THE IMPACT OF CENTRAL INDUS WETLANDS COMPLEX ON SOCIO-ECONOMIC STATUS OF FISHERMEN COMMUNITIES IN THE PUNJAB AND SINDH

by

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DEPARTMENT OF SOCIOLOGY
FACULTY OF SOCIAL SCIENCE
INTERNATIONAL ISLAMIC UNIVERSITY, ISLAMABAD
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A Dissertation
For Partial Fulfilment of the Degree of
Doctor of Philosophy in Sociology

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SUBJECT: INCORPORATION OF THE RECOMMENDATIONS OF FOREIGN AND INTERNAL EVALUATORS IN PHD DISSERTATION OF MR. SAEED AKBAR TITLED "THE IMPACT OF CENTRAL INDUS WETLANDS COMPLEX ON SOCIO-ECONOMIC STATUS OF FISHERMEN COMMUNITIES IN THE PUNJAB AND SINDH"

Sir,

The undersigned pertaining registration number 07-FSS/PHDSOC/S14, department of sociology, international Islamic university, Islamabad has completed his PhD dissertation titled "The impact of central Indus wetlands complex on socio-economic status of fishermen communities in the Punjab and Sindh" under and supervision of Prof. Dr. Saif-ur-Rehman Saif Abbasi Department of Sociology, International Islamic University, Islamabad and co-supervision of Dr. Farhan Navid Yousaf, Department of Social and Cultural Studies, Punjab University, Lahore. It is hereby stated that, in compliance of the recommendations of the foreign and internal evaluators, the undersigned has incorporated all the recommendations in the above-mentioned PhD thesis.

Saeed Akbar,
Reg. No. 07-FSS/PHDSOC/S14,
PhD Scholar (Sociology),
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FORWARDING SHEET

This thesis entitled, "THE IMPACT OF CENTRAL INDUS WETLANDS COMPLEX ON SOCIO-ECONOMIC STATUS OF FISHERMEN COMMUNITIES IN THE PUNJAB AND SINDH" submitted by Saeed Akbar (07-FSS/PHDSOC/S14) in partial fulfillment of the requirement of PhD degree in Sociology has been completed under our supervision. We are satisfied with the quality and originality of the research work. We allow the researcher to submit the dissertation to concerned authorities for further process as per rules and regulations.

Date _____

Supervisor _____
Prof. Dr. Saif-Ur-Rehman Saif Abbasi

Co-supervisor_____
Dr. Farhan Navid Yousaf

STATEMENT OF UNDERSTANDING

I, Saeed Akbar Reg. No. 07-FSS/PHDSOC/S14, student of PhD Sociology, Department of Sociology, International Islamic University Islamabad hereby declare that the thesis entitled, "THE IMPACT OF CENTRAL INDUS WETLANDS COMPLEX ON SOCIO-ECONOMIC STATUS OF FISHERMEN COMMUNITIES IN THE PUNJAB AND SINDH" submitted in partial fulfillment for the requirement of PhD degree is my original work, except where otherwise acknowledged in the text.

Date _____ Signature _____

Saeed Akbar

To
My Family
(My Parents, Wife and Children)

Acknowledgement

All praise is due to **Allāh**, Lord of all creation. May **Allāh** extol the mention of the Prophet Muhammad (صَلَّى اللهُ عَلَيْهِ وَسَلَّمَ) in the highest company of Angels and may the peace and blessings of **Allāh** be upon him, his family, his companions and all those who follow him exactly till the Day of Judgement.

I am highly indebted to my Supervisor, Professor Dr. Saif Abbassi for his untiring guidance, support and encouragement throughout my field research and thereafter in editing, suggestions for further improvement and finalization of my dissertation. Without the help and support of my Supervisor it was absolutely an uphill task for me. I am also grateful to my Co-Supervisor, Associate Professor Dr. Farhan Navid Yousaf for his consistent guidance and repeated editing's of the manuscript.

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List of Abbreviations

01	CIWC	Central Indus Wetlands Complex
02	SES	Socio-economic Status
03	GPAF	Global Poverty Action Fund
04	WWF	World Wide Fund for Nature
05	UN	United Nations
06	FAO	Food and Agriculture Organization
07	CBOs	Community Based Organizations
08	ILO	International Labor Organization

Abstract

Natural resources (air, water, soil, flora and fauna) have vital importance in the lifespan of all living beings on earth and their perpetuation. Especially, human and environment are well-knit and inter-dependent from the very beginning. Provision of food, shelter and additional amenities from natural capital can only be secured if nature is conserved and maintained in a healthy state. Waterbodies being a major organ of earth's ecosystems are regarded as the "kidneys of an ecosystem" and provide an array of livelihood support for the dependent communities. Indus, the largest river of Pakistan, has most ancient civilizations, cultures, unique ecologies and biodiversity from the snow-covered lakes of Himalayas to the deltaic regions of Sindh coast. Pakistan, blessed with a unique physiography, provides abode to high treasures of natural resources such as serene landscapes and terrestrial and aquatic ecosystems particularly the Indus River that ensure supply of innumerable tangible and intangible benefits to the dependent communities in agrarian, industrial and aquatic domains. Current study was aimed to find out the effects of Indus based wetlands on the socio-economic status of the dependent fisherfolk communities of the Central Indus Wetlands Complex stretching from Jinnah Barrage to Sukkur Barrage. The Central Indus Wetlands Complex (Jinnah to Sukkur Barrage) stretches over two provinces, Punjab and Sindh of Pakistan. Provincial fishing policies allowed fishing only under contractual system in Punjab and on an annual permit system in Sindh. A total of 608 households (Punjab 373, Sindh 235) were selected using non-probability purposive sampling technique because population is highly scattered, unidentified, distantly located couple with poor security situation and rapid migration were the major impediments to choose the families randomly. Results were staggered as targeted population was living under poverty line exclusively in Punjab area while situation was also not that different among Sindh based fisherfolks. The core reason behind this poor state of life was the prevalence of highly exploitative contractual provincial policy in Punjab and feudalism in Sindh province. Human rights are severely violated by these influential elites as they occupy the river and its resources as their personal entities. The political nexus and weaknesses in fishing policies coupled with poor law enforcement made these elites stronger and more valiant. Fishing industry being a lucrative entity does not benefit the fishermen but the contractors and the feudal lords in Punjab and Sindh, respectively. Absence of basic domestic and communal facilities make the fisherfolks more deprived and absenteeism of basic needs like education,

health, food, security and freedom. Fishermen serve as bonded labor and face miseries of all types. Revision of provincial fishing policies to ensure provision of basic human rights to fisherfolks, ownership of fish catch, proper marketing facilities of fish and other products are the main solutions to overcome the obstacles on the way of well-being of fishermen communities and for development of fish industry in the country.

CHAPTER ONE
INTRODUCTION

Current study argues that wetlands in Pakistan can serve as a catalyst for enhancing the socio-economic status of the dependent communities. This can be achieved provided the role of middlemen is minimized and interventions are designed/strengthened for sustainability of the natural capital. Factually, natural resources are usually enough for livelihood of the dependent communities but somehow the Indus-based fisherfolks are seemingly deprived, destitute, despondent and have lower socio-economic status in spite of the fact that they are very intensely interacting with natural capital. Based on the past project experiences and observations of the researcher, interaction with stakeholders, and review of literature, hypotheses were developed to examine the effects of Central Indus Wetland Complex (CIWC) on the socio-economic status of these fisherfolks. The study highlights how provincial policies such as contractual system in Punjab and permit system in Sindh were largely influenced by feudalism and affected the fisher communities in the absence of alternative livelihood skills.

1.1 Human and Nature; A Reciprocated Alliance

Ecological resources including air, water, soil, flora and fauna have profound influence on human life. Right from the beginning, human societies needed these resources to fulfill their requirements such as food, shelter and cloths (Adesina, 2005). Globally, rural communities are highly dependent on ecological resources to meet their socioeconomic needs. Scientific studies revealed that these resources played a key role in the economic growth of a country. Different

experiences of development during nineteenth and first half of the twentieth century showed that eco-resources are the major component of socioeconomic development of a state. Natural capital can lift the economic progress and sustain the economy of a nation (Behbudi, Mamipour, & Karami, 2010).

Renewable, non-renewable natural resources and eco-services are the desired wealth of countries. As a natural capital they generate other constituents of development assets. They also contribute towards the monetary revenue, income and poverty alleviation (Organisation for Economic Co-operation and Development, 2011)**.**

Humans are generally influenced by their social and physical environments as both shape and build the cognition of an individual. Cultural differences in opinion are the outcome of the physical and environmental factors. Physical environment around human provides a safety net for the lower class particularly at the time of fiscal crisis in the form of food (both flora and fauna), fertile soils for agriculture and fuelwood as domestic energy. Sustainable use of environment also contributes to the development of human capital through investments in education, health and occupation (Kitayama, Markus, & Nisbett, 1998; Markus & Kitayama, 1991).

Pakistan has historical civilization and the rural communities of Pakistan have their own culture of old traditions and the local tribes have their unique style and choice for a village site, house, family, dress ornaments, cultural functions, festivals and socio-cultural ideas. The local women are more dynamic and painstaking than their men counterparts. The lack of communication with the help of modern innovations has kept them closer to where they derive many of their day-

to-day needs. Resultantly, villagers have deep observations of environment and get indigenous knowledge about local resources by communicating with other people of their culture. They are thus building up indigenous knowledge of their ancestor generations (Ahmad, 2003).

1.2 Wetlands: A Natural Capital

Ecosystems offer number of services to local population, communities and mankind at large. Wetlands also have deep influence on the well-being of both rural and urban people. Water use and human have historical relationship from hunting and gathering to post-industrial societies. Human beings remained highly dependent on water and water bodies since early days of mankind. As development accelerates, water resources are gaining key importance in the world. Fresh water resources are considered as treasure in this modern era. Wetlands as a major resource of fresh water have direct and indirect role in the progress of a country. The definition of wetlands according to Ramsar Convention is "*areas of marsh, fen, peatland or water, whether original or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters*". (Finlayson, Bellioa, & Lowry, 2005, p. 271)**.**

Local communities and societies, all over the world are highly dependent on wetlands. These water bodies provide substantial benefits to these communities. Local communities harvest number of tangible and intangible socioeconomic benefits in the form of eco-resources and eco-services. Wetlands are considered efficient and highly productive ecosystem to sustain biodiversity

globally. The commonly dependent population on water body is the fishermen. They are directly affecting and affected by these wetlands. Culturally freshwater fishermen communities are slightly different from marine water societies (Sarker & Joarder, 2012).

1.3 Central Indus Wetlands Complex (CIWC)

Pakistan's wetlands have a lot of economic importance for its local communities. Punjab and Sindh cover a vast area with un-regulated watersheds. These watersheds form flyway to Central Asia and South Asia and wetlands therein provide suitable habitat for migratory birds. Fisherman communities are also dependent on these wetlands as located in the immediate neighborhood. This dependency results in the form of fishing, flora and fauna, cultivation and livestock rearing and domestic use of water-based products (International Union for Conservation of Nature, 2007).

Central Indus Wetland Complex consists of four major wetlands: Chashma, Tounsa, Guddu and Sukkur barrages (Figure 3.1). In Punjab, fishermen communities are working under contractual system, however, Sindh government had lifted this restriction and now fishermen are free to take benefits by obtaining individual permits. Fishermen communities that mostly belong to Sindhi casts have been moving up and downstream of Indus River of Punjab over the distant past. Majority fishermen are professionals whereas some people undertake this activity as recreation only (World Wide Fund for Nature Pakistan, 2014).

World Wide Fund for Nature Pakistan (WWF-Pakistan) with the aid of Department of International Development (DFID) once launched the project of Global Poverty Action Fund (GPAF) in Central Indus Wetland Complex (CIWC) from 2012-15. The basic motive behind the project was to improve existing and provide alternative livelihood strategies and trainings to local fishermen communities and reduce the burden on natural resources i.e., fish and water. This project covered more than 500 km area starting from Chashma Barrage including Indus basin and Guddu barrage and ending at Sukkur Barrage. The focused community was very poor and deprived. The target population was socially excluded and used as forced labor at very low wages. Main objectives of the project were to establish community-based networks in the form of Community Based Organizations (CBOs) to effectively address the poverty-environment related issues and introduced alternate livelihood practices to share the domestic economic burden and mitigate growing burden on fisheries of Indus River. The project also aimed at energy efficient techniques and equipment to effectively play role in domestic energy consumption of poor fishermen and reduce the wood fuel burden on forests around the river and barrages. Finally, main goal of the project was conservation of protected areas of Central Indus Wetlands Complex through meaningful collaboration among all the stakeholders including governments of Punjab and Sindh, fishermen communities, contractors for fishing and feudal around the wetlands (Atiq-ur-Rehman, 2012).

1.4 Fisheries and Fisherfolks of Pakistan

Pakistan is the 6th most populous country on globe with low per capita income of only 1,622 US Dollars. About 35% population is living below poverty line. The human progress indicators (education and health) also remained low as compared to other countries in South Asia. The lower brackets of social and economic indicators are mostly due to the rural population involved in agriculture and fishing and other natural resources uses for livelihood. Fisheries (fresh and marine water) are rare contributor in domestic and national economic growth and share less than 0.4 percent of total GDP. According to World Bank statistics in 2015, about 360,000 tons of marine water and 132,500 to 151,000 tons of freshwater fisheries have contributed to the country's economy. The marine fisheries is practiced in the coastal areas of Sindh and Baluchistan while fresh water fishing is carried out all over Pakistan. The study revealed that about 360,000 people are directly while 900,000 to 1800,000 are indirectly engaged with fisheries industries in the country (Patil, et al., 2018).

The Government of Pakistan and FAO (Food and Agriculture Organization) noticed fish production decline since 1990s due to excessive catch resulting in decrease of fish population. It is commonly believed that the total fishing effort (catching, harvesting and marketing) increased with the passage of time. This has directly affected the livelihood and socio-economic status of fisherfolks of Pakistan especially the freshwater one. Fish industry has the capacity to become the engine of economic boost in Pakistan as global demand for protein rich fish and byproducts is increasing on daily basis. In addition to economic growth, the fish has high nutritious value

especially for women and children**.** Statistics show that total fifty percent population of women and children (less than five years) are victim of malnutrition while forty four percent of the children are physically or mentally special due to nutrition deficiency (Patil, et al., 2018; International Labour Organization, 2016; International Institute of Sustainable Development, 1999; Ercelawn & Nauman, 2001)**.**

1.5 Power, Politics and Policy Nexus in CIWC

Fish being a high value product has increasing demand in all societies the world over. The fish trade is also influenced by various socio-political factors which affect the labor and stakeholders in their trade. Internal factors of social setup are somehow curable at local level whereas the external factors such as power, politics, policies (PPP) exploiting fisherfolks are uncontrollable by depressants. Most of the world markets related to fish business failed to ensure free trade markets for fresh and marine water fisheries. Role of fishermen is gradually decreasing even in this 21st century by the influences of external forces. The main and primary stakeholder in fish trade is fisherfolks but their options are neglected in day to day trade. Weak bargaining positions of fishermen are directly affecting their livelihood and causing reduction in socio-economic status. The central and organizational problems faced by fishermen are mostly outcome of exploitation by the institutions, middlemen and policies (Siswanto, Hanafi, & Fitrianto, 2014).

Man, and Nurture are basic elements of fish industry, as all the production units directly or indirectly rely on these two elements. The interdependence between social and environmental systems demands that human beings must be given priority while making any policies or changes

in processes. The social and economic system directs that all the industrialization processes (selection of labor, extraction of raw material, transportation of goods, completion of final products, promotion and finally consumption of goods) must obey the basic human rights and avoid abuses at each level. However, fish industry is also exposed to severe violation of human rights both on land and water. This shows that there is ample room for making appropriate strategies to control the power, politics and policy nexus and ensure the implementation. This can be done through meaningful collaboration of public-private collations having effective monitoring and evaluation mechanism (Lewis, Alifano, Boyle, & Mangel, 2017)**.**

Human Rights have gained a primary role in recent international development policies. The "rights-based approach" has become prominent approach for an inclusive development (Fukuda-Parr, 2003; Sen, 2001; Human Development Report, 2000). In its application to natural resource management, a human right-based framework draws attention of the institutions and power structures that determine resource allocation and access, as essential contributions to livelihoods and well-being framed as environmental entitlements. (Leach, Mearns, & Scoones, 1999). Human Rights in its application in natural resource management gain devotion of organizations and institutions worldwide. It has vital contributions in livelihood and well-being of local communities. It often formed the environmental entitlements especially the United Nations (UN) and US Department of State (USDOS) had passed many resolutions to happenstance the modern slavery in fish industry (United Nations Inter-Agency Project on Human Trafficking, 2009; United Nations Office of Drugs and Crime , 2013; United Nations,

1948; United Nations, 2001; United Nations, 2002; United Nations, 2003; United Nations , 2011; US Department of State, 2010; US Department of State, 2013a; US Department of State, 2013b).

Direct access to the natural resources and indirect benefits of different procedures is right to livelihood for the poor people of the area. This represents the legal and moral claim, which cannot be easily ignored and opens the ways of defending their claims through advocacy at local and international levels (Moser, Norton, Conway, Ferguson, & Vizard, 2001). Beyond the resource access, some other large welfare matters alike health and education can also be undermining. Empirical reviews of fishing communities give the details of several violations of human rights worldwide. Most common of them are forced evictions, custody without trial, child labor, forced labor and hazardous working environments, violence and personal security including gender-based violence. The current severe violations of human rights for fishermen in developing countries make them vulnerable and marginalized society. Developing countries can overcome such issues by using human rights advocacy as a tool. Further equitable allocation of fishing rights, improved resource management and enhanced human well-being are suggested for social uplift of fishing communities (Ratner, Asgard, & Allison, 2014).

The fisherfolks of Pakistan have immense need of improving livelihood through reviewing the policies of Punjab and Sindh governments by breaking the power-political nexus of feudal and contractors and provision of basic human education and facilities including rights of land, health and free environment to work. There are numerous policy drawbacks in governance framework that increase the miserable conditions of fishermen such as annual contractual systems, influence

of feudal, low budgeting, repeated allocation of contracts from 30 years to a single person/family, illegal fishing, corruption in fisheries department of the Punjab and Sindh and among other. During 2007 the national policy and strategy for fisheries and aquaculture development of Pakistan was initiated but failed to implement due to lack of political will. This and other many policies are directly or indirectly benefitting the economy and production of fish but these have failed to uplift the socio-economic status of fishermen. A national policy framework is needed to directly strengthen the fisherfolks and to upgrade their livelihood and free them from exploitation (International Labour Organization, 2016; International Institute of Sustainable Development, 1999).

1.6 Statement of the Problem

Human Society has unique quality that it keeps all the members in coordination and dependent on each other. Social marginalization is a factor that makes its associates a distinct part of civilization. Fishing is one of the largest occupations in the world. Fishermen communities were spreading along costal and freshwater bodies. Misuse of catch and resources by diverse groups and authorities was the basic reason behind poverty of fishermen population. Traditional fishing in developing countries is always categorized as low class and socially neglected profession. Fisherfolks of Indus River are one of the eliminated communities from conventional human life. They are continuously overlooked, compressed, slaves and compelled to adopt the water-based residence. The variables studied in the current research were not discussed in this combination collectively for Indus River-based fishermen communities. Current study attempts to find out their densities and depressed lifecycle. Historically, fishermen communities were always neglected in all domains of research. But due to some global issues such as poverty mitigation, water sacristy and human rights, both public and private sectors started focusing this neglected community. The current research is also a struggle to address the issues of deprived population residing along the banks of Indus River and the ways they are being benefited by the wetlands and exploited by the contractors (Stringer, C.; Simmons, G.; Coulston, D., 2011; International Labour Organisation, 2013a; International Labour Organisation, 2013b; Hodal, K.; C. Kelly; F. Lawrence;, 2014; Simmons & Stringer, 2014; World Wide Fund for Nature Pakistan, 2014; Lawrence, F., August 17, 2015; Central Marine Fisheries Research Institute India, 1998; Environmental Justice Foundation, 2010; Environmental Justice Foundation, 2013a).

1.7 Significance of the Study

Frequent studies were conducted in the field of pure sciences (hydrology, marine sciences, fisheries, ethnobotany and environmental engineering) focused on the water and human relationship. Such efforts were of great benefit for the fisherfolks who part of human society are primarily but neglected by the natural scientists. Especially Indus River water-based community is very rarely discussed by the researchers. Present research is an effort to look into the gap left by the pure and social scientists with the help of an appropriate study. The study will also focus on the procedures and recommend future strategies to probe the community's problems regarding the socioeconomic uplift of water-based Indus fisherfolks.

The identified "gap" in the body of knowledge elicit researcher to conduct a comprehensive empirical research on the neglected domain that could serve as "missing link" in physical and social environment domain (because the study will integrate social and physical environment discipline). The significance of the study to clarify fisherfolk's problems at two levels: Theoretical (disciplinary integration) and Practical (Policy concerns).

a) The study, theoretically, incorporates the primary and secondary data to drive multidisciplinary approach i.e., physical and social environment.

b) The study, empirically, produces an integrated model to abate the socioeconomic problems of fisherman.

1.8 Objectives

Following objectives of the study were developed to achieve the desired results.

1. Development of socio-economic status indicators of the target fishermen communities at the village and provincial levels residing in Central Indus Wetland Complex compared with national indicators of socioeconomic indicators in Pakistan.
2. Study the effects of goods and services provided by the wetlands and the impact on socio-economic status of the dependent communities.
3. Find out the impact of administrative policies (provincial contractual and permit system structure for fishing) on socio-economic status of fishermen communities.
4. Explore the use of technology (gears and modes) worked for the fishing practices.
5. Check the reciprocal environmental upshot and suggest the role of stakeholders for the conservation of Indus Wetlands through environmental education and awareness approaches.

1.9 Hypotheses

The study aimed to test following hypotheses.

1.9.1 Hypothesis A

There is an association between goods and services obtained from wetlands and socio-economic status of the fishermen communities;
More goods & services obtained from wetlands better will be the socio-economic status of the fishermen communities.

H_o: There is no association between the goods obtained from wetlands and socio-economic status of the fishermen communities;
H_A: There is an association between the goods obtained from wetlands and socio-economic status of the fishermen communities;

H_o: There is no association between the indirect goods obtained from wetlands and socio-economic status of the fishermen communities;
H_A: There is an association between the indirect goods obtained from wetlands and socio-economic status of the fishermen communities;

H_o: There is no association between the services obtained from wetlands and socio-economic status of the fishermen communities;
H_A: There is an association between the services obtained from wetlands and socio-economic status of the fishermen communities;

1.9.2 Hypothesis B

There is an association between the provincial policies (Contractual a& permit system) and socio-economic status of the fishermen communities of CIWC;
Permit system in Sindh results higher socio-economic status and contractual system results lower socio-economic statuses of dependent fisherfolks.

H_o: There is no association between the provincial policies (contractual & permit system) and socio-economic statuses of fishermen communities of CIWC.
H_A: There is an association between the provincial policies (contractual & permit system) and socio-economic statuses of fishermen communities of CIWC.

H_o: There is no association between the socio-economic statuses of the fisherfolks of Punjab
and Sindh due to policy difference;
H_A: There is an association between the socio-economic statuses of fishermen of Punjab and Sindh due to policy difference;

H_o: There is no association between the availability of domestic and communal facilities of the fishermen of Punjab and Sindh due to policy difference;

H_A: H_o: There is an association between the availability of domestic and communal facilities of fisherfolks of Punjab and Sindh due to policy difference;

1.9.3 Hypothesis C

There is an association between the socioeconomic indicators of the fishermen communities of CIWC and national indicators of Pakistan;
Socioeconomic indicators of the fishermen communities of the CIWC is equal to the national indicators of Pakistan.

H_o: There is no association between the socio-economic status of the fishermen communities of CIWC and national indicators of Pakistan.
H_A: There is an association between the socio-economic status of the fishermen communities of CIWC and national indicators of Pakistan.

1.10 Research Questions

i. What is difference between socioeconomic indicators of fishermen communities in comparison with the national socioeconomic indicators of Pakistan?

ii. What is the level of dependency of fishermen communities on Central Indus Wetland Complex?

iii. What is the direct and indirect effect of goods and services provided by the Central Indus Wetlands Complex on the socio-economic status of the dependent communities?

iv. How the policies of provincial governments effect the socio-economic status of dependent communities in Central Indus Wetlands Complex?

v. What is the effect of environmental pollution on wetlands and how does it affect health of the fisherfolks?

vi. How the fishermen communities cope with the new technologies used in fishing practices

CHAPTER TWO
REVIEW OF LITERATURE

Learning to write a successful review of literature is a milestone in scientific research and overall academic achievements. This is a technique through which a researcher summarizes and synthesizes the available information regarding his research and extracts the new ideas of multidimenions in relation to his own study (Denney & Tewksbury, 2012). Review of literature is a complete summary of existing researches having main theme of one's dissertation or at least identical with any of the variables (Creswell, 1994). Review may have several purposes to share empirical evidence, give an inkling for further development in research work (Frankel & Wallen, 1990) and to fill the gaps in existing knowledge on particular issue (Marshall & Rossman, 1989).

A good literature review includes all major and minor themes of research intertwined with topic, objectives, hypotheses, methodology and findings (Ridley, 2008). Literature review for quantitative studies contains the previous studies conducted in relation to the topic and makes a connection with findings and operationalizations of current study (Denney & Tewksbury, 2012). Different methods were followed to write the review such as chronological, thematic, the wheel and the pyramid (Thomson, 2016).

2.1 Human-Nature Affiliation; An Academic Approach

Physical environment includes of air, flora, fauna, energy, water, soil and calculations (Adesina, 2005). Human and nature have historical relationship, although humans have degraded the environment for its benefits. This dilapidation is also responsible for destruction of many old societies for example Ancient Rome and Babylonian Empire (Mebratu, 1998). Human-environment relationship study is particularly important for those researchers who want to find out the solutions for current environmental problems. Contemporary researchers can seek the lesson

from ancestors that either they were aware of the problems and had they learnt any lesson. While The extent of human-environment degradation increases, a new concept of sustainable development has been innovated in 1970s. Sustainability emerged as a management tool in United Nations Conference in 1972 as the World Commission on Environment and Development (WCED) published a report with the title "Our Common Future". After the rapid expansion of Industrial Revolution in 18th century the writers for Human-Nature relationship emerged in Europe and America. Jean-Jacques Rousseau (1755) is considered among the first theorists of Human-Environment Relationship writings. His work was later translated by Cranston in 1984. Secondly "The Book of Moral Sentiments" was published by a Scottish philosopher and political economist in 1759. Smith also published his work "An inquiry into the Nature and Causes of the Wealth of the Nations" in 1776. During 1800s two German geography scientists (Carl Riter and Alexander Von Humboldt) were recorded with work on human-environment relationship but 20th Century played a key role in the development and exploration of human-environment relationship. Murray Bookchin explored the chemicals in natural food and set the grounds for science-based environmentalism (Dubose, Frost, & Chamaeau, 1995; International Institute of Sustainable Development, 1999; Adam Smith Institute, 2007)

Classical sociology has very few discussions about natural environment, however, being a branch of sociology, environmental sociology was discovered in United States during 1970s. Samuel Klausner was the first writer of the book "Man in His Environment" in sociological context. Later, many theorists explained the influence of environment in social foundations of human society.

Environmental Sociology technically can be described as the scientific study of nature and nurture relationship. Nature has multitude of resources such as air, water, soil, plants and animals.

These natural things are influenced and do influence the social structure of human society. This relationship can be studied with the foundations of a newly emerged discipline (Klausner, 1971).

Human-Nature is a philosophical concept that explains the influence of political movements through the process of lobbing, education and activism for the protection of natural resources and ecosystems. Environmentalism is a social movement that centered the humans as a main stakeholder in nature and emphasizes the human rights and health initiatives. In this process the environmentalist is a person that ensures the sustainable development and use of natural resources with the help of public policies and environmental protection laws. In this context the movements and organizations for the protection of nature have key role and considered as a strong voice for protection of environment. Rise of industrial revolution in Europe gave way to modern environmental laws to overcome aftereffects of pollution as immene quantities of coal and other fossil fuels that converted the cities in heat islands. The British Alkali Act in 1863 was the first law for the protection of natural environment. Some movements can be traced in United States back in 1739 as resistant to massive pollution and urbanization because of industrialization. However, the 20th century gave popularity to the environmental movements and laws as wildlife rights became prominent and resultantly in 1916 the National Park Service was founded by President Woodrow Wilson (Pathak, 2010).

2.2 Wetlands as Socioeconomic Package for Livelihoods

Various words are used to describe the wetlands as bog, fen, mire, marsh and swamp in different contexts. However, wetland is considered a water body that provides desired habitat to the aquatic animals and plants and considered as an intermediate area between drylands and aquatic ecosystems. Since 1900, world has lost approximately half of its wetlands due to misuse, environmental degradation, global warming and human policies. Restoration of this resource is

only possible through implementation of effective policies and environmental education at grassroots level and coordinating joint efforts of different stakeholders (local community, public and private sectors). The importance of wetlands for the human society can be asserted by estimating and measuring different benefits provided by these areas to humans. A wetland can be judged on the basis of a variety of services such as it improves the water quality, recharges the underground water table, reduces the food scarcity risks, helps to maintain the river levels during the dry time of a year, provides the summer grazing for pastoral societies, provides educational sources and hydro-research for research institutions, an alternative source of livelihood for dependent communities, conserves wildlife including birds and fish and provides ecotourism. In other words, wetlands not only support the local as well as national economy but also improve the landscape and aesthetic value of the land. Figure 2.1 explains the processes, functions and value of the wetlands (Hogan, Maltby, & Mode, 2016).

