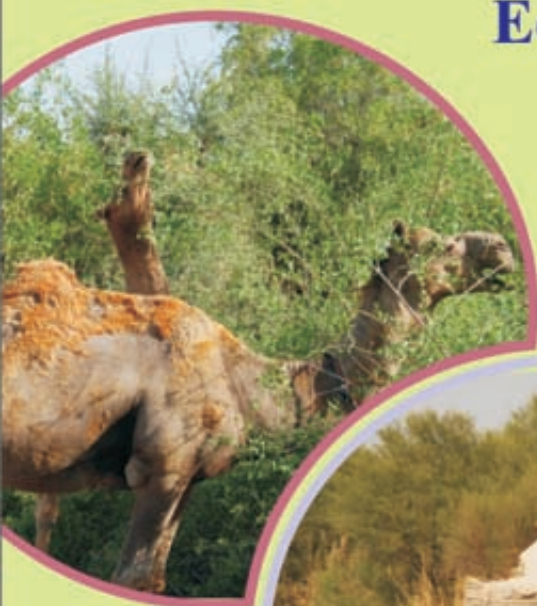




# Ecological Folk Wisdom of the Indus Ecoregion



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**Sahar Gul Bhatti, Ghulam Qadir Shah, Nawaz Kumbhar**

**Indus for All Programme, WWF - Pakistan**

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## Preface

While reading the "Ecological folk wisdom of the Indus Eco-region" manuscript, I was reminded of my childhood which I experienced in a village setting. Living in a rural village gave me the opportunity of living close to nature. There I was fortunate enough to witness Nature's changing forms and colors and I learned and absorbed many things about natural habitats that are certainly not taught in school.

As is the case the world over, elders gradually come to embody experiences and knowledge from their specific surroundings. What the elders practice, whether positive or negative is subsequently passed on to the next generation. This transfer is often referred to as the transfer of traditional knowledge. What is passed on may relate to rapidly changing social and economic circumstances as well as the penetration of technology, something that is also called modernization. While technology and industrialization does benefit us, it has taken its toll on the environment and the onslaught that natural biophysical processes have suffered continues to be tremendous. While adapting to our new circumstances and we ignore and discard old but valid information and indigenous practices. That is, the true cost of modernization and industrialization is the instilling of a mindset which considers traditional folk wisdom to be both useless and anachronistic.

In the course of its evolution Mother Earth has undergone immense changes. Earth's resources have been on offer to humans for millions of years. Their exploration has inexorably led to control over the skies and seas, from the heights of space to the floors of oceans, and all the valuable information obtained in the process has been transmitted to generations upon generations. However, all the while, valuable information continues to be lost. The principal reason for this is that it is not deemed worthy to be preserved for the benefit of future generations nor are there sufficient efforts at documentation and record keeping.

As we venture forth into the twenty first century there is a realization among developing countries of developed countries' keen awareness of how precious their own natural resources are, how valuable common or transboundary natural resources are, and the noble steps they are taking to conserve them. Developing nations are aware of the choice between engaging in more or less resource intensive paths while modernizing, knowing full well that the intensive path will neither benefit nor align well with present day realities.

As citizens and stewards of natural resources in developing countries, we have unfortunately shown great apathy towards our environment. Since our government policies have neither prioritized education nor health over the years, environment has been all but ignored. In Pakistan, environment as a subject was brought to the forefront when developed countries raised a hue and cry with regards to the depletion of the world's shared natural resource heritage, i.e., such assets as the ozone layer and the transboundary movement of hazardous wastes. Rather than showing initiative we were pushed to establish an environmental protection council at the federal level and environmental protection agencies at provincial levels.

Decades continue to pass us by with actual loss and threats to our environment only showing visible increases and with signs that no serious efforts to control the damage are being taken. Why is that so?

The clear cut answer to this question is that, as with other important subjects like education and health, environment is also at the bottom of governmental priorities.

In such a scenario, when rest of the world is demonstrating sustainable practices for all to see and emulate, this particular publication has tried to revive the age old methods and practices under the title of "Ecological Folk wisdom of the Indus Ecoregion".

It has been observed that in recent years, there has been increasing attention paid to traditional ecological practices by academics, natural resources management practitioners as well as corporate leaders. The emerging ethno scientific approach to the field of traditional ecological knowledge (TEK) fuses the methodologies of anthropology and biology to underscore the past and current relationships between nature and culture.



As biodiversity is now becoming synonymous with sustainable development and human survival, TEK has the potential to provide valuable information that can be adopted for resources management today. Agricultural techniques and products based on indigenous knowledge are now even being widely marketed! To name but a few examples there is Parma culture (mixed cropping and Agro forestry systems) water harvesting and soil conservation, Botanical herbal medicines, Heirloom grains and vegetables, handicrafts etc.

The second principle of the Rio declaration on environment and development states that:

"indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development".

Simply stated, we can say that TEK is taking on the status of a modern concept. It fuses together ethno biology and human ecology, starting with the study of local species and of their classification. Its scope extends to the understanding of ecological process and their relationships. The same concept has been beautifully defined by the Convention on Biological Diversity, Article 8 (J):

"Traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world, developed from the experience gained over the centuries and adopted to the local culture and environment, from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local languages and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture and forestry."

Traditional knowledge relating to environment or ecology can also be viewed as a system of self management, an extremely valuable source of environmental information that allows indigenous or other isolated native communities to protect and preserve their way of life. It is the basis of local decision making in agriculture, hunting and gathering, nutrition and food preparation, resource management, education and health as well as social, economic and political organization.

Because TEK is thought to constitute "data" and is generally valued in utilitarian terms for what it can contribute to management systems characteristic of developed nations, there seems to be accompanying pressure to collect this information before it is "lost". This notion does not recognize that like any knowledge system, indigenous knowledge always has and always will continue to evolve. This evolution will be manifested through the acquisition of new knowledge by taking benefit of available elements of western science, such as cartographic maps and geographic information systems, which can be incorporated with indigenous knowledge, by ensuring that core values are maintained.

Returning to the subject of the present publication of the World Wide Fund for Nature Pakistan (WWF - P), aptly collected and researched by Ghulam Qadir Shah and Sahar Gul Bhatti, under the title of "Ecological Folk Wisdom of the Indus Ecoregion", one notes that it opens the door of such work for other regions of Pakistan which I am sure will make a very valuable contribution, if taken forward.

This type of research will not only be important for the conservation of nature and natural resources, but will provide an opportunity to uncover commonalities in TEK among Pakistan's different regions which are very rich in both biodiversity and culture.

The question arises of how best to make use of the knowledge contained in this publication for environmental management. Also, a related question is how to fully integrate the present records of knowledge in a manner that will ensure their appropriate and widespread usage. There is a great deal of work involved in addressing these issues so that we may take advantage of our ecological knowledge heritage.

I congratulate WWF - P for bringing out such a valuable publication and expecting more such good initiatives in the future too.

Mahtab Akbar Rashdi



## Prologue

Some of the most unique dimensions of human-nature interactions are encapsulated in what is known as traditional ecological knowledge. Ecological knowledge and its guardians, traditional communities, have attracted world-wide attention from scientists, environmentalists and conservationist alike. This high level of interest has been generated owing to the perception that such knowledge (i) represents age old and hard earned experience acquired by communities over millennia (ii) is a valuable resource that is fast disappearing with the onset of modernisation and (iii) must be applied in conservation work before it vanishes.

The widespread discovery and dissemination of such knowledge is limited due to language barriers and lack of visibility. For instance, very few people are aware that the Indus Ecoregion is home to many communities possessing rich and varied traditions of ecological knowledge. A naturally rich area, the Indus Ecoregion is home to the river Indus and its associated wetlands, forests, pastures, estuaries, lagoons, deltas, fertile lands on the one hand and ocean and deserts on the other. Communities living in parts of this ecoregion tend to rely exclusively on natural resources for their livelihood and sustenance. For these people, ecological knowledge is central to their survival.

This publication is an attempt by WWF Pakistan's Indus for All Programme, to document and revive the threatened traditional ecological knowledge found in the Indus Ecoregion. However, a single publication cannot convey the knowledge and experience attributed to the communities living in this culturally, historically and environmentally diverse region. Therefore, we intend to periodically update this book and publish its revised editions in the future.

One of the significant challenges facing conservationists and scientists today is the difficulty in merging modern conservation techniques with traditional practices of conservation while ensuring that communities continue to benefit from the natural resources available to them. The Indus for All Programme believes that the science of conservation and folk wisdom pertaining to ecology are compatible. In fact, we intend for both traditional ecological knowledge and modern science to guide our conservation initiatives to protect the natural resources of the Indus Ecoregion.

Dr. Ghulam Akbar  
Regional Director  
WWF - Pakistan

## Review

At its heart, traditional ecological knowledge covers actions taken by communities to subsist in what are often hostile natural environments. It covers a body of knowledge, customs, beliefs, and cultural works and expressions handed down from generation to generation, and in the case of the present publication in relation to use of renewable and exhaustible natural resources.

Human societies produce, consume and exchange knowledge-based and other goods that are produced locally. Among these goods, which are communally held, knowledge and cultural expressions are valuable owing to how complex and varied they are, but also how vital they are for survival. Like scarce tangibles such as land, resources and goods, they too are vulnerable to disappearing when outsiders lack respect for governance structures and customary law, including property regimes.

It is one thing to enforce rights that communities are entitled to enjoy, such as the right to develop one's culture, to protect one's identity, to own communally held knowledge, or, the right to be protected from having alien cultures imposed on one. This is an endeavor that requires interventions to assist the free operation of customary law and the setting in place of mechanisms to uphold rights related to traditional ecological knowledge.

However, other endeavours are needed to meet other causes for the disappearance of valuable traditional ecological knowledge. The integrity of the very process by which knowledge is exchanged and handed down is also threatened by extreme poverty, ill health, unemployment, lack of access to land and essential resources, human right violations, ill conceived applications of modern production processes in local contexts, and unfair competition, among others. These problems are compounded in the Indus Ecoregion, owing to a complex nexus connecting declining real income and natural resource use among communities critically dependent on rangeland, forest, freshwater and other indigenous ecosystems.

With so many problems awaiting a solution, there are serious limits to what can be achieved by our society. Handling the matter is certainly rendered difficult by the number of inter-connected causal factors and by the need to consistent, far sighted and aware of the stakes involved. Among all possible endeavours, there is one that stands alone. It is one on which all other endeavours are reliant. It is essential not only for the targeting of interventions to be implemented, but it is also vital for one's inspiration. This endeavour, which stands alone, is that of *documenting*.

Indeed, the World Wide Fund for Nature Pakistan (WWF-P)'s publication on "Ecological Folk Wisdom of the Indus Eco-region" does not purport to deny that immediate actions are needed to protect the traditional ecological knowledge of the Indus Ecoregion. It instead carries out the most laudable of tasks, that of systematically documenting traditional practices covering key environmental and natural resources and vital aspects of societal subsistence and development.

Mazharul Haq Siddiqui s.i.,  
Vice-Chancellor  
University of Sindh  
Jamshoro



## Acknowledgment

Documentation of folk ecological wisdom of Indus Ecoregion has been a daunting and complex task in view of the fact there has been negligible research work on this subject in this part of the world. The efforts of WWF-Pakistan under the Indus for All Programme is worth appreciating to bring attention to this overlooked, but very important aspect of the *indigenous ecological wisdom* of Indus Ecoregion. This task would not have been possible without support of several people who contributed in one or the other way to the completion of this task.

The valuable guidance and leadership provided by Dr. Ghulam Akbar, Team Leader, Indus for All Programme has remained a source of motivation for us throughout the various phases of compilation of indigenous information of Indus Ecoregion. Indeed, it has been his personal commitment to documentation of this neglected but, rich conservation related knowledge and practices of Indus Ecoregion. This pioneering work is believed to act as catalyst for generating interest in further research on remaining aspects of indigenous ecological knowledge for which Dr. Akbar deserves immense appreciation.

We greatly acknowledge Mr. Zafar Wasan, Mr. Aslam Jarwar, Mr. Usama Anwar, Mr. Zahid Jalbani and Mr. Hote Khan Jamali, Managers of Indus for All Programme sites and their field staff including Mr. Moula Bux Mallah, Mr. Mumtaz Ali Mangi, Mr. Mumtaz Ali Rahoo, Mr. Waheed Jamali, Ms. Rahila Memon and Mr. Jahangir Durrane in identification of key informants and facilitating data collection at their respective areas.

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A very valuable contribution to this report has been made by Dr. Altaf Abro, Manager Conservation, Sindh Programme, WWF Pakistan who has put lot of efforts in reviewing and editing the information contained in the report and finalizing report layout, and Ms. Raina Saeed Khan, a well known Environmental Journalist for her support in final editing of the report to make it reader friendly.

Mr. Umair Shahid, a young WWF Professional provided valuable support in compiling directory of the community members annexed to the report, and Mr. Qamar Altaf, Graphic Designer, Indus for All Programme contributed to the design and layout of this report. We greatly acknowledge their support.

Lastly, a very special appreciation and acknowledgement is due to all the very senior community members belonging to various parts of Indus Ecoregion for sharing their valuable indigenous knowledge, experiences and practices related to various ecological themes which have been compiled in this document. Recollecting this information must have been most challenging for them during the lengthy interview sessions, for which, they deserve admiration.

Sahar Gul Bhatti  
Syed Ghulam Qadir Shah  
Muhammad Nawaz Kumbhar



## Executive Summary

The Indus ecoregion constitutes the lower Indus basin, which is part of one of the oldest civilizations on earth. The region is rich in ecological resources including forests, wildlife, wetlands, grasslands and deserts. Nearly 2/3<sup>rd</sup> of population in the Indus ecoregion is residing in rural areas. As elsewhere, the rural and indigenous communities residing in various ecological zones of the Indus possess rich indigenous ecological knowledge. As people have survived through hundreds of years of direct interaction with the natural resources, this association has generated and developed their formal and informal learning about nature and understanding of phenomenon behind the functioning of various ecological systems.

In many communities this informal ecological knowledge has transformed from generations to generations through their practices, attitudes, skills, wisdom, religion, ethics, myths and culture. This conventional, largely unwritten knowledge, which passes from the elder generations to the younger generations, is termed as Traditional Ecological Knowledge (TEK). TEK represents a collective understanding attained over time of the relationship between traditional communities and the nature. It is both evolutionary and dynamic in perspective and is stored in peoples' memories. It is expressed in stories, folklores, proverbs, myths, cultural values, beliefs, rituals, agricultural practices, plant species and animal breeds. The scientists have used this knowledge to contribute to the scientific and technological developments; the indigenous communities have mainly used this knowledge to meet their livelihood and survival needs.

Interest in TEK has increased in recent years, as the scientists and common people alike have started recognising that such knowledge can contribute significantly to the conservation of biodiversity, rare species, protected areas, ecological processes and sustainable resource-use. It encompasses diverse thematic perspectives related to human life. In many cases, this knowledge is consistent with the scientific logic but, it is practiced without realizing its scientific nature. Many writers of TEK support the customary nature of TEK, insisting that time has been proving the authenticity of the knowledge; as said by Conway (1997) "Given enough time, everything that is old will become new again".

Indigenous knowledge is hardly documented and is holistic in nature, unlike the scientific knowledge, which is differentiated into different thematic areas such as Botany, Zoology, and Physiology. It is speculative, abstract and is based on metaphysical and ethical codes. It is largely qualitative, intuitive, holistic, moral and spiritual, and depends upon the gathered information over a long period of time. Moreover, the indigenous communities have been using the traditional knowledge and wisdom as a part of their livelihood and risk management strategies since time immemorial. However, very little or no attempt has been made to document TEK of Pakistan in general and of Indus Ecoregion in particular.

Realizing the importance of this extremely important area, the WWF-Pakistan under Indus for All Programme funded by the Embassy of Kingdom of Netherlands has attempted to document indigenous knowledge of Indus ecoregion in the context of conservation, livelihood and socio-cultural realities. The data collection for the study was carried out in several locations of Indus Ecoregion comprising Chotiari Reservoir, Keti Bandar, Keenjhar Lake and Pai Forest. Indus for All Programme team is confident that this effort will strengthening the indigenous knowledge base and will further contribute towards conservation of natural resources for the prosperity of the people in the Indus Ecoregion.

## 1. Introduction



The terms 'environment' and 'ecology' are widely prevalent in anthropology. The term 'environment' refers to something that surrounds. It is the complex of climatic edifice and biotic factors that act upon an organisms. The term 'ecology' in broader sense refers to 'the totality of relations' between environment and organism. The line of demarcation may be hard to lie down between the two, but it is apparent that behavioural aspect may be absent with the use of environment while ecology does include behavioural pattern of the organism. The former is more popular among the behavioural scientists while the later is among the biologists. (Srivastava, 2005).

