of major wildlife species – No comprehensive baseline assessment of the entire Indus Dolphin Game Reserve has been carried out so far. A few species specific surveys i.e. Indus Dolphin etc. were carried out. There is a

dire need to undertake a complete socio-ecological baseline assessment of the Protected Area, in order to set benchmarks for further conservation efforts in the region.

8.2.2.3.2. Lack of regular monitoring mechanism – Except for a few surveys of Indus Dolphin (2001, 2006 and 2011), where a regular monitoring mechanism of 5-year interval has been set, no other species or habitat parameters are being studied to that level. There is a need to establish monitoring mechanism for major wildlife species for management purposes.

8.2.2.3.3. Lack of species specific management plans (See species specific Management Plans for a few major wildlife species i.e. Indus Blind Dolphin, Hog Deer, Marsh Crocodile, Gaviel, Freshwater turtles, Indian Smoot-coated Otter, Cranes) – Ad hoc arrangements are being made with regards to species conservation in the Protected Area. There is a need to develop and implement comprehensive species specific management plans in consultation with all the line departments, dependent communities and other stakeholders.

8.2.2.3.4. Lack of awareness amongst the masses regarding the species significance and its role in the Protected Area – The local stakeholders are unaware of the role the species (dolphins, freshwater turtles etc.) have in maintaining the riverine ecosystem. A well-targeted and a focussed awareness campaign should be launched in order to signify the role of major components of the biodiversity and to link them with their livelihoods for effective adoption.

8.2.2.3.5. Lack of participatory planning and management – Line agencies and other stakeholders are working in different directions according to their objectives. There is a duplication of efforts and also results in ineffective planning. There is a need to plan initiatives in collaboration with stakeholders so that right interventions may reach at the right place with one strong message to all the concerned authorities.

8.2.2.3.6. Lack of scientific research studies and programme related to species of special concern – Scientific research has been a very weak area in wildlife management in Pakistan. Strong scientific evidences lead to an effective management. Lack of involvement of academia and the lack of interest and funding by other major research institutions in the country has hampered effective management. It is therefore strongly recommended initiate negotiations with academia and research institutions to launch research studies to meet the objectives of the Protected Area

8.2.2.3.7. Inadequate information regarding changes in land use affecting species habitat – Habitat shrinkage and fragmentation is on the fast track in the Protected Area. Illegal wood cutting, encroachment, leasing out of riverine forests to the influentials, clearing of land for agriculture etc. has played a pivotal role. It is highly recommended to the Government of Sindh to monitor such land use changes at regular intervals through effective GIS based mapping in order to reach logical conclusions for effective management.

#### **8.2.2.4. Reducing industrial effluents entering into the Reserve**

8.2.2.4.1. Self monitoring reports should be adopted by the industries located on the bank of River Indus inside the Protected Area, in order to avoid industrial hazards, which poses a serious threat to the existing population of Indus Dolphin.

8.2.2.4.2. Random third party evaluation should also be carried out by EPA or by any other recognised institution to verify and cross check the results of the self monitoring reports.

8.2.2.4.3. Detailed analyses need to be done for heavy metals in the Indus Dolphin Game Reserve. Bioaccumulation studies in Dolphins and Birds may also need to be conducted to determine toxicity impacts for effective management of the pollution related issues.



8.2.2.4.4. Limnological studies should be carried out at regular intervals to determine the impact of industrial effluents on the wetlands micro-biodiversity and water quality.

8.2.2.4.5. An Indus River Pollution Disaster plan needs to be developed and implemented in order to avoid such risks and determine preparedness and response of relevant institutions to handle emergency situations, as this is an important habitat of endangered Indus Dolphin

#### **8.2.2.5. Reducing sewage discharge entering into the Reserve**

8.2.2.5.1. Sukkur data should be collected from NSUC (North Service Urban Corporation). Further collaboration with stakeholders need to be established for effective implementation of sewage plan for Sukkur District and adjoining areas.

8.2.2.5.2. Studies on solid waste management in Sukkur and other high populated places located on the bank of the river Indus should be carried out. Further negotiations with NSUC should be initiated for implementation of the Solid Waste Management Plan for the region.

8.2.2.5.3. The local communities living on the edges of the Protected Area using water for their domestic purposes should use the indigenous water treatment methods, which is cost effective and efficient. This is necessary to avoid any health related issues. In this regard, Sindh EPA may guide and advise the communities of such small scale interventions.

#### **8.2.2.6. Reducing agro-chemical pollution entering into the Reserve**

8.2.2.6.1. Sustainable agricultural practices needs to be introduced in collaboration with local communities. Farmer schools should be established in the entire Protected Area in order to reduce the use of agro-chemicals in their agricultural lands.

8.2.2.6.2. A well targeted awareness campaign for the farmers should be initiated to generate awareness regarding the use of harmful activities i.e. pesticides and fertilisers

8.2.2.6.3. There is an urgent need for improving coordination with other projects being implemented in the region and enhancing linkages with Agriculture Extension Department

### **8.3. Socio-economic interventions**

#### **8.2.1. Objectives of socio-economic Interventions**

Any efforts towards initiating community participation need to be carefully chosen with a long-term view rather than short-term project implementation aims. Communities in the region follow occupations that have been handed down to them over generations and with low literacy and few economic development opportunities, there are limited alternatives for them. Any change in livelihoods initiated for the duration of a short-term project are likely to make little permanent mark on changing the extraction patterns that characterise anthropogenic pressure on the Indus Dolphin Reserve. Since the area is characterised by high levels of poverty, especially among communities that use the Indus Dolphin resources, promoting people's participation can play a key role changing the management. However, the existing social structure of the area is extremely hierarchical and the influence of large land owners is undeniable. Introducing any social organisation in such a region must be a very slow and sustained approach.

The main objectives of social interventions are to:

- Organise local communities into Village level Wetlands Conservation Committees for improved management of the natural resources of the Indus Dolphin Game Reserve.
- Improve the social maturity of the established committees through registration as Community Citizen Boards (CCBs) / CBOs for their efficient involvement and in improved management of the existing natural resources of the area

- Promote collaborative management approaches with local communities through signing partnership agreements and dialogues to reduce harmful practices for improving biodiversity conservation and community development.
- Enhance conservation awareness level of the local communities living in and around the Protected Area for effective management of the resources

## **8.2.2. Strategic Interventions**

### **8.2.2.1. Empowering communities to ensure joint management approaches**

8.2.2.1.1. It is therefore high recommended to organise communities (CBOs / VCCs) with respect to the management of natural resources of the Protected Area, so that the communities may take ownership of the resources and use them wisely.