General estimated area for the global wetlands is approximately four to six percent of the total area of earth i.e., seven to nine million km^2 (Mitsch & Gosselink, 2000). Wetlands are one of the important habitats for plants and animals to maintain a biologically productive ecosystem (Mironga, 2005; Mwakaje, 2009). Wetlands also generate socioeconomic benefits to support the local communities as well as regional and national economies**.** An estimated value of wetlands annual contribution in the world economy is approximately 14.9 trillion US dollars (Malayu, Hunde, & Kissi, 2015).

Table 2.1
Wetlands Functions

A	Regulation Function	i.	Storage and Recycling of Nutrients
		ii.	Storage and Recycling of Human Waste
		iii.	Storage and Recycling of Organic Waste
		iv.	Groundwater Recharge
		v.	Groundwater Discharge
		vi.	Natral Flood Control and Flow Regulation
		vii.	Erosion Control
		viii.	Salinity Control
		ix.	Water Treatment
		x.	Climatic Stabilization
		xi.	Carbon Sequestration
		xii.	Maintenance of Migration and Nursery Habitat
		xiii.	Maintenance of Ecosystem Stability
		xiv.	Maintenance of Integrity of other Ecosystems
		xv.	Maintenance of Biological and Genetic Diversity
B	Carrier Functions	i.	Agriculture and Irrigation
		ii.	Stock Farming and Grazing (Fodder and Forage)
		iii.	Wildlife Cropping/Resources
		iv.	Transport
		v.	Energy Production
		vi.	Tourism and Recreation
		vii.	Human Habitation and Settlement
		viii.	Habitat and Nursery for Plants and Animals Species
C	Production Functions	i.	Water
		ii.	Fuel
		iii.	Fuel Wood
		iv.	Medicinal Resources
		v.	Genetic Resources
		vi.	Timber and Non-Timber Forest Products
D	Information Functions	i.	Research, Education and Monitoring
		ii.	Uniqueness, Naturalness and Cultural Heritage

Wetlands Functions (Schuyt, 2004)

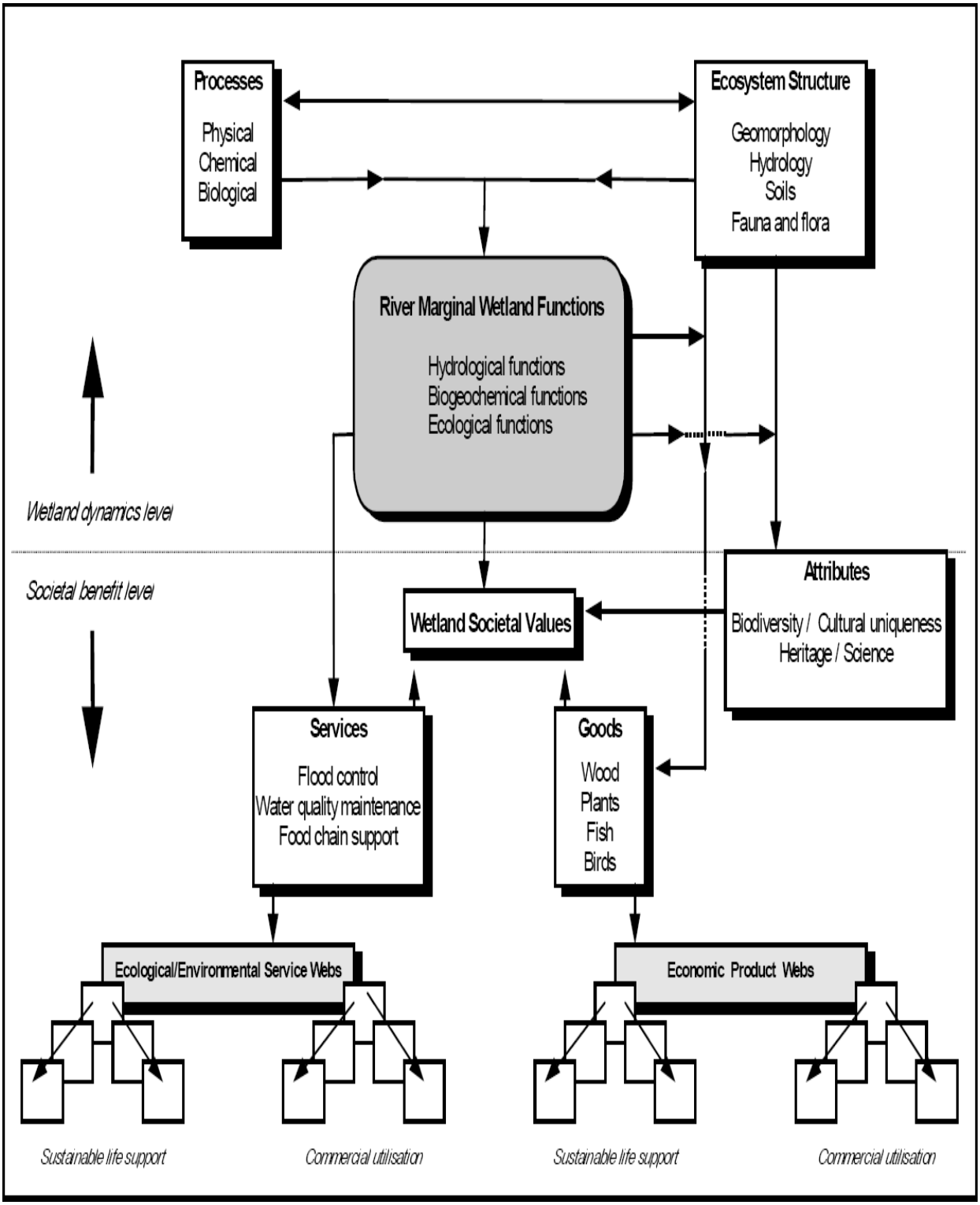

Figure 2.1 ***Wetlands Processes, Functions and Values*** (Hogan, Maltby, & Mode, 2016)

Provision of various goods and services uplifts the economic importance of wetlands (Figure & Table 2.1). The accruing benefits are widely spread in nature ranging from local communities living in its periphery to the surrounding population who fulfill their daily needs from theses water bodies and improvement of the regional environment. Many goods such as fresh water, food and building materials and services as water treatment and erosion control can be counted as direct benefits of the wetlands. On the other hand, wetlands have also socio-cultural values (Figure 2.1). There are some wetlands with historical and ceremonial importance for inhabitants. For example, in Australia many wetlands have cultural values for the native's Aboriginal owners. In these wetlands they conduct ceremonies and semi-hunting and gathering activities. In Hong Kong, Mai Poi marshes is the place where the local community does the traditional cultivation using the local wetland. Table 2.2 describes the economic valuation of Pantanal Wetland in Brazil, which is the world's largest wetland of fresh water covering 138,000 km^2 area. The economic value tabulated in Table 2.2 reveals that Pantanal Waterbody is providing various goods and services to the local communities. The current data is of only one (largest) region i.e. Neocolonial is 19.5% of the total wetland (Schuyt, 2004).

Goods and services generated thus can be measured in monetary terms to estimate economic value of a wetland and generally calculated based on local market prices as assigned share. Where local market prices are not available and difficult to calculate such as flood resistance service to quantify can be determined with the help of consumers' willingness to pay and producers willingness to accept payment. On the other hand, climate change regulation is also a service which is difficult to be valued. Environmentalists normally try to put a price label to the nature which can be justified. Majority population is unaware about the economic valuation of the wetlands and do not consider it more than a mosquito breeding area. Therefore, to generalize the benefits of

wetlands for public it is necessary to value its services in comparison to the local market that makes the sense to the people.

This complex relationship between the ecology and economics results in confusion about the importance of nature (Lambert, 2003). Rural economy is mostly dependent upon natural resources provided by the wetlands and substantially used by the near and far communities. Both ecology and economy are dependent on wetlands whereas conservation of wetlands depends on management practices adopted by the stakeholders (Roy, Roy, Samal, & Mazumdar, 2012). Sustainability of biodiversity in the past and now rest on the conservation of wetlands (Ramachandra, Alakananda, Rani, & Khan, 2011). Historically, it was specified that waterbodies also provide cultural benefits to the local communities. In present context, wetlands are considered as the kidneys of the landscape because of their ability to recycle and regulate water and thus regarded as biological supermarkets due to supply of various goods and services for the benefit of mankind (Mitsch & Gosselink, 1993).

Global water Partnership (GWP) is a network which provides a platform to all the organizations struggling for better water resource management. In 1996, international non-governmental organizations including United Nations Agencies For Water and GWP initiated the efforts to boost the work started by Integrated Water Resource Management (IWRM) to enhance and focus work on water, land and other natural resources for social and economic development (Rogers, Bhatia, & Huber, 1998). In 13th Meeting of Commission on Sustainable Development (CSD-13) the Norwegian and Swedish Government built the Stockholm International Water Institute (SIWI). The main objective was to improve the water quality and management (Stockholm International Water Institute, 2005).

Table 2.2
Economic Value of the Pantanal Wetland, Brazil

S.No.	Ecosystem Services	Economic Value per Year (1994, US$)
i.	Gas Regulation	181.31
ii.	Climate Regulation	120.50
iii.	Disturbance Regulation	4,703.61
iv.	Water Regulation	1,019.82
v.	Water Supply	5,322.58
vi.	Erosion Control	170.70
vii.	Fertile Soil	60.22
viii.	Nutrient Recycling	498.20
ix.	Waste Treatment	1,359.64
x.	Pollination	33.03
xi.	Biological Control	30.39
xii.	Habitat/Refugia	285.04
xiii.	Food Production	143.76
xiv.	Raw Materials	202.03
xv.	Genetic Resources	22.15
xvi.	Recreation	423.64
xvii.	Culture	1,144.49
	Total Economic Value	15,644.09

Economic Valuation of Wetland (Schuyt, 2004)

Water as an economic good has direct and indirect values and costs. Costs depend on the quality and quantity of water including other factors involved as geographical area, weather, distance from water source, policies, taxes, education level of users and many more.

Drinking and irrigation water have difference in terms of cost due to quality and quantity. However, developing countries are facing more bitter experiences in this context. A list of reasons is there, but mismanagement is the most significant (Rogers, Bhatia, & Huber, 1998). Water and sanitation management improves the national economy of a country because water and economy are distinctly inter-linked. Further, health of poor men and women is directly affected by the quality of water they approach and use especially poor people in rural areas directly interact with environment and natural resources. Likewise, the performance of business sectors as industry, agriculture and other goods and services directly consume huge quantity of water. Sustainable development of a nation is, therefore, attached with the water. The public and private investment of resources (money, time, social development and environmental education) predominantly require good management of water for economic growth both at grassroots and national levels. The nonexistence of access to the quality water and sanitation is causing the worse effects on the health of rural people. About 2.5 billion people of the world are at risk due to contaminated water diseases especially dengue (Stockholm International Water Institute, 2005).

Forests, as a part of natural resources, perform vital role in fulfilling livelihood needs of communities. Benefits of forests are difficult to count both in tangible and intangible form. Material benefits such as timber, fuelwood, fodder and forage, non-timber forest products (NTFPs) and services as aesthetics, tourism, clean air etc. can be counted on finger tips. At macro level forests preserve the biodiversity, prevent the soil erosion, balance the environmental pollution and

establish the ecological balance. Thus social, economic, cultural and environmental well-being is directly dependent on the existence of forests (Ranjit, 2012).

Natural forests cover about 30 percent (3.9 billion ha) of the total globe surface while only 5 percent of the total volume of natural forests meet 35 percent of the global needs of wood for human beings. Approximately 70 percent of the entire population of developing countries is inhabitants in rural areas and they are directly dependent on agriculture and animal husbandry of different nature. According to the statistics provided by United Nations Agriculture and Food Organization (UNFAO) about 450 million population of poor villagers is dependent on ecosystem services for their livelihood needs (Easterling, Aggarwal, Batima, K. M. Brandererda, & Tubiello, 2007).

A high quantity of products including timber, furniture, medicines wild-fruits and vegetables, household utensils, farm implements made of wood, honey and hedges are being used and sold in the local and international markets. The use of various products made from local wood reduces expenditure of household and their sale in the open market increases the income of local families and uplift the socio-economic status of the households. Data show that about 15 million villagers in Sub-Saharan African region increases their income by the utilization of local forests. A great number of rural populations also derive their income from the sale of cultural products made by the raw material obtained from the natural forests such as baskets, brooms, toys, hunting weapons, instruments, farm implements and domestic products (Oksanen & Mersmann, 2007).

Historically conservation of forests and preservation of natural resources was common among local people. They used indigenous ways of materialistic and non-materialistic tricks to achieve the conservation goals (Ranjit, 2012). Over the last many centuries about half of the total forests have been vanished from the surface of the earth. One fifth of the original forest reserves

remain in their original shape (Mujuri, 2007). Forest cover has been decreasing annually at the rate of 1 percent since 1980s. As the needs of the human beings are increasing and to meet the demands of industries, the natural forests are under high pressure to produce raw material. Humans can fulfill their needs by harvesting natural forests, but it must be based on sustainable basis. So far, no concrete steps have been taken by governments, industries, locals and individuals to overcome increasing deforestation rates in most of the countries of developing or under-developed world. The main cause is lack of awareness about importance of natural resources, absence of environmental education and societal barriers (Deacon, 1999). During the last few decades the massive compositional changes took place and the shape of green woody vegetation had ended up in desert formations including Southeast Asian countries (Lasco, 2002). The conversion of natural forests into land for cash crop cultivation is the largest threat of present time. Logging coupled with cultivation not only resulted in deforestation but also increased the demand for raising only cash crops in the regions (Stibig, Stolle, Dennis, & Feldkotter, 2007).

Due to diverse physiography and weathers, Pakistan has immense significance in terms of its biological resources. The existing diversity even under low forest cover plays a key role in the livelihood of millions of rural people. Total forest area of Pakistan is about 4.2 million ha which is 4.8 percent of the total land area (about 796,096 square kilometers). This area appears too meagre when compared with total 30 percent forest area of the world. Pakistan is comprised of different provinces with different edaphic and climatic conditions. Sindh, Balochistan, Punjab, Khyber Pakhtunkhwa (KP) Azad Kashmir and Northern Areas support about 0.92, 0.33, 0.69, 1.21, 0.42, and 0.66 million ha of forest area, respectively (Shahbaz, Ali, & Suleri, 2003).

2.3 Global and Local Fisherfolks

Fishermen always practiced distinct traditions in different regions. South Asian fishermen follow different religions. Contrary to this in Pakistan and Bangladesh, majority of the fishermen communities believe in Islamic religion while in India scattered minorities have faith in Christianity, Islam and others. Fishermen of this region belong to a very poor economic class and mostly uses traditional mode of fishing instead relying upon modern technology because of their very low economic level. The average size of fishermen household is between 4.7 to 8.6 and are highly exploited by middlemen who indebt them at the time of need and in return they hire their labor and take away fish catch at very low prices. Various factors such as low economic level coupled with low social status, illiteracy, lack of alternative livelihood and skills, dependency on loan, traditional fishing methods and low production effect the socioeconomic stability of the fisher communities in India (Central Marine Fisheries Research Institute India, 1977; Central Marine Fisheries Research Institute India, 1998; Nammalwar & Prakasam, 1979).

Fishermen remain under debt due to excessive borrowing from middlemen, based in different towns of Kerala. As the loans are more than income, their inability results the annual incensement of debt on households and called as Coastal Rural Indebtedness (CDI). Community generally take loans from money lenders as formal loans at high interest rates (30%) along with dictated terms and conditions leading to greater exploitation in future. Other equipment's such as boats, nets, generators, ice etc. are supplied through debt deals (Panikkar K. , 1980).

Panikkar & Alagaraja (1981) studied the impact of modern technology on the socio-economic status of fishing communities in Calicut region of India. Total 350 families were selected, as sample of the study. The sampled individuals were provided boats equipped with modern mechanism supplied by Agricultural Refinance Development Corporation (ARDC) in this

project. This venture resulted in the uplift of socioeconomic conditions of villagers and provided more income opportunities. Whereas neighboring villages were in the same condition which shows the importance of modern technology for incensement of socio-economic status. Another study (Kalawar, 1981) carried in Maharashtra, India examined the living conditions of fishermen. The low economic growth in this region compels the fishing communities to move for suitable place. Researchers suggested the accessibility of basic infrastructure and water-supply facilities to local communities which may reduce the migration of fishing labor and degradation of fisheries industries (Librero, 1985; Kalawar, 1981; Samuel D. V., 1986).

Kurien (1981) and Senthilathiban and Selvaraj (1989) unpacked the two reasons behind the low socio-economic status of fishing communities, first the dissimilarity in the assets (boat, nets, generators, ice-boxes and household luggage etc.) holding of families, secondly, the extreme exploitation of forces involved in the purchase of fish from households. This ultimately results in low income, more expenditure, increase in debts and decrease in savings. Sometimes the wages are not paid in cash but in kind in the form of one or two fishes, deduction of loan, cut from the amount of net payment which is already given by lenders and debt in non-fishing days (fish breading season).

Fernando (1981) documented some suggestions to uplift the socio-economic status of fisherfolks such as provision of fish storage (chillers, ice boxes, ice blocks) facilities and transportation (vehicles to approach the market). Roads, education, provision of technology had also influenced social status of poor fisherfolks.

Valiakandathil and Poonthura (1981) and Central Marine Fisheries Research Institute, India (1985) studied the socioeconomic conditions of fishermen in Poonthura and focused on the seasonal occupation of the fishermen when Fisheries Department bans the fishing practices during

the breeding season of fish. This study showed that community remains joblessness for a very long time. Researchers mentioned that fisherfolks are generally employed for 6 months. However, only 10 percent fishermen can do fishing practices during rains and floods who are equipped with latest good quality of equipment. This underemployment also leads to more economic burden and increase in debts for poor fishermen. Debts also result in severe problems as the interest rates vary from 36 to 120 percent. Thus, re-establishment and rebuilding of the socio-economic status of poor fishermen communities in India become a national problem. Many empirical evidences (Central Marine Fisheries Research Institute India, 1998; Durairaj, 1981; Verduijin C. J., 2000) indicate that mechanized and unmechanized fishing practices do have difference between socio-economic status of fisherfolks. According to findings, the Catamaran-based fishing has more annual return as compared to mechanized one. High costs of diesel of maintenance also impact the income resulting from poor technological based fishing. The study clearly shows that mechanized fishing practices are not always useful in all circumstances, as there are many factors which can lower the income of users i.e. weather conditions, depth of water, availability of labor force number, prices of fuel, availability of technicians and price of fish in the nearest market.

Sehara & Karbari (1983) conducted research in Maharashtra and Gujrat, (Indian States) revealed that the labor force of fishermen is generally composed of family members practices along with their household heads. In the study it was observed that with the increase in labor of family members involved in fishing practices increases the overall income and lessen the household expenditure due to comparatively more production. On the other hand, this effects the basic rights of members such as education, freedom of childhood and basic health quality.

Bhavani (1986) observed that very few information regarding health and nutrition status of fisherfolks and their households is available in the research studies (Bhavani, 1986). Men have

dominancy in fishermen families all over the world whereas women are equally participating fishing practices, but the patriarchy is dominant because of powerful labor practices, religious values and cultural factors and women are bound to fulfill their needs in given economic circumstances. Mostly fishermen communities are neglected by sociologists and economists during their research activities (King, 1989). This results in loss of rich information with passage of time. Thus, fishermen remain in very poor socio-economic status and form marginalized group of society as no attention is paid towards them.

Many researchers (Samuel & Viswasam, 1989; Sathiadas & Panikkar, 1991) put forwarded that the successful implementation of any developmental project for fishermen depends on the socio-economic status of the community. The research studies contributed to the socio-economic status of fishing community along the Madras Coast in 1984-85. Two communities were selected based on the technological use during fishing practices. The community with high fish catches and easy approach had major effect on economic well-being of fishermen community. The importance of this effect becomes lower when middleman is involved in sales and purchase activities. Middleman always exploits both seller and buyer to maximize his profits. In Pakistani context, contractors and feudal act as middlemen and are highly influenced in affecting socio-economic status of fishermen and their families. Chidambaram & Soundrarajan (1990) argued that transportation facilities have key role in the income of fishermen. Better transportation facility reduces the time and increases the price of fish. Efficient transportation facilities coupled with proper storage have significant importance for making sale in competitive market. The study also observed that the fishermen were highly exploited by the middlemen thus could not approach the real prices and failed to have benefits in real terms. Chidambaram also suggested that opportunity of education may be provided to the fishermen to overcome gross exploitation. One more

researcher (James, 1990) comparatively analyzed the capacity of labor fishing economy. He observed that retailers got more profits in the market as compared to fishermen. Major bottle-necks in-between were the middleman and unawareness about the species demanded in the local market. Demand for species always had significant role in local market and usually the retailers or middleman took away the benefits.

Pradeep & Chandra (1990) contributed their research findings in their article "Fish Marketing Efficiency" regarding Allahabad (India) fish market. Their results supported the argument of James (1990) that consumer pays price with a high profit margin to the retailers in the market and fishermen who are the actual labor behind this economic phenomenon cannot take desired benefit from their products. The study suggested that all efforts be made to favor labor to receive appropriate share according to local market price for at least local commercial species. The correlation between the investment of fishermen in the form of debt and the ratio of net profit has been studied and results supported the argument that the investment in small scale practices were heterogeneous and the profit was insufficient to meet the expenses. This association between magnitude of investment and borrowing clearly depicted the socio-economic status of fishing groups in different parts of the sphere (Rajan, 1990; Sathiadas & Panikkar, 1991).

Total contribution of Indian fisheries in the world in terms of volume is only 3% whereas the employment ratio is comparatively very high. Researcher recommended the possible interventions such as provision of seasonal debt, improvement in the infrastructure, provision of technology and technique to reduce the cultural lag and approach to the local market are necessary factors to uplift the socio-economic status of fisherfolks. The study also suggested the review in the policies can play key role in increasing the total share of fish and related products in the global market (Shukla, 1990).

Chhaya, Jani, & Amrelliya (1991) analyzed the association between total cost and net profit for one trip using different types of boats. They argued in favor of Gill-Netter with inboard motor that gives more profit as compared to the other types of techniques for boating. Sehara, Panikkar, & Karbhari (1992) build a relationship between fishing during monsoon season (July-August) in most parts of the sub-continent and the net profit of households. The study found that mechanized units were more effective during heavy rainy season as compared to traditional ones because heavy raining resulted in floods and raised water level. The researcher also argued that policies for fishing during off/low fishing season must be reviewed to overcome the poor situation of families. Ayyakannu (1992) presented the seasonal fishing and its effect on the socio-economic status of fishermen. According to findings the post monsoon season was best for the fishing because it favored diving activity (fishermen must dive in river/sea for different needs such as net releasing, motor and boat cleaning and picking of fallen tools etc.). The author argued that he found very few cooperative societies for the fishermen who usually depend on middleman or private shops for the purchase of equipment.

Adnam (1994) conducted his research in Malaysia and gathered the results that Kuala Sepetang is Malaysian village of fishermen having all the basic facilities such as transportation, telephone, sanitation and good infrastructure. Only 29 percent population was involved in direct fishing while rest of the fishermen were associated with different occupations such as fish byproducts processing, trading and marketing. Only one percent of the population was below the poverty line (non-fishing households) while the rest were well-off even though literacy rate of the village was low. The main reason behind this satisfactory socio-economic status was the direct benefits from the fish and no exploitation by the middleman or retrogressive policies of the government.

Siddiqui (1995) conducted his research in Tamil Nado, India on the fishermen whose primary occupation was fishing and marketing of fish catches. According to the findings, fishing season started from August and ended in March. Due to rough sea and cyclonic weather, the fishing operations remained off for 60 days. Only well-equipped fishermen were able to catch fish during off-season. Fisherfolks commonly hesitate to take loans from institutions such as banks due lack of information to strangeness, unawareness and prefer formal raising of funds locally to purchase equipment and meet other expenses. They preferred moneylenders or fish merchants (middlemen) for the loans even on tough conditions generally because this practice was indigenous from ancestors and they were used to contact and depend on them. Total 70 percent were found indebted during the time of poor-catch, low marketing or social ceremonies such as marriages. The study recommended that fishermen should be given sufficient trainings to avoid such loans and go for better mechanism. The researcher also suggested provision of basic facilities related to sanitation, drinking water, schools and basic health units for the overall uplift of the fishermen communities. (Chidambaram & Soundrarajan, 1997; Nair & Girija, 1998) also suggested to uplift the socio-economic status of fisherfolks.

Immanuel (1997) studied water products selling for livelihood by the fishermen and women. Sea based fishing activity is overall same as the fresh water, however, the products used to catch, made or collected might be different. Here researcher mentioned seaweeds which are mostly collected by women and sold in the local market as a raw material for different finished products. Fishermen do not stay longer on the islands, hence it results in collection of less seaweed consequently yielding low profit. This job is physically tough in nature and demands more energy.

Unexpected weather conditions and rough sea results in collection of low quality and quantity of seaweed and translates to unemployment of fishing communities for months which

effects the livelihood of families. Roy (1997) deliberates that the socioeconomic conditions of fisherfolks in Bangladesh. According to him poor fisher families were trapped in many problems because of middlemen and their peers. Every year floods, rough and tough weather conditions and off-season made more complexity in the web of livelihood problems. Researcher also mentioned that over and destructive fishing ultimately resulted in shortfall of fish population which is big natural resource of the country. Alternate means of livelihood are recommended for the families to support and reduce dependency on middleman which can result in the conservation of natural resources.

Verduijin (2000) also detailed that very few alternate livelihood opportunities put more burden on the natural resources. The sample population was selected from 39 fishermen villages of Kanyakumari district, India situated along 68 kilometers strip of costal side. The study observed that intensity of active fishing increased over many years and put more burden on the fish population of fish. Absence of alternate livelihood opportunities was another reason in decrease of fish population. The study also identified that nets were usually destroyed by the mechanized boats which made the process even more costly because of new technological mode. Health care, safe drinking water and education facilities were highly recommended by the researcher for these communities to uplift their socio-economic status.

Shanmugaraj and Ashok, (1998) surveyed two communities in Ramanatha Puram and Thoothukudi districts (India) which were totally dependent on fishing practices. These fisherfolks were indigenously highly trained in catching, sorting, cleaning, drying and marketing fish. The results indicated that fishing culture transferred from elders had high value to mitigate the basic needs of livelihood. Daily income of fishermen was dependent on the quantity, quality and species

of daily catch. The income thus earned by the fishermen was quite low as compared to prices in the local market and fell below the poverty line.

Venkatachalam, (2005) presented his paper in a conference at Lahore University of Management Sciences, Pakistan and discussed the importance of fingerlings (the juvenile fish) and the drawbacks of catching it. Study findings revealed that catching practices of juvenile fish had very bad effect on the conservation of species. That is why government recommend the net size to avoid the fingerlings catching of fish, but violation of such practices had declined the fish population. Legal methods of fishing and off-season practices were recommended to promote healthy catch and to save natural resource. A research was conducted by the Bay of Bengal Programme (BOBP/REP/4) to examine the role of fisherwomen and found that 30 percent of the fisherwomen were directly or indirectly involved in the small-scale fishing practices. The role of women in fishing industry in addition to other household chores was substantial due to the nature of work performed during distribution of different types of work. The nature of work depends on the community, region, cultural values and race that either women were full time or part-time fish worker. Women were even involved in fish catching activities but generally they got themselves engaged in post fish catching duties. Marketing, selling, drying, storing, transporting fish and byproducts were commonly performed by fisherwomen. Malaysian women were only involved in small scale fishing practices. Small fish-processing units were established and operated by fisherwomen. In Thailand, fisherwomen engaged themselves in other small activities as compared to the marketing or selling the fish. But in larger fishing villages and towns women were also engaged in mega fish related activities including marketing (Bay Of Bengal Programme, 1980).

Another research study on fisherwomen in Sri Lanka revealed that only 8 % of the women were involved in fishing while rest of the women were compelled by household heads to stay at

home to look after other jobs. But in the same community, the Negombo fisherwomen were quite different from others and were actively involved in fishing as well as remained with the menfolk during seasonal migration instead of staying at homes. Generally, these women were involved in mending the nets (Wanigasundara, 1981).

Richard (1988) found that in many fishing communities of the globe, the fisherwomen were primarily involved in selling and buying the fish and fish related byproducts. In some areas, the fishermen actively participated at all levels of fish marketing. In Caribbean, West Africa, India, Asia, the Pacific and Latin America, the middle women were also found in the fish industry. The division of labor among families also earn higher profit. Nauen (1989) claimed that fisherwomen played a key role in post-harvesting activities of fish industry. Usually in some communities the women play the role of a head during the selling and processing of fish. The Nigerian women in local fishing communities of Gabon, involved themselves in the sea foods, mangroves, fish holes and different products to uplift the status of their families. But the social status of women remained comparatively low as they do not have access to good food, health and education facilities.