The study of ecology can be approached from a very general, all-encompassing perspective, or from a narrower focus, emphasizing one or a few aspects. The aspect that is of most relevance here is what is commonly termed cultural ecology, the study of how human culture and environment are inter-related (Howard, 1989). Humans have 'used' and 'misused' the environment and ecosystems surrounding them.

A majority of rural population in developing countries like Pakistan, consisting of poor and marginalised communities have evolved rich understanding of the natural resources surrounding them. As people have survived through hundreds of years of direct interaction with the natural resources, this association has generated and evolved their formal and informal learning about using nature and understanding underlying phenomenon behind the functioning of various ecological systems. While the scientists have used this knowledge to contribute to the scientific and technological developments, the indigenous communities have mainly used this knowledge to meet their livelihood and survival strategies.

In many communities this informal ecological knowledge has transformed from generations to generations through their practices, attitudes, skills, wisdom, religion, ethics, myths and culture. This conventional, largely unwritten knowledge, which passes from the elder generations to the younger generations, is termed as Traditional Ecological Knowledge (TEK). TEK varies geographically and is largely determined by



the types of human interaction with their environment and local culture.

TEK is the indigenous local knowledge on the ecology developed within a particular geographic area which is transmitted from one generation to another over millennia. All members of a community, the elders, women, men and children possess some traditional ecological knowledge; however, the extent of knowledge may vary. The knowledge is stored in peoples' memories and is expressed in stories, folklores, proverbs, myths, cultural values, beliefs, rituals, agricultural practices, plant species and animal breeds. There is an old African proverb in this context that "*when a knowledgeable old person dies, a whole library disappears.*"

#### **Example of folk wisdom**

An elderly woman in northern India was selecting seeds for storage while being interviewed by a researcher about the impacts of modern agriculture. She commented, "it takes a sharp eye, a sensitive hand and a lot of patience to tell the difference between these seeds. These are not with things that are honoured any more." (Zweife;1997, cited in Louise, 1998).

The journey of traditional/folk ecological wisdom is known as indigenous/ecological knowledge. The term Traditional Ecological Knowledge might be very recent, but folk wisdom is as ancient as humans on the planet Earth. The continuity of the folk ecological wisdom from one generation to the other and its sustenance up to this time authenticates not only the ancientness of the wisdom, but also its soundness, strength and validity.

Interest in TEK has increased in recent years, as the people have started recognising that such knowledge can contribute to the conservation of biodiversity (Gadgil *et al.* 1993), rare species (Coding 1998), Protected areas (Johannes 1998), ecological processes (Alcorn 1989), sustainable resource use (Schimink *et al.* 1992, Berkes 1999). It encompasses diverse thematic perspectives

related to human life (Louise, 1998). It is valued 'in agriculture, pharmacology and botany (ethno botany) (Berkes, 1993).

The conservation biologists, ecological anthropologists, ethno-biologist all share the knowledge now. The diversity of local or traditional practices for ecosystem management is now being considered by the resource manager in resource-use planning. In many cases, this knowledge is consistent with the scientific logic but, it is practiced without realising its scientific nature. Many writers of TEK support the customary nature of TEK, insisting that time has been proving the authenticity of the knowledge; as said by Conway (1997), "Given enough time, everything that is old will become new again" (Conway, 1997 cited in Louise; 1998).

### **1.1 Characteristics of Traditional Ecological Knowledge (TEK)**

Traditional Ecological Knowledge represents a collective understanding attained over time of the relationship between traditional communities and the nature. It is both evolutionary and dynamic in perspective, as well as being inherently conservative in the manner in which it is handed down. Frequently, it is articulated within a context of spirituality, and it is expressed in terms of roles, respect and responsibilities.

Indigenous people provide an alternative knowledge and perspectives which might be contrary to science, based on their own locally developed practices and resource-use (Moran, 1979). Therefore, characteristically indigenous ecological knowledge differs from scientific knowledge.

Unlike the scientific knowledge, the accumulation of local knowledge is not investigated scientifically. It depends only on the empirical data accumulated, remains unclassified and undifferentiated, and thus exists in one body. As compared to scientific knowledge, which is reliant on experimentation TEK exists in original and native form without being validated as correct or incorrect.



Indigenous knowledge is hardly documented and is holistic in nature, unlike the scientific knowledge which is differentiated into different thematic areas such as Botany, Zoology, Physiology, etc. (Freeman, 1989). It passes from generation to generation, and is based on metaphysical (speculative and abstract/embodied) approach and ethical

codes. It is largely qualitative, intuitive, holistic, moral and spiritual, and depends upon the gathered information over a long period of time.

The common characteristics differences between traditional and scientific knowledge are summarised as follows:

Area of Comparison	Traditional (Indigenous) Knowledge	Scientific Knowledge
Relationship	Subordinate	Dominant
Mode of thinking	Intuitive, holistic	Analytical, reductionist
Communications	Mind and matter considered together Oral, story telling, singing etc.	Mind reduced to matter Literate Objective
Instruction	Subjective Learned through observation or hands-on-experience	Learned in a situation usually separated from the applied context
Effectiveness	Slow inconclusive	Fast conclusive
Data creation	Based on personal observations, trial and error and synthesis of facts. Data generated by resource users.	Based on experimentation and synthetic, deliberate accumulation of facts. Data generated by specialized cadre of researchers.
Data type	Qualitative Historical (long time series in one locality)	Qualitative Historical (short time series over a large area)
Explanation	Spiritual moral	Hypothesis, value free
Classification	Ecological (inconclusive internally differentiating)	Genetic and hierarchical (differentiating)

Source: Wolfe et al. (1992) and Berkes (1993)

## 1.2 Documentation of traditional ecological knowledge of the Indus Ecoregion

Indus Ecoregion constitutes the lower Indus basin region which is part of one of the oldest civilizations on earth. The region is rich in ecological resources including forests, wildlife, wetlands, grasslands and deserts. Nearly 2/3<sup>rd</sup> of population residing in the Indus Ecoregion is based in rural areas. As elsewhere, the rural and indigenous communities residing in various ecological zones of the Indus Ecoregion possess rich indigenous ecological knowledge, which is embedded in their livelihoods, attitudes, practices and culture. In some cases, the ecological knowledge possessed may be comparable to the indigenous knowledge and experiences of regional countries by virtue of having cross-cutting ecology, culture, religions and history of social interactions, whereas in other cases, it may be restricted to the Sindh province.

Over the time, there has been growing recognition of values of Traditional Ecological Knowledge in natural resources management. It is considered useful in designing of the conservation measures for managing different types of ecosystems in a sustainable way. Moreover, the indigenous communities have been using their traditional knowledge and wisdom as a part of their

livelihood and risk management strategies since centuries (Londale in Inglis, 1993).

However, very little or no attempt has been made to document TEK of Pakistan in general and of Indus Ecoregion in particular. WWF-Pakistan under Indus for All Programme has attempted to document indigenous knowledge of Indus Ecoregion by realising its importance so as to avoid its depletion due to rapid increase in poverty and inflation, which has affected the population of indigenous people.

This documentation has been carried out owing to various purposes:

- Indus Ecoregion has vast variety of TEK because of its diversified species of plants and animals, which needs to be documented, and where applicable to supplement the scientific knowledge.
- The Code of ethics and practices regarding the acquisition and use of TEK should be promoted for further advancement and implementation.
- Disseminate it widely to various target audiences including academia, researchers, anthropologists, ecologists and conservation organisations for its application and further research.
- Promoting understanding and use of TEK through the formal and informal education systems.



## 2. Conceptual Framework and Methodology



A water body adjacent to Keenjhar Lake

By virtue of its conventional nature, there is no specific and standardised framework of procedures and methods to document TEK. A variety of methods have been used by different researchers around the world. These include structured and semi-structured interviews, focus group discussions, Participatory Learning and Action techniques, thematic explorations, literature searches, etc.

For the purpose of this study P.L.A. techniques were used to explore indigenous information pertaining to Indus Ecoregion. The documentation process was mostly focused on collection of primary information. The primary information was supplemented with the secondary information wherever it existed in the literature. The documentation of TEK in Indus Ecoregion was undertaken using open-ended interviews using a checklist of questions, focus group discussions and field observations.

The information collection was guided through a conceptual framework developed for the study. This conceptual framework focused on collection of indigenous information in relation to livelihood,

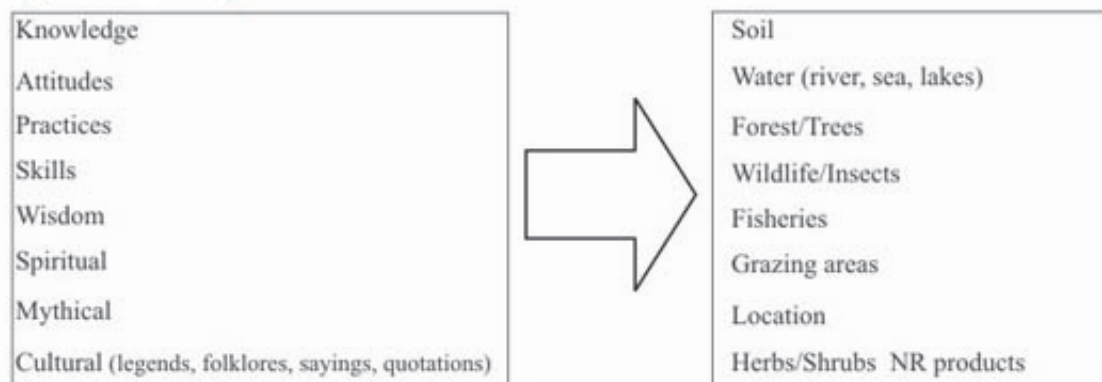
conservation and socio-cultural contexts in order to determine its traditional usefulness to different purposes. Based on this framework, indigenous knowledge documentation covered various areas such as traditional practices, knowledge, skills, wisdom, spiritual, mythical and cultural associations related to various ecological components including, soil, water, forest/trees, herbs /shrubs, wildlife, fishing, seasons/weathers, location, customs, etc. as shown in the Figure 1.

The documentation covered various ecological regions of Indus Ecoregion. The primary and secondary information collection involved the following steps:

- i. Literature search and review was undertaken to collect secondary information on TEK from various available resources, books, reports etc.
- ii. The primary information was collected in field through identification of key informants possessing indigenous knowledge. The identification of key informants was done in different ecological zones using various means,



**Figure 1: Conceptual framework for documentation of TEK**



which involved meetings with local literary persons, historians, researchers, community elders, grazers, fisherfolk, etc. Based on this, key informant were identified possessing indigenous knowledge covering various thematic areas such as forest, wildlife, fisheries, livestock, agriculture, indigenous methods of treatments, medicinal plants, astronomy, climate, culture, customary practices etc.

- iii. Semi-structured interviews were conducted with key informants covering various geographical and thematic areas including riverine, desert, irrigated and coastal tracts of Indus Ecoregion. Semi-structured interview is guided interviewing in which some questions and topics are pre-determined and questions arise during the interviews. The interviews were held informal and conversational with the informants. Initially, during the meeting, the group or the key informant was enabled to describe the environment and various components of their environment. Subsequently, the informants narrated local histories that provided knowledge as to how things have changed or changing like crops, population change, wildlife situation, trees and forest etc. This was found useful way of learning about natural resources in historical and traditional contexts.
- iv. Over all field information was collected in several districts representing various ecological zones of the Indus Ecoregion. A guiding checklist of questions was

prepared to extract indigenous ecological information from the key informants during the interviews. The interview process involved a flexible and open-ended approach to explore and extract as much information as was possible using probing techniques.

- v. The information derived from the key informants through interviews was recording using audio recorder. The recorded tapes were later transcribed, synthesized and supplemented with the field notes taken during the interview process. Geographical Information System coordinates were recorded to map the interview locations. The location map covering various geographical areas of Indus Ecoregion is shown in the annexure. The photographs of the key informants were taken to prepare a directory of interviewees in the annexure
- vi. Wherever possible, the documented TEK was supplemented with scientific explanations to elicit the rationale of traditional knowledge and/or practices.

Keeping in view the interest of readers, this report attempts to discuss indigenous knowledge of the Indus Ecoregion in relation to three aspects - livelihood, natural resources conservation and socio-cultural contexts. The canvas of indigenous ecological knowledge of a particular geographical region is so vast that it may be difficult to cover each and every aspect of such knowledge. This would require much resources, time and patience in doing such a research.

### 3. TEK of Indus Ecoregion Livelihood Context:



Traditional farming with pair of oxen

**R**ural economies in many developing countries are natural-resource based. The natural resources sustain these economies at micro levels by meeting the essential livelihood needs of the communities which are dependent upon them. At the same time, these ecological resources generate various goods and services for the sustenance and growth of economies at micro levels. The same is true for the people and ecological resources of Indus Ecoregion.

As elsewhere, the TEK of rural communities of Indus Ecoregion is subject to their immediate interaction with the specific natural resource and the environment in which they live. For example, TEK of specific resource user groups such as fisherfolk, livestock herders, hunters, farmers, etc. may be specific to that particular association. However, sometimes we may find variations in TEK of the same group. For example, the TEK of a coastal fisherfolk may vary from an inland fisherfolk, simply because of distinct type of interaction with their surroundings. Taking the same example, we may also notice many similarities in TEK of indigenous fisherfolk in relation to making of fishing boats and nets, observing certain indigenous

various resource users is that it has been at the center of their routine activities. It has benefited various resource user groups in planning, managing and using their livelihood activities, as the following discussion would indicate.

#### 3.1 Indigenous knowledge related to domestic animals

Domestic animals rearing and herding is one of the major occupations of rural communities of the Sindh province. These communities keep their livestock mainly to meet the domestic requirements and other livelihood needs through marketing of livestock and their by products. In particular, the pastoral communities in desert and hilly rangeland areas adopt this occupation because of availability plenty of opportunities for grazing, as well as a lack of alternate livelihoods. It is association that makes them specialist in the knowledge on various aspects of livestock including animal behaviour, grazing areas, grasses, and seasonal variations, symptoms of animal diseases and their traditional healing methods and such other aspects. These specialties may vary with



personal association with a particular aspect of livestock rearing. Therefore, it is not usual that each of the livestock herders may possess the similar type and magnitude of indigenous knowledge.

Sheep, goat, cow, buffalo, camel, horse and donkey are the commonly domesticated animals of the Indus Ecoregion. The association of rural people with these domesticate animals has been since times immemorial. As domestic animals are an integral part of livelihoods of rural people, it has encouraged them to experiment the indigenous ways of animal husbandry to gain maximum livelihood benefits from their livestock. The remoteness, slow access and adaptation to scientific knowledge related to livelihood sources have supplemented this experimentation to the extent that some very unusual and interesting practices have been adopted to sustain their household economies. In the following section, traditional knowledge, practices, myths, etc. related to the common domesticated animals are discussed.

### 3.2 Indigenous knowledge related to sheep

Sheep is one of the common livestock types in desert areas. Interestingly, the thicker milk of sheep is taken as a token for richness. Having more number of sheep is considered as a sign of prosperity. The sheep herders consider sheep as a valuable animal among the livestock because of its milk, meat, skin and most importantly wool. These products are valued for their direct relation to the household needs. Especially, they weave handmade quilts and rugs from sheep fur. These indigenous skills provide them an art of coping with the winter season. However, these traditional skills are slowly vanishing due to modernisation.

Based on their structural appearance and other qualities, local communities in the area differentiate sheep into at least nine different varieties. The qualities of some of these varieties are shown in (Box: 1).

#### 3.2.1 Mating behaviour of sheep

The sheep herders in Chotiari area believe that there is not a particular rut season of sheep. However, they notice that most of the mating takes place immediately before or after the onset of rainy season (Monsoon).

##### Box 1: Varieties of sheep

*Kureon, Bolahi, dnghi, vohreon, lpeon, thareli, jabloo rchheon.*

**Kureon:** With small ears and normal height and yields good quantity of milk.

**Bolahi:** Looks beautiful, tall, and yeilds more milk, meat and wool. It gives 2-3kg milk on every due time.

**Dnghi (thick tail sheep, Ewe):** It is cauterized on back side, it is stronger, and is a intensel grazer.

**Vohreon (Heifer):** Its neck is large, nose thin and angular and is shorter in height.

**Lpeon:** It is of medium height, and yields good quantity of milk.

**Thareli (Desert sheep):** It yeilds more wool than other animals and its tail is also longer.

**Jablu (Izard):** Mountainous sheep. It yeilds more milk than others.

Further, they believe that hardly any one would notice sheep during delivery time. More interestingly, they believe that mating of sheep takes place during night time, thus it remains unnoticed even by the herder. Differentiating the mating behavior of sheep from that of goat, they reveal that in case of goat, the mating behavior involves more sexual persuasion of female. On the contrary, courtship and mating behavior of sheep is not very obvious may be due to the timid nature of sheep.