8.2.2.1.2. Comprehensive training programme for these CBOs is essential in office and project management, proposal development and negotiations with donors etc.

8.2.2.1.3. Sign Terms of Partnerships with organised communities for implementation of wetlands management interventions

8.2.2.1.4. Develop a social maturity index for the organised communities in order to ensure their sustainability

### **8.2.2.2. Resolving tribal conflicts for effective resource management**

8.2.2.2.1. As far as the conflicts of the tribal leaders are concerned, it is strongly recommended to initiate dialogues with them regarding dolphin entanglement, freshwater turtles capture and trade, over-exploitation of riverine forests, hunting / shooting of wildlife. These tribal leaders can also work as “Conservation Ambassadors” in their own regions.

### **8.2.2.3. Introducing alternate sources of energy**

8.2.2.3.1. There is a dire need to make an assessment of the wood usage by these communities and initiate the process of providing alternate energy units (Biogas plants, fuel-efficient stoves, solar energy units including solar cookers, solar geysers etc.) in order to protect the remaining natural forests of the Protected Area. In addition, there is a need to negotiate at least 20% of the total cost of the unit with the local communities.

8.2.2.3.2. Energy plantations (agro-forestry) also need to be established in order to overcome the issues of fuelwood in the region. Every household who owns land should meet their energy requirements from their own farmlands.

### **8.2.2.4. Exploring alternate livelihood opportunities**

8.2.2.4.1. One of the interventions is to promote eco-tourism in the Protected Area as the region has the highest potential of nature based tourism, dolphin watch, bird watch, historical bridge, cultural sites etc. This may include providing training to the local communities as guides and boatmen.

8.2.2.4.2. In certain regions along the Indus River, the riverine communities are highly dependent on the natural resources and their products. This include a range of products including Typha mats, baskets, promotional material etc. but these need to be enhanced through improved market linkages for livelihood generation.

8.2.2.4.3. Improved fishing practices may help generate additional opportunities for income that may include good quality fish, storage capacities, less involvement of middlemen etc.

8.2.2.4.4. A few development aid agencies are involved in helping the poor communities of the Indus River, especially after the floods of 2011. Cattle farming have become one of

the major income generating opportunity for the poor fishermen and communities, if introduced effectively.

8.2.2.4.5. A wide range of training opportunities i.e. net making, enterprise development, micro-finance, kitchen gardening, nursery raising, orchard development, eco-tourism, poultry farming, apiculture, livestock management through vaccination and de-worming, establishing vocational training centres and improved fishing practices may be provided to the local communities for improvement in their livelihood.

#### **8.2.2.5. Initiating public awareness and education**

8.2.2.5.1. A school level education programme needs to be established within the Protected Area. These include the establishment of Nature Clubs which may help in organising various school level events and where children can be involved in green activities. These young students can become the future leaders of conservation in their respective areas and act as agents in their sphere.

8.2.2.5.2. Introductory and interactive education material needs to be produced in local languages to enhance the value of the biodiversity of the Protected Area. These should include posters, small booklets, brochures, and activity books for school going children.

8.2.2.5.3. Installing standard Protected Area signage at appropriate places within the region may also contribute in raising awareness of the local communities.

8.2.2.5.4. In order to address communities at large, two Dolphin Conservation and Information Centres have been established in the Protected Area. These need to be enhanced and should be made interactive to attract communities, school groups, visitors etc.

8.2.2.5.5. Exposure Visits are an important tool in creating awareness amongst the local communities, where a wide range of initiatives are being undertaken in order to address NRM related issues in the region. This has proved very effective and is recommended for the fishermen communities and other stakeholders to WWF – Pakistan's sites in the Sindh province.

8.2.2.5.6. In order to create awareness amongst the hunters and fishermen of the Protected Area, an introductory booklet entailing hunting/fishing code of ethics in local language may need to be developed in collaboration with respective line departments, which may be handed over to the licensee at the time of issuance of license.

## 9.0. Implementation Plan

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There are 63 recommendations that have been grouped together in three major components for effective implementation of the management plan for Indus Dolphin Game Reserve. These include Management interventions, Ecological interventions and Socio-economic interventions and are presented in the form of a matrix that not only includes the priority for an individual intervention but also describes the responsibilities of the primary and secondary stakeholders in order to guide implementation of the recommendations.

The time frame for this management plan is 10 years. It is intended that all recommendations will be implemented during this time frame. Some recommendations are already being implemented under the Pakistan Wetlands Programme, but the priority assigned to each recommendation can be used for guidance in their implementation.

In addition, species specific management plans are also described in the form of a matrix, which describes the species and related issues, possible set of prescriptions, means of verifications, responsibilities and the time frame. The list of species discussed in the management plans describes the entire Central Indus Wetlands Complex stretch and most of the species are covered in Indus Dolphin Game Reserve. The information described is for the entire habitat range of the species. A few significant species of interest are mentioned in this management plan.

Funding to implement recommendations of this management plan can be sought from a range of potential donors through developing proposals, co-financing, in kind contributions from existing programmes and building partnerships with other government line agencies.



## Matrix showing interventions, their priority rating and responsibilities of each implementing partner for the implementation of Indus Dolphin Game Reserve Management Plan