Nandeesha, Ngan, & Kuong, (1994) mentioned the role of Cambodian fisherwomen comprising 65 percent of the total adult population. They played key role in all socioeconomic activities related to livelihood of their families. Even in aquaculture activities the women had more participation than men of their families. Being a good housewives, they were actively participating in fish culture. Daily harvesting of fish for their family was done by women. Management of ponds and fishing related domestic activities were less physical and more recreational in the nature. Therefore, women also involved children in domestic fish activities which were less risky.

Lilian (1998) discussed the involvement of women in fishing in Pacific Islands. These activities ranged from collection, processing and harvesting to the marketing of fish. The

underestimation or overlooking of fisherwomen contribution in the local as well as domestic economy is usual practiced all over the world. The role in fishing practices of women is changing with the passage of time in different countries because of change in policies, culture, education, use of technology and barriers effecting the livelihood. All these contributions are enough to understand the role of fishermen and the contribution for their families.

The socio-economic status of fisherwomen in India is dependent on their economic strength which is subjected to their commercial activities. The societal development has a key role in the economic development of women. The recognition of fisherwomen' work is low because of poor returns from their socioeconomic activities. The main reason is that fisherwomen are engaged in informal sector which is not quantified and enumerated at any level of the society. Further, lack of techniques and binding fisherwomen to remain in traditional mode are the reasons that they cannot contribute more.

The study indicated that locally 30 percent of the households were headed by women and bearing the cost of all the economic activities related to their families related to fish industry. Lack of information, alternate opportunities, health facilities and local culture highly effect the socio-economic status of fisherwomen in India. It was advocated that separate economic planning for this marginalized group of women should be initiated which can ultimately support them and their families in coming days. The fisherwomen of Gopalpur, India fight for their rights and constituted a Panchayat (local group of prestige persons to resolve the disputes without involving the formal law) and self-help groups (SHGs). Girls were then going to schools and started raising their voices for the provision of different facilities with the help of public and private sector. Time and obsession of involvement in local fishing practices gave them courage to raise the voice for rights

and uplift their socio-economic status. Avoiding the leisure and pleasure they were now rough and tough for the betterment of future of their families especially for children.

The role of middleman was also very considerable as community women were also highly exploited by them and local venders. Raising awareness level of women regarding alternative livelihood resources, diversity, conservation, family equilibrium and community harmony can lessen the ratio of exploitation by middleman. The indigenous knowledge of all the fisher communities of the world need registration, documentation, appreciation and recognition at domestic as well as international levels. This knowledge not only helped their ancestors but also helping their families since centuries. However, the embracing of technique and technology is very essential for the fulfilment of the emerging needs (Veenakumari, 1998; Narayanakumar, et al., 2000; Chandra, 2009).

Jese (2009) put forwarded that learning of important basic management skills and education in business techniques are necessary for the fisherwomen. Hygienic awareness is very important for these women about the treatment of sea food with fresh water as it has high risk of rapid contamination. The preservation and packing of fish need hygienic protocols at all levels. The author discussed importance of the role of fisherwomen in uplifting socio-economic status of their families through participation at all levels of fish industry. The researcher also studied two fishing companies and found that almost 50 percent employees were women. This shows the contribution of women in artisanal and industrial fishing has effects on the domestic and national economy. The author also documented the role of fisherwomen from Fiji and their contribution.

Forced labor is contemporary term with existing phenomenon and dimensions. Even the growing rate of this activity is at rise and making the process more complicated in 21st Century. Currently the forced labor is being highlighted by the media which makes it too familiar to people.

At global scale about twenty-seven million people are victim of forced labor activity. Although, it is very difficult for the policy makers at different parts of the globe as correct number of victims might be erroneous and can exceed the estimated figures. However, International Labor Organization (ILO) has enlisted numerous factors of forced or bonded labor. Current study was conducted to review the literature to find out the consequences, point out the indicators of forced labor and to recommend the possible remedies. Forced labor is exactly the domain of law and human rights, however, the causes behind it are purely economic based (Ruwanpura & Rai, 2004; Bales, 2000; United Nations Economic and Social Council, 2002).

The defenselessness feelings or abuse of vulnerability also affect the rights of the labor. Deception in job or work also promote the forced labor atmosphere. Another element which results the labor as bonded is to restrict its movement. Keeping the individuals in isolation is also comes under the category of forced labor. International Trade Union Confederation has listed the following characteristics that pull an individual into forced or bonded labor;

- Birth of an individual as slave or in bonded position
- Physical abduction or kidnapping for work
- Presentment at workplace
- Threat or psychological detention for work against plenty
- Low wages against services or goods
- Deceiving agreement or false promises against work/wages
- Retention of individual's identity documents for work
- Physical violence of worker/his family/his near ones
- Sexual violence/taking the benefit of her/his lower status or financial compulsions
- Threat of response attacks or retaliation
- Financial penalties more than the value of mistake
- Handing over to law enforcement agencies or deport
- Dismissal from current employment on minor mistake or omission

- Exclusion or non-authorization for future job
- Social marginalization
- Removal of necessities or privileges
- Shifting to worse working conditions as penalty
- Degradation in social status (International Trade Union Confederation, 2008; International Labour Organisation, 2005)

Indonesian Ministry of Marine Affairs and Fisheries (KKP) and International Organization for Migration (IOM) jointly presented the study of those 1342 fishermen which were trafficked to feed the Indonesian Fishing Industry in Biljana and Ambon. These individuals were highly exploited for fishing work and became prey of compulsory labor. They were taken from Cambodia, Myanmar and Thailand to work forcefully in Indonesia under highly exploited conditions. Indonesian National Police and IOM rescued them from the custody of local power regime. These figures are very low as compared to extensive list of exploiters in fish industry especially in Indonesia. This kind of exploitation is a breach of the national law of Indonesia, international law for labor and the protocols of United Nations for free labor. The illegal, unregulated and unreported labor exploitation is common in fishing Industry all over the world (International Organization for Migration, 2016). United Nation's Secretary General in 2008 addressed General Assembly under the title "Oceans and the Law of Sea" and highlighted the importance of Maritime Security against the continuous emerging issues of trafficking, illegal migration, piracy, refugees, forced labor and fish industry exploitation (United Nations Office on Drugs and Crime, 2011)

Food and Agriculture Organization of the United Nations (FAO) in cooperation with International Labor Organization (ILO) had organized a workshop in 2010 to highlight the ancient and vital subject and to advance the policy and practice, to advocate the governments regarding child labor in marine and freshwater fisheries. This joint and operative effort of UN and ILO was

planned to impulse the governments to implement the UN conventions and resolution for the eradication of child labor from fish industries. Child labor is being used at large and small-scale both in marine and freshwater fishing for pre and post activities especially in underdeveloped and developing countries. This forum also pointed out the causes of child labor in fishing as social diversity, forced labor of parents, illiteracy of parents, vulnerability and less penetration and non-implementation of child laws by the government agencies. The consequences were measured and indicated that this practice is clear-cut defilement which can push the future of humanity at risk in terms of literateness, privileges and harmony. It was suggested that all the members of United Nations must ensure to implement the basic laws of children to minimize the strength of child labor in fish industry as well as all industries (International labour Organization, 14–16 April 2010).

In recent history, the researchers and journalists enlisted severe violations of human rights over water. Human trafficking, bonded labor and women/child abuses were on the top of the rights abuses list. In 2012, Bloomsburg Businessweek reported that a South-Korean flagged ship trafficked the labor and subjected to violent behavior (physically and sexually abuse) in the fishing (Skinner, February 23, 2012). In 2014-15 the Guardian and New York Times also mentioned the violations of basic human rights in fishing industry (Urbina, I., July 25, 2015; McDowell, R; Mason, M.;Mendoza, M, 2015; Hodal, K.; C. Kelly; F. Lawrence;, 2014).

In Thailand journalists also highlighted such activities in sea-food industry, fresh water and wild capture activities. This list of crime is exclusive and similar in nature which shows that such practices are not limited to developing countries, but modern world is also the victim of human rights violation in fish industry. Human rights violation of fish industry was found in United Kingdom, Ireland and Scotland, where European Union transit rules apply. In Asian and African

countries abuses of rights as forced labor are also prevalent (Lawrence, F., August 17, 2015; Lawrence, et al., November 2, 2015; Ercelawn & Nauman, 2001).

Fisheries management system both in developed and developing countries need the attention of academicians, researchers and journalists to put their mind in this process (Kelbie, December 13, 2008; Simmons & Stringer, 2014; Stringer, C.; Simmons, G.; Coulston, D., 2011; Lawrence, et al., November 2, 2015). Fisheries industry exploits labor both on the land and in the water. But the extreme violations were found in the fishing vessels especially for the migrants (International Labour Organisation, December 1999a; International Labour Organisation, 1999b; International Labour Organisation, 2013a; International Labour Organisation, 2013b).

Many factors are involved behind the exploitation, but the demand of cheap labor is on the top priority. Especially, the unskilled labor can be more exploited because of its need in the industry. Main problem with the migrant workers for exploitation is cultural shock. They are not familiar with the local language and food, so they are at the peak of rights abuse. This isolation also causes other problems such as physical abuse. Violation of rules is done not only with international labor, but the domestic labor is also victim of it. For example, the Thai labor within their country are real example of labor exploitation in fish industry. Many people due to lack of information become the prey of this phenomenon as they want to become the fishermen and adopt the skills and technique of fishing thus contact the vessel owners and ultimately trafficked for bonded labor. Many studies conducted strengthen arguments of physical, mental and sexual abuses and sometimes even murder has also been reported (US Department of State , 2014; US Department of State , 2015).

There is interdependence and interlinkages between environmental protection and human rights. More rights are violated in areas where overfishing is required for more profit. Labor is

generally abused for corruption, greed, cultural inequality and many of social crimes. Such social drivers ultimately cause the exploitation of fish population and other natural resources. Fish stocks closer to shore are at high risk. Increasing fishing in remote areas even put more pressure on environmental resources because increase in cost (fuel and logistics) and to decrease the expenditure, the owners try to make more profit through labor exploitation. Efforts to reduce expenditure can cost in terms of diminishing the health and wealth of labor by contractor/feudal. International policies for human rights in fisheries labor exploitation is the target domain for future planning. Specially, the World Trade Organization (WTO), ILO and FAO are the bodies whose policies came across between 1920-2000 (Environmental Justice Foundation, 2013b). Many conventions, treaties and measures have been adopted to address the rights for labor in fisheries. Following list is depicting some of these steps;

- Convention of Trafficking conducted by the United Nations and considered as Transnational Organized Crime (UNTOC) in 2000;
- Convention of Labor, Fishing, Maritime Safety organized by International Labor Organization in 2007;
- Convention of Labor fisheries, Maritime Safety under supervision of International Labor Organization in 2006;
- Convention of Maritime Safety organized by International Maritime Safety in 1974;
- Standard Convention of Fishing inaugurated by International Maritime Organization in 1995;
- Convention/Protocol of Labor, Maritime Safety organized by International Maritime Organization (but not implemented yet) (Lewis, Sara G.; Alifano, Aurora; Boyle, Mariah; Mangel, Marc, 2017).

Despite all these conventions and treaties, the forced labor is expanding on a global scale. The major flaws lie in the implementation of laws as these are not taken seriously by many member countries. The lack of accountability by many organizations and UN also cause the continuation

of crime in fishing industry. Russia as top exporter of fish sidesteps the UN conventions and do not make serious efforts to stop the forced labor and trafficking at larger scale. However, the political pressure is the key force to prevent the implementation of laws because the financial benefits according to most of the politicians are being marginalized by the convention laws.

At mega level most of the member countries did some efforts to prevent the forced labor, trafficking, child labor and workplace violence but cannot address the minor crimes as low wages and harassment etc. National level policies are also being implemented by many nations, but considerable efforts are required to address at each level. Due to harsh criticism, Thailand started to implement convention laws with minor practices. In the first phase the registration of Migrant Labors in fisheries has been completed following the implementation of criminal laws in fish industry to protect the labor rights (Ministry of Foreign Affairs of Thailand, 2015). New Zealand also amended the laws regarding Fisheries ACT (14/60) through the Parliament. Some efforts are also initiated by the Ireland to make the documentation of laws and their meaningful implementation meaningful regarding fisheries They also took initiatives to regulate the contracts, wages and harassment (Lawrence, et al., November 2, 2015; US Department of State , 2015).

WWF-Pakistan in collaboration and funding of the Department of International Development of UK implemented a project on “Global Poverty Alleviation Fund” (GPAF 2012-2015). The core objective of this project was to change the indigenous livelihood practices of the fishermen community of Central Indus Wetlands Complex (CWIC) from fishing to any other suitable alternative practices. This objective was considered as ultimate benefiter to the CWIC as silhouette for the conservation and sustainability of speedily degrading resources with time. Secondly, this may also effectively help the poor fisherfolks who are victim of low socio-economic status due to influential role of middlemen and their exploitation through the administration and

feudal by the Fisheries Department of Punjab and Sindh. Thirdly, during the off-season and under the extreme weather conditions and unexpected circumstances the fishermen were unable to do fishing which ultimately affected their livelihood badly. The project covered the Jinnah Barrage, Tounsa Barrage, Indus Basin of Rajanpur, Rahim Yar Khan, Guddu Barrage and Sukkhar Barrage which is stretched hundreds of kilometers between Punjab and Sindh. The project focused on 2100 households with improvement in their livelihood through the introduction of various alternative livelihood practices. The total population in the study area was 17000 households including other than fishermen families or households with second occupation as a fishing. The objectives of the project were:

- Construction and strengthen the community-based organization (CBOs) which can effectively represent the poverty-environment nexus,
- Production, provision and powering the alternative livelihood strategies,
- Raising awareness and provision of alternative sources of energy for the conservation of forests along and in islands of the river,
- Finally, to conserve and protect the designated areas and species of fish and wild animals with the collaboration of all stakeholders.

The following departments were collaborating with WWF-Pakistan to launch and accomplish the project;

- Punjab Forest Department,
- Punjab Wildlife Department,
- Punjab Fisheries Department,
- Punjab Irrigation Department,
- Sindh Forest Department,
- Sindh Wildlife Department,
- Sindh Fisheries Department and
- Sindh Irrigation Department.

The Non-Governmental Organizations in partnership were:

- Saiban Welfare Foundation, Tounsa Barrage,
- Khawaja Farid Foundation, Kot Mitthan, Rajanpur,
- Sindh Youth Welfare Organization, Guddu and Sukkhar Barrages (World Wide Fund for Nature Pakistan, 2014).

Atiq-ur-Rehman, (2012) in his reports improving livelihoods of fisher communities in Central Indus, Pakistan by assessing the socioeconomic baseline mentioned that location of Chashma Barrage is 25 Kilometers South-West of District Mianwali, Punjab. For this study, three villages were selected namely Ghandi, Sindhian Wala Bun and Haider Colony. Total population of 350 households was recorded including fisher and non-fisher households.

The Tounsa Barrage is located at south-east of Tounsa District, Punjab. The villages having the fisher families were Allah Wali, Basti Sheikhan and Basti Gadi including more than 1000 households with different livelihoods. District Rajanpur is situated at the west bank of Indus River at least 120 kilometers away from district Dera Ghazi Khan, Punjab. Rajanpur was designated as district in 1982 making separation from District Dera Ghazi Khan. Rajanpur is situated towards north-west from Dera Ghazi Khan and east by Rahim Yar Khan and Muzaffargarh both the districts of Punjab. Tehsil Kot Mithan of District Rajanpur was selected because it lies exactly on the banks of Indus River. The west of district Rajanpur is covered by Suleman Mountains. The north of Rahim Yar Khan is bounded with district Muzaffar Garh, while east by Bahawalpur and south by Ghotki District of Sindh province. The Chacharan village was selected which was part of Tahsil Khan Pur, District Rahim Yar khan. Chacharan is exactly located at the bank of Indus River. These both districts have no barrage on Indus River while the Indus Basin fishermen communities were researched for GPAF project. Three villages of Guddu Barrage, Sindh were the part of study area

located exactly along Barrage premises. The names of the villages were Alam Mirani, Bakhshal Shah, Chattal Mirani, Sher Dil Mahar and Wali Muhammad having approximately 700 households having fishing as primary or secondary occupation. Indus Blind Dolphin Reserve *(Platanista gangetica* minor) is between Guddu and Sukkur barrages. The villages of District Ghotki were Alam Mirani, Bakhshal Shah, Chattal Mirani, Sher Dil Mahar, and Wali Muhammad having approximately 700 households.

The study sample was composed of those households who were having the fishing as primary or secondary occupation. The results of the project may be slightly different from present study because in current research only those families were selected who were only fishermen in nature and earn livelihood through middlemen.

The findings of baseline survey of GPAF project, which was obviously without any intervention, revealed that average income of the households of the study area is 232 US dollars which was almost one fifth of the country's per capita income in 2011. At the time of survey, the National Per Capita Income was 1194 US Dollars. Majority population (83%) was falling below the poverty line category of Pakistan. The adult literacy rate in the study area was 14 percent while the literacy rate of Pakistan in 2012 was 56 percent. The youth literacy rate in the study area was 21 percent while in 2012 the country's youth literacy rate was 71 percent. The national Child Enrolment in 2012 was 94 percent in the country while study area was having the only 13 percent. The study also showed 35 percent of the total students enrolled could complete 5 year of education in schools. This lack of education and high rate of dropout is because of absence of higher formal education setup in whole study area. Only community-based efforts were made at local level for boys and girls to have their basic informal education. Health condition of fishermen families was also very poor due to non-availability of health facility in the area.

The child mortality rate was 112/1000 which is 11.2 percent while the national child mortality rate was 72/1000 (7.2 percent) in 2011. The highest mortality rate among children was 7 out of 10 (70%) in 2011 in the villages Alam Mirani and Ghotki of Sindh. Among the households selected during the survey, total 3 percent members of each family were admitted in the city hospitals. The average annual per capita expenditure could not exceed 1000 rupees/annum of the villages in the selected list. The more astonishing statistics was that 7 out of 11 villages had rupees 200 per annum per capita expenditure for health while two villages; Alam Mirani and Ghandi had zero expenditure on health care in this modern time. In context of land ownership, majority (about 84 percent) had no land ownership in study area and 73 percent of the total selected households were illegal tenants while 11 percent were legal. Rest of the population was living on their own registered land. Housing condition of fisherfolk was also very miserable as majority were living in unpaved thatched houses. Total 68 percent houses were found unpaved in Chashma while this number went up to 83 percent in Tounsa and 86 percent in Sukkur. Only 2 percent houses were found paved overall in the study area. The residential capacity of the household was also bad as 7 percent families had 1 person in single room, 34 percent had 6 persons per room. About 95 percent of the total population of fisherfolks used fuelwood as household energy while only very limited number of households had the facility of Biogas. Thus, very low number of families in the total population had smoke-free fuel facility. About 48 percent of the total population had no facility of toilets and using open field for defecation while 30 percent of the total households had no flush toilets.

The fresh drinking water and domestic water facility was available to 99 percent of the population because of nearby Indus River. They used hand pumps for fetching water, but the quality of water was never tested. The water source got contaminated day by day due to effluents from factories and human waste. Agriculture as secondary occupation was generally absent among

the sample population. Only in Basti Gadi some households had agriculture as the primary occupation and did fishing for recreation. The fisherfolks generally using their cultural equipment for fishing while very few were used modern technology. Out of the majority (64 percent) had very old motors for boats while rest were using good quality motors. Fourteen percent of the total population had television facility to receive information about development in their life. Cellular phones for communication were found with majority of population (74 percent) having at least one mobile phone per household. Chashma and Tounsa Barrages population (82 percent) had cell phones while Sukkur had 67 percent of cell phones at the rate of one per household. Electricity facility was not available in the whole area except very few villages. The fishermen got their cell phones charged from the Masjids where the generator facility was available for Adhan (Call for Prayer). Only 6 percent of the respondents had the facility of motorized transportation as majority had motor bikes. However, people also used the donkey carts or oxcarts for transportation but very low in numbers.

Table 2.3
GPAF (WWF-Pakistan) Project Data of CIWC

District	Village name	Households	Men Respondents	Women Respondents	Total Respondents
Rahim Yar Khan	Chachran	90	30	20	50
	Asghar Abad	150	45	30	65
Rajanpur	Basti Manchri	70	25	15	35
Total		310	100	65	165
Chashma Barrage Wildlife Sanctuary	Ghandi	80	12	08	20
	Haider Colony	85	13	08	21
	Sindhian Wala Ban	160	24	16	40
Tounsa Barrage Wildlife Sanctuary	Basti Allah Wali	248	38	24	62
	Basti Sheikhan	164	25	16	41
	Basti Gaadi	148	22	16	38
Indus Dolphin Game Reserve	Alam Mirani	100	15	11	26
	Bakhshal Shah	320	48	32	80
	Chhatal Mirani	156	24	16	40
	Sherdil Mahar	100	14	11	25
	Wali Muhammad	108	16	12	28
Total		1,669	251	170	421

GPAF (WWF-Pakistan) (Atiq-ur-Rehman, 2012)

2.4 Theoretical Framework

Although social sciences emerged and came into field after the development of natural sciences, but simultaneously social sciences also established its philosophical grounds to make an understanding of the cause and effect relationship. Theoretical framework helped to have the conceptualization between philosophical grounds and empirical evidences. Sociology got importance after its emergence as a scientific subject and being relatively a new academic discipline, it also came upfront to address the philosophical approaches in a scientific manner.

Theoretically the current research is divided in three themes;

i. Human and Natural Resources; Reciprocal Bonding
ii. Natural Resources as social and economic entities for humans
iii. Exploitation of humans and natural resources

Humans since day one remained dependent on the natural resources including air, water, soil, plants and animals. In the beginning they used resources mostly in raw form and less finished but with the advancement in industrialization, natural resources covered our whole life but in the form of finished goods.

Vandana Shiva born in 1952 in foothills of Himalaya in India, is a well-known philosopher, environmentalist, social activist and author. She is also known as the critic on globalization and modern economy, green revolution and new environmentalism and has academic background in the philosophy of science and follows the themes that are supported by philosophy as demonstrated in her book “Earth, Democracy, Justice, Sustainability and Peace”.

2.4.1 Humans and Natural Resources; Reciprocal Bonding

Shiva (2015) gives the concept of nature's economy based on the human and nature relationship. The nature derives the economy by providing raw material and the humans are considered as a single family living over planet sharing the resources commonly. The basic security for survival is the ecological security and the security of the environmental resources. The nature's economy provides the goods and services for the people and in response it deserves care in sustainable way. The exploitation of nature to the extent of destroying its resources is not true reciprocal response by developers of modern economy.

The Shiva's study desired the relationship of human and nature as a basic way of dependence of communities over waterbodies. These wetlands are serving mankind in the form of aquatic flora and fauna for the welfare of humans but in return the dependent population pollute and over-exploit these water bodies. The study also considered the importance of environmental education as a curing method for the improvement of the natural resources. Although the research confirms that communities receive less benefits but there are many external forces that reduce the benefits which are described in the third theme below.

2.4.2 Natural Resources as Social and Economic Parameter for Humans

The sustenance economy is a theoretical concept introduced by Shiva in her book which is the extension of nature's economy (Shiva 2015). This economy is being utilized by most of the world's population. All the rural communities are directly and most of the urban societies of the world are indirectly dependent on the sustenance economy.

The capital markets are using nature as a raw material and making the final goods for consumers to have the maximum profit. This is also causing the threat for those communities which

are extracting livelihood from nature. The sustainability of the natural resources and fulfillment of basic needs of humanity from the resources are the fundamental principles of sustenance economy. The current study is describing the sustenance economy in the form of fish-based economy. As this is the major product used for the exploitation of fishermen and water resources by overfishing practices the only way to save the Indus River resources (sustenance economy) is the sustainable management of the waterbodies and the provision of basic needs to the fishermen communities.

2.4.3 Exploitation of Humans due to Natural Resources

This theme basically discusses the power and politics nexus used by the exploiters due to occupying the natural resources (Shiva, 2015). Vandana Shiva here describes that all the modern economic development is based on the exploitation of the natural resources and nearby dependent communities. The economic and cultural security of the deprived, poor and suppressed people is at risk due to massive exploitation for profit and maximization of consumption.

In current study the middleman in the shape of contractor in Punjab and feudal in Sindh are exploiting fishermen to maximize profit and having occupied the Indus River resources to generate high rates of consumable goods. The lives of the fishermen communities of both the provinces are highly miserable due to barriers against sustenance economy. The greedy behavior of the contractors and feudal not only pushes the life of the fisherfolks in darkness but their future generations are also at risk due to absence of basic needs in the form of freedom, respect, food, education and health. The only way to restore the lives of these deprived communities is by making their access to direct benefits from the nature's economy and fix the sustainable development of the river-based resources by using tools of appropriate policies and environmental education

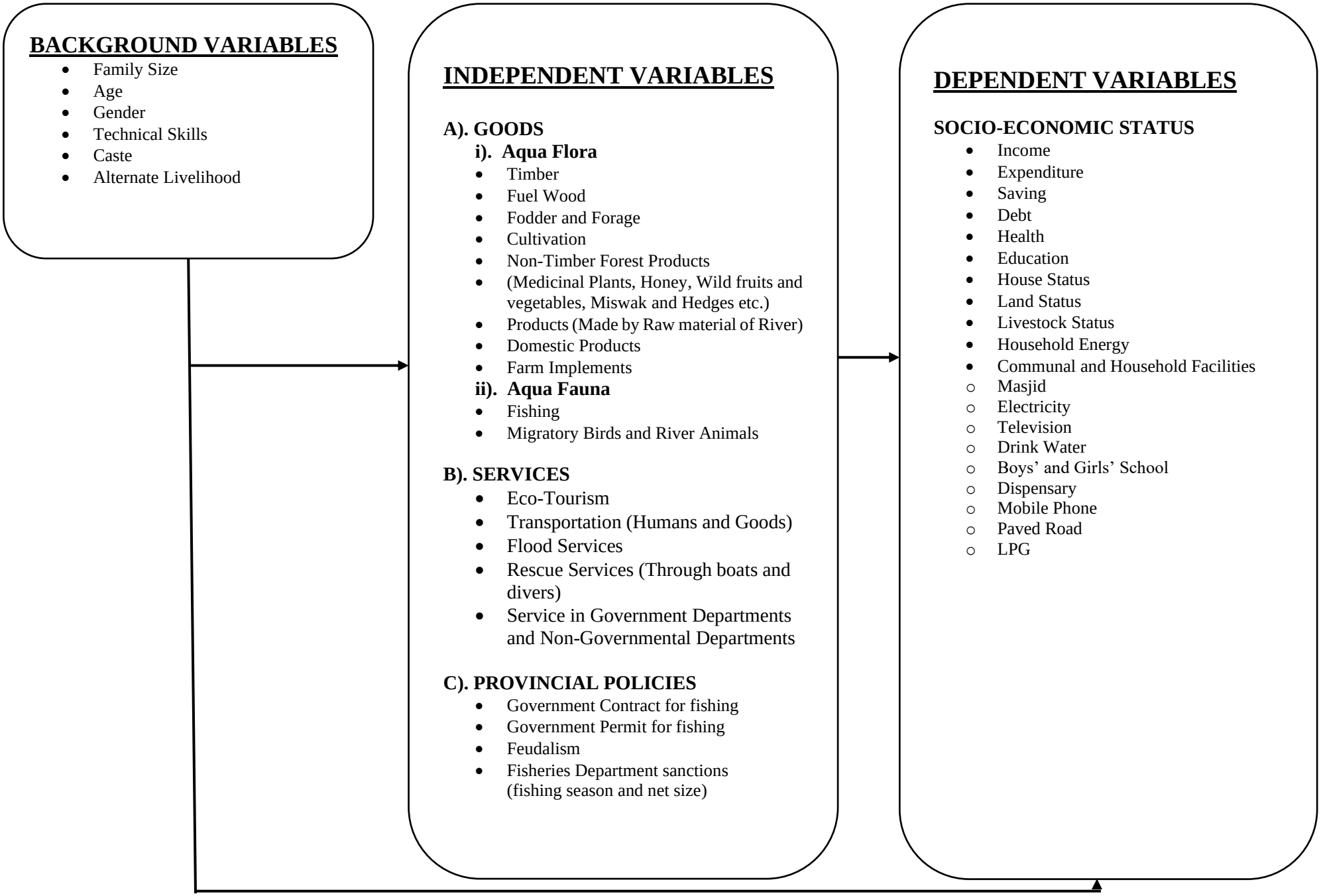

Figure 2.2 ***Conceptual Framework of Research***

CHAPTER THREE
RESEARCH METHODOLOGY

This section of the dissertation has key importance in the current study and briefly mentions site, techniques, variables, statistical treatments, ways and means for data collection, approaches used for the research and limitations and restrictions faced during the study.

3.1 Research Methodology

Sociological research can be divided in three main domains as quantitative, qualitative and mixed methods to examine and measure the key variances to ultimate deduce results.