Regarding feeding habits, herders believe that sheep prefers to eat sweat grasses and likes to eat roots of a Corchorus grass species commonly knows as Munderi Gah, which is believed to increase the milk and butter production. Conversely, Jawar (*Sorghum*) is considered as bad for sheep and goat, as it will make them seriously sick and difficult to survive. The sheep herders notice various diseases in sheep and use traditional means of treating them.

They reveal that sheep gets sick from fever which is caused by mosquitoes. The infection leads to the enlargement of its spleen.





Some local variety of sheep

### 3.2.2 Medicinal use of sheep milk

The milk and meat of sheep is believed to cure measles. Their experience shows that by giving milk and meat to ailing person the measles will disappear. It is not known, if this traditional treatment method is consistent with scientific knowledge.

## 3.3 Indigenous knowledge related to goat

Like sheep, the goat herders differentiate varieties of goats in plain and desert areas. The varieties of goats in plains include *Karyoon* (Black goat) *Bagyoon*, *Daminiyoon*, *Jatiryoon*, *Barryoon*, *Taidy* and *Bi-ssar*, whereas those of desert area include *Nabhro Karyoon*, *Ghalhyoon*, *Karyoon-Makryoon* and *Kabryoon*. It seems that in most cases this differentiation is related to the physical appearance of the goat rather than the genetic variation.

The goat herders notice significant decline in indigenous goat (*Kamori*) breed particularly after the introduction of exotic male breeds (local called as *Teddy*) during the regime of President Ayub Khan in sixties.

### 3.3.1 Mating season of goat

Goat herders believe that goat does not have specific season of mating. However, they relate mating season to different seasonal phenomenon of the year such as, fall of pods of Babul (*Acacia nilotica*) tree, final harvesting of cotton and wheat crops. During this time, the goats are considered to be much happy and relaxed due to plenty of grazing opportunities. It is believed that goat may become pregnant

## Box 2: Diseases in sheep

***Phiphri* (Contagious Pleuro pneumonia):**

It attacks sheep because of swelling of lungs.

***Samaro* (Foot and Mouth Disease):** It is treated by throwing peels of fish and gets its feet and face washed with hot whey and incense / wash in cattle-farm.

***Serhaie*:** It's cauterize tail and wash with hot oil and pour oil in nostrils.

again very quickly even three weeks after giving birth. The gestation period lasts for five months and at one time it may deliver 1-4 kids.

### 3.3.2 Feeding habits of goat

Goat is considered as universal grazer, as it eats almost every kind of vegetation including *Ak* (*Calotropis procera*) which is bitter in taste; other domestic animals avoid eating it. Goat is fond of leaves and pods of Babul leaves are considered to give them more strength. Therefore, it is a common practice in rural areas to buy the branches of Babul tree from the farmers for feeding their goats. The herders notice difference in feeding preference of goats belonging to plain and desert areas. According to their observations, the goat of plain area is fond of eating (*Trianthema intermedia*) *Waho* grass but hardly will browse on desert grasses.



Herd of goats going for grazing

### 3.3.3 Traditional ways of treating goat diseases

Grazers notice a variety of diseases in goats based on their symptoms. Several indigenous methods of treatment are commonly used in rural areas of Indus Ecoregion to treat various livestock diseases. Some of the common traditional methods used to treat goat diseases are summarised in (Box: 3). In many cases, the treatments involve use of indigenous skills and the ecological resources available in their surroundings. Interestingly, in certain cases, livestock keepers follow certain measures



which are consistent with scientific knowledge. One such method is isolation of diseased animals. For example in case of *Phipri* disease, the diseased goat is kept isolated for forty days to avoid spread of infection to other healthy goats. Except for the shepherd, no one is allowed to enter the isolated ward.

In case of small pox disease, no unclean man should enter the animal shed; his clothes

should be neat and clean. Usually when goats eat lot of babul leaves, they get side. These cases actually happen when babul trees shed their leaves and new leaves start appearing, if these are grazed by goats in large quantity, they are likely to create problem for such goats. Affected goats start shaking violently due to disease. In this case, they are given warmth. After doing so, they are milked and fed on the same milk.

### Box 3: Traditional treatment methods of goat diseases:

**Aas (Prolapse):** This disease is caused due to delivery of baby goat in summer; in this disease dried tea leaves are given.

**Bhagg (Sheep Pox):** If leg is broken, it is tied tightly to create a balance, Phitki is added in butter and then given; or a branch of 100-year old Karir tree (*Capparis decidua*), which is called *Muhanda* is burnt and its ash is mixed with butter, or surmo and given to the sick goat.

**Jara na Lahin:** In this disease black tea is given, or the branch of Khaji tree (*Phoenix dactylifera*) is burnt and given to the goat.

**Oso (Dysnea):** Its asthma, in which water is given to drink at empty stomach and in order to save goat from heat stroke white onion too is given to goats.

**Motions (Teek):** For this, at the top of tail is pierced and dipped into hot oil, sometimes tail is tied.

**Phiphri (Contagious Pleuro pneumonia):** In this disease one goat is killed and its lung is taken out and is put in *Hinga* for a night. Next day in the morning that lung is cut into small pieces; the larger vein of ear is pierced, and a small piece of lung is put into the pierced area. Goat suffering from this disease is kept in isolated ward (*waro*) for forty days to avoid spreading of infection to other goats.

**Seedo (Ration):** In this disease, mustard oil and black pepper are administered through nostrils. The smoke of Asri Lai tree (*Tamarix sp.*), Gugur tree (*Commiphora mukal*) or old black cotton cloth is created around the animal.

**Problem in teats:** To cure this disease goat is fed *Hurbo* or *Methi* (mint). If teat gets itching the feather of dove or clove is inserted in teats. At occasions mercury too is given to goats to treat diseased teats.

**Phikriyo (Black Water):** In this disease, teats get problems. In the remedy for this, one person would penetrate hand in goat from behind and the other would pour in water over it early in the morning (with goats' empty stomach).

**Tiredness (Thakaa'u or Kaadryo):** In this disease the goats can not stand up for a long and will sit on ground shortly. The unusual traditional method of treating this is to fire a gun near the sitting goat. There is a myth about this disease that there are two Kaadryo brothers, who kept arrow with them whenever they found a beautiful thing, they will target it. So this disease is believed to be suffered by the beautiful looking goats.

**Samhaaro (Foot and Mouth Disease):** There are two kinds of Samhaaro, one is of mouth and other is of hooves. In the Saamharo of hooves the goat is made walk on hot sand, and in case of mouth, one side wheat bread (*chepati*) is cooked, and on its other side oil is smeared and fed to goat. A mythical treatment of this disease is also adopted. In the goatyard a traditional merry-go-round (*cheeklo*) made of wood is constructed. Grinded coal and oil is used to facilitate circular movement of merry-go-round. The children are allowed to play on this merry-go-round. It is believed that the sound produced by the friction of wooden parts of the merry-go-round makes the Samhaaro run away. Sometimes villagers, owing to religious beliefs, make the animals walk through a passage under the Holy Quran tied over the passage. Another practice is to paint goats in shocking pink color.

**Angaari (tarter emetic/scurvry):** This disease is like that of termite attack. It affects horns and hooves in which small holes appear.



**Box 4:**

**Pheri, GID (Gender Identity Disorder) disease:** In this disease Dambh is given in the middle of horns and grinded black pepper is mixed with oil and administered through nostrils. The villagers believe that pheri disease is caused when an insect/germ enters the brain of goat. If through sneeze that insect/germ comes out through the nose the goat would be relieved otherwise they believed that the worm has stung inside the brain of goat. It is because of this myth, the black pepper are administered to facilitate sneezing process.

**Wa-u (Fever):** There are three to four kinds of this disease; the Wau of joints is referred as Sukka wa'u (dry wa'u). In this disease the branch of a tree named Sanmbhaalu is fed to goat. Sanmbhalu is like olive but its leaves are small. The other is called Khunbh Karo Wa-u that means dark black Wa-u. This is believed to be very deadly and the people tend to avoid taking name of this disease. There is one other Wa-u in which goat squeezes her/his teeth. In this kind of Wa-u the tops of ears are pierced to press the veins of ears, and the oozing drops of blood are put in eyes. This deadly disease hardly gives time of remedy, often goat dies out of it.

**Aam Wa'u (Normal Fever):** In this the goat squeezes teeth. Same treatment as that of *Phiphri* disease is applied.

**Khunbh Wa'u:** This wa'u causes *Aphree* or *Aabham*. In this disease the abdomen of goat gets swells. In other case, the stick of *Ak* plant (*Calotropis procera*) is crossed through mouth and is tied to horns to prevent the goat from moving her mouth. It is believed that the goat suffering from this *Abham*, should not get asleep at all. Therefore, Naas and chilies are administered through nose to keep the goat awake. In some cases the inflated abdomen is pierced by penetrating a sharp needle inside to draw gases out. In still other case, raw sugarcane (*Gur, Brown sugarr*) or sometimes oil and salt are administered to goat to treat the disease.

**Chichir Lagan (Bug attack):** Due to uncleanliness of goatyard, the goats catch chichir, which often enter ears, under the tails or hooves. For the remedy of the same gasoline/gaslet is smeared- some times Naas and oil is smeared, salt is spread in wathaan, seerhi or choovo is spread, or the dry grass is spread in wathaan and set the same on fire, the burnt grass be the remedy.

**Garru:** Its skin disease, for its remedy black oil is smeared on skin, bitter oil is fed, Mait and hena too smeared, the animals which have this disease are kept separate

**Sundh (Infertility):** In this disease despite coming off age the goat does not copulate and in remedy green and red chilies and big cinnamon are fed

**Na Rahee ta:** In this disease they do not conceive despite coming off age, for this the villagers say that there occurs a knot in uterus, which the local experts set through soft stick of Khabar or any other stick.

**Phara Jo andar marn (Fatal Death):** (Death of baby goat inside the womb) This is indicated by a delay in delivery than the expected time, the goat is fed some measured quantity of ghee/oil such as quarter or half of a kilogram.



Vaccination of goat

### 3.4 Indigenous knowledge related to cow

As other domesticated animals, the cow herders distinguish four varieties of indigenous cow based on their colours and other qualities (Box 4). These include *Dhani*, *Ghaarhi*, *Maleer* and *Tharee* varieties. The cow herders believe that indigenous breed of



Variety of indigenous cows

cow is nearly vanished these days.

Further, the people of Indus Ecoregion assign different names to cow based on their age. *Gabi*, *Wohri*, *Dhagi* are the some of the common names attributed to cow of different age groups. *Gabi* is usually applied to cow up to the age before maturity; *Wohri* is the age at which it reaches maturity and *Dhagi* is the fully grown milking adult cow.

The names are also attributed on the bases of teeth which appear at different age. For example, the name *Gabo* (male-calf) is applied till the age of two years when it breaks milk teeth. At the age when it has four molar teeth, it is referred as *Wahro* (Young bullock), and when it has eight teeth it is called *Dhago* (bull) . Before the advent of tractor, the bulls of 2 ½ years age were employed by the farmers for ploughing their farm or used in carts. A good quality bull is considered to be agile and obedient and does not require



poking with stick. The bull with such qualities is believed to get the peasant exhausted without getting itself exhausted.

### 3.4.1 Feeding habits of cow

The cow herders consider it as thirst tolerant. Therefore it is one of the preferred livestock in desert areas. The herders believe that as cow eats *Tooh*, (*Citrullus colocynthis*, Bitter apple), hence cow is tolerant to thirst and does not require much water. According to their local knowledge, the animals eating *Tooh* are thirst tolerant. They also believe that cow can remain hungry for a long and travels long to graze. It is believed not to graze in mist. According to their observations, cow would drink water when she is fully fed. In winter, the cow of Thar Desert would prefer continuously grazing during the night time to protect herself from heat and would usually find a place to rest under *Khabar* (*Salvadora spp.*).



Some local varieties of cow

Furthermore, they notice that cow would never leave new born calves alone. It will never move for grazing without feeding the new born. Therefore, in case of delivery usually herders follow the cow to locate the newly born in the grazing field. While for milking cow, it is customary in the villages to leave one teat of cow to feed new born calf for 4-6 months. The milk of cow gets normal three days after delivery. The butter and traditional ghee (oil) extracted from the milk of cow is considered very nutritious. Local people consider fresh milk of buffalo, churned milk of goat and butter of cow as the best for consumption. They believe that adding salt to the curd before churning will increase the quantity of butter.



### 3.4.2 Diseases in cows

Enlargement of spleen is one of the common diseases of cow which herders believe turns the skin of cow darker. It is believed to be caused by the germs in liver due to drinking of stagnated pond water. Probably, this disease is caused by Liver fluke which finds its way inside the cow through drinking water. Therefore, in many households people keep ducks to limit population of snails which are causal organisms of this disease. The traditional treatment of this disease is to give *Danbh* (burn) on the left side of body of cow. In other cases, ghee or oil is administered to the diseased animal. The cow is also affected by another disease which results in diarrhea (*Raij*). This disease is treated by extracting liquid from the roots of a local plant *Tooh*

#### Box 5: Indigenous varieties of cow

- i. **Dhani:** This is identified by the herders as *Chitkmri (roan)* (with black & white, redish brown and creamish color spots. It has small horns, big teats and small and narrow ears. The bull of this species fights with human and is considered weak in hunger and thirst tolerance therefore, not good for ploughing.
- ii. **Gaarhi (Red Cow):** This is reddish in colour.
- iii. **Maleeri/Maleer:** It has moderate size horns and ears and is brownish red in color. It looks beautiful in physique and is gentle in nature. It is considered strong for ploughing as it hardly gets tired during ploughing. It has high hunger and thirst tolerance. Because of these qualities, it may get peasant exhausted during ploughing.
- iv. **Tharee:** It is a taller cow with large horns; it's grey in colour and is full of flesh. Its bull is considered weak in hunger and thirst tolerance. This kind of cow gives much milk if it is fed on *Mandhan* grass; but if is given *Jooar (Sorghum)*, will end up at less milk; she grazes less and it's oh too is small. She is fond of eating *Ranbas* grass.



(Bitter apple) and administering the same to the diseased animal. In winter, cow turns blackish and sick. In order to treat this sickness, salt is added to the churned yoghurt (*Kachi Lassi*) of goat's milk and applied over the body to get it relieved.

### 3.4.3 Traditional prophesies regarding rain

The local people of Indus Ecoregion have been using various natural signs to predict changes in weather and other natural phenomenon. One of such signs is related to the behaviour of cow. According to them, cow indicates occurrence of rain four or fives days earlier. For example, it would start moving in northern direction and start smelling the blowing wind and mooing loudly. Another sign of the forthcoming rain indicated by cow is that it will stop eating grass four or fives days before the rain. When these types of behaviour are noticed, the people believe that cow has foreseen rain.

### 3.5 Indigenous knowledge of buffalo

Cattle owners usually prefer water buffalo as they believe greater quantity of milk delivery from such a buffalo. Black buffalo is not get inseminated by a brown male buffalo. Earlier, it was customary in rural areas not to sell milk, as selling of milk was conceived as misfortune and insult. Milk was shared as a gift during festivals and free of cost to needy.

Daily in the early morning when such buffaloes are with empty stomach, drops of cold water are sprinkled on the left slender part of the body under the short ribs, if by doing so embryo starts moving, it is presumed to be male-calf. Before delivery if its udder appears full of milk in the morning and gets empty in the evening or sometimes it is full and sometimes it is empty, then it is presumed to be male Calf. In case of female buffalo calf, there is no swelling on the vagina and its size remains intact. Whereas in case of a male calf the vagina becomes enlarged and swollen.

During pregnancy period, it should be given 2 Kg of Millet for 2 to 2 ½ months. This would increase the quantity of milk. The quantity of

first milk yielded by buffalo after delivery is indicative the same quantity of milk it would yield afterwards. According to local knowledge, the pregnancy period of cows last for about 9 months and 13 days, whereas the buffalo takes 10 months and 4-6 days. Cattle owners never prefer to sell calves, they on the contrary sacrifice them keeping in view their common faith that such sacrifice would increase quantity of their cattle.