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
1	Management Interventions						
1.1.	Lack of coordination between different line agencies working in the same area						
1.1.1.	Establishment of Sindh Provincial Wetlands Management Committee, as also highlighted in the National Wetlands Policy. This should be established under the Chairmanship of Secretary Forest and Wildlife, with representatives of other relevant Departments to guide wetlands conservation in the province.	High	Sindh Wildlife Department	Line Departments, WWF – Pakistan	√	-	-
1.1.2.	Establishment of “Indus Dolphin Game Reserve Conservation and Coordination Committee” under the Chairmanship of Deputy Conservator (Wildlife) Sukkur Region in order to guide wetlands conservation, with representatives of other relevant line Departments, in addition to the terms of reference defined for each Department. Specific discussions in the Committee, should be held in the presence of respective group of stakeholders e.g., fishermen, researchers, local landlords. etc.	High	Sindh Wildlife Department, WWF - Pakistan	Sindh Irrigation Department, Sindh Forest Department, Sindh EPA, Sindh Fisheries Department, Others	√	-	-
1.1.3.	A well organised coordination mechanism between senior police officers and the Conservator / DFO of Sindh Forest Department, in the region, needs to be established for avoiding the allotment of lands to encroachers and promote sharing of information	Medium	Sindh Forest Department	Sindh Police, Sukkur Region	√	-	-
1.2.	Lack of training and capacity of the field staff and others in wetlands and associated biodiversity related issues						
1.2.1.	Organise specific trainings for the staff of Forest, Wildlife and Fisheries in defining Laws, Ordinance and Acts	Medium	Sindh Wildlife, Forest and Fisheries Departments	WWF - Pakistan	-	√	-
1.2.2.	Train local community activists in watch and ward to support wetlands and biodiversity conservation in and around the Protected Area. Help in notification of community activists as “Honorary Game Watchers” for enhanced protection.	Medium	WWF – Pakistan	Sindh Wildlife Department	√	-	-
1.2.3.	Train field Wildlife Watchers in “Wildlife Identification Techniques, Survey Techniques, Data Recording and Compilation, Use of Binoculars and Spotting Scope, First Aid, Emergency Services, Dolphin Handling and Stranding and Effective Watch and Ward”	Medium	WWF - Pakistan	Sindh Wildlife Department	-	√	-
1.3.	Lack of necessary field / technical equipment for effective monitoring of the Protected Area.						
1.3.1.	Fish testing labs needs to be established for enhancing the capacity and	Medium	Sindh Fisheries Department	Government of Sindh	-	-	√

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
	skills of the Sindh Fisheries Department, which may help them in analysing specimens for identifying threats to the Protected Area.						
1.3.2.	Provision of necessary field equipment to the field staff of the Protected Area especially deputed at Guddu Dolphin Centre, Kandhkot field office and Indus Dolphin Centre based at Sukkur. The equipment may include Binoculars, GPS, Camera and others.	High	Sindh Wildlife Department	WWF - Pakistan	-	√	-
1.3.3.	EPA field staff should be provided with field testing labs (mobile) in order to provide on spot check of the various water parameters affecting the quality of Indus River water. This should be carried out on a regular basis.	Low	Sindh EPA	Government of Sindh, District Government, Sukkur	-	-	√
1.4.	Lack of clear understanding of the Sindh Wildlife Protection Ordinance (1972), Forest Act 1927 and Fisheries Law amongst the field staff for the effective implementation						
1.4.1.	Sindh Wildlife Protection Ordinance (1972) should be translated in Sindhi and Urdu languages in order to provide a clear understanding of various clauses of the Ordinance to the field staff, for its effective implementation.	Medium	Sindh Wildlife Department	WWF - Pakistan	-	√	-
1.4.2.	The Fisheries Licence (Shaheed Benazir Bhutto Fishing Card) does not contain necessary details related to fish catch, fishing duration and the specific area, where the fishing is carried out. The Card system needs to be replaced with the previous Contractor System where one person is held responsible for all the activities related to fishing, dolphin mortality, freshwater turtle catch and trade, and to avoid harmful fishing practices.	High	Sindh Fisheries Department	Government of Sindh	-	√	-
1.4.3.	The relevant staffs of the Fisheries Department is not taken into confidence when the licenses are issued to individuals regardless of their information related to their previous occupation, which needs to be determined in collaboration with all the stakeholders.	Medium	Sindh Fisheries Department	Government of Sindh	-	√	-
1.4.4.	In order to implement Forest Act 1927 in this region in true spirit, it is highly recommended to the Government of Sindh to establish a "Riverine Forest Protection Force" in order to establish the writ of the Government of Sindh, Sindh Forest Department and to have a minimum deterrence.	High	Sindh Forest Department	Government of Sindh	-	-	√
1.4.5.	Departmental training workshops need to be organised for the field / technical staff of the different departments for their understanding, defining their roles and responsibilities and implementing legislations.	Medium	Sindh Forest, Wildlife and Fisheries Departments	WWF - Pakistan	-	√	-
1.5.	Inadequate field staff of the relevant line agencies to cover the entire Protected Area for conservation of natural resources						
1.5.1.	Three field offices of the Sindh Wildlife Department are located on the right bank of the Indus River with a total field staff capacity of approx. 20 watchers and inspectors to cover a huge stretch of the Protected Area ( 200 km in length). Additional field staff is needed to cover the gaps	High	Sindh Wildlife Department	Government of Sindh	-	√	-

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
	and to maintain an effective link with the tribal leaders to avoid harmful fishing practices in the Protected Area which is not only a threat to the endangered Indus Dolphin, fish and freshwater turtles but also adds to the degradation of the water quality.						
1.5.2.	Fisheries department has an existence in Sukkur with its few field staff, which is not enough to enforce the legislations in the entire Protected Area. Additional staff needs to be recruited at Dolphin hotspots in order to avoid mortality due to use of illegal netting and harmful fishing practices. In addition, local community activists also need to be trained in above mentioned issues.	High	Sindh Fisheries Department	Government of Sindh, WWF – Pakistan	-	-	√
<b>2</b>	<b>Ecological Interventions</b>						
2.1.	Degradation of Riverine Forests, habitat shrinkage / fragmentation						
2.1.1.	Wood cutting in Kacha areas – The riverine communities of the Protected Area need to be provided with alternate energy units (biogas plants, solar energy) in order to reduce pressure on riverine forests, which not only serves as an effective floodplain but also provides an important habitat for hog deer in addition to other biodiversity.	High	WWF - Pakistan	Sindh Forest Department, Sindh Wildlife Department	√	-	-
2.1.2.	Forcible encroachment in floodplains – Negotiations at the highest level needs to be established with the influential landlords to create awareness of the role of floodplains in managing risks and disasters. In addition, operations may also be launched to establish the writ of the government in such areas.	High	Sindh Forest Department	Parliamentarians, WWF – Pakistan	-	-	√
2.1.3.	Illegal allotment of forest areas – The local influentials have allotted riverine forest lands to different people in their constituencies for different land uses. Negotiations with these influentials need to be initiated for vacating the forest lands which is an essential component of the riverine ecosystem.	Medium	Sindh Forest Department, Sindh Wildlife Department	WWF - Pakistan	-	-	√
2.1.4.	Lack of water for riverine forest regeneration – Water is a scarce commodity in the downstream Indus River and additionally illegal encroachments in the forest lands have further exacerbated the problems related to forest regeneration. Extensive water uses for various agricultural crops have reduced the water that is required for forest regeneration. Existing land use practices within the floodplains need to be discussed and negotiated with the local tribal leaders to recover the ecosystem.	Medium	Sindh Forest Department, Sindh Irrigation Department	WWF - Pakistan	-	-	√
2.1.5.	Extension of agricultural practices to the river bank – The local	High	Sindh Forest Department	Local influentials, WWF	-	-	√