The University of Southern California mentioned the following main points for the importance of methodology in the sociological research;

i. Researcher must know about the methods used for the data collection prior to field exercise because it may disturb the overall results and conclusion.

ii. Defective methodology finally produces the unreliable results which may affect the credibility of the research and researcher.

iii. Justification behind the selection of specific methods and models must be highlighted as only most proper method may require defense at any forum(s).

iv. The generalization of the results can only be formulated if the selection of sample size and sampling technique is conferring the commandments set by the academics.

v. The social science methodology is always a milestone for other researchers to follow. It must be matching with laid down standards to set the line for future researchers to replicate this methodology (Kallet, 2019).

3.2 Quantitative Research

Quantitative research does the measurement by using the mathematical based statistical formulas for the data collected from primary or secondary sources. The generalization of the results is considered the basic objective of the quantitative research. The following may include the main elements of the quantitative research.

i. Quantitative study develops a relationship between independent and dependent variables and focuses on the descriptive or experimental designs to make a causality between variables

ii. It often uses the structured tool (questionnaire or interview guide) for the data collection processes so that the reliability of research is high and can be verified with the repetition of tests and data in most cases.

iii. Usually the sample size is more in quantity and depends on the nature of the study and size of the population and methodology, especially the selection of study area, sample size and technique have momentous position in the quantitative nature of study. Mostly non-textual (numerical) form of the data is collected or coded (Babbie, 2019).

iv. The following lineage of research has been followed for current study;

→ Research Problem (Title/Topic) → Objectives → Research Questions → Hypotheses (Supported by Literature Review & Theoretical Framework) → Conceptual Framework → Methodology → Findings (Supported by Literature Review & Theoretical Framework)→ Conclusion and Recommendations → Generalization

3.3 Global Poverty Action Fund, WWF-Pakistan, July 2012–June 2015

World Wide Fund for Nature- Pakistan (WWF-Pakistan) with the help of Global Poverty Action Fund (GPAF) under the Department for International Development, UK launched its project for the fishermen communities of CIWC starting from Chashma Barrage and ending at Sukkur Barrage.

The primary objective of this project was to shift the fisherfolks on alternative livelihoods and lessen the burden on the natural resources (fish and forests) of the CIWC. For this purpose, community-based organizations (CBOs) were developed for the reciprocal relationship. Further Livelihood Development Plans (LDPs) were framed to select the best replacements of earnings according to the accessibility and necessity of local areas.

After the formation of CBOs and LDPs the alternate livelihood-based trainings (boat and net making, mason, cultural products and sewing) were organized for the fishermen and in the final phase different interventions and commodities (livestock, nursery, kitchen gardening and sewing machines etc.) were introduced for local communities.

Simultaneously another groundwork was also launched in the form of alternative energy (solar panels, biogas and energy efficient stoves) to reduce pressure on the natural resources. Researcher being consultant of the GPAF worked with the fisherfolks continuously for three years and this was the actual reason to select CIWC for research area for PhD dissertation and help fisherfolks by examining the true reason behind their miserable life. Further Punjab and Sindh Forest, Fisheries, Irrigation and Wildlife departments were made partners as the government agencies to have the best results as they are historically integrated with the communities and the system as line departments for development (World Wide Fund for Nature Pakistan, 2014).

3.4 Study Area

Current research was carried out in the central part of the Indus River named as Central Indus Wetlands Complex (CIWC) starting from Jinnah Barrage and ending at Sukkur Barrage. The study area thus lies across the two provinces of Pakistan and stretched over approximately 750 Kilometers or 468.75 miles (Atiq-ur-Rehman, 2012). The map (Figure 3.1) of the study area indicates that Jinnah Barrage covers most upstream of the Indus River and gradually in sequence of barrages goes towards the downstream Sukkur Barrage (World Wide Fund for Nature Pakistan, 2020). Both the barrages of Punjab and Sindh and river basin-based communities were counted in the sample and the selection of sites were dependent on the GPAF project discussed earlier.

The first site for data collection was Jinnah Barrage at the most upstream of Indus River was situated in the Mianwali District. A very few numbers of fishermen were found in village Jalal Pur because a very limited fishing practices were performed there. Usually, the contractor of Chashma Barrage uses to win the auction of this barrage and further sold out to any other contractor.

The second site at downstream was Chashma in the district Mianwali having a large community of fisherfolks there. Total three villages Basti Ghandi, Sindhian Wala Ban and Haider Colony were having residences of dependent fishermen. Here, the apparent socioeconomic condition of fisherfolks was highly miserable due to their bondage and exploitation by local contractors. High security because of sensitive installations and greater influence of contractor made data collection a challenging task here.

The third site for data collection of the Indus dependent fishermen was Tounsa Barrage, having a good number of fisherfolks. The upstream and downstream localities of Tounsa Barrage

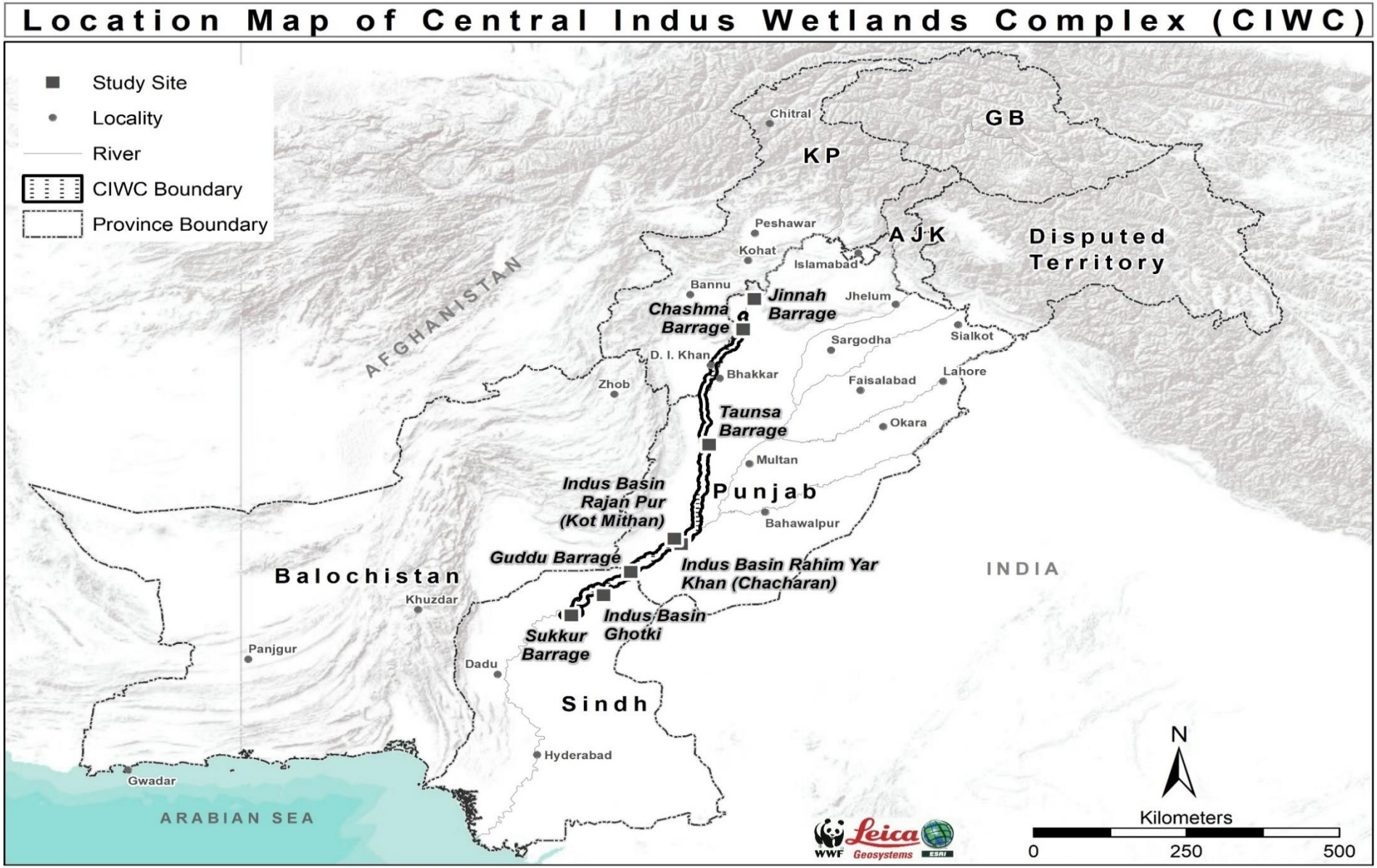

Figure 3.1 ***Map of Study Area (CIWC)*** (World Wide Fund for Nature Pakistan, 2020)

had different contractors based on the annual auction winning conducted by the Fisheries Department, Punjab. Majority of the fishermen were found at downstream and local people considered this contractor as a softhearted man. He often took the low burden-based labor and forgave the annual loans of fishermen. However, the upstream fishermen communities were comparatively depressed, and it was very difficult to visit them easily. Here one could find the Indus River boat residents' fishermen communities as a unique populace of water. Allah Wali Basti and Basti Sheikhan were two communities which facilitated the researcher for data collection.

Forth site for data collection was Indus Basin Rajanpur which is on the right side of the River Indus downstream towards Sindh. Here only a single village Basti Manchari Merani was found having a very few numbers of fishermen. Parallel on the opposite side (left bank of Indus River) two villages Basti Dost Muhammad and Asghar Abad of Chacharan, District Rahim Yar Khan were selected and categorized as Indus River Basin instead of barrage. Here the river is wider with many streams. Locally the feudal are the contractors and they also use the river land for their private cultivation. Being highly productive land, the feudal grow wheat in winter while the area mostly remains inundated during summer due to increased volume of water in the river.

Rajanpur area before entering Sindh is very dangerous as dacoits and fleeing criminals take refuge in this area. These criminals repressively use the fisherfolks for transportation and labor. The premises of Sindh start from Kashmor which harbors first site in Guddu Barrage having a single fishermen village Sher Alam Merani. The person who established this village was a fisherman and still alive. Here the permit system is used for the fishing practices and annual permit is issued by the Sindh Fisheries Department. The community was very large but due to law and order reasons, the data collection team had to leave the area before sunset.

Local villagers are generally affected by the feudal l residing along the bank of the Indus River. Mostly, feudal keep half of the fish catch and use other exploitation methods to maximize their profit. Although permit system is little better than the contractual system, but the true benefits can only be gained when political influence and feudalism will end. The second last site of CIWC study area was the Ghotki Indus Basin situated at the left bank of the river towards downstream. Here a large community Chattal Mirani was surveyed and found them in low economic conditions. The researcher also used to visit these communities during the survey of GPAF WWF-Pakistan. The other community was of village Sher Dil Mahar having low numbers of fisherfolks. The last site of CIWS was Sukkur Barrage situated in the Sukkur District, Sindh. Here Sharfa Abad village was selected for data collection instead of Saeed Abad village where the community was leaving fishing profession and adopting alternate livelihoods through the GPAF project.

3.5 Sampling Technique

It has already been mentioned that the researcher used to work with WWF-Pakistan in its GPAF project and had the enough information of the local area and the communities, which help to conduct the field survey and established the contact with key informants in the study area.

3.5.1 Obstacles for Probability Sampling

There were many reasons for the researcher to choose the non-probability sampling technique and some of them are mentioned below;

3.5.1.1 Unidentified Population Size

Indus fishermen especially under the contractual system mostly belong to Sindh, having Sindhi identity cards and doing fishing practices in the Punjab province. Punjab government had introduced a contractual system for allowing fishing in their waters. Thus, Sindhi fishermen work

under the influence of contractors as bonded labor and the correct number of fishing families cannot be ascertained. This was the main reason that having no information about their total population probability sampling cannot be justified. Although there is statistical technique to support the use of probability sampling for unknown population, however, equal chance of selection for all respondents cannot be justified in such cases.

3.5.1.2 Scattered Population

The area under one contractor at one site is very large and the fishermen are usually present either in the river or on islands. They used to tend to stay in the river for many days until the proper fish catch is obtained. In case of good fishing condition, they send one boat to transport supply for the contractor and rest of the fishermen stay in the river or on the banks. It is thus very difficult for data collection team to approach all the fisherfolks separately if they were selected through the probability sampling techniques.

3.5.1.3 High Security Risks for Enumerators

As mentioned earlier, that the area within the embankments of Indus River is called *Kacha* area whereby most of the criminals take refuge and is highly risky for the visitors to visit or work over here. During the year 2011, the WWF-Pakistan team was also kidnapped by the dacoits in such area at Tounsa Barrage. These criminals usually do not harm the fishermen as they also use them for transportation and fishing purposes. The fishermen fishing in the remote areas had to stay in *Kacha* area within the boat and inside the river. It was highly risky for the data collection team to visit the *Kacha* areas for data collection. However, keeping in view the safety side best efforts were made to collect data of the target fisherfolks.

3.5.1.4 Contractors and Feudal Influence

Punjab province has the fisheries department for the auctions of wetlands; therefore, they publicly announce the auctions of Indus River within the province. Although the auction process is widely notified but usually the locally known contractors win the auction as they are politically and socially influential and the new contractor had to hire all the fishermen after paying their loans to previous contractor. For this reason, nobody shows interest for the bid and same contractor gets contract to exploit the natural resources on old practice. As contractors usually purchase these fishermen through lending money for years so nobody can contact the fishermen directly.

3.5.1.5 Sense of Fear among Fisherfolks

As mentioned before that fishermen are highly influenced by the contractors in private and professional life, so they remain fearful and do not bypass them for any activity. Local people also narrated some stories where fishermen were also killed by the contractors and physical harassment is the routine matter. Fishermen are also afraid of unknown persons and from Government who may impose taxes and create more problems. Therefore, they usually avoid having contacts with strangers. The researcher also requested the contractors to approach the fishermen but mostly the touts of the contractor usually stayed there during the data collection processes.

3.5.1.6 Rapid Movements and Seasonal Migrations

The fishermen who have less, or no debts usually migrate and change the locations under different contractors. They also use to visit dams in Punjab for fishing practices. The off-season fishing compels them to migrate back to their origin (Sindh) for months during slack period.

3.5.1.7 No Vital Source of Data

Some of the fisherfolks are even not having the Identity Cards issued by the governments and women are more in this list. Contractors also hide the identity of the fishermen to cheat the inquiries if held. This also leads to the inadequate knowledge about actual strength of the fishermen population.

3.5.1.8 Transportation Barriers

As discussed earlier, fishermen are scattered for fishing and use to stay in or around the remote areas of river, thus only the boat was efficient and safe mode of transportation to approach them. However, very few boats were available at very high fares without any safety measures. This might cause the less chances of enumerators to search the fishermen in river in addition to all other above discussed reasons. During the stay at Tounsa Barrage, the research team also faced the boat accident, but all the team members remained safe.

3.5.1.9 Alternative Livelihoods during Off-Seasons

GPAF project introduced many interventions for the fishermen communities to have alternate livelihood practices with small loans changed their professions. Others who could not free themselves from the jaw of exploiters mostly depend on unskilled labor for their livelihood. Fisheries Departments of both provinces notify the breading duration of fish as off-season for fishing. During these months most of the fishermen visit their hometowns and unavailable on site. This also makes the data collection process difficult to approach all the fishermen during the year. All the above-mentioned reasons could not support the probability sampling because random sampling demands equal chance of selection for all the respondents. Thus, it was not impossible of random selection of all the fishermen under prevailing circumstances.

3.5.2 Non-Probability Purposive Sampling

Keeping in view all the enumerated barriers, the non-probability purposive sampling was chosen for the selection of respondents. For this, the inclusive and exclusive criteria was fixed to filter and ensured selection of relevant respondents for the current study.

3.5.3 Inclusion and Exclusion Criteria for Fisherfolks

The following filter was applied for the selection of Indus River fishermen;

- Fishing as primary occupation
- Fishermen under contractual or permit System
- Indus based fishermen
- Household head
- Men respondents

Only those fishermen were selected who had the fishing as a primary occupation, although they might have other livelihoods at the same time. Fisheries Departments of both the provinces allowed the tourists to fish as a game and entertainment but this activity has some conditions to strictly follow such as one permit for fishing one day only and one can use the hook for this purpose.

Net based or commercial fishing is allowed only under contractual or permit systems. Some fishermen joined the contractor for one season and left him after that time. But for this research only those fishermen were selected which were attached with the fishing practices of Indus River throughout the life. As household was the basic unit of analysis for current research thus only those fishermen were selected who had the families along on the site and were heads of their families. Fishing is masculine gendered profession due to its rough and tough nature, therefore, this profession is only attached with the men along Indus River basin. Local culture also supports the patrilocal setup and the interaction with men in local ethos is supported and due to social

restrictions, approaching or interacting with the women is not easy. Keeping in view the law and order and socio-political conditions of the area, the above-mentioned filter was used to select sample size for the study.

3.5.4 Sample Size

Total 608 fishermen households were selected from CIWC and 373 families belonged to Punjab and rest 235 families were the inhabitants of Sindh province. Figure 3.2 gives the detail of sample size of each community of CIWC and table 3.1 explains the community wise proportionate percentage. Jinnah barrage was at the most upstream in district Mianwali of Punjab province having only 07 households of fisherfolks (01.15%) while the next site was Chashma barrage also in Mianwali district contained a large community (238 households, 39.06%) including three villages. Next site was Tounsa barrage in district Muzaffar Garh near to tehsil Kot Addu having 92 households (15.12%) of fisherfolks divided up and downstream of the barrage. Towards the downstream before entering the Sindh province there were two sites of the Indus River basin, Rajanpur district (14 households, 02.30%) on the right bank and Rahim Yar Khan (22 households, 03.60%) on the left bank towards the downstream. The first site in the Sindh province was Guddu barrage having 35 families (05.75%) while Ghotki district had also large community consisting of two villages with 158 households (25.98%) having fishing practices in Indus River basin. The last site of CIWC was Sukkur barrage of Sindh province consisting 42 households (06.90%).

3.6 Development of the Tool

A complete structured interview schedule was used as a tool to measure the socio-economic status of the fishermen communities dependent on CIWC. The researcher used his experiences of the different surveys under GPAF and earlier interactions and observation-based knowledge to

Table 3.1
Study Area Profile of CIWC

Site	District	Barrage/Basin	Sample size	
	Punjab Province		*f*	%
Basti Manchari Mirani	Rajanpur	Indus Basin	14	03.8
Asghar Abad	Rahim Yar Khan	Indus Basin	11	02.9
Basti Dost Muhammad	Rahim Yar Khan	Indus Basin	11	02.9
Basti Sheikhan	Muzaffargarh	Tounsa Barrage	62	16.6
Boat Residents	Muzaffargarh	Tounsa Barrage	16	04.3
Allah Wali Basti	Muzaffargarh	Tounsa Barrage	14	03.8
Haider Colony	Mianwali	Chashma Barrage	57	15.3
Sindhian Wala Ban	Mianwali	Chashma Barrage	83	22.3
Basti Ghandi	Mianwali	Chashma Barrage	98	26.3
Jalal Pur	Mianwali	Jinnah Barrage	07	01.9
	Total		373	100
	Sindh Province		*f*	%
Sharfa Abad	Sukkur	Sukkur Barrage	42	17.9
Sher Dil Mahar	Gothki	Indus Basin	12	5.1
Chattal Mirani	Gothki	Indus Basin	146	62.1
Sher Alam Mirani	Kashmor	Guddu Barrage	35	14.9
	Total		235	100
	CIWC		*f*	%
	Total		608	100

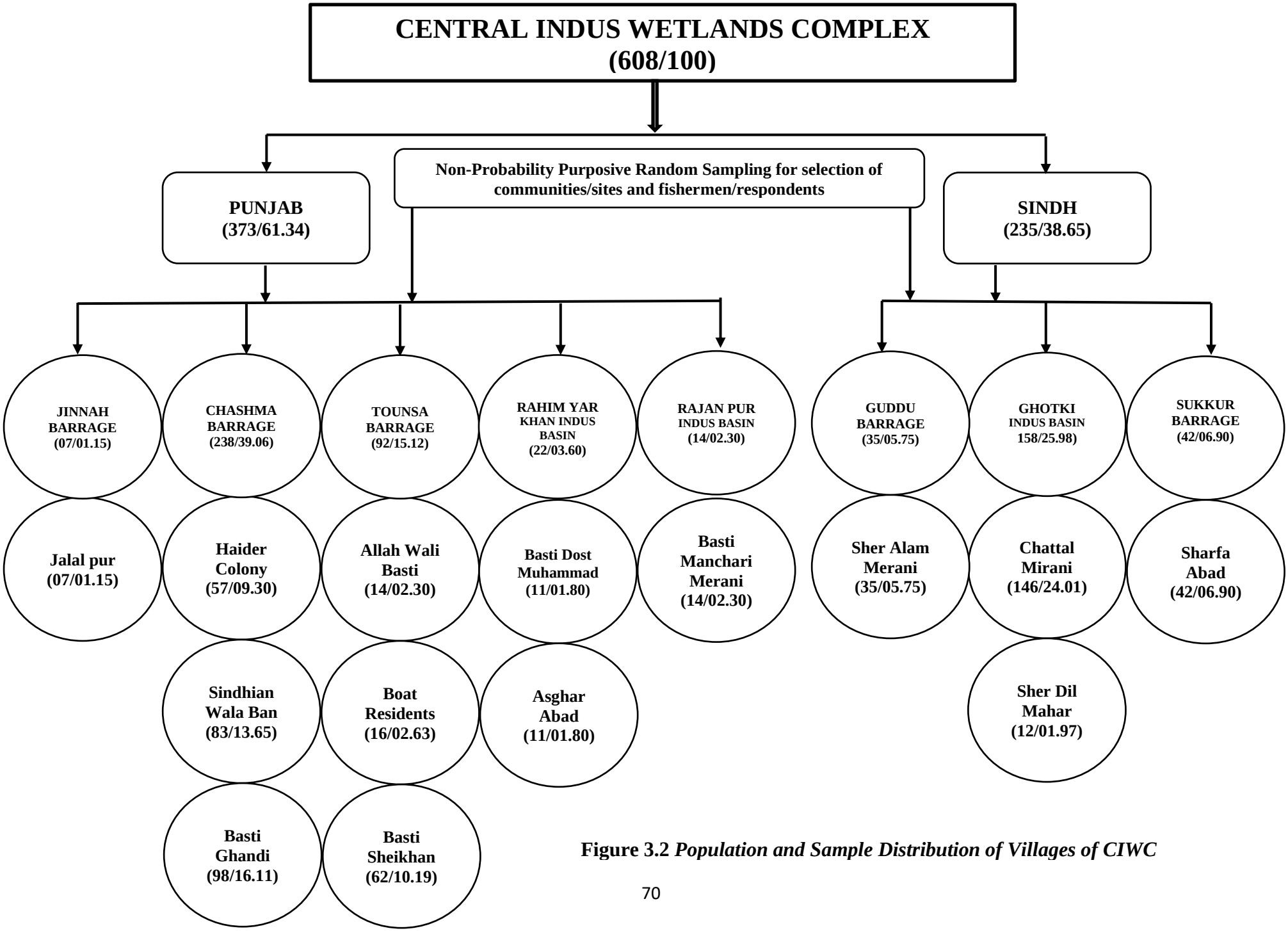

Figure 3.2 ***Population and Sample Distribution of Villages of CIWC***

develop the tool of data collection. All the necessary parameters were kept in view to make statistical analysis accordingly and questions were designed in the light of suggestions given by the statistical experts. The tool finally designed was also presented to two experts for review and after incorporating their suggestions a pilot survey was conducted.

3.6.1 Reconnaissance and Pilot Survey

GPAF project experience provided ample ground to the researcher for the reconnaissance surveys. The studies for baseline, midterm, livelihood plans, and final term survey gave a lot of information for the development of the tool, but tool testing survey was conducted at Tounsa barrage to relook and refine the tool.

3.6.2 Reliability of the Tool

To check the reliability of the tool the Cronbach's Alpha test was run on most of the questions (243 out of 304). Only the irrelevant questions (61) were skipped and result was found on the merit as 0.709 (Table 3.2).

Table 3.2
Reliability Statistics of Research Tool

Cronbach's Alpha	No of Items
0.709	243

3.7 Field Experiences

A team was selected for the data collection from the graduate and post-graduate students of the Sociology and one from the PhD Scholars of Environmental Science. Tounsa Barrage was selected for the first travel because it was considered near and in the center of CIWC area. The first day was spent in travelling from Islamabad to Tounsa Barrage. Second day the team was trained for the tool and sent in community for pilot survey. All the necessary changes came in front

during the pilot survey were incorporated in the interview scheduled and again sent the team in the field for the finalization of tool. Next day the data collection teams were divided in three groups, team A was sent to Sukkur for covering three sites (Sukkur, Ghotki and Guddu) of Sindh and join back in Chashma Barrage.

The B and C teams were engaged in Tounsa Barrage because it was a big community and researcher was also stationed here to supervise the data collection processes. Both teams (B&C) covered the Tounsa Barrage and later team B was sent to the Rajanpur to collect the data from both sites (Rajanpur and Rahim Yar Khan Indus Basins). After collection of data from Tounsa, team C travelled to Chashma Barrage along with researcher. The team A joined the team C after collection of data from Sukkur data. Both the teams collected data as this community was also large and having most hurdles from both the security organizations and the contractors.

A single enumerator was sent to the Jinnah Barrage because only 07 households were there to give the information. Although there was a lot of fear among the fishermen, but they supported the teams and showed their interest in conveying the relevant information. At Tounsa and Chashma Barrages the contractors were approached to facilitate the data collection as it was a huge task to approach and collect the information.

The key informants were there at each site to facilitate the teams including the gathering and approaching the fishermen and helping in travelling. Motor bikes and boat were hired to ease the travelling. Team A had to leave the Guddu Barrage quickly as there was a reported murder among the fishermen community before arrival. Most of the expenditure was incurred on travelling and food.

3.8 Data Presentation Techniques

The interview schedule was used for data collection and was coded according to the statistical analyses. Mostly tables were used to present the results, however, following data presentation techniques were used in the current research to formulate the outcomes and supported with the text in all the sections;

- Tables
- Figures
- Images
- Maps
- Snapshots and

3.9 Software

The following software(s) were used for the writing, compiling, data entry, data sorting and data analysis at different stages;

- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint
- Statistical Package for Social Sciences
- Stata
- Google Search Engine, Google Advanced Search and Google Scholar

3.10 Statistical Techniques, Formulas and Models

The following statistical tests were used in current research to examine the impact of Central Indus Wetlands Complex on the socio-economic status of the fishermen communities.

3.10.1 Non-Parametric Statistical Tests

Usually it is considered the best statistics for the qualitative research with probability sampling that exhibits the normality. In sociological researches the variables can be divided into continuous and categorical (Nominal and Ordinal) variables. The continuous variables except income (Income is always right skewed) can show the normality in distribution but categorical

variables are always showing the abnormal distribution because either they are binary (0,1) or might be in different categories denoted by 1,23,4 etc. Non-probability sampling technique (purposive sampling) has been used in the current research and categorical variables also did not show the normality due to their nature, therefore only non-parametric tests were performed for hypothesis testing. All the continuous variables (income, expenditure, savings and remaining debt) were converted in categorical variables to apply the non-parametric tests except single non-parametric test (Mann Whitney U) test was applied (in a single case) on the continuous variables (income, expenditure, savings and remaining debt) without converting them in categorical variables for the validation of Hypothesis B results. All the statistical tests in current research have been performed at 0.05 (value of alpha) level of confidence.

The following statistics were used for the analysis processes;

3.10.2 Descriptive Statistics

- Frequency and Percentage Distribution
- Mean
- Skewness
- Standard Deviation
- Range
- Means Comparison

3.10.3 Test Statistics

- Chi-Square
- Cramer V
- Mann Whitney U

CHAPTER FOUR
DEMOGRAPHIC PROFILE OF THE STUDY AREA

Chapter four focuses on the data analyses for current research and it describes the demographic profiles of all the communities of CIWC and briefly introduces the wetlands as well. Only univariate analyses have been performed in this chapter.

4.1 Sukkur Barrage

4.1.1 Sharf Abad

The Sukkur Barrage is situated in District Sukkur of Sindh province. The increase of population and expansion of the city resulted in its proximity to the Sukkur barrage. A sample size of 42 households was selected based on criteria mentioned in chapter three. Most of the population here left the profession after their new generation had got education and adopted other professions for livelihood.

Table 4.1 shows that all 42 respondents were men having the age between 18 to 75 years. The household heads of all respondents except one were found married. The average income of household was recorded rupees 17100.00 (162.37$) while the expenditure was higher than the income and accounted to rupees 19709.50. The respondents also reported savings from very low to the tune of rupees 1171.43 while the total loan (including paid and remaining) amounted to rupees 26476.19 per household. Most of the household heads (35) were healthy while 07 were sick found during the data collection.