### 3.6 Traditional remedial measures of livestock diseases

In winter, if buffalo does not graze on grass and its skin appears tightly attached with bones, then barnacles of *Tamarix* trees may be slightly heated and put on back of buffalo and covered with old clothes. But before doing so, salt should be sprinkled on the back of buffalo. After an hour or two, the body of buffalo would get perspired and animal would get relieved.

Sometimes, cattle fall prey to Tympanitis which is locally known as "*Aphri*" (Tympani) In this disease, the stomach gets filled up with gases. It usually happens due to too much eating and drinking water thereafter. It also happens due to incidental eating of cooks or cranes feather together with grass. In such case, a quarter of milk plus quarter of oil may be mixed together and given to the animal.

In case of Tympanitis (*Ubham*), a handful of salt is put in the mouth of animal and the salt is there rubbed inside the entire mouth up to the pallet. Some cattle-owners put sneezing powder in the eyes and nostrils of animal. Whereas, others are against this practice, as they think that this is injurious for the brain. In other cases, a small stick of Ak plant (*Calotropis procera*) is put in the mouth for chewing purpose, and stomach is tightened with trousers belt. This is done so as to prevent further spread of Tympanitis. In case of disease reaching at full scale, a sharp needle is inserted in the stomach of animal to take out extra gases from it.

Diseases of throat locally known as Ghutiar (*Haemorrhagic Septiaemia*) results in





choking up of the throat. This disease takes place either in the beginning or end of winter. In this disease, salt is rubbed to the small branch of Neem tree (*Azadirachta indica*) which is then rubbed in the entire throat. Ghatiar disease usually falls on young buffalo suffer from Ghatiar disease. In this ailment, the animal develops expansion in tonsils. For remedial purpose an iron ring is fixed in the mouth of buffalo and its tonsils are pressed hard by entering hand in the mouth.

Apart from this, there is foot and mouth disease locally called Muharo. If it falls on feet, the animal's knee joints get stiff and are unable to move. To treat this ailment, the curd is slightly boiled and the feet of the animal are washed with the luke warm curd and it is made to move on hot sand. If the mouth is affected, then a salt is mixed in luke warm curd and then it is put in the mouth in small doses.

There is another disease known as 'Anthrax' locally it is called Karo wau (Fever). It is very dangerous disease and there is no reliable remedy for this disease except startling the animal. In case of Anthrax, the extract of Hing (Bhangue) is administered to the animal in the dose of one full glass for 3-4 times along with (hurbo) "Triagonella foenum-graecum" mixed with Sorghum grains.

In case of *Phiphiri* (Contagious-pleuro pneumonia) a small cut is given in the ear.

In case of *thadri* diseases (Small pox), in which cattle starts trembling/shivering, the branches of *Tamarix spp.* are heated and tied on the back of animal.

In case of white spot in the eye china-clay is

ground and a small quantity of that powder is inserted 2-3 times in the eyes of the animal. In addition to this honey drops are also used.

Sometimes trouble occurs in teats, which is known as 'mastitis', then in a quarter or half kilogram of milk is mixed with mercury is administered to animal. If teat of an animal is unable to deliver milk, then a feather of cock or partridge or dove of proper thickness is inserted in the teat. Moreover, a paste out of rat earth is prepared and applied on the teats of animal; this paste would decrease its swelling.

If weak animal's delivery becomes difficult, it should be given full diet, especially millet or pieces of bread mixed with butter oil. The delivery would be easier. The animal may not be allowed to engulf placenta (*jar*), otherwise the animal would cease to deliver good quantity of milk. If *jar* (placenta) does not part with the body then mait Fuller's Earth (multani mitti) is burnt out and ash obtained may be given to the animal as food.



### 3.7 Indigenous knowledge related to camel

Traditionally, camel has been used in rural areas of Indus Ecoregion for transportation, carrying load, ploughing, and extracting water from wells. Rural people consider camel obedient and sluggish animal. It is also considered as a dumb and senseless animal. Like cow, there are as many as sixteen different names assigned to the camel based on their age and other physical attributes or qualities (Box 6).

Locally, the camel is differentiated into two



### Box 6: Names of camel according to age

*Todo* : One year old camel

*Goro* : Baby camel that is still feeding on milk.

*Kanwat* : is the name for two years old camel.

*Maiyo*: A camel that is bulky and often fat.

*Dagho*: It is name for an old camel.

*Boto*: Name for a young camel.

*Karaho*: It is the name of camel that is often used out of love.

*Parbat*: English translation of the word parbat is 'mountain'; it is used for camel due to its heavy size and weight.

*Jamaz*: Basically an Arabic word that is used for fast and speedy camel.

*Shatur*: It is used in Persian synonym for camel.

*Rodo*: Word is used for bald (without hair) camel.

*Doekh*: The camel that is Biraand.

*Mahri*: Is used for the best camel; which is fast in comparison to the same others; they are preferred in journey due to their fast movement.

*Naqo*: This is used for female camel.

*Lada*: Name for the camels which carry load.

*Daachee*: Used for young female camel.

varieties, *Sindhi* (belonging to Sindh and *Dhati*). The camel keepers believe that the *Sindhi* camels can carry very heavy loads, however, it would travel lesser distance. On the other hand, *Dhati* camels do not carry much load, but is best for traveling long distances. The camel of three to four years old is considered ready for riding.

According to camel herders, the milk of camel cannot be churned nor could butter be extracted from the camel milk. However, the camel milk is considered to have rich medicinal use. It is believed that camel milk is panacea for as many as 72 diseases including jaundice and diabetes etc. The female of *Sindhi* camel gives much milk: it can be milked 2-4 times a day and may give 3-4 kilogram of milk each time.

According to their knowledge female camel often conceives during winter season and her gestation period lasts for a minimum of 12 months. It is a usual practice to keep a male camel with the herd of female. This male does not let any other male share the female belonging to the herd. The places where camels take rest are called *Jhok*.

Camel herders notice that camel prefers feeding on some types of plant such as, *Lano* (*Salsola* sp.), *Khabar* (*Salvadora* sp.), *Karir* (*Capparis* sp.), *Singri* (pods of *Prosopis cineraria*) and *Bhoongri*. *Bhoongri* is known as the most favourite plant of camel. The other plant considered as favorite and best feed of camels *Chandan* (*Tecomella undulata*) which often grows along water channels.

### 3.8 Indigenous knowledge related to herbs and traditional treatment

The rural people of Indus Ecoregion believe that in earlier day's diseases, such as heart-attack and blood pressure were not very common. At large, the people were healthy and lived longer. Even the people at the age of 70 years performed their activities independently, as against the current generation which remains handicapped beyond the age of 70's.

Traditionally, rural people have largely relied on vernacular methods of treatment derived from many wild plants and animals. This has been so because in earlier days the means of communication were not well developed and peoples' access to qualified doctors was limited.

However, many of the traditional methods are being replaced with modern methods in the places, where, they are easily accessible. The various traditional means of treatment, which have remained prevalent in rural areas include the following:

- If someone was seriously injured, patient was treated by wrapping around skin of goat, calf or other animals. This treatment was also



common for many other diseases such as chronic fever, body pain, pneumonia and to some extent to treat the patients suffering from TB.

- Milk of Cactus plant is applied to treat pain of joints.
- Egg of home-grown/indigenous chicken is considered useful to cure every poison.
- A snake-bitten person would recover quickly if skin of frog is tied around on the body.
- Onion is used to cure sting of scorpion.



A traditional way of stall feeding

- If a pregnant woman drinks Caster oil regularly then her new born child would be healthy. The Castor oil is also considered good for new born child. If given regularly, it would make bones strong and kill every pain.
- Ground Neem (*Azadirachta indica*) seeds mixed in mustard oil are used as an effective treatment against hair loss. Leaves of Neem are considered to be anti-septic. Taking a bath with Neem leaves boiled water has traditionally been used to treat various skin

diseases. Often in rural areas people drink juice of Neem leaves or seeds, as a panacea to various abdominal diseases. It is also used for treating sugar. *Lupri* (poultice) of Neem and oil are used to foment the human body for easing the pain.



Vaccination of ox

- It is very common in rural areas to mix Neem leaves with stored grains to prevent damage by insects, particularly grain beetles.
- Milk of Ak (*Calotropis procera*) and milk of Fig can cure itch especially groin-itch. Leaves of Ak are used to cure cough etc.
- Alum and Henna are used for eye diseases.
- Soil of Ak root is cool; it cures phlegm and hepatitis too.
- The fat of Malhar/Bulhan (Dolphin) is believed to possess aphrodisiac properties. It is also good for rheumatic pain. It is administered by adding one drop of its fat in black tea, taken at the interval of 2-3 days. It should be taken during winter season.

#### Box 7: Diseases of animals and their treatment

**Aas (Prolapse):** Aas is a disease that appears in hot weather. Its treatment includes a mixture of dried-tea leaves, oil of *Tir* (sesame), glucose and *Neel* (blue-powder given to clothes) administered to diseased animal.

**Bhad:** In this treatment the affected animal is bound with roof and the wound is cauterized, it is especially fed 100-years-old reeds, 100-years-old leafless bush and Surbo with ghee.

**Wau (Fever):** If any animal became ill of *Wau* (Fever) local treatment is that smoke of *Assri Lawa* (*Tamarix spp.*) is to be created, and body of animal is wrapped with a hot cloth. *Wau* disease is also cured by *Dunbh* (cauterize; burn the skin or flesh of (a wound) to stop bleeding or prevent infection).

**Raij (Fasciolosis):** It weakens the animal physically. It occurs due to drinking of stagnant water of waterlogged ponds or eating grass growing on such land.

### 3.9 Animal diseases and their traditional treatment

The people of Indus Ecoregion have employed various traditional means of treating various animal diseases by using various plants and animal products.

The urge for use of these un-scientific methods had mainly come from their remoteness and lack of access to scientific methods of treating various animal diseases. These factors had necessitated their learning and use of locally available materials to meet their livelihood strategies which have remained in practice in rural areas up till today, even though many scientific options have evolved. Some of the common treatments of various animal diseases are

indicated in (Box: 8).

From the above discussion related to various domesticated animals, it could be revealed that livestock rearing has been one of the main livelihood sources of people in rural areas of Indus Ecoregion. The rural people have adopted various indigenous practices of livestock management based on their knowledge of different animals, their varieties, their behaviours, and traditional treatment of various livestock diseases. Their association with different animals has also been culturally significant, and in some cases, the noticeable behavioral aspects of these animals have been used to forecast seasonal changes.

#### Box 8: Treatment of some of common animal diseases

**Kangri:** Remedy; baked cow-meat will be given to animal.

**Affri (Tympani):** In order to treat this disease animal is forcibly fed on branches of Ak plant. In other cases, *Neel* (Blue powder used for shining of cloths) is also used as medicine. Even Kerosene oil is given as medicine. In some case disease is cured by *Dunbh* (cauterizing).

**Samani:** It is cured by different ways, such as by giving meal made of millet flour with any light thing and salt, by applying kerosene oil at animal foot, or by letting the animal walk on hot sand.

**Gurji:** Animal is rubbed with oil of *Janbho* (Rapeseed) or Reeds.

**Khali-Pai:** If animal is attacked by Khali-pain(pain) (kind of disease), its effects appeared quickly, on the contrary, Monjh-pain (disease) shows effects slowly, its treatment is Injni (a herb) mixed with leaves of tea fed to the animal at early morning. But dose may vary for different animals.

**Hawo:** Its remedy is that leg of animals will be hit by a stick for three days, or incise skin and air at point.

**Heat stroke:** Bark of Shisham is used to cure animals suffering from heat stroke. *Tamarindus spp.* is also used for this purpose.

**Jar:** If the placenta (*Jar*) does not get detached, the animal is cured by the ashes of *Tadi* (a type of mat made from reeds) after mixing it with lasi (whey or churned youghart).

**Attack of Chichr:** (a type of bugs) is remedied by having polish or rubbing of animal with bitter oil of *Janbho* (rapeseed).

**Eye cataract:** It is cured by putting Sendoor (a powder used by Hindus) and salt in eyes of animals at early morning.

**Not eating grass/ fodder:** When animals do not like to eat grass, it is cured by feeding fine powder of *Fitki* (alum) mixed with Lasi (whey or churned youghart).

**Pregnancy:** If an animal conceives but do not hold embryo (*Gubh*), it is administered half kilo oil mixed with cow-dung. Sometimes, animal is cauterized (*danbh*) using a hot iron. It is believed this process shock the animals, as a result, animal would hold embryo.



### 3.10 Indigenous knowledge related to fish

Like the livestock grazers, the fisherfolk of Indus Ecoregion possesses rich indigenous knowledge related to fisheries. The traditional fisherfolk consider fisheries as superior and profitable business as compare to other activities.



For example, they view that catching fish is easier and with quick returns as compared to peasants cultivating crops who have to wait for six months. They also face risks of crop damage if there is a shortage of water or heavy rains. Similarly, labourers get low daily wages as compare to fishermen who earns much more in a day trip.

Further, the fisherfolk go to the fishing lake at evening time, set their nets and then sleep at night. They collect the trapped fish and again after fixing their nets return back to home.

#### Box 9: Introduction of exotic species of fish and its damages

Fisherfolks take keen notice of changes in fisheries resources in their surroundings. According to them, exotic fish (Tilapia) was introduced in 1974, in brackish water channels and ponds by Fisheries Department during an exhibition held at Wazeer Ali Cotton Factory on Sangher Bagor road. Later, this fish found its way into lakes. This species has wiped out all grasses of lakes and has threatened survival of other indigenous fish. They have noticed this fish biting birds which avoid sitting over lake water. It has been noticed feeding on some insects such as Dragon Fly (*Bhanbhori*) and eggs of other fish. It was introduced for the reason of increasing income of fisherfolks as it lays eggs three times but its negative impacts on indigenous fish were not considered.

According to the indigenous fisherfolk, in earlier days fishing relied upon the specialisation/ skills of fishermen but, now a variety of gears are available in the market, therefore, anyone can catch fish easily.



The fisherfolks of Indus Ecoregion follow a fishing calendar. Fishing is done from October to April. The period from April to August is considered as resting period as this is breeding period. Locally, it is termed as the period of *Aani* (seed). The usual time of fishing is early morning. In evening, fishermen just go for checking the fixed nets.

Fisherfolks narrate that Keti Bunder used to be rich in fish and agricultural production in earlier days. The area was full of cultivation of red rice, peas and mong beans. There was a rice factory in the area which used to thresh nearly 400 maunds of red rice every day. Sugdasi rice, an indigenous variety of red rice was famous in this area because of its taste and aroma. The people belonging to Sheedi tribe (Gushi sub-tribe) used to come to this area from Mekran coast in Balochistan to clean the rice. People from Punjab, Northern area of Thar used to come for labour in rice fields. They used to come through big boats. The rice was exported. The people of Keti Bunder recall that earlier, sea was at a distance of 80-90 kms. In earlier days this *Sohan grass (Oryza coarctata)* grew plentiful in Hajamaro creek and grew up to waist height. This grass is a good fodder for all types of livestock. It enhances milk and butter production. It also provides habitat for fish. Blatter 1929 in his memoir has shown Hajamaro creek as river. The fish kept in soon grass would remain fresh for a longer period of time, as flies do not prefers sitting on this grass, hence the fish remains safe from getting spoiled.

Keti Bunder town was so rich that it used to extend loan to Karachi Municipal Corporation. However, nowadays the fish productivity has declined due to reduction in freshwater flows and population pressure.



They also relate it to the reduction in mangrove forests which provide food and breeding ground for a variety of fish. Kum (*fruit of Nymphaea lotus*) also grow in Mangroves. They are considered good for enhancing milk production in camel and buffalo.



A flower of *Nymphaea lotus*

### 3.10.1 Palla fish (*Tenulosa ilisha*)

The fisherfolks further narrate that in earlier days snails, crabs and lobsters were not caught as there were plenty of other fish available. Previously, people used to catch white fish, Palla and prawns but nowadays everything is being harvested. Except for winter, Palla used to be caught throughout the year. Nowadays it is available during water flow season. It was customary in earlier days to gift Palla to friends and relatives. This tradition seems to have vanished now. The fisherfolks believe that the more the distance Palla travels upstream the river more it will be tasty. According to them, Palla fish which returned back after traveling up to Sukkur city (nearly 400 kms from sea) would be very tasty.



Theeli (*Catla catla*)

The palla traveling such a distance could be identified by its reddish head, skin and abdomen and fatty tail and dorsal area. It was a customary in earlier day to offer sacrifice (Bheta) to the Indus, when its flow reached the delta. This was indicated by appearance of Palla fish in the river. Local fisherfolks consider Palla as the fish of paradise.