#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
	communities have cleared forest lands for agricultural uses and have reached to the bank of the river in the Protected Area. Disaster and flood risks are obvious and may cause significant damage to the agricultural crops and other infrastructure. A well targeted awareness campaign coupled with livelihood development initiatives need to be discussed with communities to avoid altering the natural landscape, which is equally important for their long-term survival.			- Pakistan			
2.2.	Illegal and harmful fishing practices in the Indus Dolphin Game Reserve						
2.2.1.	Unauthorised fishing – A few communities living on the edge of the Protected Area are involved in fishing in the region without licenses, which is an illegal activity. The locals should apply for a proper license with the Fisheries Department and should observe all the restrictions imposed by the Department, with regards to fish catch, duration and areas.	High	Sindh Fisheries Department	Government of Sindh, WWF – Pakistan	-	√	-
2.2.2.	Illegal use of nets – Different kinds of nets, which are prohibited and the timings of the nets used to catch maximum fish are not being observed accordingly. This causes a significant threat to the Dolphins, which is caught following its prey. Due to the longer duration, the dolphin gets trapped and dies. This is effectively handled through watch and ward by field staff, negotiations with fishermen and local tribal leaders and education through awareness campaigns and meetings.	High	Sindh Fisheries Department	Local tribal leaders, WWF - Pakistan	-	-	√
2.2.3.	Fishing during closed/ban seasons – Local communities and fishermen do not observe closed seasons, which is a threat to the next generation of fish population, which is a breeding season. May – August are closed seasons and fishing during these seasons are highly prohibited. Strict watch and ward mechanism should be established with local activists of the region.	High	Sindh Fisheries Department	Local tribal leaders, Community activists	-	-	√
2.2.4.	Poisoning in deeper pools for maximum fish catch – harmful fishing practices are on the rise in the Protected Area through poisoning and other baits for maximum fish catch. This should be strictly monitored in collaboration with local community activists, partners and influential tribal leaders to ensure sustainable fish catch, maintain water quality and improve the riverine ecosystem.	High	Sindh Fisheries Department	Sindh Wildlife Department, Community activists, influentials and tribal leaders	√	-	-
2.2.5.	Illegal net mesh size - Illegal nets of various mesh sizes are being used in the Protected Area, which is a threat to the existing populations of fish, dolphins and freshwater turtles. Training and an awareness campaign should be launched to generate awareness regarding the issue in addition to an effective watch and ward mechanism coupled	High	Sindh Fisheries Department	Sindh Wildlife Department, WWF - Pakistan	-	√	-

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
	with implementation of fisheries law to avoid the problems.						
2.2.6.	Shaheed Benazir Bhutto Fishing Card – The communities who even do not qualify for the license acquires them leading to over exploitation of resources through all means. This practice has exacerbated the dolphin mortality and also has resulted in an increased capture and trade in freshwater turtles. Sindh Fisheries Department has strongly opposed this idea of licenses, which has degraded the resources. The contract system needs to be revived, where the responsibility of harmful fishing practices lies on a single contractor which is held for all the activities. The contractor observes areas, duration and seasons through its well organised network. It may also be suggested that the Government of Sindh may also think of banning fishing activities in the Protected Area to help conserve the world's largest Indus River Dolphin population, which needs lot of negotiations at the decision and policy level actors.	High	Sindh Fisheries Department, Pakistan Fisherfolk Forum	Sindh Wildlife Department, Parliamentarians, Policy makers	-	√	-
2.3.	Inadequate species conservation efforts and over-exploitation of wildlife species in the Protected Area leading to local extinctions						
2.3.1.	Inadequate baseline information of major wildlife species – No comprehensive baseline assessment of the entire Indus Dolphin Game Reserve has been carried out so far. A few species specific surveys i.e. Indus Dolphin etc. were carried out. There is a dire need to undertake a complete socio-ecological baseline assessment of the Protected Area, in order to set benchmarks for further conservation efforts in the region.	High	WWF - Pakistan	Sindh Forest, Wildlife and Fisheries Departments, Academia, Research Organisations	√	-	-
2.3.2.	Lack of regular monitoring mechanism – Except for a few surveys of Indus Dolphin (2001, 2006 and 2011), where a regular monitoring mechanism of 5-year interval has been set, no other species or habitat parameters are being studied to that level. There is a need to establish monitoring mechanism for major wildlife species for management purposes.	Medium	WWF - Pakistan	Sindh Wildlife Department	-	√	-
2.3.3.	Lack of species specific management plans (See species specific Management Plans for a few major wildlife species i.e. Indus Blind Dolphin, Hog Deer, Marsh Crocodile, Gavial, Freshwater turtles, Indian Smoot-coated Otter, Cranes) – Ad hoc arrangements are being made with regards to species conservation in the Protected Area. There is a need to develop and implement comprehensive species specific management plans in consultation with all the line departments, dependent communities and other stakeholders.	High	WWF - Pakistan	Sindh Wildlife Department	√	-	-
2.3.4.	Lack of awareness amongst the masses regarding the species significance and its role in the Protected Area – The local stakeholders are unaware of	High	WWF - Pakistan	Sindh Wildlife Department, Sindh	-	-	√