Table 4.1

Demographic Profile of Sharf Abad

Province	Sindh			
District	Sukkur			
Indus Barrage/Basin	Sukkur Barrage			
Total Fisherman Population/Sample Size	42			
Household Heads'/Respondents' Age	a). Minimum	18	b). Maximum	75
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	10
Household Heads'/Respondents' Marital Status	a). Married[1]	41	b). Unmarried	01
Average Household Income (PKR)	17100.00 (162.37$)[2]			
Average Household Expenditure (PKR)	19709.50			
Average Household Savings (PKR)	1171.43			
Average Household Total Debt (PKR)	26476.19			
Primary Occupation	Fishing			
Secondary Occupation	Nothing			
Healthy Household Heads	35			
Diseased Household Heads	07			
Family Size	a). Minimum	04	b). Maximum	22
Total Number of Adult Men including HHH[3]	85			
Total Number of Adult Women including HHH	72			
Total Number of Boys (Below 18 Years)	95			
Total Number of Girls (Below 18 Years)	101			
Maximum Education in Households	16 (Single Family)			
Major Diseased in all community (Sample)	15			
Minor Diseased in all Community	04			
Total Earning Family Members	a). Minimum	01	b). Maximum	08
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	No			
Distance from Fish Market	04 Kilometers			
Distance from Main City	04 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

[1] Married includes widower, separated and divorced

[2] At the time of data collection, One US Dollar was equal to 105.31 Pakistani Rupees

[3] Household Head/Respondents

Total 15 people among all the community were found with major diseases among the families of respondents while four individuals had minor ailments. Major diseases included heart problems, cancer while minor diseases included seasonal or temporary ailments such as Malaria, Typhoid, Diarrhea, Blood Pressure, Allergies etc. The minimum family size of the respondents was consisting of 02 persons while families with the size of 22 persons were also found. Total population was composed of 85 men, 72 women, 95 boys, and 101 men and girls of different ages.

The good information from Sukkur Barrage target population was that a single boy among respondents had educational level of post-graduate (16 years of education). That family was a resident of the city and free from bonded labor because of permit system and influence of feudalism was also absent within the city premises. The earning family members ranged from 01 to 08 per household. As discussed earlier the residents of Sharaf Abad were having the facility of education, therefore, there were schools for both boys and girls in the community. The city fish market was only 04 Kilometers away from this village. However, the facility of security, water supply, drainage and sewerage were not observed in the Sharaf Abad village.

4.2 Indus Basin Ghotki, Sindh

4.2.1 Sher Dil Mahar

The second village with the name of Sher Dil Mahar was surveyed in the District Ghotki, Sindh. It is situated on the eastern bank of the Indus River. The sample population of this village was comprised of 12 households. The Ghotki Indus Basin was the main wetland which provides the socioeconomic benefits to the residents of this village. All the respondents of the sample

household heads were men, married and their primary occupation was fishing. The age of men respondents was ranging between 20-77 years.

Table 4.2 depicts that the average income, expenditure, savings and total loan were as rupees 17166.67, 18032.50, 36666.67 and 11666.67, respectively. The household expenditure was found more than income. The main reasons behind their more savings was low debt, permit system and contribution of their women through income generation activities of making cultural items such as *relly* (bedsheets) and Sindhi caps. Secondly the men were also involved in daily labor to contribute in the overall income of their families.

The average family size was between 02-11 and total 19 men, 14 women, 24 boys and 12 girls were there among the 12 sample households of village Sher Dil Mahar. The education of both heads and family members only in one sample household was recorded as intermediate (12 years) in both men and women categories.

Only one sick person was found in case of household heads and two individuals in rest of the family members. Total earning family members varied from 01-05 per household. Boys and Girls schools were present in the community, but no hospital was there in the village. The main city Ghotki was about 15 kilometers away from the village and it was also the main nearest city. There was no facility of police station, paved road, water supply or sewerage in the village at the time of data collection.

Table 4.2
Demographic Profile of Sher Dil Mahar

Province	Sindh			
District	Ghotki			
Indus Barrage/Basin	Ghotki Indus Basin			
Total Fisherman Population/Sample Size	12			
Household Heads'/Respondents' Age	a). Minimum	20	b). Maximum	77
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	12
Household Heads'/Respondents' Marital Status	a). Married	12	b). Unmarried	0
Average Household Income (PKR)	17166.67			
Average Household Expenditure (PKR)	18032.50			
Average Household Savings (PKR)	36666.67			
Average Household Total Debt (PKR)	11666.67			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor			
Healthy Household Heads	11			
Diseased Household Heads	01			
Family Size	a). Minimum	02	b). Maximum	11
Total Number of Adult Men including HHH	19			
Total Number of Adult Women including HHH	14			
Total Number of Boys (Below 18 Years)	24			
Total Number of Girls (Below 18 Years)	12			
Maximum Education in Households	12 (Single Family)			
Major Diseased[4] in all community (Sample)	02			
Minor Diseased in all Community	0			
Total Earning Family Members	a). Minimum	01	b). Maximum	05
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	No			
Distance from Fish Market	1.5 Kilometers			
Distance from Main City	1.5 Kilometers			
Police Station	Yes			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

4.2.2 Chattal Mirani

Chattal Mirani was the largest village in the Sindh province with high population of fishermen. It is in District Ghotki and near the previously discussed village. Total 146 sample households of fisherfolks residing in the village constitute 62.1% of the surveyed population of fisherfolks in Sindh. This community was settled on the eastern bank of Indus River with Indus Basin of Ghotki as wetland.

Table 4.3 depicts that only 01 household head was found unmarried among 146 household heads having age range of 22-70 years. Literacy among the respondents was not very common and only a single boy among the family members was found with 12 years of education. The average income, expenditure, savings and total loan were logged as rupees 13999.32, 17879.45, 6735.88 and 137246.58, respectively. Again, the expenditure remained higher than income with meagre saving capacity and more loans. This shows the low level of socio-economic status amongst all the villages of fishermen of Sindh. Total population of the fisherfolk families was 1035 persons of both the sexes of adults and children. A number of 20 household heads and 06 family members were found sick.

Ghotki was main city and market to sell the fish catch situated about 10 Kilometers away. There was no facility available in the form of school, hospital, police station, paved road, sewerage, water supply and drainage etc.

Table 4.3
Demographic Profile of Chattal Mirani

Province	Sindh			
District	Ghotki			
Indus Barrage/Basin	Ghotki Indus Basin			
Total Fisherman Population/Sample Size	146			
Household Heads'/Respondents' Age	a). Minimum	22	b). Maximum	70
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	12
Household Heads'/Respondents' Marital Status	a). Married	145	b). Unmarried	01
Average Household Income (PKR)	13999.32			
Average Household Expenditure (PKR)	17879.45			
Average Household Savings (PKR)	6732.88			
Average Household Total Debt (PKR)	137246.58			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor			
Healthy Household Heads	126			
Diseased Household Heads	20			
Family Size	a). Minimum	06	b). Maximum	28
Total Number of Adult Men including HHH	262			
Total Number of Adult Women including HHH	215			
Total Number of Boys (Below 18 Years)	311			
Total Number of Girls (Below 18 Years)	245			
Maximum Education in Households	12 (Single Family)			
Major Diseased in all community (Sample)	44			
Minor Diseased in all Community	06			
Total Earning Family Members	a). Minimum	01	b). Maximum	08
Boys, Schools (Matric or Primary)	No			
Girls' Schools (Matric or Primary)	No			
Dispensary	No			
Distance from Fish Market	10 Kilometers			
Distance from Main City	10 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

4.3 Guddu Barrage

4.3.1 Sher Alam Mirani

The upstream first barrage of Sindh is Guddu near the city of Kashmor. Here is a village named Sher Alam situated in Punjab having noticeable population of fisherfolks. Due to security concerns of data collection team during the field work, the team had to quit the area early and therefore, only 35 respondent households were interviewed.

The Kashmor city lies at the junction of three provinces (Sindh, Punjab and Balochistan) of Pakistan and have road links with these regions. The locality, therefore, have all types of communities over here with different ethnic and sectarian issues. The law and order conditions were precarious over here since many decades in Kashmor but all possible efforts were made to approach the communities. The only village of fishermen was Sher Alam Mirani on the west bank of Guddu Barrage.

Table 4.4 explains that total 35 families (14.9% of Sindh data) were interviewed with maximum 34 number of household heads married and 01 household head single. The age of household heads ranged between 18-70 years with 0-08 grades of education of the respondents. The average figures accounted for income, expenditure, savings and total loan were rupees 12860.00, 14408.57, 2400.00 and 24000.00, respectively. Again, household expenditure surpassed the income rendering respondents with burden of debt and low saving.

Fishing was the main source of their income; however, unskilled labor was also recorded as secondary occupation during the breeding/off season of the fish catch. Only 03 heads and no more

Table 4.4
Demographic Profile of Sher Alam Merani

Province	Sindh			
District	Kashmor			
Indus Barrage/Basin	Guddu Barrage			
Total Fisherman Population/Sample Size	35			
Household Heads'/Respondents' Age	a). Minimum	18	b). Maximum	70
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	08
Household Heads'/Respondents' Marital Status	a). Married	34	b). Unmarried	01
Average Household Income (PKR)	12860.00			
Average Household Expenditure (PKR)	14408.57			
Average Household Savings (PKR)	2400.00			
Average Household Total Debt (PKR)	24000.00			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor			
Healthy Household Heads	32			
Diseased Household Heads	03			
Family Size	a). Minimum	03	b). Maximum	23
Total Number of Adult Men including HHH	65			
Total Number of Adult Women including HHH	61			
Total Number of Boys (Below 18 Years)	80			
Total Number of Girls (Below 18 Years)	75			
Maximum Education in Households	13 (Single Family)			
Major Diseased in all community (Sample)	13			
Minor Diseased in all Community	0			
Total Earning Family Members	a). Minimum	01	b). Maximum	05
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	No			
Distance from Fish Market	03 to 60 Kilometers			
Distance from Main City	03 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

family members were found having disease. The average family size was between 03 to 23 members with 65, 61, 80 and 75 men, women, boys and girls, respectively. Mostly the single family members (household head) was found bread winner, however, in some cases the young children also helped their fathers in fishing. Only very few families of the sample respondents were found with maximum 05 earning members. Schools of both boys and girls were present in the area. Majority of fishermen sell fish at Guddu Barrage to the tourists at fishing points while small number of fishermen go to Sadiq Abad (60 Kilometers) in Punjab for selling their fish catch in the main market. The major city near the Sher Alam Mirani is Guddu with no facilities except schools.

4.4 Indus Basin Rajanpur, Punjab

4.4.1 Basti Manchari Mirani

The first sample village of Punjab downstream was Basti Manchari Mirani situated near Kot Mithan, District Rajanpur. Table 4.5 shows that the community was very small with 14 families. According to the criteria fixed for sampling, all the respondents were household heads, married and men with age ranging from 20-60 years having 0-10 years of education. Majority of respondents were found illiterate, however, very few went to schools during the life of their parents. The average income, expenditure and total loan were recorded rupees 10981.71, 12807.93 and 48571.43, respectively and no savings were reported during the data collection, therefore, the sample population can be categorized as the most deprived community among fishermen with small difference due to contractual system.

Table 4.5
Demographic Profile of Basti Manchari Mirani

Province	Punjab			
District	Rajan Pur			
Indus Barrage/Basin	Indus Basin Kot Mitthan			
Total Fisherman Population/Sample Size	14			
Household Heads'/Respondents' Age	a). Minimum	20	b). Maximum	60
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	10
Household Heads'/Respondents' Marital Status	a). Married[1]	14	b). Unmarried	0
Average Household Income (PKR)	10981.71			
Average Household Expenditure (PKR)	12807.93			
Average Household Savings (PKR)	00			
Average Household Total Debt (PKR)	48571.43			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor			
Healthy Household Heads	32			
Diseased Household Heads	03			
Family Size	a). Minimum	03	b). Maximum	11
Total Number of Adult Men including HHH	19			
Total Number of Adult Women including HHH	20			
Total Number of Boys (Below 18 Years)	35			
Total Number of Girls (Below 18 Years)	25			
Maximum Education in Households	10 (Single Family)			
Major Diseased in all community (Sample)	0			
Minor Diseased in all Community	0			
Total Earning Family Members	a). Minimum	02	b). Maximum	06
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	No			
Distance from Fish Market	20 Kilometers			
Distance from Main City	20 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

The family size of the respondents was fluctuated between 03-11 members with no significant disease except three family heads who were found ill. The main occupation was fishing and unskilled labor during off season in the Basti Manchari Mirani. Men, women, boys and girls were counted 19, 20, 35 and 25, respectively. At least 02 persons in each sample household were found earning while very few were fortunate to have a maximum up to 06 earning members. The fishermen sell out the fish to contractor who deliver it to fish market in Rajanpur (20 Kilometers), a nearest city. As usual, no facility of water supply, security, paved road, drainage, water supply and sewerage were observed in the community during the course of data collection.

4.5 Indus Basin Chacharan Rahim Yar Khan, Punjab

4.5.1 Asghar Abad

Data in table 4.6 depicts that this village had very small population of sample households (11) for providing data for variables of this study. Basically, most of the fishermen in Punjab came from Sindh for seasonal fishing leaving behind their families due to heavy debt of the contractor. Some of them had even to spend whole life to repay the loans. The socioeconomic condition of this community was more miserable with average income of rupees 9193.64 per month. The mean monthly expenditure recorded was rupees 11294.82 which is more than income and does not make them able to have any type of savings even in the form of cash or kind. However, they must repay the average total loan of rupees 193636.36 else remain as slaves with the contractor with meagre earnings. As usual, these fishermen also work as unskilled labor as their secondary mode of earning during off season. The total men, women, boys and girls counted in the sample households

Table 4.6
Demographic Profile of Asghar Abad

Province	Punjab			
District	Rahim Yar Khan			
Indus Barrage/Basin	Indus Basin Chacharan			
Total Fisherman Population/Sample Size	11			
Household Heads'/Respondents' Age	a). Minimum	26	b). Maximum	40
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	0
Household Heads'/Respondents' Marital Status	a). Married[1]	11	b). Unmarried	0
Average Household Income (PKR)	9193.64			
Average Household Expenditure (PKR)	11294.82			
Average Household Savings (PKR)	00			
Average Household Total Debt (PKR)	193636.36			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor			
Healthy Household Heads	11			
Diseased Household Heads	03			
Family Size	a). Minimum	03	b). Maximum	09
Total Number of Adult Men including HHH	13			
Total Number of Adult Women including HHH	11			
Total Number of Boys (Below 18 Years)	14			
Total Number of Girls (Below 18 Years)	16			
Maximum Education in Households	0			
Major Diseased in all community (Sample)	0			
Minor Diseased in all Community	0			
Total Earning Family Members	a). Minimum	02	b). Maximum	04
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	Yes			
Distance from Fish Market	13 Kilometers			
Distance from Main City	35 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

were 13, 11, 14 and 16 years, respectively. Only 03 household heads were ill. The family members including children were generally found illiterate although they had the facility of boys' and girls' schools in their vicinity.

The range of earning family members fluctuated between 02-04 persons. They commonly sell fish to the local contractor who later market it in Chacharan Bazaar fish points or Khan Pur (35 Kilometers) which is the nearest main city for the community. Furthermore, other essential facilities were absent in the village.

4.5.2 Basti Dost Muhammad

The second village of Indus Basin Chacharan District Rahim Yar Khan was Basti Dost Muhammad with very few (11) families of fisherfolks (Table 4.7). All the eleven respondents were men, married and illiterate (including all family members) having age range fluctuation from 40 to 65 years. The average income here was comparatively more than the first village same vicinity. The average income of the households was estimated was rupees 13999.32 with expenditure of rupees17879.45 with very low savings (6732.88 rupees) but very high loan (rupees 137246.58).

As usual, the primary occupation was fishing of the sample households, but no secondary occupation. Only a single respondent and family member was found ailing. The family size of the sample respondents ranged from 03 to 14

Table 4.7
Demographic Profile of Basti Dost Muhammad

Province	Punjab			
District	Rahim Yar Khan			
Indus Barrage/Basin	Indus Basin Chacharan			
Total Fisherman Population/Sample Size	11			
Household Heads'/Respondents' Age	a). Minimum	40	b). Maximum	65
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	0
Household Heads'/Respondents' Marital Status	a). Married[1]	11	b). Unmarried	0
Average Household Income (PKR)	13999.32			
Average Household Expenditure (PKR)	17879.45			
Average Household Savings (PKR)	6732.88			
Average Household Total Debt (PKR)	137246.58			
Primary Occupation	Fishing			
Secondary Occupation	Nothing			
Healthy Household Heads	10			
Diseased Household Heads	01			
Family Size	a). Minimum	03	b). Maximum	14
Total Number of Adult Men including HHH	18			
Total Number of Adult Women including HHH	15			
Total Number of Boys (Below 18 Years)	10			
Total Number of Girls (Below 18 Years)	17			
Maximum Education in Households	0			
Major Diseased in all community (Sample)	01			
Minor Diseased in all Community	0			
Total Earning Family Members	a). Minimum	01	b). Maximum	06
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	Yes			
Distance from Fish Market	13 Kilometers			
Distance from Main City	35 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

members. Total men, women, boys and girls were noted 18, 15, 10 and 17, respectively. The fluctuating earning family members including family heads ranged from 01 to 06.

There were boys' and girls' schools in the community and none of the family members of the responding community was found literate. The main city was about 35 Kilometers far from the community and fishermen used to sell the catch to the contractor who supply it to local fish points and in the nearby market located 13 Kilometers away from the community. A dispensary was also found while no paved road, sewerage, draining and water supply systems were there to facilitate the community.

4.6 Tounsa Barrage

4.6.1 Basti Sheikhan

District Muzaffar Garh is adjacent to historical city of Multan, having beautiful gardens of mangos and excellent canal system of Punjab. The Tounsa Barrage is located near Kot Addu and serves as road bridge over the Indus River. Tounsa Barrage has beautiful landscape and provides ample space for the growth of special Indus fish which is very popular among the tourists. Basti Sheikhan is situated on the eastern bank of Tounsa Barrage and can be considered as one of the comparatively developed village of fishermen communities in both the provinces. Table 4.8 explains that this village provides abode to the large community of fisherfolks with 62 families and in total having 96, 87, 148, and 44 men, women, boys and girls, respectively.

All the respondents were heads of their families, men, married (except 01), age ranged (18-72 years) with minimum to maximum education level ranged from 0 to 8^{th} grade. The averag

Table 4.8
Demographic Profile of Basti Sheikhan

Province	Punjab			
District	Muzaffar Garh			
Indus Barrage/Basin	Tounsa Barrage			
Total Fisherman Population/Sample Size	62			
Household Heads'/Respondents' Age	a). Minimum	18	b). Maximum	72
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	08
Household Heads'/Respondents' Marital Status	a). Married	61	b). Unmarried	01
Average Household Income (PKR)	9299.68			
Average Household Expenditure (PKR)	11185.24			
Average Household Savings (PKR)	8233.87			
Average Household Total Debt (PKR)	83483.87			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor and Cultural Products			
Healthy Household Heads	50			
Diseased Household Heads	12			
Family Size	a). Minimum	02	b). Maximum	19
Total Number of Adult Men including HHH	96			
Total Number of Adult Women including HHH	87			
Total Number of Boys (Below 18 Years)	148			
Total Number of Girls (Below 18 Years)	81			
Maximum Education in Households	08			
Major Diseased in all community (Sample)	44			
Minor Diseased in all Community	10			
Total Earning Family Members	a). Minimum	01	b). Maximum	08
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	No			
Distance from Fish Market	Throughout Pakistan and Foreign Countries			
Distance from Main City	17 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	Yes			
Drainage System	Yes			
Water Supply System	No			

income, expenditure, savings and debt were recorded as rupees 9299, 11185.24, 8233.87 and 83483.87, respectively which depicts the low monetary status of the respondents. The residents of Basti Sheikhan can generate different cultural products in addition to working as unskilled labor and consider it a secondary occupation.

The family size of the fishermen fluctuates between 02 to 19 members who have low literacy even they have the facility of Boys and Girls schools in the community. There was no proper dispensary/health unit in the village at the time of data collection, however, there was a local quack with some medicines in the shop. A good thing for residents was facilities of paved road and drainage but facilities such as security, water and sewerages supplies were absent.

4.6.2 Boat Residents

The most dejected community during survey found in the Indus River was those living in boats permanently. These individuals with exceptional values were located at the downstream of the Tounsa Barrage. Although they floated throughout the year in the Indus River but mostly remain engaged during the fishing season with a specific contractor of their choice.

The barrages have special gates for passing out of the boats of different organizations and the boat dwelling community which also uses these channels for travelling. The respondents born, lived and had all the sociocultural life in the boats except burial on land. There are many reasons for having such lifestyle. The prominent factors were poverty, occupational demand, security issues, cultural and racial taboos which force them for continuous travelling, fishing and residing in boats to harvest deep waters of Indus River.

Income, expenditure, savings and debt were recorded as rupees 9299, 11185.24, 8233.87 and 83433.87, respectively which depicts the low monetary status of the respondents. The residents of Basti Sheikhan can generate different cultural products in addition to working as unskilled daily wages labor as a secondary occupation. But due to low wages and less demand this occupation did not make it a significant contribution to family income.

The family size of the fishermen fluctuated between 02 to 19 members who had low literacy level even they had the facility of boys' and girls' schools in the community. There was no proper dispensary / health unit in the village at the time of data collection, however, there was a local quack with some medicines in the shop. A good thing for the residents was the presence of paved road and drainage but other amenities such as security, water and sewerage were absent. During the survey, team did its best to approach maximum boat dwelling fishermen but due to transportation difficulties, security concerns and inaccessibility (due to remote and distantly located places) could not contact them.

Table 4.9 displays that the total 16 boats with their residents were found at the downstream of Tounsa Barrage. All men respondents were married and having the aged between 18 to 60 years. Responding households were having very low income (rupees 9745.63) with comparatively high expenditure (rupees 14768.44) and no savings (rupees 62.50). They had very high loan (rupees 214375.00). Fishing was their major occupation and had no other alternative to boost their livelihood. This was another factor which forced this community of the Indus River to remain deprived of all the facilities for better living status. Only 03 household heads and 02 family

members were found sick during the survey. The family size of the boat residents fluctuated from 02 to 16 members knowing that a single family is resident of a single boat. In some cases, the married son also desires to have his independent boat to accommodate his family separately adjacent to ancestral one. This unique community was not availing any facilities such as electricity, health care and security.

Table 4.9
Demographic Profile of Boat Residents

Province	Punjab			
District	Muzaffar Garh			
Indus Barrage/Basin	Tounsa Barrage			
Total Fisherman Population/Sample Size	16			
Household Heads'/Respondents' Age	a). Minimum	18	b). Maximum	60
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	08
Household Heads'/Respondents' Marital Status	a). Married[1]	16	b). Unmarried	0
Average Household Income (PKR)	9745.63			
Average Household Expenditure (PKR)	14768.44			
Average Household Savings (PKR)	62.50			
Average Household Total Debt (PKR)	214375.00			
Primary Occupation	Fishing			
Secondary Occupation	Nothing			
Healthy Household Heads	13			
Diseased Household Heads	03			
Family Size	a). Minimum	02	b). Maximum	16
Total Number of Adult Men including HHH	23			
Total Number of Adult Women including HHH	24			
Total Number of Boys (Below 18 Years)	30			
Total Number of Girls (Below 18 Years)	31			
Maximum Education in Households	08 (Single Family)			
Major Diseased in all community (Sample)	06			
Minor Diseased in all Community	02			
Total Earning Family Members	a). Minimum	01	b). Maximum	09
Boys, Schools (Matric or Primary)	Not Applicable			
Girls' Schools (Matric or Primary)	Not Applicable			
Dispensary	Not Applicable			
Distance from Fish Market	Basti Sheikhan to Pakistan and Foreign			
Distance from Main City	17 Kilometers			
Police Station	Not Applicable			
Paved Road	Not Applicable			
Sewerage System	Not Applicable			
Drainage System	Not Applicable			
Water Supply System	Not Applicable			

4.6.3 Allah Wali Basti

The third village of the Tounsa Barrage visited during the survey was Allah Wali Basti located at the western bank of the Indus River. Total 14 households were selected against the criteria mentioned earlier in the methodology section with all men respondents, married, having the age from 20 to 79 years. The education level of the residents ranged from 0 to 10^{th} class. However, the Indus River does not have any noticeable impact on their socio-economic status in the real sense because of already mentioned reasons. Most among the fishermen left their family profession because of the oppression by the contractors. Only those who are remaining in the profession had fake loans imposed by the contractors and could not got rid of from the web of slavery. This can be proved from the data analysis as total average income, expenditure, savings and loan per household were recorded as rupees 9632.14, 11341.86, 3071.43 and 55142.86, respectively (Table 4.10).

Total population of fishermen along with family members was recorded as 26, 22, 42 and 30 men, women, boys and girls, respectively. Total 02 among both categories (heads and members of the families) were found sick and family size fluctuated between 05 to 34 members. This community was among those villages where the amenities of paved road and water supply were available, however, dispensary, security and sewerage system facilities were absent.

Table 4.10
Demographic Profile of Allah Wali Basti

Province	Punjab			
District	Muzaffar Garh			
Indus Barrage/Basin	Tounsa Barrage			
Total Fisherman Population/Sample Size	14			
Household Heads'/Respondents' Age	a). Minimum	20	b). Maximum	79
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	10
Household Heads'/Respondents' Marital Status	a). Married[1]	14	b). Unmarried	0
Average Household Income (PKR)	9632.14			
Average Household Expenditure (PKR)	11341.86			
Average Household Savings (PKR)	3071.43			
Average Household Total Debt (PKR)	55142.86			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor and Cultural Products			
Healthy Household Heads	12			
Diseased Household Heads	02			
Family Size	a). Minimum	05	b). Maximum	34
Total Number of Adult Men including HHH	26			
Total Number of Adult Women including HHH	22			
Total Number of Boys (Below 18 Years)	42			
Total Number of Girls (Below 18 Years)	30			
Maximum Education in Households	10			
Major Diseased in all community (Sample)	06			
Minor Diseased in all Community	02			
Total Earning Family Members	a). Minimum	01	b). Maximum	07
Boys' Schools (Matric or Primary)	Yes			
Girls' Schools (Matric or Primary)	Yes			
Dispensary	No			
Distance from Fish Market	Local Contractor at Basti Sheikhan			
Distance from Main City (Kilometers)	18 Kilometers			
Police Station	No			
Paved Road	Yes			
Sewerage System	No			
Drainage System	No			
Water Supply System	Yes			

4.7 Chashma Barrage

4.7.1 Haider Colony

Haider Colony is considered a village with good numbers of fishermen. Total 57 families were selected for interview. All the respondents were men and married with 19-70 years of age. The literacy level of the residents (heads and members of households) was low.

Table 4.11 illustrates that the average household income was comparatively better than the downstream barrage residents and noted as 1rupees 1629.91. However, higher expenditure (rupees 14190.35) severely affected the social life of the households. Furthermore, a small amount of savings (rupees 3657.89) and a debt (rupees 45263.16) made the lives of the community members terrible.

Fishing as major occupation and unskilled labor during off season is also the characteristic of the target population of the sample area. There was a total of 07 family heads and 01 family member was found sick in Haider Colony. Total population of the fishermen as men, women, boys and girls was 80, 71, 123 and 105, respectively. The fishermen catch the fish and sell to the local contractor at very low price who export it to the major cities of Pakistan and especially far-off places such as Dubai. There was no other facility found in Chashma Barrage except paved road.

Table 4.11
Demographic Profile of Haider Colony

Province	Punjab			
District	Mianwali			
Indus Barrage/Basin	Chashma Barrage			
Total Fisherman Population/Sample Size	57			
Household Heads'/Respondents' Age	a). Minimum	19	b). Maximum	70
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	10
Household Heads'/Respondents' Marital Status	a). Married[1]	57	b). Unmarried	0
Average Household Income (PKR)	11629.91			
Average Household Expenditure (PKR)	14190.35			
Average Household Savings (PKR)	3657.89			
Average Household Total Debt (PKR)	45263.16			
Primary Occupation	Fishing			
Secondary Occupation	Unskilled Labor			
Healthy Household Heads	50			
Diseased Household Heads	07			
Family Size	a). Minimum	02	b). Maximum	27
Total Number of Adult Men including HHH	80			
Total Number of Adult Women including HHH	71			
Total Number of Boys (Below 18 Years)	123			
Total Number of Girls (Below 18 Years)	105			
Maximum Education in Households	10			
Major Diseased in all community (Sample)	10			
Minor Diseased in all Community	01			
Total Earning Family Members	a). Minimum	01	b). Maximum	04
Boys, Schools (Matric or Primary)	No			
Girls' Schools (Matric or Primary)	No			
Dispensary	No			
Distance from Fish Market	Local Contractor to Pakistan and Foreign			
Distance from Main City	25 Kilometers			
Police Station	No			
Paved Road	Yes			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

4.7.2 Sindhian Wala Ban

This was the second community of fishermen at Chashma Barrage with good numbers of fisherfolks. Total 83 families were there to share the data during the survey. The name given to this village Sindhian Wala is because of the fishermen from Sindh province who had settled over there for their livelihood.

Table 4.12 reveals that all the respondents were men and married with age ranged 17-80 years and the educational level of the family heads was very low as only maximum literacy level was noted as 05^{th} grade. However, the educational level among the members of the fishermen was comparatively good and 8^{th} grade was the maximum education there. The total income, expenditure, savings and debt were noted as rupees 10430.47, 11743.73, 921.69 and 79277.11, respectively. The debt figures depict the overall picture of the fisherfolks and the main reason behind this was the manipulation of middleman (contractor). The contractor purchased the fish at the maximum rate of 20-30 rupees per Kilogram from the fishermen and sold it at the rate of 600-2000 rupees per Kilogram in Pakistan and abroad. During the breeding season of fish, the fishing is not allowed by the government, so contractor extends the loan to the fishermen at the rate of 500 rupees per household per week. This abuse was more severe than the bonded labor and can be regarded as slavery.