The fisherfolks also possess indigenous knowledge of various kinds of fish. For example, Sua fish always lives in schools. It is highly valued fish and is used in manufacturing of operation stitching threads. Another fish species locally called as Mangro (shark) possess aphrodisiac properties. The soup of crab is good for asthma patients. Fisherfolks believe that fish is caught more during night times as it is unable to see the net. During day time fish rests.

There is a variety of traditional methods employed in fishing. These methods have evolved to meet different fishing situations. Some of these are detailed in (Box:10).

### 3.10.2 Fish habitat

Fish prefer to stay in deep waters during the winter months to hide themselves in the grasses. In summer season, it stays in shallow waters. Fish likes sweet water. In brackish water, the fish tend to come at the surface, as they feel it difficult to breathe in brackish water.

Kuriro (*Labeo rohita, Roh*) and Danbhro are tastiest among all fish. *Kuriro* has red wings, small face and is tasty. Common people may not be able to easily differentiate between *Morakho (Cirrhinus mirigala)* and *Kuriro* because physically both of them look very similar but face of *Morakhi* is bigger and its scales are thin as compared to *Kuriro*. *Khago (Rita rita)* is termed as chicken of river.

Fish move in upstream from April to July, downstream from August to December to stay in deep waters. Fisherfolks also notice that after giving eggs (spawning) fish feels hungrier and feeds more. Those fish lay eggs in flowing water by traveling long distances upstream. According to the fisherfolks observations, they may travel distances up to a 100 kilometers within an hour. There are a few fish species whose eyes lighten at the night.



Khago (*Rita rita*)



### 3.10.3 Feeding habits of fish

Based on their feeding habits, the fisherfolk distinguish fish into carnivore and grass-eating types. Jerko (*Walagu attu*), Shakur (*Channa punctata*), Seengari (*Mistus singhala*), Foji Khago (*Bagarius bagarius*), Sindhi Khago (*Rita rita*), Gandan (*Notopterus chitala*), and Chitto (*Channa marulius*) are carnivorous and feed upon other small fish whereas, Kurro, Morakho, Their (*Gibelion catla*), Sreo, Suni (*Cirrhinus reba*), Dahi (*Labeo calbasu*), and Dhanbhro feed upon grass. According to their knowledge the fish with intestines feeds on grass and dust. Male fish is identified by its hard and female by its soft fins.

### 3.10.4 Reproduction in fish

Furthermore, the fisherfolks categorize fish species into *Maleon* (without scales) and *Chhiler* (with scales). According to them, some fish species brood, while others lay their eggs in the flowing water. The eggs hatch after traveling three to four kilometers. The eggs fish with scales develop in the flowing water. These include *Kuriro*, *Morakho* and *Thelhi*. There are *roes (Aani)* in other fish such as *Jerko*. Some fish species such as *Chitto* cares its offspring for 10-40 days to protect them from carnivore fish such as *Jerko*. *Sanwal* or *Chitto* make vessel in banks to lay their eggs. They keep watching their eggs after laying them.

The fishermen have also keenly observed egg lying season of various fish species. For example, they notice that *Jerko*, *Shakur* and *Chitto* bear eggs during April, while others lay their eggs from April to August. They observe that the quantity of eggs laid down would vary in different years. The eggs developed in stagnant water then eggs will not be viable. Based on their knowledge, fisherfolks believe that all fish would vary in their weight, even if the fingerlings are thrown into same pond at the same time.

### 3.10.5 Diseases in fish

Fisherfolks narrate that a disease called *Dadr* attacks fish. In this disease the fish would look like a live fish but actually it would be dead and fleshless.

### Box 10: Traditional methods of fishing

#### Pathri (stone)

There are three parts of pathri/ bhn, these are *Kher*, *Pathro* and *Tnb*. *Pathro* is to be fixed at such place where there is flow of water or is a way of fish. At the mid point sticks of bamboo are to be fixed, 'tnb' is to be bound at three feet over the water surface and an opening of three feet is to be left, wood of door is bound with the inner part, then upper part of pathri is to be fixed and other part of wood is to be bound on top of angles, it looks like a circle room. Thereafter, ropes are to be bound on the upper part of wood and their one tale to be fixed in land under water, one part of *Kher* start from bank of lake and brought to the door of *tnb*, *dafa* are fixed with the upper part of *kher*, while pieces of bricks are attached on land, *kher* looks like a wall. Likewise, other side of *kher* is to be brought to the door of 'tnb'. This method is applied in lakes and canals. Five to six people within two to three days prepare it, about sixty thousands are to be invested, *pathreo* continues for one year, only its lower part, 'tnb', is to be fixed again and again after having dried it. *Pathro* is relocated keeping in view height of water and availability of fish. After having fixed *pathro*, fishermen make sound with metal pots on which fish go towards *pathri* and are trapped.

**Bhan:** Net is kept within two houses and there is open entrance and large courtyard, boatmen, after making heavy sound moves towards these houses. The sound is made to drive fish towards the net houses. This method is applied during autumn season and requires 8 people and 4 baots.

**Dhar:** This is very old method; it was applied when there was little water in lakes. Now a days, this method is not applied.

**Jar:** One part of jar is wider and other one is narrow. Smaller pieces of iron/lead are tied at the bottom of net with thin ropes. A rope from the middle of net is drawn out. Before throwing net, fishermen assess presence of fish. The net is thrown by holding its top part in hand and letting the other part lowering down due to weight of iron. Then, gradually fishermen lift the lower part up to get the fish trapped.



### 3.10.6 Locating presence of fish

Fishermen have powerful instincts and well developed skills in locating presence of fish. They could know the presence of fish by noticing excreta of fish in the water. They also notice that all fish assemble at a common place in the night after roaming throughout the day. Fish mostly feed at the time of night time. Therefore, fishermen set their nets at the evening as they will catch more fish during night. They also notice getting less fish on the nights of the full moon. Some fish species make sounds and therefore are easily captured by fishermen. According to them when such fish move at the bottom, the movement of grasses and reeds at the surface indicates their presence. In other cases, they notice water getting dusty at the places of fish movement.

### 3.10.7 Uses of fish fat

Fish fat is extracted through cutting and baking fish in a pot or in iron pan. The extracted oil is further baked and mixed with onions baking and then filtered and stored. The extracted and refined fish oil is used for a variety of purposes including cooking. The fisherfolks apply extracted raw fish oil to their boats every year to increase its life and to make its sailing easier, as the oily surface

prevents attachment of shells to the boat, which makes the boat heavier.

Fish fat is also fed to animals during the winter season and also applied to mango trees to prevent insect attack. Certain fish species are also used as conventional treatment of several diseases. For example, Jerko fish, after having baked is dried down and then given to the patients of Hepatitis. *Jerko* fish is considered to treat sexual weakness and weak sight. It is also used as treatment for people suffering from TB. Fish oil is also used to polish *Khurh hoofs* (big nail above the foot) of cock. The oil of Seengari fish is use to treat animal diseases. Soup of *Jerko* fish cures animals *Wau* disease.

### 3.10.8 Ways of storing fish

In order to keep fish fresh, fish are stored in wet jute sacs or in the grass of lake. In another indigenous method called *Kandan*, after catching fish by net, its backbone is broken by a sharp needle and then fish are bound with thin rope and stored in shallow water near the bank. In order to preserve fish for a longer period of time, salt, chilies and coriander powder are rubbed inside the belly of fish.

#### Box 11:

**Wran:** By splashing/slapping water and diving in water to catch fish with hands.

**Chonkn:** A circular wooden pad made babul tree is used to create sound by hitting upon water surface to guide the fish towards the net. *Chonkn* is to be set at the time of early morning.

**Jhukno:** In order to direct the fish towards the net of fishermen hit sticks on surface of water in order to produce sound, it is said Jhukno, it is done at the time of sunset.

**Batho:** Holding boat at a spot, person ahead hit stick on surface of water for three times while person behind also hit for four times, meanwhile, first man throws net to catch fish.

**Um:** Is way of catching fish by using net only without any other thing.

**Pato:** When water of river enters in lake, as a result, new fish also enter into lake Fishermen fix sticks, rope and net at the entrance, during entering fishes jumps out and fishermen catch it.

**Kurhi:** Net is made out of cotton woven around six wooden sticks. It shapes like a *chonro* (traditional hut in desert area). The sticks are set at the identified spots where grain was thrown. This is called Lakho. The fishermen find after finding presence of fish felt through feet leaves the upper rope to get the fish trapped into the net. The movement of leaves over the surface of water is also used as indicative of presence of fish.

**Bandho:** Bandho is like a house and is made up by the wood of *Lai (Tamarix spp.)* It has two sides both of which are attached with sticks of various plants. *Hathreo* is a way of catching fish only by hands.

**Ojhan:** Two people, standing on boat, throw out net in water at evening time and push the net out in morning.



### 3.10.9 Signs of fresh fish

The fisherfolks of Indus ecoregion also possess indigenous skills of knowing freshness of a fish.

- Shining scales of *Kuriro* fish are a sign of its freshness. Scales of a non fresh fish would appear white and dry and the colour of its gills would be reddish.
- If the gills and belly of a fish is reddish, it is sign of fresh fish. If they are black or brown in color, then the fish is stale.
- If the body of fish is pressed with a finger and if the pressed area appears softer, it means fish is stale, but if not, then the fish is fresh.

### 3.10.10 Fish as indicators of rain

The fisherfolks believe that if *Kuriro* and *Morakho* fish start jumping out of water, it is sign of forthcoming rain.

### 3.10.11 Treatment by usage of fish

Fish like *Seengari*, *Kuriro*, *Jarko*, *Dahi*, etc. have medicinal properties. The fat of *Dahi* fish is used to prepare tablets for treating TB. If goat is attacked by *Samany* disease, soup of *Jerko* is remedy for it.



## 4. Indigenous Knowledge in Conservation Context



Like domestic animals, the people of Indus Ecoregion possess rich knowledge of wildlife. Wild animals and plants have traditionally been used in rural areas for meeting various livelihood needs including hunting for food, earning, medicinal uses, etc. There are many social, cultural values and myths associated with various animals and plants. It is not very unusual to find people in rural areas of Indus Ecoregion with the names of various plants and animals. One could easily assume this due to rural peoples' direct interaction with the nature.

### 4.1 Indigenous knowledge related to honey bees

Honey collection has been one of the sources of livelihood for poor people in the rural areas of the Sindh province. Honey collected in the wild has traditionally been used for a variety of household and medicinal uses, as well as earning income. This association over generations has equipped the rural people with the knowledge of behavior of honey bees, seasons and indigenous methods of honey collection.

According to local knowledge, there are two

types of bees, local and exotic. Local bee is smaller in size and the exotic bees are larger in size. The people of Chotiari recall that the exotic bee was introduced from abroad some 30 years ago. They have noticed that the exotic bees come together in a swarm of thousands of bees and make sound where as local bees do not make sound.

#### Box 12: Home-remedies with honey

Honey has been traditionally used as treatment for several diseases. Honey of babul tree cures palsy (muscle numbed), and its gum (white gum) is remedy for joint-pain and waist-pain, though red gum also cures waist-pain. Honey also eliminates cough and heart-attack, purifies blood and veins too. Honey of Babul tree is derived out from its flowers, while the honey of red roses and other flowers is less beneficial than babul tree. Honey wax has been traditionally used to strengthen cotton threads.

*Maakhi* forest in Chotiari area draws its name from honey bee (*Maakhi* is Sindhi word for honey bee). According to them, in past, they could observe two to four colonies in a single tree which would yield from one to two kilos of honey per colony. This situation has changed these days due to loss of forest and



introduction of the foreign bee which is bigger in size and predated upon smaller local bees. Thus, the production of honey has lessened.



A honey bee searching for Nectar

In addition, use of pesticides in agricultural fields is also contributed to the extinction of local bees. They believe, this is the reason that honey bees are found in large numbers in *Mithi* (a town) area of Tharparkar district; where people do not spray chemicals upon crops. These observations of local people indicate their keen research on changes in their surrounding environment; which could be useful for scientific enquiry and analysis.

#### Box 13: Honey bees as sign of fortune

A home was considered lucky if a honey was nesting in it. People consider it a bad omen to disturb a nesting bee colony. On the contrary, honey bees flying over ones house were tried to get sit in by spraying water towards them. The trees and hedges around the houses attracted bees to nest in them. Now, this tradition is vanishing due to population growth, house are squeezing day by day, trees are being cut so bees have migrated to other areas. Gifting honey is still a social practice in rural areas of the Indus Ecoregion.

#### 4.1.1 Knowledge on behavioral aspects of honey bees

According to their knowledge, bees eat their collected honey when weather turns cloudy or



A Marsh crocodile going to hide in vegetation

Cold, for the reason that rain harms bees, as trees may fell down. Similarly, people prefer not to disturb honey nest during the winter season, as honey comb is considered empty of honey.

A honey collector revealed that bees collect honey in their nests within 20-30 days. If honey is not collected at this time, bees would eat honey themselves, within a month's time later.

The traditional method of collecting honey is to use smoke to repel the bees. This job is considered 'easy said than actually done', as bees usually fight back to protect their nest. Indicating their knowledge on behaviour of honey bees, local people reveal that bees do not attempt to bite/attack anyone coming close to their nests at the time when their hives are empty; however, they will attack to protect their nests, when they are full of honey. Interestingly, they believe that bees collect nectar during 10 am to 3 pm and make honey during the evening time.

#### 4.2 Indigenous knowledge related to crocodiles

People in Chotiari area of Indus Ecoregion possess rich indigenous knowledge of crocodiles, which inhabit the desert wetlands of the area. According to their knowledge, crocodiles inhabited Nara Canal from Sakhar to *Green Naro*; Kalach Lake to Naro; and also in sweet and salt lakes, some 20-25 years before, crocodiles were in large numbers. However, their numbers have drastically reduced due to illegal hunting for trade in its skin (Box: 14). Further, the drying up of lakes and ponds due to abstraction of water for cultivation purpose is another major threat facing them. Due to these reasons, the crocodile population has shrank to a very



A Marsh crocodile



small number in Nara area.

#### 4.2.1 Knowledge of crocodile habitat

They believe that the area from Sanghar Bakhoro Bridge to North Pagsary is the rich habitat for crocodiles. In conservation context, this knowledge could very usefully be applied to identify potential sites for various conservation measures related to the recovery of crocodile population.

The local people also possess keen knowledge on movement of crocodiles between the Nara Canal and the desert wetlands. They observe that basically crocodiles are inhabitant of Nara canal. However, they move out to surrounding lakes in search of fish and other food, as the fish in Nara canal moves fast with the flow of water. Crocodiles prefer to move back to Nara Canal during the summer season (June or July) because the standing water in the lakes turns hot. According to local people, crocodiles travel singly and may cover a distance of up to 50 kilometer in a day. Crocodile would never live at a place, where there is no fish. In the desert wetlands of Nara, it keeps moving between different lakes by smelling the fish while climbing up the sand-dunes.

They have observed that crocodile mostly comes out of water in evening or at night time. Crocodiles do not smell foul. Interestingly, they believe that jackals are capable of hunting a crocodile. A crocodile would loose the fight, if it is surrounded and attacked by four jackals at one time.

#### 4.2.2 Differentiating between male and female crocodiles

The local fishermen tell that the male crocodile has bigger face than that of the female. Furthermore, the nostrils of a male crocodile are raised upwards, while that of the female they are tilted downward.

#### 4.2.3 Food of crocodile

Crocodile is fond of rabbit and dogs and keenly eats *Dahi* fish, if a dog enters into the Naro or lake crocodile would quickly catch it. Crocodile never misses a swimming dog. A rabbit crying in the wild is also targeted by the crocodile.

crocodile. Crocodiles may also hunt goat or sheep when they come for drinking water from Naro or Lakes.

#### Box 14: The uses of crocodile skin skin of crocodile

According to local knowledge, shoes, bags, jackets and such other things were made from the crocodile skin. Such products made from the crocodile skin are more durable as compare to other kinds of leather. Crocodile skin trade was more in past but, now the trade has reduced due to legal restrictions.

#### Fat of crocodile

The fat of crocodiles is used to cure many diseases. The local people believe it as useful traditional treatment of ailments like piles and asthma. The tail of crocodile is rich in fats.

#### 4.2.4 Knowledge on reproduction

According to local knowledge, the female lays eggs before rains by digging pits on the shore of lake. When it rains, the female comes to know that it is time to break/open the eggs to hatch out the baby crocodiles. At the beginning, the baby crocodiles appear like a lizard. The mother takes care of young ones for 2-3 days in order to protect them from predators such as Jackals. After four days female takes them into water under her supervision. Thereafter, the young offspring get dissociated from their mother to face the challenges of their independent survival.