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
	the role the species (dolphins, freshwater turtles etc.) have in maintaining the riverine ecosystem. A well-targeted and a focussed awareness campaign should be launched in order to signify the role of major components of the biodiversity and to link them with their livelihoods for effective adoption.			Fisheries Department			
2.3.5.	Lack of participatory planning and management – Line agencies and other stakeholders are working in different directions according to their objectives. There is a duplication of efforts and also results in effective planning. There is a need to plan initiatives in collaboration with stakeholders so that right interventions may reach at the right place with one strong message to all the concerned authorities.	Medium	Sindh Wildlife Department, Sindh Forest Department, Sindh Fisheries Department	District Government, WWF - Pakistan	-	-	√
2.3.6.	Lack of scientific research studies and programme related to species of special concern – Scientific research has been a very weak area in wildlife management in Pakistan. Strong scientific evidences lead to an effective management. Lack of involvement of academia and the lack of interest and funding by other major research institutions in the country has hampered effective management. It is therefore strongly recommended initiate negotiations with academia and research institutions to launch research studies to meet the objectives of the Protected Area	High	Shah Abdul Latif University, Khairpur, WWF - Pakistan	Other Academia, Research institutions.	-	-	√
2.3.7.	Inadequate information regarding changes in land use affecting species habitat – Habitat shrinkage and fragmentation is on the fast track in the Protected Area. Illegal wood cutting, encroachment, leasing out of riverine forests to the influentials, clearing of land for agriculture etc. has played a pivotal role. It is highly recommended to the Government of Sindh to monitor such land use changes at regular intervals through effective GIS based mapping in order to reach logical conclusions for effective management.	High	Sindh Forest Department	WWF - Pakistan	-	√	-
2.4.	Non-biodegradable pollution originating from a broad range of human activities – Industrial Effluents / Water Pollution						
2.4.1.	Self monitoring reports should be adopted by the industries located on the bank of River Indus inside the Protected Area, in order to avoid industrial hazards, which poses a serious threat to the existing population of Indus Dolphin.	High	Industries	Sindh EPA	√	-	-
2.4.2.	Random third party evaluation should also be carried out by EPA or by any other recognised institution to verify and cross check the results of the self monitoring reports.	Medium	Sindh EPA	Industries	-	√	-
2.4.3.	Detailed analyses need to be done for heavy metals in the Indus Dolphin Game Reserve. Bioaccumulation studies in Dolphins and Birds may	Medium	Academia	Sindh EPA	-	-	√

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
	also need to be conducted to determine toxicity impacts for effective management of the pollution related issues.						
2.4.4.	Limnological studies should be carried out at regular intervals to determine the impact of industrial effluents on the wetlands micro-biodiversity and water quality.	Medium	Academia	WWF - Pakistan	-	-	√
2.4.5.	An Indus River Pollution Disaster plan needs to be developed and implemented in order to avoid such risks and determine preparedness and response of relevant institutions to handle emergency situations, as this is an important habitat of endangered Indus Dolphin	High	WWF - Pakistan	Provincial EPAs,	-	-	√
2.5.	Non-biodegradable pollution originating from a broad range of human activities – Sewage discharge / Water Pollution						
2.5.1.	Sukkur data should be collected from NSUC (North Service Urban Corporation). Further collaboration with stakeholders need to be established for effective implementation of sewage plan for Sukkur District and adjoining areas.	High	NSUC	Sindh EPA	√	-	-
2.5.2.	Studies on solid waste management in Sukkur and other high populated places located on the bank of the river Indus should be carried out. Further negotiations with NSUC should be initiated for implementation of the Solid Waste Management Plan for the region.	Medium	NSUC	Sindh EPA	-	-	√
2.5.3.	The local communities living on the edges of the Protected Area using water for their domestic purposes should use the indigenous water treatment methods, which is cost effective and efficient. This is necessary to avoid any health related issues. In this regard, Sindh EPA may guide and advise the communities of such small scale interventions.	High	Sindh EPA	Local fishermen communities	-	√	-
2.6.	Non-biodegradable pollution originating from a broad range of human activities – Agro-chemical Pollution						
2.6.1.	Sustainable agricultural practices needs to be introduced in collaboration with local communities. Farmer schools should be established in the entire Protected Area in order to reduce the use of agro-chemicals in their agricultural lands.	Medium	WWF – Pakistan, Sindh Agricultural Extension Department	Sindh EPA	-	√	-
2.6.2.	A well targeted awareness campaign for the farmers should be initiated to generate awareness regarding the use of harmful activities i.e. pesticides and fertilisers.	High	WWF – Pakistan, Sindh Agricultural Extension Department	Sindh EPA, Local communities	-	-	√
2.6.3.	There is an urgent need for improving coordination with other projects being implemented in the region and enhancing linkages with Agriculture Extension Department	High	Sindh Agricultural Extension Department	Local Communities, other project partners	-	√	-

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
3	Socio-economic Interventions						
3.1.	Lack of community empowerment, mobilisation to take ownership of the resources – Except a very few initiatives, community mobilisation process has been very weak especially from the natural resource conservation and management perspectives. A few existing community based organisations are in place organised by different agencies but have little role to play in NRM.						
3.1.1.	It is therefore high recommended to organise communities (CBOs / VCCs) with respect to the management of natural resources of the Protected Area, so that the communities may take ownership of the resources and use them wisely.	High	WWF – Pakistan, Local partners	SRSP, other organisations, SYWO	-	√	-
3.1.2.	Comprehensive training programme for these CBOs is essential in office and project management, proposal development and negotiations with donors etc.	High	WWF - Pakistan	SRSP, SYWO	-	√	-
3.1.3.	Sign Terms of Partnerships with organised communities for implementation of wetlands management interventions	High	WWF - Pakistan	Communities, SYWO	-	-	√
3.1.4.	Develop a social maturity index for the organised communities in order to ensure their sustainability	High	WWF - Pakistan	Communities, SYWO	-	-	√
3.2.	Tribal conflicts – Local communities belonging to different castes have conflicts over resource uses, which are resulting in degradation of natural resources of the Protected Area. Dolphin mortality due to extensive netting, poisoning, wood cutting etc. are some of the issues being faced due to these conflicts in addition to their social and cultural issues.						
3.2.1.	As far as the conflicts of the tribal leaders are concerned, it is strongly recommended to initiate dialogues with them regarding dolphin entanglement, freshwater turtles capture and trade, over-exploitation of riverine forests, hunting / shooting of wildlife. These tribal leaders can also work as “Conservation Ambassadors” in their own regions.	High	WWF - Pakistan	Sindh Forest Department	-	-	√
3.3.	Lack of alternate sources of energy – Excessive wood cutting from the remaining riverine forest is also a threat to its associated biodiversity. People living on the edges of the Protected Area have no access to alternate energy programmes except the use of wood.						
3.3.1.	There is a dire need to make an assessment of the wood usage by these communities and initiate the process of providing alternate energy units (Biogas plants, fuel-efficient stoves, solar energy units including solar cookers, solar geysers etc.) in order to protect the remaining natural forests of the Protected Area. In addition, there is a need to negotiate at least 20% of the total cost of the unit with the local communities.	High	Livestock Department, Government of Sindh, WWF - Pakistan	Government of Pakistan’s major initiatives	-	-	√
3.3.2.	Energy plantations (agro-forestry) also need to be established in order to overcome the issues of fuelwood in the region. Every household who owns land should meet their energy requirements from their own farmlands.	Medium	Sindh Forest Department	WWF - Pakistan	-	√	-
3.4.	Lacks of alternate livelihood opportunities – The local communities living on the edges of the Protected Area are extensively dependent on the natural resources for generating their livelihood, which has resulted in loss and local extinction of species.						