There was no secondary occupation available to the fishermen and they were found totally dependent on advances in the form of loan during off season. There were 03 household heads and 26 family members were found sick.

Table 4.12
Demographic Profile of Sindhian Wala Ban

Province	Punjab			
District	Mianwali			
Indus Barrage/Basin	Chashma Barrage			
Total Fisherman Population/Sample Size	83			
Household Heads'/Respondents' Age	a). Minimum	17	b). Maximum	80
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	05
Household Heads'/Respondents' Marital Status	a). Married[1]	83	b). Unmarried	0
Average Household Income (PKR)	10430.47			
Average Household Expenditure (PKR)	11743.73			
Average Household Savings (PKR)	921.69			
Average Household Total Debt (PKR)	79277.11			
Primary Occupation	Fishing			
Secondary Occupation	Nothing			
Healthy Household Heads	80			
Diseased Household Heads	03			
Family Size	a). Minimum	01	b). Maximum	18
Total Number of Adult Men including HHH	124			
Total Number of Adult Women including HHH	112			
Total Number of Boys (Below 18 Years)	209			
Total Number of Girls (Below 18 Years)	141			
Maximum Education in Households	08			
Major Diseased in all community (Sample)	26			
Minor Diseased in all Community	01			
Total Earning Family Members	a). Minimum	01	b). Maximum	08
Boys' Schools (Matric or Primary)	No			
Girls' Schools (Matric or Primary)	No			
Dispensary	No			
Distance from Fish Market	Local Contractor to All Pakistan and Foreign			
Distance from Main City	35 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

Minimum 01 and maximum 08 members per family were to contribute in the income of households for their livelihood. Here, comparatively high number of men, women, boys and girl's population was noted as 124, 112, 209 and 141, respectively. The main city near this village was Mianwali which was about 35 Kilometers away and no boys and Girls school was found in the community. Other facilities such as dispensary, security, sewerage, drainage and water supply systems were absent as expected, however, the paved road was found because this village was located on the dyke of the barrage.

4.7.3 Basti Ghandi

Population wise the largest village of fishermen community surveyed in Punjab province was Basti Ghandi at Chashma Barrage near the Mianwali city (15 Kilometers away). Total 98 families were the resident of this village which fulfill all the criteria set for the selection of sample as mentioned in the preceding chapter. All the respondents were men and married.

Table 4.13 demonstrates that the ages of the household heads were between 20-80 years, and the educational level of both heads and members of households was recorded up to (0-5th Grades) because there was no school in the village. Very low average income per household (rupees 9031.26) was earned for livelihood and had more average expenditure (rupees 11896.73) which made households to face more financial difficulties. However, savings (rupees 7280.61) was quite good as compared to previously discussed village. The respondents had loan debt (rupees

Table 4.13
Demographic Profile of Basti Ghandi

Province	Punjab			
District	Mianwali			
Indus Barrage/Basin	Chashma Barrage			
Total Fisherman Population/Sample Size	98			
Household Heads'/Respondents' Age	a). Minimum	20	b). Maximum	80
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	05
Household Heads'/Respondents' Marital Status	a). Married[1]	98	b). Unmarried	0
Average Household Income (PKR)	9031.26			
Average Household Expenditure (PKR)	11896.73			
Average Household Savings (PKR)	7280.61			
Average Household Total Debt (PKR)	45153.06			
Primary Occupation	Fishing			
Secondary Occupation	Nothing			
Healthy Household Heads	92			
Diseased Household Heads	06			
Family Size	a). Minimum	02	b). Maximum	19
Total Number of Adult Men including HHH	140			
Total Number of Adult Women including HHH	126			
Total Number of Boys (Below 18 Years)	217			
Total Number of Girls (Below 18 Years)	178			
Maximum Education in Households	05			
Major Diseased in all community (Sample)	13			
Minor Diseased in all Community	01			
Total Earning Family Members	a). Minimum	01	b). Maximum	06
Boys' Schools (Matric or Primary)	No			
Girls' Schools (Matric or Primary)	No			
Dispensary	No			
Distance from Fish Market	Local Contractor to All Pakistan and Foreign			
Distance from Main City	15 Kilometers			
Police Station	No			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

45153.06) to repay in future. The reasons for loan were almost the same as discussed in the earlier section.

Fishing remains major occupation with no alternate livelihood and total 140, 126, 217, and 178 men, women, boys and girls, respectively were observed. All 06 household heads and 13 other family members were found having ill. The same procedure was adopted over here for the sale of fish catch as described earlier in various fishermen communities. All common social services in this village were found absent.

4.8 Jinnah Barrage

4.8.1 Jalal Pur

The smallest village of the fishermen in the CIWS was Jalal Pur at Jinnah Barrage, Mianwali which was built as the first barrage at the most upstream site on the Indus River in Punjab. Usually the sub-contractor of the Chashma Barrage sold out fish catch to the local contractor. The local contractor ultimately sold the fish of Jannah Barrage at Esa Khail town 80 Kilometers away from the barrage. Generally, fishermen from the Chashma Barrage come to catch fish over here and very few among them stayed permanently.

Data in table 4.14 indicates that only 07 households were found engaged in fishing during the data collection. All men respondents except one were married. The age of these household heads ranged from 28-50 years while having maximum 3 years of schooling including all family members. The total income, expenditure, savings and debt was recorded as rupees 10500.00,

Table 4.14
Demographic Profile of Jalal Pur

Province	Punjab			
District	Mianwali			
Indus Barrage/Basin	Jinnah Barrage			
Total Fisherman Population/Sample Size	07			
Household Heads'/Respondents' Age	a). Minimum	28	b). Maximum	50
Household Heads'/Respondents' Education	a). Minimum	0	b). Maximum	03
Household Heads'/Respondents' Marital Status	a). Married[1]	06	b). Unmarried	01
Average Household Income (PKR)	10500.00			
Average Household Expenditure (PKR)	12394.29			
Average Household Savings (PKR)	7142.86			
Average Household Total Debt (PKR)	21428.57			
Primary Occupation	Fishing			
Secondary Occupation	Nothing			
Healthy Household Heads	06			
Diseased Household Heads	01			
Family Size	a). Minimum	04	b). Maximum	09
Total Number of Adult Men including HHH	11			
Total Number of Adult Women including HHH	09			
Total Number of Boys (Below 18 Years)	17			
Total Number of Girls (Below 18 Years)	12			
Maximum Education in Households	03			
Major Diseased in all community (Sample)	01			
Minor Diseased in all Community	0			
Total Earning Family Members	a). Minimum	01	b). Maximum	02
Boys' Schools (Matric or Primary)	No			
Girls' Schools (Matric or Primary)	No			
Dispensary	No			
Distance from Fish Market	80 Kilometers			
Distance from Main City	45 Kilometers			
Police Station	Yes			
Paved Road	No			
Sewerage System	No			
Drainage System	No			
Water Supply System	No			

12394.29, 7142.86 and 21428.57, respectively. Fishing remains their major occupation and secondary occupation was not found. Commonly 01 to 02 family members were involved in fishing activities. The family size of the respondents ranged from 04-09 members and total men, women, boys and girls were 11, 09, 17 and 12, respectively. Only a single person was found sick and rest were healthy during the time of survey. There were one police post there but no other facility was available to make their lives easy. The nearest city is Mianwali which is 45 Kilometers away from the Jalal Pur village.

4.9 Summary (Chapter Four)

Chapter four describes the demographic profiles of the communities of CIWC. Total four villages of Indus-based fisherfolks are situated in the vicinity of Sindh province. Average income, expenditure, saving and remaining debt of these communities were 14518.72, 17697.40, 6622.13 and 116865.53 rupees respectively. Almost all respondents were married and household heads. Educational level was very low however health situation was not really bad even with very few facilities available. Fisherfolks of the Punjab province in ten villages had worse socio-economic status with average income, expenditure, saving and remaining debt of 10025.45, 12311.54, 4297.59 and 65451.07 rupees respectively. Simultaneously the situation of education, health and other facilities was relatively poor in comparison with Sindh. The main reason behind this difference is provincial policies for fishing in Indus River as Sindh allows more freedom in terms of annual permit while the Punjab restricts its fishermen with annual contract owned by local politicians or feudal. These powerful people exploit fisherfolks to maximize their profit.

CHAPTER FIVE
SOCIO-ECONOMIC STATUS OF FISHERFOLKS OF CIWC

Current chapter describes empirical evidence from the study area to gauge socioeconomic indicators and establish their relationship with CIWC. Uni-variate analyses and descriptive statistics is used for analyses. Both continuous and categorical variables were analyzed and are discussed. At the end, the environmental conditions of Indus River are also described.

5.1 Socio-economic status (SES)

Socio-economic status (SES) can be regarded as the combination of resources, finance, material goods, health and educational facilities, power, social capital and leisure time (Oakes & Rossi, 2003). SES indicators are many in the list but most important are income, occupation, health and education. These indicators are also dependent on each other. Income is dependent on occupation and education while health is directly related to the education (Marilyn, et al., 1992). SES usually defines the individuals social and financial level in the community (Foley, Paul, 2007; Mukherjee, 1999). SES must include the financial, cultural, human, social and capitals. There is no single measure for the true judgement of SES as it is the combination of the list of indicators (Ainley & Long, 1995).

5.1.1 Demographic Profile of Punjab, Sindh and CIWC

Punjab is the largest province of Pakistan having variety of casts, races, social and economic status in its premises. The data were collected from the fishermen communities from Mianwali to Rajanpur districts under contractual system of fisheries department of Punjab. As

discussed in the methodology, only the respondents that were household head were selected because fishing activity is considered masculine in nature and they can provide more accurate data as compared to other family members. Raw data was mostly collected directly, processed and transformed in categorical form with the help of software.

Data corresponding to age groups show that nobody among the respondents was less than the age of 15 because household heads were obviously more in age. Table 5.1 shows that in the Punjab majority (3/4, 74.00%) of the respondents fall between age of 16 to 45 years because heavy activity of fishing in all weathers demands fishermen of young age. Only 26.00% of the total population were more than the 60 years of the age.

Almost all (96.5%) respondents were married while only 02 household heads were found unmarried during the data collection. Half (49.90%) of the total households were having family size of 6 to 10 members with the group mean of 7.81 members. This shows that 8 members in a family was the average household size of almost half of the fishermen communities in the Punjab. However, the second prominent group was the family size of below 05 members with average of 3.80 persons. Throughout Punjab province only 34 (09.10%) households were found with family size of above 10 members' category. The average household size of the Punjab reported in 2017 census was 6.8 (Social Policy and Development Centre, 2018). The number of total family members were graphed in the categories of adult men, adult women, boys and girls. The person having below 18 years was categorized as boy or girl according to their sexes. Total 550, 497, 845

and 636 (Total 2528) adult men, women, boys and girls were counted against the selected families of pure fishermen in Punjab.

Demographic profile of Sindh (Table 5.2) is slightly different from Punjab because the area covered by Indus River was more in Punjab as compared to Sindh. Secondly, the fishermen of the Punjab are under the contractual system while in Sindh individual permits were issued for fishing purpose. Contrary to Punjab, Sindhi respondents were also more in numbers than 15 years of age group because they were also the household heads as described in the methodology section. A total of 70.20% of the total fishermen population of Sindh were between the age group of 16 to 45 years. This is very familiar with Punjab as most respondents were young. Total 29.80% were having the age more than 45 years in Sindh. All 97.00% respondents were found married as discussed previously as data was taken from the household heads. Only 3 respondent fishermen in Sindh were found unmarried. Family size of the respondents was recorded against four categories mentioned in the Table. Most of the respondents were found in the category of 6-10 family size with the average of 7.88 members. However, only 11.50% families were with members more than 10 and 29.80% households having the family size less than five members with the average of 4.03 persons. The population of respondent fishermen was observed having family members as 431, 362, 510 and 433 of total men, women, boys and girls, respectively. The sum of all categories was 1736 persons which was comparatively less than the population of Punjab due to the reasons discussed already. Likewise, in Punjab, all the respondents were men and fishermen with fishing as primary occupation.

Table 5.1

Demographic Profile of Fisherfolks (Household Heads) of the Punjab Province

Age				
Categories	*f*	*%*	Group Mean	Group S.D
Below 15	00	00.00	00	00.00
16-30	133	35.70	25.35	03.879
31-45	143	38.30	38.19	04.302
46-60	74	19.80	53.92	04.955
>60	23	06.20	68.74	05.404
Total	373	100.00	38.57	13.581

Marital Status		
Categories	*f*	*%*
Married	360	96.50
Unmarried	02	00.50
Widower	01	00.30
Separated	08	02.10
Divorced	02	00.50
Total	373	100.00

Household Size				
Categories	*f*	*%*	Group Mean	Group S.D
Below 5	153	41.00	03.80	01.078
6-10	186	49.90	07.81	01.312
>10	34	09.10	13.85	04.894
Total	373	100.00	06.72	03.495

Sex Distribution of Population	
Sex Groups	Total Sum
Total Adult Men	550
Total Adult Women	497
Total Boys	845
Total Girls	636
Total Population	2528

Sex		
Sex	*f*	*%*
Men	373	100.00
Women	00	00.00

Major Occupation		
Occupation	*f*	*%*
Fishing	373	100.00
Household Heads as Fishermen	373	100.00

Table 5.2

Demographic Profile of Fisherfolks (Household Heads) of Sindh Province

Age				
Categories	*f*	%	Group Mean	Group S.D
Below 15	00	00.00	00	00
16-30	77	32.80	26.44	03.299
31-45	88	37.40	38.83	04.145
46-60	53	22.60	52.38	04.667
>60	17	07.20	67.88	04.136
Total	235	100.00	39.93	12.966

Marital Status		
Categories	*f*	%
Married	228	97.00
Unmarried	03	01.30
Widower	04	01.70
Separated	00	00.00
Divorced	00	00.00
Total	235	100.00

Household Size				
Categories	*f*	%	Group Mean	Group S.D
Below 5	70	29.80	04.03	00.992
6-10	138	58.70	07.88	01.335
>10	27	11.50	15.15	04.276
Total	235	100.00	07.57	03.715

Sex Distribution of Population	
Sex Groups	Total Sum
Total Adult Men	431
Total Adult Women	362
Total Boys	510
Total Girls	433
Total Population	1736

Sex of Household Heads		
Sex	*f*	%
Men	235	100.00
Women	00	00.00

Major Occupation		
Occupation	*f*	%
Fishing	235	100.00
Household Heads as Fishermen	235	100.00

Table 5.3

Demographic Profile of Fisherfolks (Household Heads) of CIWC

Age				
Categories	*f*	%	Group Mean	Group S.D
Below 15	00	00.00	00	00.00
16-30	210	34.50	25.75	03.707
31-45	231	38.00	38.43	04.245
46-60	127	20.70	53.27	04.877
>60	40	06.80	68.37	04.866
Total	608	100.00	39.10	13.352

Marital Status		
Categories	*f*	%
Married	588	96.50
Unmarried	05	00.80
Widower	05	00.40
Separated	08	02.00
Divorced	02	00.30
Total	608	100.00

Household Size				
Categories	*f*	%	Group Mean	Group S.D
Below 5	223	36.70	03.87	01.055
6-10	324	53.30	07.84	01.320
>10	61	10.00	14.43	04.638
Total	608	100.00	07.05	03.603

Sex Distribution of Population	
Sex Groups	Total Sum
Total Adult Men	981
Total Adult Women	859
Total Boys	1355
Total Girls	1069
Total Population	4264

Sex		
Sex	*f*	%
Men	608	100.00
Women	00	00.00

Major Occupation		
Occupation	*f*	%
Fishing	608	100.00
Household Heads as Fishermen	608	100.00

While looking on the overall demographic picture of the CIWC (Table 5.3), we see that combining both provinces the majority (72.50%) respondents fall between the ages of 16-45 and all 96.50% were married and half 53.30% (mean = 7.84) were of 6-10 members as family size. The total population of CIWC was found as 981, 859, 1355 and 1069 as men, women, boys and girls, respectively. The data presented in this research refers to the total 4264 members of fishermen households in CIWC.

5.1.2 Income, Expenditure, Savings and Remaining Debt

The data was recorded against different socioeconomic variables to examine the SES of fishermen communities of Indus River and to examine the effect of wetland on SES of the said communities. The most important data in this regard and having top position in the indicators were income, expenditure, savings and remaining debt. These variables in a straight line depict the actual existence of an individual or community with their particular social and economic statuses. The data of these SES variables were noted at all sites in CIWC and analyzed further to have the true picture. All the variables (income, expenditure, savings and remaining debt) were divided in equal interval-based categories of Pakistani Rupees for ease of measurement and understanding. The income and expenditure are per month data while savings and loan are compared to the total lifespan of fishermen.

Data in table 5.4 depicts that the income in Punjab gives a surprising figure that in the 21st century where the global economy is improving at local and communal levels these miserable communities are thriving far below from the poverty line. A total of 65.00% of the total population

of fishermen in the Punjab were earning below rupees 10,000 with group mean of rupees 7724.89 (73.35$). During the year of data collection, the average conversion rate was Rupees 105.317 to One US Dollar. While during the current year it exchanges at the rate of rupees 155.75 per US Dollar (X-Rates, 2019).

The second most prominent category was of those who had income range from (rupees 10001-15000, where only 27.30% of the total fishermen of Punjab were recorded. Here it will be worth mentioning that almost all (91.90%) population surveyed in Punjab had income less than 15000 rupees (142.43$) per month. Only a very few 8.0% were found with the income more than 15000 rupees.

Almost similar trend was noted about the expenditure of the households per month of Indus fishermen of Punjab province. More than three fourth (77.80%) fishermen of the Punjab were found with the expenditure below rupees 10,000 per month having rupees 8294.17 (78.75$) of group mean. Rest of the respondents (22.20%) were having group mean of rupees 23240.19 (220.68$) per month. No doubt this is more than the income of these individuals which indicates the extent of exploitation by the contractors. This more expenditure forces them to have more loan, which costs more years of their life under bonded labor/oppression.

Almost all (93.30%) respondents were having nothing in savings because their imbalance in expenditure and income. Only 4.8% were found with savings more than of rupees 25,000 with same group mean. The overall mean of the Punjab was 4297.59 rupees (40.80$) contrary to total savings of life. However, the debt in Punjab was higher because of more expenditure and less

income. Higher figures of debt refer to the manipulation of local contractor as they frequently execute fake debt even on individual's minute contractual violation such as taking out a single fish from the collection. Majority (60.30%) of the respondents in Punjab were found in category of above rupees 25000 with group mean of rupees 105,355.56 (1000.43$) total loan. This high amount of loan in comparison to low income of poor fishermen results in lifetime slavery.

The economic status of the fishermen of Sindh is not so appreciable but a little better than the residents of Punjab. The residents of Punjab are under contractual system of provincial government, but the Sindhi fishermen are free from this obligation and enjoying the facility of annual permit.

Fishermen communities of Sindh are browbeaten by the feudal sitting along the banks of the river and occupy control of the government lands. They take away 50.00% of the total fish catch of fish and not allow them to have any other good within or along the Indus River. The area within and along the Indus River called *Kacha* is considered the good refuge for dacoits.

The security situation of Punjab *Kacha* area is not worse than that in Sindh. Although government performed many operations but could not clear the area. These criminals also use fishermen for the transportation of people, luggage, weapons, fishing and spying activities.

The third exploitation is itself by the workers of government departments (Fisheries, Canal and Wildlife and Forest) by taking away part of fish catch as bribery in both the provinces specially in Sindh, because in Punjab the annual contract limits the intervening actions of government.

Table 5.4

Income, Expenditure, Savings and Remaining Debt of the Punjab Province

Categories in Pakistani Rupees	*f*	%	Group Mean	Group S.D
Income				
Below 10000	241	64.60	7724.89	1637.768
10001-15000	102	27.30	12197.62	1347.390
15001-20000	19	05.10	16770.37	1427.281
20001-25000	05	01.30	22000.00	1414.214
>25000	06	01.60	34166.67	8010.410
Total	373	100.00	10025.45	4645.356
Mean Income	10025.45	Standard Deviation	4645.356	
Expenditure				
Below 10000	133	35.70	8294.17	1343.618
10001-15000	157	42.10	12208.80	1409.486
15001-20000	67	18.00	17195.46	1441.568
20001-25000	08	02.10	21632.88	1047.421
>25000	08	02.10	30892.25	4023.733
Total	373	100.00	12311.54	4640.209
Mean Expenditure	12311.54	Standard Deviation	4640.209	
Savings				
Below 10000	348	93.30	295.98	1467.235
10001-15000	01	00.30	15000.00	0.000
15001-20000	00	00.00	00	0.000
20001-25000	06	01.60	25000	0.000
>25000	18	04.80	74166.67	72360.413
Total	373	100.00	4297.59	22353.975
Mean savings	4297.59	Standard Deviation	22353.975	
Remaining Debt				
Below 10000	117	31.40	976.50	2830.450
10001-15000	06	01.60	13000.00	1549.193
15001-20000	18	04.80	19166.67	1465.285
20001-25000	07	01.90	24428.57	1511.858
>25000	225	60.30	105355.56	93141.203
Total	373	100.00	65451.07	87617.057
Mean Debt	65451.07	Standard Deviation	87617.057	

Table 5.5

Income, Expenditure, Savings and Remaining Debt of the Sindh Province

Categories in Pakistani Rupees	*f*	%	Group Mean	Group S.D
Income				
Below 10000	53	22.60	8364.15	1387.180
10001-15000	107	45.50	12365.42	1286.732
15001-20000	45	19.10	17377.78	1235.808
20001-25000	18	07.70	23083.33	1664.950
>25000	12	05.10	37333.33	16427.988
Total	235	100.00	14518.72	7678.507
Mean Income	14518.72	Standard Deviation	7678.507	
Expenditure				
Below 10000	13	05.50	8403.85	1588.823
10001-15000	89	37.90	12576.97	1314.324
15001-20000	78	33.20	17665.26	1407.263
20001-25000	30	12.80	22423.33	1268.976
>25000	25	10.60	35188.00	18361.289
Total	235	100.00	17697.40	9301.965
Mean Expenditure	17697.40	Standard Deviation	9301.965	
Savings				
Below 10000	215	91.50	182.33	1210.339
10001-15000	00	00.00	00	00
15001-20000	00	00.00	00	00
20001-25000	01	00.40	21000.00	00
>25000	19	08.10	78736.84	41650.453
Total	235	100.00	6622.13	24413.836
Mean savings	6622.13	Standard Deviation	24413.836	
Remaining Debt				
Below 10000	50	21.3	560.00	2251.167
10001-15000	02	00.90	15000.00	0.00
15001-20000	07	03.00	20000.00	0.00
20001-25000	05	02.10	24080.00	1063.955
>25000	171	72.80	158742.69	221800.237
Total	235	100.00	116865.53	201162.985
Mean Debt	116865.53	Standard Deviation	201162.985	

Table 5.6

Income, Expenditure, Savings and Remaining Debt of CIWC

Categories in Pakistani Rupees	*f*	%	Group Mean	Group S.D
Income				
Below 10000	294	48.40	7840.13	1612.202
10001-15000	209	34.40	12283.53	1316.197
15001-20000	64	10.50	17197.45	1314.118
20001-25000	23	03.80	22847.83	1647.552
>25000	18	03.00	36277.78	13994.980
Total	608	100.00	11762.16	6383.507
Mean Income	11762.16	Standard Deviation	6383.507	
Expenditure				
Below 10000	146	24.00	8303.94	1361.377
10001-15000	246	40.50	12342.00	1384.509
15001-20000	145	23.80	17448.18	1437.591
20001-25000	38	06.30	22256.92	1255.524
>25000	33	05.40	34146.61	16121.083
Total	608	100.00	14393.25	7310.365
Mean Expenditure	14393.25	Standard Deviation	7310.365	
Savings				
Below 10000	563	92.60	252.58	1374.801
10001-15000	01	00.20	15000.00	00
15001-20000	00	00.00	00	00
20001-25000	07	01.20	24428.57	1511.858
>25000	37	06.10	76513.51	57838.675
Total	608	100.00	5196.05	23179.685
Mean savings	5196.05	Standard Deviation	23179.685	
Remaining Debt				
Below 10000	167	27.50	851.80	2670.369
10001-15000	8	01.30	13500.00	1603.567
15001-20000	25	04.10	19400.00	1290.994
20001-25000	12	02.00	24283.33	1300.233
>25000	396	65.10	128409.09	163686.902
Total	608	100.00	85323.44	144680.677
Mean Debt	85323.44	Standard Deviation	144680.677	

These all-important influences do not make the Sindhi fishermen able to take the tangible paybacks from the annual permit system in its real sense. Therefore, they also fall very near to the Punjabi fishermen in economic and social statuses. Table 5.5 expresses that the majority (87.20%) of the Sindhi households' fall below rupees 20,000 per month income with the average of rupees 12702.45 rupees (120.61$). The expenditure of Sindhi respondents is little better than those of Punjab as in <10,000 category only 05.50% fishermen fall while in same category total 35.7% were from the Punjab which was quite higher figure. Therefore, maximum population 3/4th (76.60%) of fishermen from Sindh has expenditure up to rupees 20,000 per month with the average of 12882.02 rupees (122.32$). This is almost equal to the income per month of same category for same respondents. Obviously, the low income, same expenditure and more debt do not make the local community capable of savings therefore almost equal to the Punjab (91.50%). Maximum respondents in Sindh fall in the category of <10,000 total savings of life with the group mean of 182.33 rupees (1.73$). Only 21.3% fishermen of Sindh have loan less than average 560.00 (5.31$) while majority (72.80%) are like Punjab and have average loan 158742.69 rupees (1507.30$). The main reasons behind this economic disparity was less income and exploitation as discussed earlier. The combination of both economic signs gives the overall fiscal picture of Indus River fishermen communities as 11762.16 (111.69$), 14393.25 (136.67$), 5196.05 (49.34$) and 85323.44 (810.21$) rupees average income, expenditure, savings and debt, respectively (Table 5.6).

Average expenditure data was further analyzed to determine the in-depth financial image of the respondents in different study areas. Table 5.7 explains that the residents of the Sindh have 43% more expenditure on food as compared to Punjab. In terms of grocery, interestingly Sindhi people also spend more (47.00%) than respondents of Punjab. Sindhi fishermen had incurred more expenditure (68.00%) for education as compared to Punjab. This goes for their children whereas elders had almost same education level as in Punjab. Sindh also had more expenditure by 43% for

health while expenditures for livestock health, utility bills and household energy were almost same in both the provinces. The expenditure in terms of transportation was already double for the respondents in Punjab as compared to those of Sindh. The fishermen of Sindh were expending more for cloths, mobile phones and annual ceremonies while the fisherfolks of the Punjab are higher in expenditure for boat and net maintenance. But both provinces were equal in meeting rent expenditure. The entailed explanation of the income, expenditure, savings and remaining debt displays the overall depiction of the SES of the Indus River dependent fisherfolks. However, for more exhaustive reflection, other indicators were also included and used to make a comprehensive breakdown of the role of wetlands in the lives of fishermen under provincial contractual and permit systems in Pakistan.

Table 5.7
Categories wise Average Expenditure of the Fishermen Communities

Categories	Average Expenditure of Punjab	Average Expenditure of Sindh	Average Expenditure of CIWC
Food	4876.68	8463.83	6263.16
Grocery	2276.01	4294.04	3056.00
Education	74.58	232.98	135.81
Health	703.45	1251.06	915.16
Livestock Health	18.57	22.55	20.11
Utility Bills	238.65	284.26	256.17
Household Energy	252.48	230.38	243.94
Transportation	1192.56	596.17	962.05
Cloths	835.64	1344.26	1032.23
Mobile	285.35	388.09	325.43
Rent	34.85	34.47	34.70
Boat & Net Maintenances	814.21	393.62	651.65
Ceremonies	664.92	783.40	710.71

5.1.3 Education

Education as key indicator of SES has momentous worth for any society. The data against education was collected from all communities in raw form and finally categorized into groups named locally in Pakistan as primary, middle, matriculation or 5^{th} grade, 8^{th} grade and 10^{th} grade of schooling, respectively.

The data for education was collected for both household heads and maximum education in the household which depicted the overall literacy of the area as well as attention of fishermen communities paid towards educating their children. Lack of education in fishermen society was due to the reason that fishermen were struggling for their survival in terms of food and shelter and thus could not focus on providing education to their children.