Further, according to local people, one brood may contain as much as 70 newborns and in some cases even up to 100. Some people believe that two newborns emerge from one egg which is of the size of the egg of *Kaz* (*Swan*) (a bird). The crocodiles grow moderately faster, for example, within two-three years, they would attain length of 5-6 feet. In the first year, they are believed to attain length of three feet. The size of crocodile may vary from 5-6 feet to 15-16 feet. The small size crocodiles are more agile and attacking than the large size crocodiles which are less agile due to their heavy body structure.



### 4.3 Knowledge about other wild animals

#### 4.3.1 Wild boar

The key informant in Keenjhar area revealed that wild boar gives birth to about 17-18 offspring two times in a year. The babies feed on mother for 20 days and it takes the young piglets 1.5 years to reach adulthood. They feed on grass, rice and sugar cane etc. The female gets pregnant during the season of *Chet spring*. During rutting season, a male wild boar would not allow other males to come near to female. The mating continues for 7 to 8 days. The female becomes violent during pregnancy period and would attack human beings.

Based on their structural features, they identify four kinds of wild boars such as *Wono*, which has a small neck and thin nose. It is taller in height and has smaller legs. *Chhotp* looks like a Rhinoceros. *Bhoro*, is brown in colour with black tail and *Kabera*, which is black in colour.

Wild boar abode near water-logged areas during summer season. It prefers to live in *Typha* and *Reed* grass. Wild boars are fond of peanuts grown by people in Makhi area of Chotiari. It prefers to sit on a ground where black oil has been split which is believed to help it get rid from lice attack. Some minority communities (*Bheel*, *Bagri* and *Gurgula*) eat its meat. Wild boar takes rest during day time and feeds during night. People notice boar snoring like a man while sleeping.

#### 4.3.2 Hog deer

Hog deer prefers to live in areas vegetated with Dabh; (*Saccharum spontanium*), Kanh (*Phragmatis australis*), Sar (*Saccharum munja*), Pun (*Typha elephantia*) and Lai

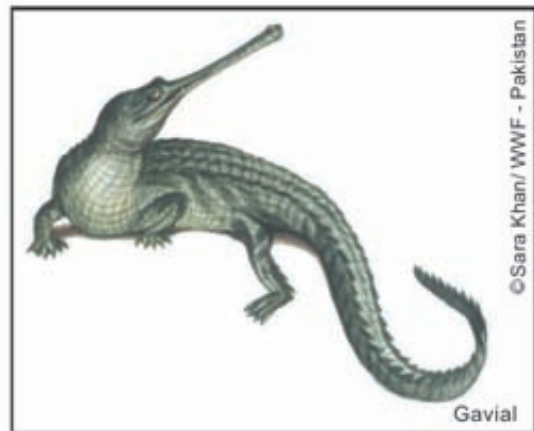


(*Tamarix ahylla*) etc. There are three kinds of Hog deer such as *Chmrel*, *Soohr* & *Banher*. Hog deer's favorite food is pods of Kandi and leaves and pods of Babul, as well as all grasses. Female Hog deer has no horns. During rutting season, male calls female by making a whistling sound. Hog deer mostly feeds during night time. Interestingly, some people believe that Hog deer eats snake too. When it sees a snake, it jumps over it and smashes snake head and then eats it. People in the Chotiari area notice that the Hog deer grazes together with goats and even exhibits mating behavior identical to that of a goat.

The people also know certain traditional medicinal uses of Hog deer horns. The powder made from horns of Hog deer is used to cure Asthma and eye disease in animals. Such medicines are used in winter season only.

#### 4.3.3 Gharial (*Seesar*, *Gavial*)

About 50-60 years ago, Gharial was present in large numbers in Nara canal area and the surrounding lakes. Seesar has large snout with teeth around it. It is believed to be stronger than crocodile. The animal has become extinct in the area for the reason of being persecuted for its skin and out of retaliation for attacking people and their livestock. Like crocodile, Seesar also comes out of lakes and Nara canal during winter season to get heat of sun. Testicles of Seesar are used as traditional medicine to increase human sexual vigor.





## 5. Knowledge on Hunting/ Taming of Wild Animals



A trophy hunt of an Afghan Urial (Asian Wild Sheep) found in Sindh

**H**unting of wild animals has remained an integral part of livelihoods of rural communities of the Indus Ecoregion. In earlier days, hunting was done to meet domestic needs for gathering food (Box: 15). Still, many wild animals are hunted in rural areas at the demands of Hakims for preparing traditional and homeopathic medicines. Moreover, over the time, the activity has become a hobby and passion for the rich and a mean of expanding relationship with influentials. The hunting methods have also transformed from primitive techniques of using bow, traps, etc. to modern techniques of using guns and hunting dogs. People remind that earlier during British regime, hunting was strictly regulated due to effective law enforcement. Nowadays, it is largely persecuted. Hunter used to follow certain rules. No female of Hog deer was targeted. Summer is the egg laying season of birds that is why bird hunting was avoided during summer. Now a days, these ethical codes of hunting are not followed.

There are several traditional methods used to catch birds. The birds in water bodies are caught by mimicking bird (wearing a bird head like hat) and secretly swimming to catch

the bird by hands. The birds fail to differentiate and are caught.

### Box 15: Hunting for food

Many minority tribes in rural areas of Indus Ecoregion hunt wild animals for food and hides. They eat Jackal, Crocodile, Rabbit, Wild cat, Monitor Lizzard, Wildboar, Tortoise, Gharial, etc. There communities include *Gurgula, Baala, Shikari, Daffair, Sami, Jogi, Oad, Bagri, Baaleshahi, Colhi, Hdwar* and *Bheel*. The people belonging to *Meghwar* community collect skins of dead domestic animals for making shoe leather. *Hdwar* mostly collect dead animals for bones. Some tribes such as *Kaheris* tame Black Bears. Poor people belonging to Muslim community also hunt animals for food, except those which are religiously prohibited.



A duck shot illegally near Keenjhar Lake



### 5.1 Hunting of partridge

In traditional way, trap nets are set in jungle with a living partridge kept inside, which calls other partridges to assemble and thereby they get trapped. Partridge's hunting is done mostly in winter. Hunting can be done from morning till noon but not after that since the day turns hot and

Partridge will not flush. Partridges prefer to live in Lai (*Tamarix spp.*), Dabh (*Desmostachya spp.*), reeds (*Typha spp.*) and cotton-crop. The partridge egg hatch during cotton harvest season. Black partridge sits for brooding in pair and yields/gives two to three new chickens. Gray partridge is more in numbers than the black partridge. In Chotiari area, Makhi forest and Avadh provides rich habitat for partridges. Now a days due to water logging and hunting pressure partridges have migrated to other areas.

### 5.2 Migratory birds

The people living in Chotiari area reveal that before construction of Chotiari reservoir, the network of sweet and brackish water lakes attracted large numbers of migratory birds. After the construction of reservoir, these lakes have been combined; the natural grassland areas, which provided plentiful food for birds, have come under water creating shortage of food. The local people believe that during the day time the migratory birds stay in sweet water lakes and move towards brackish water lakes during the night.

Among the migratory birds, coot come and migrate alone, it never flies in flock. Coot arrives first and leaves first during the migratory season. Thurando, Budhano and Khoonharo leave at the end of the migratory season. After harvesting of wheat crop cheeklo, Pwar and Gihno etc. start coming. These birds are larger in size. Cheeklo, Neergi (Shoveller) and Gahino fly to different lakes



Green bee eater

Crow pleasant



A flock of migratory birds near Chotiari Reservoir

in search of their food and finding a peaceful wintering ground. In local language this flying is called Jhaaro. Usually, the birds follow each other while resting over a water body. They land watching the other birds.

### 5.3 Birds as indicators

- Singing by Taro bird (female Indian Cuckoo) is symbol of forthcoming rain. It is said that Koyal (cuckoo) is male and Taro is female.
- If Chenayo, Pen and Karo Khanbhao birds hunt over a specific place of lake, it means there is fish. Fisherfolks follow these indicative birds to set their nets.
- Arrival of Vaheo bird is indicator of *Chet* season. *Chet* occurs at the end of summer season. During *Chet* people notice various biological changes such ripening of millet crop, dispersal of seed of *Desmostachya bipinnata*, etc.

The names of certain rural tribes are also believed to have originated due to their association with hunting activities. For example, it is believed that the people belonging to Hingora (a rural tribe) used to be hunters and ate every kind of animal. The name Hingora was assigned to the tribe because once a Hingora person had kept a Hing in his shop which has a peculiar smell. Therefore, he was called as Hing. Later, this word was transformed to *Hingoro* and continues to exist since then.

Similarly, the name of another tribe called *Daffair* is believed to have originated as result of their ten times denial of the motivation by a saint for converting to be Muslims.



People hunt all the birds except Koonj (Crane) because it is believed that if someone kills Koonj, then its group/flock will pursue the killer and bird may bruise the killer.

## 5.4 Indicators of changes in weather

Under the agriculture calendar, the farmers of Indus Ecoregion plan their activities by observing changes in their surrounding environment such as direction of blowing wind, movement of stars, etc. For example, the start of wind blowing from North indicates start of cotton growing season. Before the arrival of *Kati* (Autumn season) and at the end of *Kati*, eastern hot winds start blowing which indicates that it is time to stop sowing cotton crop. *Kati* is related to appearance of constellation of seven stars in the sky.

The indigenous people had traditionally used appearance of various stars in the sky at different times as indicators of changes in season. In other cases, appearance of star had been used as indicators of damage to their livelihood resources such as tree, crops, hot and cold weather, etc. The most commonly used stars include *Kati* (constellation), *Tero* (three stars in a row), and *scorpion tail* (shape like scorpion tail/hook). The movement of these stars in the sky is used to assess time and directions.

When *Salvadora* sp. (Khabhar) comes to blossom, it is sign of arrival of autumn. After 15 days season starts to sow mustard (sirhan) thereafter, Lucerne, Gobi (Cabbage) and other oil-seed-crops. After the arrival of winter, wheat crop is grown. The beginning of southern winds are predicted by observing the ripening of *Zizyphus* sp. (Ber).

The people also used some superstitious methods of predicting water flows in the Indus River. For example, in Pai area, it was a common perception that when there was shortage of water someone will climb up on a tree and search eggs of crow. If there were two eggs in the nest, it was assumed that there was little time left before flow of water will reach and if there were four eggs means water will certainly arrive very soon. It seems that the

periodicity of laying of eggs by crow was used as a 'natural clock' to coincide with the water flows in the river.

The people living in riverine track of Indus Ecoregion use certain indicators for noticing changes in river flows. For example, by taking a handful of river water they notice change in color of water and quantity of silt in it to speculate if it is raining at upper reaches of the river.

If *Seengari* fish is found in the river, it indicates that water flow of Ravi River in Punjab province has arrived, but if *Jarko* fish is found in abundance, it means that the water from dams has arrived.

At the end of cold weather, rise in river water is expected, the fish comes to the water surface for feeding and white butterflies with one inch length become abundant covering the surface of river making it white. These butterflies are food for fish, turtles, crows, and their appearance creates bad smell. These are indication of rise in river water. Interestingly, the people in areas around Pai forest narrate that if they can not see the hills of Laki, which lie across the river, they get sure that the level of river water has risen up. In fact, it is because of evaporating water vapours that prevent visibility across the river, which is used as indicative of changes in the river flow.

When *Ber* tree blossoms, it means it is beginning of sowing wheat crop. Another biological indicator is that cow dung would evaporate quickly after being dropped.

### 5.4.1 Birds as indicators of weather change

The people in Keti Bunder area use various birds as indicators of weather change. For example, arrival of Keenha (Mew Gull bird) is treated as indicator of arrival of winter season. When this bird circles in sky like kites it is indicator of storm.

Another bird called Seelan is regarded as indicator of arrival of summer season. This bird migrates out at the end of August indicating end of summer season. The out migration of this bird is indicator of arrival of other migratory birds in the area. Similarly, arrival of Red Crane (*Koonj*)/Lulh and



Khumbo birds in Keti Bunder area is indicator of freshwater flow in the Indus. When cranes arrive, people start preparing their fields for cultivation. Khumbo is a small black in colour and duck like seabird.

#### 5.4.2 Animals as indicators of weather change

- If *Kuryal* cries in night it means it has seen water.
- If frogs begin jumping after rain this means that rain will continue. Frogs making heavy sound also means that rain will continue.
- If snake climb up the tree, it means there will be rain.
- If ants start shifting their eggs, it means rain will come. Likewise, mouse also collects its young during the onset of rain.
- If owl and cheeho (Robin) (small reddish spotted bird) start singing at 3 am, it is indicator of start of spring season. Then, Hureo bird (Lark) appears and flies up in the sky. When this bird comes down, it means wheat has ripened and is ready for harvesting.
- If any domestic animal/cattle raises its head upwards, it means, storms will come. Likewise, if cow hides in trees or comes back quickly in cattle yard, it is a sign of upcoming rain.
- If buffalo does not like to drink water, it also warns upcoming disaster such as oceanic wave or earthquake.
- If camel runs away towards Kohistan means it is about to rain; even master of camel restrict it but camel secretly flee away before the arrival of rain. If partridge moves up the trees from ground it is clue of forthcoming rain.

#### 5.4.3 Indicators of strong winds

In Keti Bunder area local fisherfolks use various signs to predict changes in weather. For example, it is believed that if wind starts blowing at the time when *Sual/Dann* star appears in the sky, it means rain or storm will come. *Sual/Dann* star appears during August, September.

When Malhar (Dolphin) starts jumping in the sea, it means storm/cyclone is forthcoming. Similarly, if the blowing wind suddenly stops and bubbles starts appearing in the water, it means storm is forthcoming.

Further, if colour of water appears greenish it means storm is following. Fisherfolks of Keti Bunder observes that fish will disappear 2-3 hours before the storm. Hence, local people treat it as an indicator of storm. They also reveal that a few years back, before earthquake, birds started making a lot of noise but people failed to understand their unusual behavior. Coming together of three simultaneous tides in sea predict future cyclone.

In some cases certain traditional musical instruments are used as indicators of weather change. For example, if the sound of *Boneedo* (a clay-made musical instrument) becomes heavy, it means more water will flow in the river.

#### 5.4.4 Clouds and stars as indicators

The fisherfolks in Keti Bunder also use movement of clouds to predict weather changes. For example,

- The clouds from north side with thunder would surely bring rain. Whenever the clouds with thunder appear from east, they would bring rain with wind.
- Clouds rising from south-western side are the indicator of big storm. Whereas, those appearing from northern side are considered to bring less damaging storms.
- People believe that at the end of winter season, a cloud emerges from the south which is the indicator of end of winter season and start of wind blowing from southwards.
- When the *Ladho* star disappears in the month of Jeth (Hindu calendar) as wind blows from south means water will come. When this star disappears it brings some disaster like storm/cyclone etc. If it keeps

appearing up to winter, it means milk quantity in animals will decrease.

- When the *Aith* star (Spinning Genny) appears means milk quality in animals will reduce.
- When the *Adhari* star, when appears in the month of Asoo (Hindu calendar), it means summer is ending and mosquitoes will diminish and animals will get to rest. Up to *Kati*, (constellation) animals will keep standing because of heat and mosquitoes. At the appearance of *Kati* there will always be little or more rain. However, if there is lightening in the sky (Thunder) at the time of appearance of *Kati* (constellation). It means there will be no rain.
- If stars appear very bright in sky, it means wind will blow.

#### 5.4.5 Indicators of rain

- When ants come out of their nest, is the indicator for rain.
- When cow and buffaloes sweat, it means rain is forthcoming. Buffaloes and cows starts smelling by keeping their heads up when rain is about to come.
- *Sobarr* (Probably mealy bug), this is 1 inch in size reddish black colour Insect which mostly live in Babul, Karir and Lao tree. The bite of this insect causes irritation. When this insect appears the most, it means rain is forthcoming.
- An insect called (Jalhati) emerges and starts biting the most mean rain is forthcoming.
- Dog climbs at higher places like rooftops that means rain will arrive soon.

#### Box 16:

Dates	Phenomenon
9 to 15/ 16	Jawar
17 to 22/ 23	Baggi
24 to 02	Jawar

- Warm winds start blowing means rain. On the contrary blowing of cold wind is considered an indicator of drought.

#### 5.4.6 Indicator of sea level rise

The phenomenon of rise in sea level is locally termed as 'Jawar' and fall of seawater is called 'Baggi'. The fishermen relate this phenomenon with moon cycle. According to them, in a month, there will be two Jawars and two Baggis as per calendar of moon dates mentioned in Box: 16.