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
3.4.1.	One of the interventions is to promote eco-tourism in the Protected Area as the region has the highest potential of nature based tourism, dolphin watch, bird watch, historical bridge, cultural sites etc. This may include providing training to the local communities as guides and boatmen.	High	WWF – Pakistan, STFP	Government of Sindh	√	-	-
3.4.2.	In certain regions along the Indus River, the riverine communities are highly dependent on the natural resources and their products. This include a range of products including Typha mats, baskets, promotional material etc. but these need to be enhanced through improved market linkages for livelihood generation.	High	WWF - Pakistan	Sindh Wildlife Department	-	√	-
3.4.3.	Improved fishing practices may help generate additional opportunities for income that may include good quality fish, storage capacities, less involvement of middlemen etc.	High	Sindh Fisheries Department	WWF - Pakistan	-	√	-
3.4.4.	A few development aid agencies are involved in helping the poor communities of the Indus River, especially after the floods of 2011. Cattle farming have become one of the major incomes generating opportunity for the poor fishermen and communities, if introduced effectively.	High	Development projects by Development Aid Agencies, Livestock Department, Government of Sindh	Government of Sindh	-	-	√
3.4.5.	A wide range of training opportunities i.e. net making, enterprise development, micro-finance, kitchen gardening, nursery raising, orchard development, eco-tourism, poultry farming, apiculture, livestock management through vaccination and de-worming, establishing vocational training centres and improved fishing practices may be provided to the local communities for improvement in their livelihood.	High	WWF - Pakistan	Government Line Agencies	-	√	-
3.5.	Lack of public awareness and education regarding the natural resources of the Protected Area – No such initiative exist in the region except a few education programmes were conducted in joint collaboration of Sindh Wildlife Department and WWF – Pakistan. These are not enough keeping in view the wide range of issues and extent of problems being faced by the ecosystem and the communities.						
3.5.1.	A school level education programme needs to be established within the Protected Area. These include the establishment of Nature Clubs which may help in organising various school level events and where children can be involved in green activities. These young students can become the future leaders of conservation in their respective areas and act as agents in their sphere.	High	WWF - Pakistan	Education Department, Government of Sindh	-	√	-
3.5.2.	Introductory and interactive education material needs to be produced in local languages to enhance the value of the biodiversity of the Protected Area. These should include posters, small booklets, brochures, and activity books for school going children.	High	WWF - Pakistan	Sindh Wildlife Department	-	√	-

#	Issues / Interventions	Priority	Responsibility		Duration		
			Primary	Secondary	Immediate	Medium-Term	Long-Term
3.5.3.	Installing standard Protected Area signage at appropriate places within the region may also contribute in raising awareness of the local communities.	High	WWF - Pakistan	Sindh Wildlife Department	-	√	-
3.5.4.	In order to address communities at large, two Dolphin Conservation and Information Centres have been established in the Protected Area. These need to be enhanced and should be made interactive to attract communities, school groups, visitors etc.	High	WWF - Pakistan	Sindh Wildlife Department	-	√	-
3.5.5.	Exposure Visits are an important tool in creating awareness amongst the local communities, where a wide range of initiatives are being undertaken in order to address NRM related issues in the region. This has proved very effective and is recommended for the fishermen communities and other stakeholders to WWF – Pakistan’s sites in the Sindh province.	High	WWF - Pakistan	Other large programmes and conservation and development projects by different aid agencies	-	√	-
3.5.6.	In order to create awareness amongst the hunters and fishermen of the Protected Area, an introductory booklet entailing hunting/fishing code of ethics in local language may need to be developed in collaboration with respective line departments, which may be handed over to the licensee at the time of issuance of license.	High	Conservation and Hunting Association of Pakistan (CHAP)	WWF – Pakistan, Government Line Departments	-	-	√

# Central Indus Wetlands Complex Species Specific Management Plans

## A. Indus River Dolphin – *Platanista minor*

#	Threat	Possible set of prescriptions	Means of Verifications	Lead Agency	Other partners	Timeline
Indus River Dolphin	1.1. Limited information about dolphin distribution, population dynamics and habitat use	1.1.1. Undertake comprehensive population surveys (5 – years interval)	Survey reports with GIS-based maps	PWP, ZSD (MoE) with the support of Provincial Wildlife Departments	Conservation agencies (WWF-P), research institutions, Cetacean Specialist Group, Academia	Feb.-Mar., 2011 (Ongoing)
			Publications in refereed journals			Two months after the survey
		1.1.2. Carry out annual monitoring of hotspots as already identified	Annual <i>Adhoc</i> reports			Adhoc Surveys after 2011 population assessment
		1.1.3. Undertake habitat assessment (e.g. Environ. Flow, prey availability, Water quality etc.) in different sections of the Indus River at 5-years interval	Habitat assessment reports based on pre-determined parameters			Feb.-Mar., 2011 (Ongoing)
	GIS-based maps					
	1.2. Inadequate technical and operational capacity of the staff of the Federal, Provincial and Territorial Wildlife Agencies especially in surveys and research	1.2.1. Conduct a Training Need Assessment of the stakeholders	Training Need Assessment Report with implementation mechanism	MoE with the support of Provincial Wildlife Departments	WWFP (PWP, Indus for All and other programmes), Provincial, territorial and Federal agencies, Other conservation partners	2011
			Number of trainings conducted			Ongoing (immediate)
		1.2.2. Organise specialised training courses as per the Training Need Assessment	Number of professionals trained			Ongoing (immediate)
			Number of training reports			Two weeks after the training
	1.2.3. Help develop sectoral plans / PC-1's of the wildlife agencies for the provision of equipment, trained professionals and specialised trainings	Provision of budget for training, equipment etc. in Sectoral Plans / PC-1's		2011-2012		
	1.3. Stranding of Dolphins in canals	1.3.1. Carry out rescue operations of stranded Dolphins using already established standardised protocols	Certified event reports	Sindh and Punjab Wildlife Departments	WWFP (PWP etc.), Communities, Media, Provincial, territorial and Federal agencies	Each year after canal closures
	1.4. Suspected inbreeding	1.4.1. Translocate stranded dolphins to other potential segments	Certified activity reports	Sindh, Punjab and NWFP Wildlife Departments, MoE	WWFP, Local communities, Media	Soon after rescue operations based on assessment of animal's condition
		1.4.2. Get formal provincial approvals for translocation outside provinces	Correspondence between the provinces for approvals			Immediate, for translocation outside provinces
	1.5. Entanglement in fishing nets / by-catch	1.5.1. Establishment of no-fishing zones	Notification of No Fishing Zone (PA)	Sindh Wildlife Department, MoE	WWFP, Local communities, Media, Local conservation partners	Immediate
1.5.2. Awareness of fishing community		Published awareness material	Immediate			
		Media reports	Ongoing			