Table 5.8 illustrates that in Punjab a very large portion (90.10%) of household heads were totally illiterate, however, a very small portion (09.90%) of household heads were found educated but up to low grades. Extremely low rate of education was found among other family members especially children, as ¾ (75.30%) persons were families deprived of education. However, a bit encouraging portion (18.20%) of their children were receiving education. It was also observed at Tounsa Barrage that fishermen community established some Primary schools in their areas which can be a source of education for their future generations. The education level for the household heads and rest of the family members of fishermen in Sindh province was almost same (90.20% and 74.0%, respectively) as were in Punjab who also could not find the opportunities for having formal education. However, they also showed interest for the education of their children like that in Punjab as some children were enrolled in Primary (13.60%), few in the secondary (09.40%)

Table 5.8
Education of the Fisherfolks of Study Area

Educational Categories		*f*	%	Group Mean	Group S.D
		Household Head Education			
Illiterate	PUNJAB	336	90.10	00.00	00.00
Primary		23	06.20	03.87	1.517
Middle		10	02.70	07.50	0.850
Matriculation		04	01.10	09.75	0.500
Above Matric		00	00.00	00.00	00.00
Total		373	100.00	00.54	1.822
		Maximum Education in Household			
Illiterate		281	75.30	00.00	00.00
Primary		68	18.20	03.25	1.757
Middle		17	04.60	07.24	0.903
Matriculation		07	10.90	09.86	0.378
Above Matric		00	00.00	00.00	00.00
Total		373	100.00	01.11	2.348
		Household Head Education			
Illiterate	SINDH	212	90.20	00.00	00.00
Primary		12	05.10	04.67	1.155
Middle		04	01.70	07.50	1.000
Matriculation		05	02.10	10.00	0.000
Above Matric		02	00.90	12.00	0.000
Total		235	100.00	00.68	2.249
		Maximum Education in Household			
Illiterate		174	74.00	00.00	00.00
Primary		32	13.60	03.00	1.666
Middle		15	06.40	07.33	0.816
Matriculation		07	03.00	10.00	0.000
Above Matric		07	03.00	12.71	1.496
Total		235	100.00	01.55	3.248
		Household Head Education			
Illiterate	CIWC	548	90.10	00.00	00.00
Primary		35	05.80	04.14	1.438
Middle		14	02.30	07.50	0.855
Matriculation		09	01.50	09.89	0.333
Above Matric		02	00.30	12.00	0.000
Total		608	100.00	00.60	1.997
		Maximum Education in Household			
Illiterate		455	74.80	00.00	00.00
Primary		100	16.40	03.17	1.724
Middle		32	05.30	07.28	0.851
Matriculation		14	02.30	09.93	0.267
Above Matric		07	01.20	12.71	1.496
Total		608	100.00	01.28	2.737

and still decreasing in number higher secondary (03.00%) level classes. Although these are not significant percentages but encouraging if one can understand the actual life of fishermen having very miserable circumstances. The total illiteracy in the study area was recorded as 90.10% for family heads and 74.80% within the family members of the fishermen residing in the Indus River of CIWC.

Education and SES were also considered by the researcher as deep rooted and interdependent variables (Bourdieu & Passeron, 1977; Williams, T.; Clancy, J.; Batter, M.; Girling, S. Butcher, 1980; Linke, R.; Oertel, L.; Kelsey, N., 1985; Shavit & Blossfeld, 1993).

5.1.4 Health

Health is also a gauge characteristic of SES and has a vital role for the social, psychological and economic opulence for any community. Data collected for health was also divided in two main categories as in the education that healthiness of the household heads and other family members. The family members data included the incidence of both minor and major diseases. The minor diseases included momentary illnesses such as flu, fever, malaria, typhoid or viral and other seasonal infections etc. while the major disease included chronic one (sugar, blood pressure, allergies, hardscaped) and severe (cardiovascular, paralysis, tumor, cancer etc.) disorders. Health of the household head directly effects the whole earning of the family as in most of the cases they are the only earning member in the unit and is directly in contact with the contractor to earn livelihoods. As bonded labor, the employer did not bother about the health condition of the household head.

Table 5.9
Health Status of the Fisherfolks and their Households

Household Head Health Status		*f*	%
Healthy	PNJAB	335	89.80
Diseased		38	10.20
Total		373	100.00
Total Major Diseased including households		107	
Total Minor Diseased including households		17	
Grand Total (Minor and Major Diseased)		124 (4.90%)*	
Approach to Health Facilities		00	00.00

Household Head Health Status		*f*	%
Healthy	SINDH	204	86.80
Diseased		31	13.20
Total		235	100.00
Total Major Diseased including households		74	
Total Minor Diseased including households		10	
Grand Total (Minor and Major Diseased)		84 (4.83%)**	
Approach to Health Facilities		00	00.00

Household Head Health Status		*f*	%
Healthy	CIWC	539	88.65
Diseased		69	11.34
Total		608	100.00
Total Major Diseased including households		181	
Total Minor Diseased including households		27	
Grand Total (Minor and Major Diseased)		208 (4.87%)***	
Approach to Health Facilities		00	00.00

The data in table 5.9 revealed the health conditions of the household heads in the study area. Only 10.20% and 13.20% household heads in Punjab and Sindh, respectively, were found having health problems while remaining (Punjab 89.80%, Sindh 86.80%) were healthy. Most of the ailing heads were found in such a condition that they could not undertook profession for the earning. The health condition of other community members was more inspiring that only 4.90% in Punjab and 04.83% of total population in Sindh were found ill including both minor and major types of diseases as categorized earlier. Thus, overall 95.13% fishermen were considered healthy in CIWC and the main reason behind could be healthy environmental condition in the neighborhood of Indus River. Here, it is also necessary to mention that among respondents nobody in Punjab and Sindh study area had direct and easy access to the basic health facilities.

5.1.5 Land and Cultivation Status

Although land is considered one of the important indicators of SES, it can be categorized as luxurious item especially for those societies struggling for their basic needs. However, residential land is one of the basic needs for human and can be considered as one of the essential entities to live.

The fishermen residing in Punjab study area originated from Sindh having casts as *Mohana, Malah, Kehal* and *Mirbar*. They left their original places and migrated upstream areas along the Indus River to overawe their economic needs and most of them were trapped in the contractual system of Punjab and became resident on the banks of Indus River and barrages since decades.

As discussed earlier that majority of the fishermen of Indus River belonged to Sindh based casts and at their places of origin in Sindh must had their own land for cultivation or little portion for house construction. This fact was also supported by data that more than half (59.10%) of total

population of fishermen in Sindh (Table 5.11) had their own land for residence and rest (39.20%) were residing on government allocated land or land provided by feudal. Same as Punjab (Table 5.10), no other type of land such as cultivated, barren or rental was owned by fishermen who were the residents of Sindh. Data also verified that no other types of cultivation of crops or vegetables were found in both the provinces among the dependent communities.

Table 5.12 shows the overall picture of CIWC that only 29.80% of the fishermen population had own piece of land for residence and rest of all people were dependent on the government, contractors or feudal owned land for their residence. Here it is worth mentioning that all the fishermen of both the provinces had owned residential land less than half acre.

Table 5.10

Land Status and Cultivation of Fisherfolks of the Punjab

LAND CATEGORIES

LAND STATUS	Residential Land		Cultivated Land		Barren Land		Rented Land	
	F	*%*	*f*	*%*	*f*	*%*	*f*	*%*
No Land	13	03.50	372	99.70	373	100.00	373	100.00
Personal land	42	11.30	00	00.00	00	00.00	00	00.00
Government Occupied/River Land	295	79.10	01	00.30	00	00.00	00	00.00
Government Allocated	23	06.20	00	00.00	00	00.00	00	00.00
Feudal/Contractor Land	00	00.00	00	00.00	00	00.00	00	00.00
Total	373	100.00	373	100.00	373	100.00	373	100.00

LAND AREA

LAND CATEGORIES	No Land		Less than 4 Kanals		5-8 Kanals		9-12 Kanals		Total *f(%)*
	F	*%*	*f*	*%*	*f*	*%*	*f*	*%*	
Residential Land	13	03.50	360	96.50	00	00.00	00	00.00	373(100.00)
Cultivated Land	372	99.70	01	00.30	00	00.00	00	00.00	373(100.00)
Barren Land	373	100.00	00	00.00	00	00.00	00	00.00	373(100.00)
Rented Land	373	100.00	00	00.00	00	00.00	00	00.00	373(100.00)
Farm land	373	100.00	00	00.00	00	00.00	00	00.00	373(100.00)

CULTIVATION

Cultivation of Vegetable	*F*	*%*
Yes	01	00.30
No	372	99.70
Total	373	100.00
Cultivation of Crops		
Yes	01	00.30
No	372	99.70
Total	373	100.00

Table 5.11

Land Status and Cultivation of Fisherfolks of Sindh

LAND STATUS	LAND CATEGORIES	Residential Land		Cultivated Land		Barren Land		Rented Land	
		F	*%*	*f*	*%*	*f*	*%*	*f*	*%*
No Land		04	01.70	235	100.00	235	100.00	235	100.00
Personal land		139	59.10	00	00.00	00	00.00	00	00.00
Government Occupied/River Land		36	15.30	00	00.00	00	00.00	00	00.00
Government Allocated		51	21.70	00	00.00	00	00.00	00	00.00
Feudal/Contractor Land		05	02.10	00	00.00	00	00.00	00	00.00
Total		235	100.00	235	100.00	235	100.00	235	100.00

LAND CATEGORIES	LAND AREA	No Land		Less than 4 Kanals		5-8 Kanals		9-12 Kanals		Total *f(%)*
		F	*%*	*f*	*%*	*f*	*%*	*f*	*%*	
Residential Land		05	02.10	229	97.40	00	00.00	00	00.00	235(100.00)
Cultivated Land		234	99.60	01	00.40	00	00.00	00	00.00	235(100.00)
Barren Land		235	100.00	00	00.00	00	00.00	00	00.00	235(100.00)
Rented Land		235	100.00	00	00.00	00	00.00	00	00.00	235(100.00)
Farm land		235	100.00	00	00.00	00	00.00	00	00.00	235(100.00)

Cultivation of Vegetable	CULTIVATION	*f*	*%*
Yes		02	00.90
No		233	99.10
Total		235	100.00
Cultivation of Crops			
Yes		01	00.40
No		234	99.60
Total		235	100.00

Table 5.12
Land Status and Cultivation of Fisherfolks of CIWC

LAND STATUS	LAND CATEGORIES	Residential Land		Cultivated Land		Barren Land		Rented Land	
		f	%	*f*	%	*f*	%	*f*	%
No Land		17	02.80	607	99.83	608	100.00	608	100.00
Personal land		181	29.80	00	00.00	00	00.00	00	00.00
Government Occupied/River Land		331	54.40	01	00.17	00	00.00	00	00.00
Government Allocated		74	12.20	00	00.00	00	00.00	00	00.00
Feudal/Contractor Land		05	00.80	00	00.00	00	00.00	00	00.00
Total		608	100.00	608	100.00	608	100.00	608	100.00

LAND CATEGORIES	LAND AREA	No Land		Less than 4 Kanals		5-8 Kanals		9-12 Kanals		Total *f(%)*
		f	%	*f*	%	*f*	%	*f*	%	
Residential Land		17	02.80	591	97.20	00	00.00	00	00.00	608(100.00)
Cultivated Land		607	99.83	00	00.00	00	00.00	00	00.00	608(100.00)
Barren Land		608	100.00	00	00.00	00	00.00	00	00.00	608(100.00)
Rented Land		608	100.00	00	00.00	00	00.00	00	00.00	608(100.00)
Farmland		608	100.00	00	00.00	00	00.00	00	00.00	608(100.00)

Cultivation of Vegetable	CULTIVATION	*f*	%
Yes		03	00.50
No		605	99.50
Total		608	100.00
Cultivation of Crops			
Yes		02	00.30
No		606	99.70
Total		608	100.00

5.1.6 House and Animal Coral Status

Housing is second basic human need after the fulfillment of biological needs. Housing also have a key role in the development of a community being an essential asset. The socio-economic status of a person can easily be determined through the status of housing. Urban societies mostly have the paved houses while villagers have paved, semi-paved and unpaved residences (Saddozai, Hussain, Shah, & Manan, 2013). Government of Pakstan, (2006) also describes the importance of housing by pointing out in the National Housing Policy of Government of Pakistan. Pakistan at present faces the shortage of housing for all categories in a society. The housing report of 2014-15 described that in Pakistan the facility of own houses is declining day by day. However, most of the population i.e., 90.00 percent in rural areas while 74 percent in urban areas had the facility of personal houses. Only10.00 percent of the total population was found living in rented houses. Survey report also mentioned that overall half of the population in Pakistan living in semi-paved house structures with Girder/T-Iron on the roof and most of them belongs to the rural areas. The second most common houses had roof built were that of RCC/RBC in Pakistan. Wood and bamboo were the third type of material which is being used for the construction of roof (Government of Pakstan, 2006).

Data in table 5.13 depict very astonishing results that in Punjab only 03 (00.80%) and in Sindh only 4 (01.70%) among all respondents had the paved houses which clearly shows the miserable economic condition of the respondents. It also shows that the fear of not owning the land on which house is built kept them away from the struggle to construct a paved house for their

families. Secondly, the contractors and feudal always tried to push them in such state of life that they were unable to make any progress in their social life, especially for their families. Struggle for two times meals was the primary goal which could not allow them to look forward for their better standard lifestyle. Semi-paved houses were occupied by almost 1/3rd in the Punjab while 1/4th in Sindh of the total fishermen population, respectively. On the other hand, unpaved house population in Punjab is 27.90% and 20.90 % in Sindh. Majority of the fishermen population in both the provinces, especially in Sindh (51.10%) belonged to temporary form of housing in the shape of Shed/Chappar. The Punjab fishermen community also used the boats as residence. They were the inhabitant of boats throughout their life span from birth till death. Their all social life as birth, marriage, observances and death took place in the boats. The major two reasons behind the boat residence were poverty and insecurity.

More than 90% respondents in both provinces had no animal corals. Approximately same number of families (90.60%) or households in both the provinces had no livestock. Those having livestock used the natural forests within and around the Indus River to meet fodder and forage demand. Same situation was observed in case of poultry as only 09.70% fishermen population of CIWC respondents reared the poultry for their livelihood.

Table 5.13

House and Animal Coral Status of the Fisherfolks of Study Area

House Status		*f*	%
Paved	PUNJAB	03	00.80
Sami-paved		115	30.80
Unpaved		104	27.90
Shed/Chappar		129	34.60
Tent		05	01.30
Boat based residence		17	04.60
Total		373	100.00
Animal Coral Status			
No Animal Coral		345	92.50
Paved		02	00.50
Sami-paved		01	00.30
Unpaved		03	00.80
Shed/Chappar		21	05.60
Tent		00	00.00
Any other		01	00.30
Total		373	100.00
Paved	SINDH	04	01.70
Sami-paved		61	26.00
Unpaved		49	20.90
Shed/Chappar		120	51.10
Tent		01	00.40
Boat based residence		00	00.00
Total		235	100.00
Animal Coral Status			
No Animal coral		215	91.50
Paved		00	00.00
Sami-paved		01	00.40
Unpaved		01	00.40
Shed/Chappar		18	07.70
Tent		00	00.00
Any other		00	00.00
Total		235	100.00
Paved	CIWC	7	01.15
Sami-paved		176	28.90
Unpaved		153	25.20
Shed/Chappar		249	40.90
Tent		06	00.98
Boat based residence		17	02.79
Total		608	100.00
Animal Coral Status			
No Animal coral		560	92.10
Paved		02	00.30
Sami-paved		02	00.30
Unpaved		04	00.70
Shed/Chappar		39	06.40
Tent		00	00.00
Any other		01	00.20
Total		608	100.00

5.1.7 Livestock, Poultry and Forage Status

Community livestock directly depends on the grazing but inadequate land, water scarcity, local disputes and shortage of technology forced the local people to restrain their livestock from free grazing. Livestock obviously has deep influence in socioeconomic well-being of rural communities worldwide, but it had low role in socio-economic status of the fishermen communities (Qureshi, 1993). The fishermen of Indus River (Table 5.14) were not allowed by the adjacent local communities to have livestock especially goats and sheep to avoid damages to their crops.

5.1.8 Household and Communal Facilities

Government of Pakistan, (2008) elucidates the approach of Pakistani people to the basic facilities of human life. According to the report, most of the population of the rural areas in Pakistan dies because they do not have access to the safe drinking water, toilets and sanitation system. Drinking water quality and sanitation are the basic indicators to measure health of any population. They also determine the socioeconomic conditions of the household as well as community. Poor quality of drinking water and inadequate sanitation conditions promote spread of many diseases for not only adults but also for children who become first victim in any case. It is the responsibility of the state to provide the basic human needs especially the safe drinking water and sanitation facilities which affects the health of society. Federal ministry of environment in its 2009 policy document highlighted the importance of safe drinking water nationwide through environmental education and awareness.

Table 5.14
Status of Livestock, Poultry, Fodder and Forage among Fisherfolks

Status of Livestock	PUNJAB *f*	PUNJAB %	SINDH *f*	SINDH %	CIWC *f*	CIWC %
Yes	39	10.50	17	07.20	56	09.20
No	334	89.50	218	92.80	522	90.80
Total	373	100.00	235	100.00	608	100.00
Source of Fodder and Forage						
No Livestock	334	89.50	218	92.80	551	90.60
Forest	27	07.20	16	06.80	43	07.10
Cultivation	02	00.50	00	00.00	02	00.30
Forest and Cultivation	01	00.30	00	00.00	01	00.20
Purchase	07	01.90	01	00.40	08	01.30
Any Other	03	00.80	00	00.00	03	00.50
Total	373	100.00	235	100.00	608	100.00
Status of Poultry						
Yes	53	14.20	06	02.60	59	09.70
No	320	85.80	229	97.40	549	90.30
Total	373	100.00	235	100.00	608	100.00

Table 5.15 provides the detail of basic amenities available to the fishermen communities of Indus River. Access to basic facilities of any society also determines the socio-economic status of that society. There are many indicators that force a society for the delivery of basic needs as inclusive of educational level, social unity and tie, serviceable leadership, true direction, distance from the center (metropolitan city) and cognizance of social and physical development. This table basically describes the status of different indicators which provide the fundamental platform for the social as well as infrastructural development of the target communities.

In an Islamic society and culture, the Masjid is well-thought-out obligation for five-time prayers and perceived as the worship and gathering place for Muslim society. Irrespective of their socioeconomic conditions wherever they live, a Masjid is constructed. Therefore, this deprived community of fishermen also preferred to construct the Masjid. In Punjab almost 80.00% of the respondents availed the facility of Masjid and rest 20.00% were those who lived in boats and are seasonal migrants while in Sindh this facility was more outstanding as almost all (98.30%) villagers had the access to Masjid. In other words, target population of Sindh paid more attention towards the practice of Islam as compared to fishermen population of Punjab.

Punjab portion (Table 5.15) portrays that majority (66.20%) of the respondents had no facility of electricity during the year of 2017. Same condition was observed in Sindh where only 31.90% population had the electricity connection and remaining 68.10% were deprived of this necessity of life. For domestic energy the local community did not have the capacity to buy LPG from the open market. In following tables, it was indicated that majority of the (86.60%)

respondents of CIWC used fuelwood to meet the household energy requirements. Extraction of fuelwood was thus a massive burden on the forests growing along the riverbanks of the study area. Data shows that only 9 households (02.40%) of the total population from both the provinces had LPG cylinders and all these families belonged to Punjab.

Television is no doubt considered a luxury item in such deprived society as only 14.80% in Punjab and 11.9% in Sindh were enjoying the facility of television. In the absence of electricity, it was not possible to watch programmes on television. But simultaneously a large population as 72.40% in Punjab, 59.60% in Sindh and 67.40% in CIWC) had the latest technology in the form of cell phones. This has many reasons as the prices of cell phones were very low and it did not need the regular electricity supply. These cell phones were commonly charged from the market during daily visits to shops. Some of the respondents also possessed the batteries which they charged once in a week and could these use for a week for cell phone charging. Now-a-days solar power banks also help them to charge their mobiles in remote areas.

Cell phone helped fishermen to make rapid communication with their fellows, contractors, families and rescuers in emergency. This forced them for high dependency on modern communication. Neighborhood of Indus River provided them simplified form of facility for drinking water. Population of the area obtained water through dugout wells, borings or directly from river. Whether this water was hygienic or not, it needed a standard chemical analysis.

The data also shows that total 530 (87.20%) households in the study area had direct approach to drinking water which is a blessing for the poor society. Different sources such as wells, borings, ditches etc. were used to tap nearby water table for irrigation purposes.

Results further show that majority (66.80% in Punjab and 73.60% in Sindh) of the respondents did not have the basic facility of toilet in their homes. Even public toilets were not being constructed by the community or NGOs working in the villages. Respondents used open areas in the fields for defecation.

Government of Pakistan, (2008) reports that 73.00% of the households in Pakistan had the facility of flush toilets in 2014-15. Inadequate knowledge and lack of awareness about hygiene may cause basic health problems specially for infants and children, as well. Both respondents (61.70%) in Punjab and Sindh did not have the facility of Boys and Girls schools of any level in their fishermen communities. This simply show that respondents remained illiterate and general literacy rate of the area is extremely low. This situation will push them to remain behind in the mainstream of development. Rapid transportation means are also a necessary part of the business of fish industry. Extreme weather conditions need proper cold storage before marketing fish at proper time and places. The data shows that in Punjab and Sindh majority of the respondents are deprived of such basic facility.

Table 5.15

Status of Communal and Domestic Facilities for Fisherfolks

Description		Status	*f*	%		Status	*f*	%		Status	*f*	%
Majid	PUNJAB	Yes	293	78.60	SINDH	Yes	231	98.30	CIWC	Yes	524	86.20
		No	80	21.40		No	04	01.70		No	84	13.80
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Electricity		Yes	126	33.80		Yes	75	31.90		Yes	201	33.10
		No	247	66.20		No	160	68.10		No	407	66.90
		Total	373	100.00		Total	235	100.00		Total	608	100.00
LPG		Yes	09	02.40		Yes	00	00.00		Yes	09	01.50
		No	364	97.60		No	235	100.00		No	599	98.50
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Television		Yes	62	16.60		Yes	28	11.90		Yes	90	14.80
		No	311	83.40		No	207	88.10		No	518	85.20
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Cell Phone		Yes	270	72.40		Yes	140	59.60		Yes	410	67.40
		No	103	27.60		No	95	40.40		No	198	32.60
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Drinking Water		Yes	303	81.20		Yes	227	96.60		Yes	530	87.20
		No	70	18.80		No	08	03.40		No	78	12.80
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Toilet		Yes	124	33.20		Yes	62	26.40		Yes	186	30.60
		No	249	66.80		No	173	73.60		No	422	69.40
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Boys' School		Yes	143	38.30		Yes	90	38.30		Yes	233	38.30
		No	230	61.70		No	145	61.70		No	375	61.70
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Girls' School		Yes	143	38.30		Yes	89	37.90		Yes	232	38.20
		No	230	61.70		No	146	62.10		No	376	61.80
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Paved Road		Yes	98	26.30		Yes	07	03.00		Yes	105	17.30
		No	275	73.70		No	228	97.00		No	503	82.70
		Total	373	100.00		Total	235	100.00		Total	608	100.00

5.1.9 Domestic Energy

Different types of fuels are used to meet the needs of domestic energy the world over, however, in rural society majority of the people use fuelwood for their domestic energy requirements. Riverbanks and Islands are excellent habitat for the development of natural woody vegetation and climax forest types. Reasons as difficult approach, insecure conditions, land mafias and protected areas under the government control keep these areas beyond the reach of local communities. Fishermen because of their daily access inside different parts of river generally use these natural forests for their daily fuelwood and fodder requirements. Data in table 5.16 show that 312 (83.60%) families in Punjab and 213 (91.00%) in Sindh directly used fuelwood obtained from these areas. However, very small portion (03.80% in CIWC) of the respondents also used dung for energy purposes. In addition, fishermen also caught floating wood and fulfilled their fuelwood needs. However, few households also purchased wood along other substitutes to meet domestic demand for fuel. The data collected from the Indus fishermen communities also depicts that average consumption of fuelwood per household per month in summer in Punjab and Sindh was 71240 and 30260 Kilograms, respectively. However, the expected increase in income obviously increases consumption of the target stakeholders per month that may rise to 99670 and 55907 Kilograms for Punjab and Sindh, respectively. Total population of the responding fishermen in the study area consumed about 250477 Kilograms annually.

One third population of the world is facing the problems of domestic energy due to difficulties faced in collection of the fuelwood. The researchers, economists and media did not pay

adequate attention to this important issue. In developing countries more than the 90% population directly or indirectly use natural vegetations for household energy needs. African and South Asian countries where wood is the main source of energy at household level, need concerted efforts for conservation of natural vegetation while finding out some cost-effective alternate sources of energy for the dependent communities. Obviously, shortage of fuelwood for the put pressure on the market prices for domestic fuel (firewood, LPG and Kerosene oil) which finally badly affects the socio-economic status of the dependent households. Globally prices of fuelwood have increased 300 times due to short supply and decrease in natural forests. Over exploitation and less emphasis on sustainable management of existing resources is direct threat to desired level of conservation. This problem can be resolved only if levels of environmental education and awareness are enhanced among dependent communities and commercial users. Promotion of energy efficient stoves can also reduce the burden of firewood as less quantity of wood can generate more energy (Board on Science and Technology, 1980).

Table 5.16
Domestic Energy Types and Sources (Fuel Wood) of Fisherfolks

Domestic Energy Types		*f*	%		*f*	%		*f*	%
Fuel Wood		312	83.60		213	91.00		526	86.60
Dung		02	00.50		22	09.00		23	03.80
Coal		00	00.00		00	00.00		00	00.00
Kerosene Oil		00	00.00		00	00.00		00	00.00
LPG		01	00.30		00	00.00		01	00.20
Electricity Heater		03	00.80		00	00.00		03	00.50
Fuel wood and dung		42	11.30		00	00.00		42	06.90
Fuel wood and LPG		13	03.50		00	00.00		13	02.10
Any Other		00	00.00		00	00.00		00	00.00
Total		373	100.00		235	100.00		608	100.00
Source of Fuel Wood									
No use of fuel wood	PUNJAB	02	00.50	SINDH	25	10.60	CIWC	27	04.40
Forest		99	26.50		16	06.80		115	18.90
Purchase		19	05.10		21	08.90		40	06.60
River Catch		07	01.90		06	02.60		13	02.10
All Mentioned Sources		66	17.70		17	07.20		83	13.70
Forest and river catch		131	35.10		129	54.90		260	42.80
Purchase and river catch		45	12.10		20	08.50		65	10.70
Any other		04	01.10		01	00.40		05	00.90
Total		373	100.00		235	100.00		608	100.00
Quantity Consumed Kg/M (Approx. & Average) Summer		71240			30660			101900	
Quantity Consumed Kg/M (Approx. & Average) Winter		92670			55907			148577	
Grand Total		163910			86567			250477	

5.1.10 Goods and Services

Goods and services generated by the natural resources are the core benefits which have direct effect on the socio-economic status of the dependent communities. Wetlands are the potential hub of benefits for the fishermen communities of Indus River in both the provinces of Punjab and Sindh. During the fish harvesting process, the local middlemen exploitation is on the peak to make a serious deprivation of these households.

The income, expenditure, savings and loans data show that fishermen communities in the study areas are helpless to get even a little benefit directly from wetlands. Data analysis of goods (Table 5.17) and services (Table 5.18) also support already deduced results of over exploitation of goods and services (whether tangible or intangible) by the middlemen and feudal. Floating wood is only single good that put positive effect on socioeconomic well-being of local communities as the fishermen caught floating wood 78.30% in Punjab and 66.00% in Sindh to meet their domestic needs. Total 9 households in CIWC benefitted from the aquatic flora directly but lack of information and simultaneous exploitation made them unable to use it. On the other hand, overall 15 families were having benefits from migratory birds in both the provinces and in case of fingerlings a very low percentage (04.60%) of households in both provinces were befitted. However, data for fish oil is little bit inspiring as 28% of population in CIWC was using fish oil to support their household economy.

Wetlands also generate intangible benefits to elevate the socioeconomic environments of dependent communities. Here, fisherfolks of Indus River were deprived from use of resource due to life-threatening law and order situation and misuse by the contractors and feudal to take nonmaterialistic benefits produced by the wetlands.

Tourism is considered as an emerging economy of Pakistan and current government is vigorously promoting tourism to uplift the national GDP and support the local communities. But in case of fishermen of Indus River only 08 households in both the provinces took benefit from the tourists of wetlands. In other words, only 02.60% of the total CIWC dependent communities were deriving benefits of wetlands tourism by provision of boating facility provided by the main activity. About 02.40% people in the Punjab and 05.50% in Sindh were taking socioeconomic benefits from tourists by providing boating facility. The main reason behind this low-income generating boating service was that the contractors/feudal do not permit fishermen to provide such facility to the tourists and others. However, in case of the guests or family members of the contractors or feudal, the fishermen are forced to provide this facility free of cost.

Fisherfolks based on their myths do not take any money while finding or transporting the dead bodies of people who die in the river because of accidents and or found floating from elsewhere. This free service is part of their culture transferred from ancestors. In Punjab 59.80% and in Sindh 84.30% respondents provided their services free of cost to find and transport the human dead bodies.

Provincial governments during floods often take facilities provided by the fishermen. Being highly expert for water-based services, government directly engage fishermen for flood rescue services on payments. In Punjab 61.70% and in Sindh 40.40% fishermen provided their services to the local governments during flood seasons.

As discussed earlier the fisherfolks are not allowed by the power elite to provide any service to others without their permission. Thus overall, 03.00% fishermen in CIWC study areas were able to provide their services for transportation of people, luggage and livestock. During the data collection not a single fisherman was found having government service in fisheries, wildlife or forest departments which remained directly attached with them while working in the Indus River. Whenever the vacancies are announced for local jobs, only relatives of local political elite get selected because of their political influence and nuisance value.