The fisherfolks believe that if there was a cyclone or storm in the sea, then both Jawars could come simultaneously together. In that case they are called as 'twins'. This phenomenon is called as breathing by sea. The traditional way for the measuring depth of seawater is estimated through 'waam' which means the distance between the fingertips of two arms when spread wider apart. The various indicators use to predict changes in sea level rise are as under:

- *Kati* (constellation) disappears means sea water will rise
- *Keenha* bird (Mew Gul) starts migrating back means sea water will rise. Thereafter, 10 to 15 days sea will become rough.
- The wind blowing from east and north (during chet and Akharo months) which creates irritation or annoyance is indicator of freshwater flowing down the Indus river.

### 5.5 Advent of different season / weathers

#### 5.5.1 Spring

Arrival of spring is indicated by growth of new leaves first of Neem, then Babul and thereafter of Kandi. If Taro (bird) sings, it is sign of spring.





### 5.5.2 Winter

If Lai (*Tamarix aphylla*) blossoms it means winter has arrived. This is time to apply fertilizer to rice. Then, crow appears, it means cold weather is about to start and it is time to start harvesting of rice. Thereafter, Sar, reeds (*Saccharum sp.*) bears seed which continues for 40 days. It is also believed that when young shoot of reed (Sar) gets strong enough so that it does not bend due to sitting of a Myna (Starling) (a bird), it is the indicator of the beginning of winter and the season of wheat crop. During this season, snakes and other awful animals hide in holes (hibernate); migratory birds start arriving and rutting season of camel starts. Further, if bullock and buffalo start heavy breathing in the morning, it is presumed to be the start of winter.

According to Hindu calendar, this is the month of *Katti* (constellation) so crops sown during this period area called crops of *Katti*. The Hindu religious festival called *Dyari* is celebrated on 25<sup>th</sup> of *Katti* month. There are also certain religious superstitions associated with the sowing of wheat crop. For example, it is said that "plough wheat crop so as *Dyari*, (*Deewali*) (*Religious festival of Hindu's*) can see it".

Further, blowing of wind during *Dyari* (*deewali*) is prophesized as the indicator of wheat yield. For example, if a wind blow on first night, of *Dyari* (*deewali*) then it indicates that early wheat sowing would yield plenty of grain. However, if wind blows on the second night it indicates that late wheat sowing would yield more grain. If wind blows from midnight then mid-term sowing of wheat is believed to yield plenty of grain. The farmers are also aware of the fact that wheat crop would yield more if there was heavy cold. At the end of *Katti* wind, north facing sides of *Khabbar* (*Salvadora spp.*) wither. If hot southern wind blows it is called *Bokhiro*, it weakens roots of wheat crop and hence the crop withers. When *Manghi Siran* (southern wind blowing during the Hindu calendar month *Mangh*) blows, then, it is time to thresh wheat. *Manghi* nights are famous in lower Sindh region. The fall of pods (*palro*) of *Babul* is indicator of end of winter. It is believed that

initial winter days are harmful for cows and final winter days are harmful for buffaloes.

The people of Indus ecoregion also relate seasonal changes with appearance of stars in sky. According to them, during the whole winter, 40 stars appear in the sky at different periods of time which include constellation (*Katti*), *Kakroo*, *Awans* of wheat (*Ann Joon Muchoon*) and *Kund* etc. It is believed that appearance of *Kund* (star) is indicative of end of the winter season. Blossoming of mango and the *babul* trees, flowering of camel thorn, fruiting of date palm tree, are all symbols of ending of winter.

### 5.5.3 Summer

Disappearance of *Katti* (constellation) is indicator of beginning of the summer. Some times it also rains during *Kattii*. Cattle owners pray for the rain in *Katti* because due to rain, grass and water become plenty in very beginning of the season. Further, ripening of *Peroon* (fruit of *Salvadora sp.*), blowing of southern wind and falling of pods of *Babul* are indicators of start of summer. During this season cotton is cultivated. During summer, extremely warmer periods are locally referred as *Chet*. These periods are again related to various ecological changes. The first *chit* appear with the arrival of summer then different *Chet* arrive such as, *Chet* of *Dabh* (*Poa cynosuriodes*) thereafter *Chet* of *Lai* (*Tamarix aphylla*) *Chet* of *Sar/Kana* (*Saccharum munja*) and *Chet* of reed. In this way summer ends and winter begins.

### 5.5.4 Autumn

The people of Indus ecoregion related different ecological events as the indicators of arrival of autumn season. For example, if *Aaro* (bird) starts singing at night, it means autumn is arriving. During autumn leaves of *Jaman*, *Shisham*, *Neem* and *Siris* trees fall. First of all, leaves of *Siris* would fall. The *babul* tree would start bearing flowers. Wasps would leave their nests (*Aakhero*) to hide inside houses and fissures in walls and their stings would become ineffective. Partridges would start singing and baby crows start flying. This is time of harvesting of cotton Crop. When *Kandi* (*Prosopis cineraria*) and *Mesquite* trees start sprouting, then it is



presumed the start of autumn season.

When Sar (*Saccharum munja*) kana (Reeds) starts flowering, it the time end of the autumn and ripening of Millets. First of all silky flowers of *Dabh* (*Poa cynosuroides*) then *Munj Mung bean*, then *Tamarix* sp. (Lai) and in the end *Desmostachya* sp. (Sar-kana's silky flowers emerge. This is known *Chaleho* (forty days rotation). Sometimes, the expiry of such season invites rainfall. The clouds of such rainfall appear from the corner of north/west. Sometimes, it thunders only without any shower. In this season the bolls of cotton get ripened.

### Hindu Calander

S. No.	Name of Month	Length	Start date
1	Chaitra (Chait)	30/31	March 22*
2	Vaishakh	31	April 21
3	Jyaishtha	31	May 22
4	Ashadha	31	June 22
5	Shravana	31	23 July
6	Bhadrapad	31	August 23
7	Ashwin	30	September 23
8	Kartik	30	October 23
9	Agrahyana	30	November 22
10	Paush	30	December 22
11	Magh (Mangh Siran)	30	January 21
12	Phlgum	30	February 20

#### 5.5.5 Spring

Spring starts from the 15<sup>th</sup> of *Maangh Siran*. The indicators of beginning of spring season include, days become hot and nights cold, wheat crop become ready for harvest, Shisham tree starts bearing new leaves and mango trees start blossom. First of all it is babul which starts flowering, then Kadero (*Alhaji* sp.) then Neem, mesquite and mango trees. When scorching heat starts, it is presumed to be the end of spring.

If hotness rises, it is sign of rising of level of river water, likewise if more winds blow, it is sign of reducing level of water. Thereafter appears a whirlpool, like a well and crying sound comes out; it shows that new water of river is about to reach here. Level of river water rises during summer.

#### 5.6 Indigenous plants

The indigenous trees of Indus Ecoregion include Khaber (*Salvadora oleoides*), Lai (*Tamarix aphylla*), Kandi (*Prosopis cineraria*), Babul (*Acacia nilotica*), Berries, etc. These trees are gradually vanishing. Local people of Indus Ecoregion have used these tree species for a variety of purpose such as for furniture, fire wood, agricultural implements, fruits, medicinal purposes, etc.

Traditionally, different names of plants and animal have been used to call people such as Karir (leafless bush), Ak, Tooh (Bitter-apple), Khabar (*Salvadora spp.*) Kadero (camel thorn), Babul, *Anb* (Mango), Nim (the Neem tree), Zaitoon (Olive), Leemo (Lemon), Soof (Apple), Darhoon (Pomegranate), Basar (Onion), Mithu (Parrot) etc.

Previously riverine forest contained full density of species of flora and fauna. They were a source of livestock grazing, honey, gum, lac, fuel and timber. As such, these forest source of livelihood for local communities and revenue for the government. Due to decrease in river water, the forests have degraded. Earlier, wildlife was so much abundant that during flooding many hog deer used to get drowned.

Bahan (*Populus euphratica*), a riverine tree species was in abundance and supported lacquer industry. Its wood is light in weight, durable and resistant to termite attack. It used to occur naturally in swampy patches. The wood was best raw material for match factories in Tando Adam town. The leaves of this tree are fodder diet for Hog-deer.

Lac was one the important products of riverine forests. Matiari and Khabrani used to be the biggest centers of this product. Due to deterioration in riverine forest, lac has ceased to exist which has deprived people of their livelihood. Lac collection was a big business and a source of livelihood for many people. It is estimated that one tree yields ¼ Kg of gum and 20-30 Kg of lac.



### Box 17: Perception of local people about Khaber (*Salvadora oleoides*)

As Syed caste is believed to be superior among all castes likewise we can say Khaber is superior tree among all trees. There are different aspects of its importance, it was crime/censorious to cut Khaber, it is famous for being sign of different seasons, used in medicines, ending Sim (salinity) even grow during the drought season and fruit for poor.

It is also called tree of graveyard; it holds blossom/bud at the half-winter and when it holds Peron (fruit like berries) that means summer is to be arrived and people lose their expectation of rain if it dries up. It is used in medicines for treating different disease as well as it is used as for tooth brush. Apart from it, there are many other usages of it, such as lower part of plough, called Chocho, is made of it. Poor people use it in their homes' construction because white-ant can't erode it.

It has flexible wood therefore it is used in handles of axes, spades, pickaxe and hammer basis of cot and cradle are also made of it, it is a shelter upon the graves and fence around graveyard. Its Peron/dried Peron is like dry fruit for poor and also sent in gifts to farther areas.

Honey bee, doves, wood-pecker, wasp, fosi (Huming Bird) and Wahi etc like to make their nest in this tree; it has no thorns and it can face storms and rains. Foxes, Deer and Rabbit are habitual to take shelter them under its shadow/shade. Even snakes take refuge under its shade during the hot days and cold days, cobra, Lundi (Viper) Kunbharo snakes mostly found there. Khaber protects animals everywhere; it provides shade to cow, goats and sheep, and it also protects life of goats during the rainy season. Camels and goats life depend upon it during the drought. Despite of all such important usages, in Mukhi, it has been uprooted by army under defence quota, and now it is cut for few rupees and being sent to factories of chip-board, besides, its roots, having made tooth brush, are sent to factories of foreign countries.

In some areas such as Mehar Taluka, Henna has been a traditional source of livelihood for local people of the area. According to local knowledge, Henna has three cycles of harvesting. The second harvest of Henna is rich in colour as compare to the first and last harvest.

Karir is one of the indigenous trees of this region. Blossoms/buds of *Karir* (*Capparis decidua*) are called *Bati*. Its flower is called *Kusi* and green unripe fruit of *Kusi* is called *Doonro* and ripe fruit is called *Paka*. In past, the pulp of *Paka* was stored after removing seeds and skins. The rural people used the stored pulp in place of rice dish as well as making drink. Rural people also use *Doonra* to cook dish or pickles.

Many indigenous plant species form an integral part of the culture of Indus Ecoregion. The great poet of Sindh, Shah Bhitai has poeticized qualities of these plants in his poetry. These include *Kandi* (*Prosopis cineraria*), *Kikaror Karir* (*Capparis decidua*) *Neem* (*Azadirachta indica*) *Cactus*, etc.

This is indicative of how nature has influenced the cultural aspects of Indus Ecoregion.

*Kandi*, another indigenous tree species has also remained an integral part of livelihoods for rural people of Indus Ecoregion. The fruit pods of *Kandi* are locally called as *Singri*. When *Singri* is fully ripened it is called *Khokho*. Poor people use to cook dish of *Singri*. *Singri* is considered as healthy diet for goats and camels. *Kandi* (*Prosopis cineraria*) tree is considered as a sign of prosperity. For example, in desert (Thar) area, it is famous that if someone has four or five trees of *Kandi* (*Prosopis cineraria*) within his compound he is considered to be safe from effects of drought and will not have to shift to another area. Local people differentiate two varieties of *Kandi*, the one which has more thorns and less bark is called *Kandi* and the other one which has fewer thorns and more bark is called as *Kando*.



### **Mangroves:**

The local people of Keti Bunder reveal that continuous grazing by camel has damaged mangroves a lot. In earlier days camels used to be shifted to the interior Sindh for grazing, during winter season. But nowadays they graze in mangrove throughout the year around. Probably, this shifting of camel to the interior Sindh allowed sufficient time to the new foliage to regenerate and the new seedlings to establish.

## **5.7 Traditional medicinal uses of plants**

Wood of Khaber (*Salvadora* sp.) had traditionally been used in construction of clay made castles for the reasons of its strength and durability against termites. Khabar branches provide the function of iron-rods to hold the clay walls.

Karir (*Capparis decidua*.) has traditionally been used to cure rheumatic pain. The older the Karir tree more beneficial is it considered. The oil and powder extracted from Karir plant are believed to enhance sexual strength. Karir oil is pain-killer and used to join broken parts of body.

Cotton roots have been used as traditional medicine to cure cough, if ash of burnt roots is taken and mixed in black tea.

Babul tree is most precious and is used in traditional medicines. It is believed to cure asthma, sugar and urinary diseases. Its roots and leaves are considered valuable for human body energy. *Tharo* (wine) is also made out of it. Animals feeding on Babul would remain healthy throughout the year.

Bar/Banyan (*Ficus bengalensis*) is considered useful in increasing blood. It gives energy by using its dried roots with milk. It is also used as treatment for Diabetes.

## **5.8 Indicators of fertile land**

The peasant community of Indus Ecoregion also uses various indigenous indicators of testing the fertility of soil (Box 18).

For example, by throwing clay jar on tilled field, if the jar is not broken, it means that the land is well prepared. Likewise, while ploughing the land, if dust starts rising behind the plough, it is indicator of best land preparation and ready for cropping. The land with clay pebbles is considered highly fertile.

There are also certain biological indicators of testing quality of land. Local people also use different tree plant species as indicators of different types of soil. For example, *Azadirachta indica* (Neem) and *Acacia nilotica* (Babul) are considered as good indicators of

### **Box 18: Identification of various soil types**

**Latyasi (loamy)** It is the soil formed by a combination of silt and clay. Such lands are formed at the tail of a river or canal.

**Varyasi (sandy)** It is the land with high quantity of sand in it. Sandy soil will never form pebbles.

**Kalrathi (saline)** There are two kinds of Kalrathi, one is white and the second is black. Khaber, Lani prefer this soil. Teeteehr partridge (bird) mostly lays eggs in this type of soil. This land will be useable after watering for three to four times. The black colour soil is very hard to plough and nothing could grow over it.

**Pakki/ Cheeki Miti (clay soil)** It is hard land and forms pebbles during ploughing. It produces less but qualitative product. Even it is difficult to plough a paki land without softening it with water, such condition of land happens because of shortage of water and decrease of tree cover. It is best land for jujuba cultivation.

**Middle (vecholi)** it is combined form of Kalrathi and Cheeki land. Dates are better produced in it.

**Mithi (sweeter clay)** It is soft and rich land, and easy to plough.

**Sim (waterlogged Land)** In this land, subsoil salty water comes over the surface. Lai, Lani, Typha, Reeds, etc. grow in such soils.



rigid (Paki) land. Lani (*Suaeda fruticosa*) is indicator of salt affected soil whereas, *Salvadora spp.* (Khabar), *Alhaji* sp. (Camel thorn), *Tamarix articulata* (Lawa) are indicators of Paki (A class) land. Likewise *Desmostachya bipinnata* (Sar), Tooh (Bitter apple) and are good indicators of Varyasi land. The land on which growth of Sugarcane and Babul tree is vertically upward, it is sign of better land. The land where Kandi is growing in large quantity is considered of best quality. Wherever, Khunbhi (mushroom) is found, it is indicator of good quality land. Khunbhi (mushroom) is found, it is indicator of good quality land.

Livestock manure has traditionally been used by the peasants of Indus Ecoregion to enhance fertility of soil. The manure containing goat dropping is considered the best followed by buffalo and in last camel. This is one of the main reasons, why some peasants encourage livestock grazers to bring their cattle on their land to rejuvenate the soil with animal manure. This practice is called *Bhelaro*. It is a common after the harvest practice of farming community practiced during the intervening period between the two crops. Farmers believe animal manure plays important role in softening land.



## 6. Indus Ecoregion TEK in Socio-cultural Context



A local woman making a handcraft

### 6.1 Traditional homes

The ecological knowledge has been very much reflected in the making of traditional homes in rural areas of Indus Ecoregion. The rural people use their indigenous skills to construct their living huts using a variety of materials, which are found in their surrounding environment. The alleviation of these hutments or cottages took into consideration various environmental features such as ventilation, light, shade, etc.