## B. Hog Deer – *Axis porcinus*

#	Threat	Possible set of prescriptions	Means of Verifications	Lead Agency	Other partners	Timeline
Hog Deer	1. 1. Overall population status is not known	Carry out surveys to determine population estimates in various known natural pockets of Sindh and Punjab	Survey reports	Provincial Wildlife Departments	PWP, Indus for All, WWF-P, ZSD	2011
			Identification of hotspots			2011
			Publication in refereed journals			2011
		Potential habitat assessment and mapping (Historic, Current and Potential for rehabilitation)	GIS-based maps			2011
	1. 2. Illegal hunting	Assess population in community controlled conservation areas	Survey reports	2011		
			Enhance law enforcement	FORs and Challans	Ongoing	
			Community-based conservation initiatives (watch and ward etc.)	Event and activity reports	Immediate (2011)	
			Species specific awareness campaign targeting different stakeholders including Armed Forces	Published awareness material	Immediate (2011)	
	1. 3. Habitat degradation, fragmentation and conversion	Training of stakeholders especially the Armed Forces	Specific training modules	Immediate (2011)		
			Declare Hog Deer Reserves (PAs) in Punjab and Sindh	Notification of PAs in Sindh and Punjab	2011	
		Identify and establish potential corridors for Hog deer migration/ movement	GIS-based habitat maps showing potential areas as corridors	2011		
			Letter of Agreements with relevant stakeholders for corridors	2011		
		Participatory management initiatives	Letter of Agreements	2011		
			Community watchers in place	2011		
		Reintroduction/ rehabilitation in suitable habitats in its former natural habitat in NWFP, Sindh and Punjab	Sites assessment reports	2011-2012		
			Animal release reports	2011-2012		
	1. 4. Encroachment on Hog deer habitat	Define land tenure system	Reduction in allocation of lands to influentials etc. Boundary demarcation	Provincial Wildlife Departments	Board of Revenue, PWP, Indus for All Programme, Irrigation and Power Departments of Punjab and Sindh, Sindh Forest Department	2011 – 2012 (Ongoing)
			Revenue records			2011 – 2012 (Ongoing)
Community-based participatory species and habitat management		Registered CBOs	2011-2012 (Ongoing)			
Enhance law enforcement		Record of FORs and Challans	Ongoing			

## C. Indian Smooth-coated Otter – *Lutrogale perspicillata*

#	Threat	Possible set of prescriptions	Means of Verifications	Lead Agency	Other partners	Timeline
Indian Smooth-coated Otter	Uncertain taxonomic status of Indian Smooth-coated Otter	Undertake species specific surveys in its known home range	Survey reports with results published in refereed journals	ZSD (MoE), Indus For All Programme	NCCW, PWP, PMNH, WWF-P, Provincial and Territorial Wildlife Departments, OSG	2011-2012
		Conduct DNA analysis for taxonomic study	DNA sequencing with results published in refereed journal			2011-2012
	Apparent population decline in its entire home range	Species specific awareness campaign	Published awareness material	Provincial and Territorial Wildlife Agencies	PWP, Indus For All Programme, ZSD, PMNH, WWF-P, Media, Otter Specialist Group (OSG), Other expert groups and partners	2011-2012
			Media and event reports			Ongoing
		Captive breeding on experimental basis	Captive Breeding Site			2011-2012
		Habitat evaluation / mapping	Photographs			2011-2012
		Declaration of Otter Reserves	GIS-based habitat mapping			2011
	Otter – private fish farmer's Conflict	Electric fencing of private fish farms on experimental basis	Successful fence trials	MoE, PWP and Indus For All Programme	Sindh Wildlife Department, WWF-P, Fishermen, Farmers	Immediate (2011-2012)
		Enhanced law enforcement	Records of FORs			Ongoing
	Illegal hunting (live animals as pet, as a competitor and for trade)	Enhanced law enforcement	Records of FORs and Challans	Provincial Wildlife Departments	MoE, NCCW, Indus For All Programme, WWF-Pakistan, PWP	Ongoing
			Wildlife agencies and customs, Coast Guards reports			Ongoing
		Awareness campaign	Published awareness material			Immediate (2011-2012)

## D. Gharial / Gavial – *Gavialis gangeticus*

#	Threat	Possible set of prescriptions	Means of Verifications	Lead Agency	Other partners	Timeline
Gharial / Gavial	A locally extinct species – re-establishment in its natural habitat	Confirmatory surveys of Gharial in Nara region	Survey reports	PWP and Indus For All Programme	Sindh and Punjab Wildlife Departments, ZSD, PMNH, Local Communities, WWF-P, WWF India, CZA India, Gharial Conservation Alliance (GCA), Wildlife Institute of India, <i>Aman ki Asha</i>	2011
		Identification and assessment of historic habitats e.g. Nara Region - Sindh	Assessment reports			2011
			GIS-based Habitat maps			2011
		Hire a Gharial International Expert to short-list potential sites for re-establishment with a detailed Action Plan including the procurement of Gharial for release	ToRs and Feasibility assessment reports.			2011
		Investigate the availability of Gharial (preferably Indus basin genotype) from India preferably through WWF-P	Correspondence with Indian authorities			2011
			Agreements between WWF-P and WWF India and other authorities			2010-2011
		Designate the selected site as PA	Notification of PA			2012
		Establish captive breeding facility for Gharials in its natural habitat (Sindh and Punjab), in order to supplement population in the wild	Approvals by the Government			2011-2012
			Photographs			2011-2012
	Low acceptance of Gharial amongst the local communities	Species specific awareness campaign for acceptance by local communities	Consultative meeting reports	Sindh and Punjab Wildlife Departments	PWP, Indus for All Programme, ZSD, WWF-P, Local Communities, Media	2011-2012
			Published awareness material			2011-2012
		Community-based participatory management of species and habitats (CBOs, Community watchers, fishing)	Registered CBOs			2011
Community Watchers			2011-2012			
Agreements with communities			2011-2012			

## E. Marsh Crocodile / Mugger – *Crocodylus palustris*

#	Threat	Possible set of prescriptions	Means of Verifications	Lead Agency	Other partners	Timeline
Marsh Crocodile / Mugger	Overall population status is not known	Undertake rigorous population surveys in Sindh (CIWC) in its natural home range and in areas where relocation has been initiated	Survey reports	Sindh and Punjab Wildlife Departments	PWP, Indus for All Programme, ZSD, Individual researchers and Academia	2011-2012
			Photographs			2011-2012
		Potential habitat assessment and mapping (Historic, current and potential)	GIS-based historic home range map			2011-2012
	Illegal hunting	Enhance law enforcement	Records of FORs and Challans	Sindh and Punjab Wildlife Departments	PWP, Indus For All, ZSD, Local Communities	2011 onwards
		Community-based conservation initiatives	Community watch and ward mechanism			2011-2012
		Species specific awareness campaign	Published awareness material			2011-2012
	Habitat fragmentation	Develop and implement species recovery plans for selected sites through participatory management initiatives	Minutes of the meetings with stakeholders on the issues	Sindh and Punjab Wildlife Department	PWP, Indus For All Programme, ZSD	2011-2012
			Species recovery plan			2011
		Monitor water quality	Water quality reports			2011-2012
	Poorly maintained ex situ breeding facilities	Maintain and upgrade the existing captive bred facilities at Faisalabad for augmenting the existing natural populations	Assessment report of the Faisalabad facility	Sindh and Punjab Wildlife Departments	PWP, Indus For All Programme, ZSD	2011-2012
			Photographs			2011-2012
		Establish trial crocodile farm in the vicinity of potential natural habitats.	Site selection report			2011-2012
		Photographs			2011-2012	

## F. Terrestrial Freshwater Turtles and Tortoises

#	Threat	Possible set of prescriptions	Means of Verifications	Lead Agency	Other partners	Timeline
Terrestrial Freshwater Turtles and Tortoises	Ineffective protection due to low density and widely spread fragmented populations of freshwater turtles	Training of custom/coast guards and wildlife authorities at significant posts to curb that practice	Training Need Assessments and the training reports	PWP, Indus For All Programme	Customs Department, Provincial Wildlife Departments, Motorway and Highway Police	2011-2012
		Compensation measures – Protected Areas along Motorways etc.	Minutes of the meeting with NHA and Motorways			2011-2012
	Poor awareness regarding freshwater turtles and the roles they play in the aquatic ecosystem	Awareness campaign focusing on the role of turtles as a natural scavengers	Published awareness material	PWP, Indus For All Programme	MoE and WWF-P, Provincial Wildlife Departments, Local Communities	2011-2012
	Absence of formal inter-provincial coordination mechanism	Include specific agenda items in the meetings of NCCW	Minutes of the meetings	NCCW (MoE)	Conservation Agencies	2011-2012
	Low priority conservation status in Provincial Wildlife Acts	Add freshwater turtles / tortoises in the schedule of protected animals in the Provincial Wildlife Acts and also in the approved National CITES Law	Government Notifications	Provincial Wildlife Departments, MoE	PWP, Indus For All Programme, Other Conservation Agencies	2011-2012
		Improve existing wildlife Acts	Model Wildlife Laws approved with the inclusion of turtles and tortoises			2011-2012
	Illegal capture and trade (National and International)	National and International lobbying to stop international trade	Correspondence	NCCW, MOE and Provincial Wildlife Departments	Indus For All Programme, WWF-P, Customs / Coast Guards, Local Communities	2011-2012
		Effectively monitor trade at International Gateways – law enforcement - confiscations	Check posts at International Gateways			2011-2012
			Record of Challans and FORs			2011 (Ongoing)
		Establish trial turtle breeding farm for exploring commercial potential initially in the public sector	Site selection / assessment			2011-2012
Initiate community-based conservation projects at selected sites		Photographs	2011-2012			
		Community organisation and mobilisation – correspondence / meeting minutes			2011-2012	

## G. Cranes

#	Threat	Possible set of prescriptions	Means of Verifications	Lead Agency	Other partners	Timeline
Cranes	Lack of community's awareness about crane conservation	Species specific awareness campaign	Published awareness material on cranes	Provincial Wildlife Departments	MoE, PWP, Indus For All, ZSD, International Crane Foundation, Cracid Breeding Facility - Belgium	2011
		Community-based conservation initiatives to promote crane conservation in Pakistan in collaboration with International Crane Foundation and other national and international stakeholders	Letter of Agreements signed with national and international agencies			2011-2012
			Letter of Agreements signed with registered CBOs			2011-2011
			All related correspondence			2011-2012
	Illegal hunting and capture	Effective law enforcement, patrolling and monitoring in provinces and territories	Records of Challans and FOR's	Provincial Wildlife Departments	MoE, PWP, Indus For All Programme, Communities	2011 (Ongoing)
		Declare Protected Areas (PAs) in Balochistan to protect wild cranes	Notification of PAs as Crane Refuges			2011-2012
		Population and habitat surveys of cranes in their natural habitats especially on their migratory routes as well	Population surveys and habitat assessment reports			2011 (Ongoing)
	Captive breeding facilities	Maintain and upgrade the existing captive breeding facilities to curb wild capture in Khyber Pakhtunkhwa	Husbandry manual Reports Photographs	Khyber Pakhtunkhwa Wildlife Department	MoE, Communities, Indus For All Programme, WWF-P	2011-2012
	Inadequate research studies on cranes	Encourage academia and institutions to conduct studies on behavioural and reproductive aspects of cranes in wild and captivity	Project Proposals	Khyber Pakhtunkhwa Wildlife Department in collaboration with PWP	WWF-P, MoE, ZSD, Academia, Researchers, Indus For All programme	2011-2012 (Ongoing)
			Agreements with Academia			2011-2012 (Ongoing)
			Number of Internship Reports			2011-2012 (Ongoing)
			Agreements between Khyber Pakhtunkhwa Wildlife Department and PWP			2011
		Strengthen facilities at Pakistan International Crane Centre, Lakki for research, conservation and education	Necessary infrastructure available			2011-2012 (Ongoing)
			Relevant literature available			2011-2012
			Letter of Agreements signed with national and international groups			2011-2012
Number of professionals working			2011-2012			
Age old traditions of crane capturing in southern parts of Khyber Pakhtunkhwa and other regions of the country endangering wild crane populations	Identify potential community activists and build their capacity for trade off	Agreements between communities and Khyber Pakhtunkhwa Wildlife Department and PWP	Khyber Pakhtunkhwa Wildlife Department	WWF-P, PWP, Communities, Other Conservation Agencies / Partners	2011-2012 (ongoing)	