A local settlement in Sindh

For example, westward direction of house fronts is usually avoided on religious as well as environmental considerations. One consideration is to avoid spiting out through the entrance in the direction of the sacred city for Muslims, Mecca which lies westwards. Further, Hindus keep foot of dead person westwards during funeral rituals. Among the

environmental considerations, it is believed that in summer, sun emits more heat rays at the time of sunset; therefore, people tend to avoid facing their houses westwards. Similarly, people tend to avoid facing their houses northwards due to certain astronomical and environmental reasons. For example, they believe that north side is harmful than other sides because of North Star. During winter, cold winds blow from northwards. Secondly, the rains from northward direction are considered torrential. Also, some tombs of religious saints are located in north side so people tend to avoid facing their houses towards north.



Chonro, a traditional house in desert

Some of the typical traditional homes constructed in desert areas of Indus Ecoregion include *Chonro*, which is a typical thatched hut of circular shape. The circular shape is



built keeping in view the resistance of structure against wind storms and seepage of rain water. The other considerations include its durability and coolness during the summer. It is constructed from locally available materials of various desert vegetation such as, Khip (*Leptadenia pyrotechnica*), Sin or Karir (*Capparis decidua*) and Phog (*Polgonium oleoides*). People in Thar desert areas prefer this type of homes.

## 6.2 Indigenous clock

In old times, stars, calling of cock and shades of sun were used as tools/criteria of measuring time. Conventionally, time is divided into seconds, moments, periods, durations, minutes and hours. At a broader level, time is divided into days, months, years and decades. The indigenous measurements of time are different from the modern clock. These include, *Vipal* it is equal to 2 ½ seconds, *Pal* (moment) which is equal to 24 seconds, *Ghari* which is equal to 24 minutes and *Pahar* which is equal to 3 hours. According to these measurements, the day (24 hours) is divided into eight *Pahars* and 60 *Gharis*. There are 2 ½ *Gharis* in one hour, 2 ½ *Pals* in a minute, and 24 *Vipals* in a minute. According to this time scale, humans breath in and out six times in a *Pal* that means humans breath 21600 times in 24 four hours.

## 6.3 Revenge of lamb

The herders have observed that some animals such as camel, oxen and ram have instinct of taking revenge, if they are persecuted or disturbed and driven out of grazing land. They believe that such animals never forget to take the revenge from the persecutor even after a



Resting lamb

lapse of many years. These animals wait for opportunity to attack the persecutor and try to get him collapsed with repeated attacks to take revenge from him.

A practice followed by many people is to leave sheep graze in rice field because it is felt that after eating upper shoots the rice plant will yield more.

## 6.4 Interesting stories about sheep

The shepherds tell that “all sheep follow a sheep that leads, if it jumps over the water of pond or watercourse then other all sheep also jump over it, and if it stops then all other also stop and they don't move even a bit until they see the movement of sheep. A place where they sit remains comparatively warm because they sit together. It is believed that due to their lazy nature, sheeps cannot walk long distances hence they graze in nearby areas with scattered tree growth; which provide them shade, as they cannot bear heat for a long and quickly return under tree shelter by finishing their grazing as quickly as possible. While in winter, they graze in open freely. The stagnated water of ponds is considered very harmful for sheep for drinking purposes.



A herd of sheep near Keenjhar Lake

Ghulam Rasool / WWF - Pakistan

## 6.5 Proverbs and sayings about sheep

There is a popular proverb used regarding sheep; it says, “Ridhn agyan rubaab vjaiendey vrheh thia”; this proverb is often used in situations where someone does not heed to the problem despite the same being narrated before them many times. *Rubaab* (*Trumpet*) is a musical instrument, mostly used by the mountainous people, those especially from the rocky terrains of Afghanistan and Balochistan; the literal meaning of the



proverb is that if *Rubaab* is played before sheep, it would remain unheard and not understood. This proverb symbolically relates the nature of sheep to the nature of people before whom one keeps reiterating and saying the similar narration, yet they do not understand, hence the purpose of reiteration remains unattained.



## 6.6 Cultural aspects of camel

Religiously and culturally, camel is treated with respect, as the Prophet Muhammad (Peace be Upon Him) always used camel for traveling. Also, the great poet of Sindh, Shah Abdul Latif Bhitai has devoted many of his verses to camel. Calling it *Karaho* (one of the names of camel called out of love), Bhitai offers *Karaho Chandan* (*Tecomella undulata*) plant which was considered as high quality fodder. In his verses Bhitai says, 'let other eat Lani (*Suaeda sp.*), I would offer you *Chandan*. *Chango* (Best) is another name assigned to camel by Bhitai.

## 6.7 Socio-cultural aspects of fish

In order to fish it is necessary for all the fisherfolk to learn swimming. Therefore, children of fishermen usually accompany their elders of fishing trips to develop their fishing skills. The name of indigenous caste of fisherfolk, Mirbahar (king of sea), in fact determines their conventional association with water. The fishermen treat fishing activity with respect by following certain customary practices. For example, it is customarily forbidden to step over the fishing net with shoes.

There are also socio-cultural values associated with some fish species. For example, in Khadro city, there is a tomb of

Saint Hameer Fakeer, where people offer sacrifice of *Kuriro* fish (*Labeo rohita*). Similarly, charity of fish is also given at the tomb of Sher Shah Wajeehudin.

There are also some superstitions associated with fish. For example, it is believed that if some one is suffering from leprosy and he ties in the neck teeth of *Kuriro* fish (Cyprinidae-*Labeo rohita*) with a black thread and then dives in water and promises not to kill a fish for a certain period, he would be healed.

There are certain proverbs associated with fish. The well off households in rural areas are called as "*machhi mani waro*" which means some one who is rich.

### 6.7.1 Marriage of boat to water

It is a tradition of indigenous fisherfolk, when a new boat is added for fishing, the fisherfolk offer a charity by feeding people with boiled rice. Boats are polished by fish oil. The fisherfolk would wear new clothes and offer prayer.

The new boat, before laying into water, is sprinkled with drops of gold water, garlands of flowers and flower of cotton are thrown over it. This tradition of introduction of new boat to the water is referred as marriage of boat and water; that the boat has married with river. It is forbidden to get on to the boat with shoes. It is customary to offer sacrifice when a new boat is launched in the water for the first time. In other cases, a ram is sacrificed and its blood is applied to a new boat before it is launched in the water. It is customary not to go for fishing on Friday.

### 6.7.2 Religious beliefs and myths related to fisherfolk

There are also certain religious beliefs and myths followed by fisherfolk of the Indus Ecoregion. Muslim fishermen do not go for fishing on Friday. The fisherfolk also believe that various prophets have banned fishing on certain days. For example, Jesus had forbidden fishing on Sunday. Prophet Moses prohibited fishing on Monday and Prophet Daud (David) prohibited fishing on Saturday. The fisherfolks believe that those who did not



follow these commandments were transformed into dolphins.

### 6.7.3 Myths about Morakho fish

Morakho (*Cirrhinia mrigale*) fish is considered as chief fish for the reason that the other fish are believed to follow it. Local fisherfolks relate their observed behaviour of Morakho fish to certain religious stories. There are three narrations in this regard. One according to Prophet Solomon; who had God-given commandment over the animals, once lost his finger ring in the water; as a result of which, his power was reduced; the ring is believed to have been taken inside by Morakho fish. After some days, his wife got a fish and while cutting belly of fish she found the same ring inside the belly of fish and handed over to the Prophet Solomon; who regained the lost powers therefore, he assigned Morakho fish as the chief of all fish. Fishermen claim that there is sign of ring like circle inside the belly of Morakho fish. Because of being a chief fish, the other fish follow it; hence the presence of Morakho fish is considered as presence of other fish at the same place.

According to the second narration the Prophet Yunus was gulped by Morakho fish. The third narration is that once the Prophet Muhammad went to attend an invitation arranged by one of his followers. The host tried to cook Morakho fish for the Prophet, but it could not be cooked despite efforts; the host shared this situation with the Prophet. When prophet enquired about the reason, the fish replied that once it had recited *Darood* (prayer) on the Prophet; hence by the will of God, fire has been prevented to harm the fish. Accordingly, the Prophet Muhammad also assigned *Morakho* the title of chief fish.

### 6.7.4 Myth about Vessar fish

Fisherfolks in Keti Bunder revealed that they treat some fish with respect such as Vessar fish. It is believed that if any one tried to catch this fish, would get his boat overturned. According to a local myth, a woman of Jat tribe failed to conceive baby. However, when she crossed over a Vessar fish and she got pregnant and had a child. Therefore, Jat tribe

treats this fish with respect. It is believed by feeding bread to Vessar fish one would get wealthy. Therefore, Vessar fish is called king of sea. They believe that Vessar fish is scared of a small fish called Velro which is 1-1.5 ft in size and is believed to enter inside the nostrils of Vessar fish and kills it. The oil of Vessar fish is applied to the boats to avoid damage by grain beetle insect.

### 6.7.5 Belief about Daahi fish

It is said that once Prophet Muhammad ordered to collect all fish, all fish assembled except one, after few moments it also arrived. The Prophet asked fish the reason of being late. The fish replied, I was late because I was waiting lest any fish might not be missing. After hearing this the Prophet called it Daahi (wise fish). Therefore, as per their belief, Senhari sub-caste of fisherfolk community prefers not to eat a Daahi fish. Another narration related to it is that, once an elder of Senhari sub-caste became ill of 'Korh' Leprosy. Therefore, he prayed and offered not to eat Daahi fish. Now a days this tradition of not eating *Daahi* fish is not practiced strictly. On the contrary, some fishermen claim that of *Daahi* fish is not wise but a foolish fish. They believe another fish called *Kuriro* as the wisest fish. Some other examples of myths related to fisherfolks are as follows:

- If Bolhar bird sings over the home of a fisherfolk, it is believed as sign of a forthcoming calamity such as, it may indicate death of a person from the clan.
- While going for fishing, if Malhari (Dolphin) bird flies from left side to right side it is believed that there would be no chance of a good catch.
- If fishermen see on way a rabbit or camel is considered a bad omen; whereas, encountering a Jackal on the way to work is considered a good omen and good catch.
- If a virgin crosses the lake, it is sign of not getting a good catch.
- If fisherman is called from behind after he leaves for fishing, it is considered as a bad omen.
- A woman with filled jar over her head is



considered as a sign of luck.

- If a fisherman requests another fisherman to accompany and if he refuses, it is considered a sign of not getting good catch.
- If crow sings, then there will be more wind or guest will come.
- If male cat wipes her face with paws that means guests will come.
- If donkey brays on the way from some one's right side, it means there will be success and if on left side, there will be no success.

### 6.7.6 Boat houses

In *Manchar* lake area, many fisherfolks have built houses on their boats. The tradition of building boat houses is prevalent in indigenous fisherfolk. They prefer to reside on boats because it saves their time and expenses and they remain ready every time to catch fish. Women sing folk songs when a new house is constructed over the boat.

In good earlier days, it was believed that those fishermen who lived on land were poor and those who lived on boats were considered well-off. However, this tradition of residing in boat houses is slowly vanishing. These days, only 100 boat-houses are available. Many fisherfolks have shifted their home on land due to loss of fishing livelihoods and rising poverty. A fisherman narrated that his forefathers lived in straw-made boat houses, and then they shifted in clay-made houses.



Local children collecting fuelwood

## 6.8 Customary practices

It was customary in the earlier practices of people of Indus Ecoregion to follow moon cycle for fixing their important cultural events, such as marriages, engagements etc.

People preferred to avoid fixing these events following full moon days. Similarly, it was custom to fix such events during spring season, which is believed to be luxuriant season. Therefore, the fisherfolks tend to avoid fixing important events during autumn season, which was considered as a fade. They believed fixing events after full moon and in the seasons like autumn season, the happiness would be short lived.

- When the Indus water reaches delta, people used to offer sacrifices of ground bread (*Roat*) to welcome the arrival of freshwater.
- If there is more light/visibility at the time of sunset, it means it would be windy next day.
- It is customary in rural areas to fix the direction of house entrance facing south as it keeps the house airy and cool.

### 6.8.1 Customary practices related to fish

- Kuriro fish has a thorn inside which is one inch in length and three inch width. It is called *weendo*. Fisherfolks believe that if it is kept with gold, it brings good fortune. It is found rarely. Some one who finds it will gain more gold.
- It is a customary practice of indigenous fisherfolk communities to cook fish first day of arrival of bride, as it is considered sign of good fortune.
- Fish is considered *Lachmi* (wealthy). Therefore, in earlier days, people used to keep scale (*chilar*) of fish in their turban or pocket, because it was considered as a sign of luck.



Kuriro fish



- Hindus bake fish on the sixth night of birth of a new child.
- Fishermen mostly eat fish; if some one cooks vegetables, other fishermen criticise them and say, “you have cooked grass!”

### 6.8.2 Customary practices related to cutting of trees

Earlier, it was a custom not to cut trees. People used to pray Kandi (*Prosopis cineraria*), Tulsi (*Ocimum sp.*) and Peepal (*Ficus trees*). There were fixed seasons and days of cutting trees. For example, the cutting was allowed in first forty days of winter and summer seasons. During this time, winter chill and summer heat is at peak, therefore, tree cut during this time would not get infected with insect attack. Another interesting practice was to avoid cutting of trees on certain days of week. While



A local person collecting fuelwood from a forest

narrate the names of days in local language (Sindhi); when calling these names if two lips touch each other, that day was not preferred for cutting a tree. People believed that if tree was cut in those days it would get infected with insect attack. Based on this principle, it was customary to avoid cutting trees on Monday, Wednesday, Thursday and Friday.

### 6.8.3 Camel as a path finder

During the time of high tide (Jawar) all the mud flats will get inundated with water. During this time, it is hard to find the path and assess the depth of water. In such circumstances, camel is considered as the only animal which has idea of the topography. Therefore, during Jawar people prefer camel leading the way to get to their destination without facing any trouble getting confused by deep water.

In this area there used to be a variety of camel called “Kharai”. This camel was thin in



Browsing Camels

physique with slim ears and small feet. It was good at swimming. The Sindhi camel and mountainous camels are not good for this area, as they are heavy and slow swimmers. It is a customary practice, even now a days to give a full or a half camel in dowry to their wedding daughters.

### 6.8.4 Cultural Festival to Invite Rain

One of the indigenous cultural events to invite rain is called “Kariro Kumariro”. In this, the face of one person is blackened and then different cooking items are collected from the entire village, which are then fed to the needy people.

### 6.8.5 Cultural aspects of honey bees

Traditionally, many inhabitants of Chotiari area consider honey bees as sign of luck/fortune. A household is considered lucky, if bees make nest in that house. Certain myths are also associated with honey bees. It is believed that fleeing bees will sit back, if footwear is turned over.



Honey bees

## 7. Conclusion and Recommendations



The tomb of Noori and Jam Tamachi (two characters of a legendary folklore) situated at Keenjhar Lake

From the preceding discussion, it may be concluded that the rural people of Indus Ecoregion possess rich knowledge of various ecological resources surrounding their environment. The extent of this knowledge is spread over different fields, such as botany, zoology, ecology, astrology, geography, etc. The rural people through various indigenous uses and practices have developed rich understanding of various natural resources in order to sustain their livelihoods. In a variety of cases, superstitions and myths have also been part reflected in use of various ecological resources. In some cases, the traditional knowledge has been found consistent with scientific knowledge.

It has been found that in many cases, this knowledge could be helpful in furthering scientific research. A blend of scientific and traditional knowledge may also be useful in better management of various natural resources.

There is an enormous research potential on the corpus of Indus Ecoregion's Traditional Ecological Knowledge. It is recommended that further research can be undertaken to refine this pioneering attempt through

linkages with various educational or research institutions. An in-depth research based on individual aspects of this knowledge would help in better understanding and classification of TEK and in determining its effective use. Therefore, this documentation may be considered as preliminary attempt to gather the scattered traditional information on diversified subject. The next step would be to start an organised research, which would preferably be done subject-wise by classifying individual subjects separately.

Since, the modern communication has outreached the remotest place of the Indus Ecoregion, it would be useful to document the traditional information before it is lost. Because, there is always a chance that a certain percentage of knowledge may get lost during transmission from one generation to the other, if it is not documented, particularly due to the fact that if the elderly generation which carries this knowledge vanishes.

There is also need to authenticate the traditional information so as to develop its proper use for the benefit of society and sustenance of ecological resources.



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

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

## **Vision of the Indus Ecoregion Programme**

"Mankind coexists in complete harmony with nature and biodiversity of the Indus Ecoregion flourishes in its respective habitat"

## **Indus for All Programme, WWF - Pakistan**

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