The genuine benefits from natural resources received by the fishermen community were the claim of having rich indigenous knowledge to convert the natural wood for domestic use or to sell it in the market after proper finishing and finished products. This cultural treasure not only necessary for the survival of local traditions, but also helpful to uplifts the household economy. It also plays a vital role for the sustainable development and conservation of natural resources (Warren, 1990).

Table 5.17
Use of Wetlands Based Goods among Fisherfolks

Description		Status	*f*	%		Status	*f*	%		Status	*f*	%
Floating Wood	PUNJAB	Yes	292	78.30	SINDH	Yes	155	66.00	CIWC	Yes	447	73.50
		No	81	21.70		No	80	34.00		No	161	26.50
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Aqua Flora		Yes	03	00.80		Yes	06	02.00		Yes	09	01.50
		No	370	99.20		No	229	98.00		No	599	98.50
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Aqua Fauna		Yes	00	00.00		Yes	00	00.00		Yes	00	00.00
		No	373	100.00		No	235	100.00		No	608	100.00
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Migratory Birds		Yes	14	03.80		Yes	01	00.40		Yes	15	02.50
		No	359	96.20		No	234	99.60		No	593	97.50
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Fingerling		Yes	24	06.40		Yes	04	01.70		Yes	28	04.60
		No	349	93.60		No	231	98.30		No	580	95.40
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Fish Oil		Yes	157	42.10		Yes	13	05.50		Yes	170	28.00
		No	216	57.90		No	222	94.50		No	438	72.00
		Total	373	100.00		Total	235	100.00		Total	608	100.00

Table 5.18
Use of Wetland Based Services of Fisherfolks

Description		Status	*f*	%		Status	*f*	%		Status	*f*	%
Tourism	PUNJAB	Yes	08	02.10	SINDH	Yes	08	03.40	CIWC	Yes	16	02.60
		No	365	97.90		No	227	96.60		No	592	97.40
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Boating		Yes	09	02.40		Yes	13	05.50		Yes	22	03.60
		No	364	97.60		No	222	94.50		No	586	96.40
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Dead Body Finding/Recovery		Yes	223	59.80		Yes	198	84.30		Yes	421	69.20
		No	150	40.20		No	37	15.70		No	187	30.80
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Flood Rescue Services		Yes	230	61.70		Yes	95	40.40		Yes	325	53.50
		No	143	38.30		No	140	59.60		No	283	46.50
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Transportation		Yes	05	01.30		Yes	13	05.50		Yes	18	03.00
		No	368	98.70		No	222	94.50		No	590	97.00
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Fisheries, Wildlife or Forest Department Jobs		Yes	00	00.00		Yes	00	00.00		Yes	00	00.00
		No	373	100.00		No	235	100.00		No	608	100.00
		Total	373	100.00		Total	235	100.00		Total	608	100.00

5.1.11 Secondary Goods (Made from Riverain forests) of Wetlands

Natural vegetation growing along the riverbanks is due to river flow and the products made from the herbs, shrubs, grasses and trees of the adjacent areas are regarded as indirect products of wetlands. Usually, dense tree growth is found in good quantity in the islands of river because they are out of human and livestock reach thus remain protected. High fertility of river mud provides excellent medium and habitat for vegetation growth.

The domestic products and agriculture implement made from riverain vegetation and their uses were recorded during survey. Data in Tables (5.19, 5.20, 5.21, 5.24, 5.25 and 5.26) clearly show and confirm that local fishermen in the Punjab and Sindh did not get any benefit in the shape of domestic products from Indus River based natural vegetation. The only reason behind this appears to be local departments dealing such chunks of government lands.

Tables (5.22, 5.23, 5.27 and 5.28) show data of these goods made of river vegetation and recorded by the researcher from District Chakwal of Punjab and Margalla Hills National Park (covering districts Islamabad, Haripur and Abbottabad of the Federal area and Khyber Pakhtunkhwa provinces of Pakistan), respectively. These tables give a clear picture that where there is no feudalism and contractual/permit systems, the same products are being made and used by the local communities in massive quantity. These products have direct effect on the socio-economic status of the household because they directly contribute to the total income of the household by marketing finished products by the dependent communities. This data was collected by same researcher previously for Master and MS dissertations (Akbar, 2007; Akbar, 2012).

Many studies describe the relationships between household economy and natural forests. Communities living along the periphery of forest land use the natural resources in different ways for their livelihood. In terms of food security, decrease in expenditure and increase in income are the direct benefits from the natural forests. Many rural people use a wide range of forest products by gathering raw material from forest and finishing at home to make useful products (Enters, 2000; Jenkins & Schaap, 2018; Food and Agriculture Organization of the United Nations, 2019).

Most of the Rural African communities use natural forests to boost their economy. The materialistic entities they take from the local forests are firewood, medicinal plants, NTFPs (non-timber forest products), wild fruits and vegetables, timber, hedges, medicinal plants, honey, domestic products and farm implements. The socio-economic status of African people is greatly influenced by these goods obtained from natural forests. But simultaneously the conservation of local forests is also needed to sustain long-term benefits (Karmann & Larbach, 1995).

Pakistan has a unique physiography, climate and culture. The distinct seasons and supportive climate provide ample opportunity to sustain natural forest types depending upon site. Local communities are gaining their benefits from these forests indigenously. Ayubia National Park is one of such examples for the efficient usage of locally grown plants. The natural forest area providing free source of fuelwood, grazing, fodder and non-timber forest products (NTFPs) for dependent communities who are highly satisfied from their life even living away from urbanized area with better facilities. They also take the local herbs for traditional mode of medication to treat various ailments of people and livestock. The main motive behind natural forest dwelling is

pleasure and healthy environment. Forest and Wildlife Departments of Khyber Pakhtunkhwa province promote sustainable resource use by encouraging the conservation of local species without disturbing local areas (Jabeen, 1999). Similar results were found during a research conducted in Margalla National Park. The researchers also developed a link between people and plants and found significant influence of plants on the socioeconomic and cultural aspects of life of the local communities (Shinwari & Khan, 1999). All the empirical evidences show that natural forests always help the communities to uplift their socio-economic status if there is no obstacle between the relationship of producers and users.

Table 5.19

Use of Domestic Products Made by River Based Natural Vegetation among Fisherfolks of The Punjab Province

Products	Status	*f*	%	Products	Status	*f*	%
Wooden Pen	Yes	03	00.80	Wooden ladder	Yes	00	00.00
	No	370	99.19		No	373	100.00
	Total	373	100.00		Total	373	100.00
Sticks	Yes	69	18.50	Wooden Mesher	Yes	00	00.00
	No	304	81.50		No	373	100.00
	Total	373	100.00		Total	373	100.00
Charpoy	Yes	6	01.60	Wooden Churner	Yes	00	00.00
	No	367	98.39		No	373	100.00
	Total	373	100.00		Total	373	100.00
Wooden Weaven stool	Yes	8	02.10	Wooden Churner's stand	Yes	00	00.00
	No	365	97.85		No	373	100.00
	Total	373	100.00		Total	373	100.00
Basket	Yes	35	09.40	Wooden Roof Drain	Yes	01	00.30
	No	338	90.61		No	372	99.73
	Total	373	100.00		Total	373	100.00
Broom	Yes	38	10.20	Table & Chair	Yes	01	00.30
	No	335	89.81		No	372	99.73
	Total	373	100.00		Total	373	100.00

Table 5.20

Use of Domestic Products Made by River Based Natural Vegetation among Fisherfolks of Sindh Province

Products	Status	*f*	%	Products	Status	*f*	%
Wooden Pen	Yes	16	06.80	Wooden Ladder	Yes	21	08.90
	No	219	93.20		No	214	91.10
	Total	235	100.00		Total	235	100.00
Sticks	Yes	75	31.90	Wooden Mesher	Yes	060	02.60
	No	160	68.10		No	229	97.40
	Total	235	100.00		Total	235	100.00
Charpoy	Yes	31	13.20	Wooden churner	Yes	05	02.10
	No	204	86.80		No	230	97.90
	Total	235	100.00		Total	235	100.00
Wooden Weaven Stool	Yes	22	09.40	Wooden Churner's Stand	Yes	05	02.10
	No	213	90.60		No	230	97.90
	Total	235	100.00		Total	235	100.00
Basket	Yes	26	11.10	Wooden Roof Drain	Yes	05	02.10
	No	209	88.90		No	230	97.90
	Total	235	100.00		Total	235	100.00
Broom	Yes	62	26.40	Table & Chair	Yes	03	01.30
	No	173	73.60		No	232	98.70
	Total	235	100.00		Total	235	100.00

Table 5.21

Use of Domestic Products Made by River Based Natural Vegetation among Fisherfolks of CIWC

Products	Status	*f*	*%*	Products	Status	*f*	*%*
Wooden Pen	Yes	19	03.10	Wooden Ladder	Yes	21	03.50
	No	589	96.87		No	587	96.00
	Total	608	100.00		Total	608	100.00
Sticks	Yes	144	23.70	Wooden Mesher	Yes	06	01.00
	No	464	76.31		No	602	99.01
	Total	608	100.00		Total	608	100.00
Charpoy	Yes	37	06.10	Wooden Churner	Yes	05	00.80
	No	571	93.91		No	603	99.17
	Total	608	100.00		Total	608	100.00
Wooden Weaven Stool	Yes	30	04.90	Wooden Churner's Stand	Yes	05	00.80
	No	578	95.06		No	603	99.17
	Total	608	100.00		Total	608	100.00
Basket	Yes	61	10.00	Wooden Roof Drain	Yes	06	01.00
	No	547	89.96		No	602	99.01
	Total	608	100.00		Total	608	100.00
Broom	Yes	100	16.40	Table & Chair	Yes	04	00.70
	No	508	83.55		No	604	99.34
	Total	608	100.00		Total	608	100.00

Table 5.22

Use of Domestic Products Made by Natural Vegetation Among Villagers of District Chakwal (Punjab) in 2007 (Akbar, 2007)

Products	Status	*f*	%	Products	Status	*f*	%
Wooden Pen	Yes	36	36.00	Wooden Ladder	Yes	57	57.00
	No	64	64.00		No	43	43.00
	Total	100	100.00		Total	100	100.00
Sticks	Yes	98	98.00	Wooden Mesher	Yes	54	54.00
	No	02	02.00		No	46	46.00
	Total	100	100.00		Total	100	100.00
Charpoy	Yes	85	85.00	Wooden Churner	Yes	81	81.00
	No	15	15.00		No	19	19.00
	Total	100	100.00		Total	100	100.00
Wooden Weaven Stool	Yes	85	85.00	Wooden Churner's Stand	Yes	79	79.00
	No	15	15.00		No	21	21.00
	Total	100	100.00		Total	100	100.00
Basket	Yes	22	22.00	Wooden Roof Drain	Yes	03	03.00
	No	78	78.00		No	97	97.00
	Total	100	100.00		Total	100	100.00
Broom	Yes	83	83.00	Table & Chair	Yes	03	03.00
	No	17	17.00		No	97	97.00
	Total	100	100.00		Total	100	100.00

Table 5.23

Use of Domestic Products Made by Natural Vegetation Among Villagers of Margalla Hills National Park (Federal, Punjab and Khyber Pakhtunkhwa Provinces) in 2011 (Akbar, 2012)

Products	Status	*f*	%	Products	Status	*f*	%
Wooden pen	No Use	63	17.8	Wooden Ladder	No Use	63	17.80
	Yes	188	53.10		Yes	81	22.90
	No	103	29.10		No	210	59.30
	Total	354	100.00		Total	354	100.00
Sticks	No Use	63	17.80	Wooden Mesher	No Use	63	17.80
	Yes	272	76.80		Yes	92	26.00
	No	19	05.40		No	199	56.20
	Total	354	100.00		Total	354	100.00
Charpoy	No Use	63	17.80	Wooden churner	No Use	63	17.80
	Yes	271	76.60		Yes	93	26.30
	No	20	05.60		No	198	55.90
	Total	354	100.00		Total	354	100.00
Wooden Weaven Stool	No Use	63	17.80	Wooden Churner's Stand	No Use	63	17.80
	Yes	255	72.00		Yes	69	19.50
	No	36	10.20		No	222	62.70
	Total	354	100.00		Total	354	100.00
Basket	No Use	63	17.80	Wooden Roof Drain	No Use	63	17.80
	Yes	226	63.80		Yes	102	28.80
	No	65	18.40		No	189	53.40
	Total	354	100.00		Total	354	100.00
Broom	No Use	63	17.80	Table & Chair	No Use	63	17.80
	Yes	264	74.60		Yes	174	49.20
	No	27	07.60		No	117	33.10
	Total	354	100.00		Total	354	100.00

Table 5.24

Use of Farm Implements Made by River Based Natural Vegetation among Fisherfolks of the Punjab Province

Farm Implements	Status	*f*	%	Farm Implements	Status	*f*	%
Wooden Handles	Yes	23	06.20	Wooden Plank	Yes	00	00.00
	No	350	93.83		No	373	100.00
	Total	373	100.00		Total	373	100.00
Wooden Pegs	Yes	26	07.00	Wooden Spade	Yes	00	00.00
	No	347	93.00		No	373	100.00
	Total	373	100.00		Total	373	100.00
Wooden Rake (2 & 3 prongs)	Yes	06	01.60	Wooden Blade (Leveler)	Yes	02	00.50
	No	367	98.39		No	371	99.46
	Total	373	100.00		Total	373	100.00
Wooden Rake	Yes	11	02.90	Hand hoe for Looping Tree Branches	Yes	00	00.00
	No	362	97.05		No	373	100.00
	Total	373	100.00		Total	373	100.00
Wooden Plough	Yes	02	00.50	Donkey Cart	Yes	02	00.50
	No	371	99.46		No	371	99.46
	Total	373	100.00		Total	373	100.00
Yoke	Yes	00	00.00	Wooden Coach Box	Yes	02	00.50
	No	373	100.00		No	371	99.46
	Total	373	100.00		Total	373	100.00

Table 5.25

Use of Farm Implements Made by River Based Natural Vegetation among Fisherfolks of Sindh Province

Farm Implements	Status	*f*	%	Farm Implements	Status	*f*	%
Wooden Handles	Yes	12	05.10	Wooden Plank	Yes	01	00.40
	No	223	94.90		No	234	99.60
	Total	235	100.00		Total	235	100.00
Wooden Pegs	Yes	14	06.00	Wooden Spade	Yes	00	00.00
	No	221	94.00		No	235	100.00
	Total	235	100.00		Total	235	100.00
Wooden Rake (2 & 3 Prongs)	Yes	07	30.00	Wooden Blade (Leveler)	Yes	05	02.10
	No	228	97.00		No	230	97.90
	Total	235	100.00		Total	235	100.00
Wooden Rake	Yes	09	03.80	Hand Hoe for Looping Tree Branches	Yes	02	00.90
	No	226	96.20		No	233	99.10
	Total	235	100.00		Total	235	100.00
Wooden Plough	Yes	00	00.00	Donkey Cart	Yes	02	00.90
	No	235	100.00		No	233	99.10
	Total	235	100.00		Total	235	100.00
Yoke	Yes	00	00.00	Wooden Coach Box	Yes	02	00.90
	No	235	100.00		No	233	99.10
	Total	235	100.00		Total	235	100.00

Table 5.26

Use of Farm Implements Made by River Based Natural Vegetation among Fisherfolks of CIWC

Farm Implements	Status	*f*	*%*	Farm Implements	Status	*f*	*%*
Wooden Handles	Yes	35	05.60	Wooden plank	Yes	01	00.20
	No	573	94.24		No	607	99.83
	Total	608	100.00		Total	608	100.00
Wooden Pegs	Yes	40	06.60	Wooden spade	Yes	00	00.00
	No	568	93.42		No	608	100.00
	Total	608	100.00		Total	608	100.00
Wooden rake (2 & 3 prongs)	Yes	13	02.13	Wooden blade (Leveler)	Yes	07	01.20
	No	595	97.46		No	601	98.84
	Total	608	100.00		Total	608	100.00
Wooden rake	Yes	20	03.30	Hand hoe for Looping Tree Branches	Yes	02	00.30
	No	588	96.71		No	606	99.67
	Total	608	100.00		Total	608	100.00
Wooden plough	Yes	02	00.30	Donkey cart	Yes	04	00.70
	No	606	99.67		No	604	99.34
	Total	608	100.00		Total	608	100.00
Yoke	Yes	00	00.00	Wooden coach box	Yes	04	00.70
	No	608	100.00		No	604	99.34
	Total	608	100.00		Total	608	100.00

Table 5.27

Use of Farm Implements Made by Natural Vegetation Among Villagers of District Chakwal (Punjab) in 2007 (Akbar, 2007)

Farm Implements	Status	*f*	%	Farm Implements	Status	*f*	%
Wooden Handles	Yes	94	94.00	Wooden Plank	Yes	59	59.00
	No	06	06.00		No	41	41.00
	Total	100	100.00		Total	100	100.00
Wooden Pegs	Yes	97	97.00	Wooden Spade	Yes	57	57.00
	No	03	03.00		No	43	43.00
	Total	100	100.00		Total	100	100.00
Wooden Rake (2 & 3 prongs)	Yes	86	86.00	Wooden blade (leveler)	Yes	43	43.00
	No	14	14.00		No	57	57.00
	Total	100	100.00		Total	100	100.00
Wooden Rake	Yes	86	86.00	Hand Hoe for Looping Tree Branches	Yes	44	44.00
	No	14	14.00		No	56	56.00
	Total	100	100.00		Total	100	100.00
Wooden Plough	Yes	61	61.00	Donkey Cart	Yes	02	02.00
	No	39	39.00		No	98	98.00
	Total	100	100.00		Total	100	100.00
Yoke	Yes	57	57.00	Wooden Coach Box	Yes	18	18.00
	No	43	43.00		No	82	82.00
	Total	100	100.00		Total	100	100.00

Table 5.28

Use of Farm Implements Made by Natural Vegetation Among Villagers of Margalla Hills National Park (Federal, Punjab and Khyber Pakhtunkhwa Provinces) in 2011 (Akbar, 2012)

Farm Implements	Status	*f*	%	Farm Implements	Status	*f*	%
Wooden Handles	No Use	63	17.80	Wooden Plank	No Use	63	17.80
	Yes	133	37.60		Yes	65	18.40
	No	158	44.60		No	226	63.80
	Total	354	100.00		Total	354	100.00
Wooden Pegs	No Use	63	17.80	Wooden Spade	No Use	63	17.80
	Yes	148	41.80		Yes	65	18.40
	No	143	40.40		No	226	63.80
	Total	354	100.00		Total	354	100.00
Wooden Rake (2 & 3 prongs)	No Use	63	17.80	Wooden Blade (Leveler)	No Use	63	17.80
	Yes	119	33.60		Yes	101	28.50
	No	172	48.60		No	190	53.70
	Total	354	100.00		Total	354	100.00
Wooden Rake	No Use	63	17.80	Hand Hoe for Looping Tree Branches	No Use	63	17.80
	Yes	127	35.90		Yes	78	22.00
	No	164	46.30		No	213	60.20
	Total	354	100.00		Total	354	100.00
Wooden Plough	No Use	63	17.80	Donkey Cart	No Use	63	17.80
	Yes	148	41.80		Yes	31	08.80
	No	143	40.40		No	260	73.40
	Total	354	100.00		Total	354	100.00
Yoke	No Use	63	17.80	Wooden Coach Box	No Use	63	17.80
	Yes	113	31.90		Yes	48	13.60
	No	178	50.30		No	243	68.60
	Total	354	100.00		Total	354	100.00

5.1.12 Hedges and Timber Usage

To examine the in-depth effect of Indus River on socio-economic status of dependent communities some data was recorded against the indirect goods produced by vegetal growth of Indus River. Most of the societies take direct benefits of natural forest produce to increase their income and decrease their expenditure and to uplift their socioeconomic condition. But respondents of this miserable community live under deprived condition because of contractors, feudal and robbers who to take away the indirect benefit from the river.

Table 5.29 explains that in Punjab the fishermen were under more stress as compared to Sindh. Only 04.30% of total population could use the natural forests because of security reasons to have hedges of brushwood as boundary wall. But in Sindh due to comparatively less influence of powerful people 39.60% of the total population derived benefits of natural shrubs to erect boundary wall. The overall analysis reveals that 82.20% could not use natural forest material for Hedges. Same condition was observed for timber as 92.20% and 99.60% respondents in the Punjab and Sindh, respectively did not use the natural wood along the river for their construction purposes.

The data analysis indicates that despite of all facilities there were intermediate forces which formed obstacles for poor fisherfolks not to take benefits in the form of goods available from river forests. Almost similar data was recorded (Punjab 95.60%, Sindh 99.60%) for the absence of timber for livestock sheds of dependent communities. Only 04.90% respondents in both provinces could use the river timber while majority purchased it from the market. Very small number of respondents (only 01.60%) in both provinces used timber during the last twelve months.

Table 5.29

Use of Hedges and Timber among Fisherfolks

Use of Hedges		*f*	%		*f*	%		*f*	%
Yes		16	04.30		93	39.60		109	17.90
No		357	95.70		142	60.40		499	82.10
Total		373	100.00		235	100.00		608	100.00
Purpose of Hedges									
No Use of Hedges		357	95.70		142	60.40		499	82.10
Household Protection		15	04.00		92	39.10		107	17.60
Crop Protection		00	00.00		01	00.40		01	00.20
Animal Corals Protection		00	00.00		00	00.00		00	00.00
Boundary Demarcation		01	00.30		00	00.00		01	00.20
All Above		00	00.00		00	00.00		00	00.00
Total		373	100.00		235	100.00		608	100.00
Types of Hedges									
No use of hedges		357	95.70		143	60.90		500	82.20
Protection Wires		00	00.00		00	00.00		00	00.00
Forest and Protection wires		00	00.00		00	00.00		00	00.00
Forest		15	04.00		92	39.10		107	17.60
Any other		01	00.30		00	00.00		01	00.20
Total		373	100.00		235	100.00		608	100.00
Use of Timber	PUNJAB			SINDH			CIWC		
Timber in House									
Yes		29	07.80		01	00.40		30	04.90
No		344	92.20		234	99.60		578	95.10
Total		373	100.00		235	100.00		608	100.00
Timber in Livestock Shed									
Yes		17	04.60		01	00.40		18	03.00
No		356	95.40		234	99.60		560	97.00
Total		373	100.00		235	100.00		608	100.00
Source of Timber									
No use of timber		335	89.80		235	100.00		570	93.80
Forest		21	05.60		00	00.00		21	03.50
Purchase		14	03.80		00	00.00		14	02.30
Forest and Purchase		02	00.50		00	00.00		02	00.30
Any Other		01	00.30		00	00.00		01	00.20
Total		373	100.00		235	100.00		608	100.00
Use of Timber During Last 12 Months									
Yes		10	02.70		00	00.00		10	01.60
No		363	97.40		235	100.00		598	98.40
Total		373	100.00		235	100.00		608	100.00

Total 71% population of the rural Sri Lanka directly depends on the fuelwood for domestic energy. They have the history of growing wood on farmland to meet different basic needs. The farm forestry is also the part of their economy as plantation in tea gardens and grasses for paper industry that contribute at domestic and national levels. The rural people there use live fences for the protection of home and animal corals. These natural hedges reduce the costs of domestic spending for iron wires to have strong fence. Farmland trees are generally grown to assure the purchase of shade and shelter (Mohns & Rajapakse, 1990).

5.1.13 Non-Timber Forest Products (NTFPs)

Traditional societies in Pakistan generally take benefits from the non-timber forest products (NTFP) in different ways. Medicinal Plants are widely used for the treatment of human and animals' diseases, Due to lack of local knowledge and restriction from powerful elite only 30.80% population in Punjab and not a single household in Sindh used herbs for treatment purposes. In CIWC not a single fisherman used medicinal plants for the medication of livestock. In case of using wild fruits and vegetables, only 7 families in CIWC could use food plants. However, 16.4% population used honey in Punjab and only 00.90% could freely harvest honey from natural forests of Indus River. Only 03.00% in CIWC areas purchased honey for domestic use (Table 5.30).

Shrubs are seen widely growing along the banks of the river and constitute major part of the natural forest's growth along and within Indus River. These shrubs have special economic value in terms of medicinal plants, firewood, hedges (security and boundary demarcation) and fodder

Table 5.30

Use of Non-Timber Forest Products among Fisherfolks

Use of Medicinal Plants	PUNJAB *f*	PUNJAB %	SINDH *f*	SINDH %	CIWC *f*	CIWC %
Yes	14	03.80	00	00.00	14	02.30
No	359	96.20	235	100.00	594	97.70
Total	373	100.00	235	100.00	608	100.00
Purpose of Medicinal Plants						
No use of medicinal plants	360	96.50	235	100.00	595	97.90
Own Medication	13	03.20	00	00.00	13	02.00
Livestock Medication	00	00.00	00	00.00	00	00.00
Own and Livestock Medication	01	00.30	00	00.00	01	00.20
Total	373	100.00	235	100.00	608	100.00
Source of Medicinal Plants						
No use of medicinal plants	359	96.20	235	100.00	594	97.70
Forest	09	02.40	00	00.00	09	01.50
Purchase	05	01.30	00	00.00	05	00.80
Forest and Purchase	00	00.00	00	00.00	00	00.00
Any Other	00	00.00	00	00.00	00	00.00
Total	373	100.00	235	100.00	608	100.00
Use of Wild Fruits and Vegetables						
Yes	01	00.30	06	02.60	07	01.20
No	372	99.70	229	97.40	601	98.80
Total	373	100.00	235	100.00	608	100.00
Source of Wild Fruits and Vegetables						
No use of wild fruit and vegetables	372	99.70	229	97.40	601	98.80
Forest	01	00.30	06	02.60	00	00.00
Purchase	00	00.00	00	00.00	07	01.20
Forest and Purchase	00	00.00	00	00.00	00	00.00
Any Other	00	00.00	00	00.00	00	00.00
Total	373	100.00	235	100.00	608	100.00
Use of Honey						
Yes	61	16.40	02	00.90	63	10.40
No	312	83.60	233	99.10	545	89.60
Total	373	100.00	235	100.00	608	100.00
Source of Honey						
No use of honey	312	83.60	233	99.10	544	89.60
Forest	40	10.70	02	00.90	42	06.90
Purchase	18	04.80	00	00.00	18	03.00
Forest and Purchase	03	00.80	00	00.00	03	00.50
Any Other	00	00.00	00	00.00	00	00.00
Total	373	100.00	235	100.00	608	100.00

and forage, but demand of traditional practices to have benefit an income from this natural resource. The local community due to lack of indigenous knowledge and restrictions imposed by contractors and feudal were unable to uplift their economic status through alternate sources (Amir, 1992).

5.1.14 Means of Fish Catching

Efficient use of modern technology in 21st century yields increased production in each field specially in industries. Fisheries sector also uses modern equipment in developed countries to promote business. However, in developed and developing countries the indigenous mode of fish catching is common. Pakistan being a developing country and Indus fishermen being most deprived segment of the society are using traditional nets and hooks to catch fish in this modern era. This results in less production and meagre contribution to the individual and national economy.

Table 5.31 represents the data collected from household heads of fisherfolks. Data analysis revealed that majority of the fishermen were using both nets and hooks (Punjab 61.90%, Sindh 70.20%) for fish catching. A total of 29.00% in the Punjab and 20.40% in Sindh used only nets for fish catching. Most deprived fishermen even could not afford to have or borrow net, therefore, used only hooks for fish catching. Small population of 04.30% in Punjab and 09.40% in Sindh only use hooks for fish catching. Illegal fishing is not prevalent due to check and balance by fisheries department in both the provinces. Current statistics show that at the time of survey not a single person was involved in illegal fishing practices such as use of electric shocks, poison and blasts. In CIWC only 3% population were also recorded using local cultural methods for fishing practices.

Table 5.31
Means for Fish Catching Found among Fisherfolks of Study Area

Means of Fish Catching		*f*	%
Net	PUNJAB	108	29.00
Hook		16	04.30
Electric Shock		00	00.00
Poison		00	00.00
Blast		00	00.00
Net and hook		231	61.90
Any Other		18	04.80
Total		373	100.00
Net	SINDH	48	20.40
Hook		22	09.40
Electric Shock		00	00.00
Poison		00	00.00
Blast		00	00.00
Net and hook		165	70.20
Any Other		00	00.00
Total		235	100.00
Net	CIWC	156	25.70
Hook		38	06.30
Electric Shock		00	00.00
Poison		00	00.00
Blast		00	00.00
Net and hook		396	65.10
Any Other		18	03.00
Total		608	100.00

5.1.15 Gears for Fishing

As discussed earlier that use of technology is need of the time to meet the demands of increasing population. The ever-changing market equilibrium can only be maintained with the help of modern equipment. The deprivation of fishermen of Indus can be seen from the data analysis that in Punjab 29.50% population did not have their boats to catch fish. Sindh had more severe condition in this regard as 77.87% of total fishermen community did not have boats. Furthermore, in Punjab majority 60.10% households' heads had one boat while only 09.10% population could not afford two boats for their livelihood. Sindh, as observed was falling behind from the Punjab (Table 5.32), as only 20.00% had one boat and very small portion 02.12% had two boats to manage their earnings. In Punjab most of these fishermen (68.36%) had ownership of boats, however, the condition of having maximum boats (40.75%) was considered normal. In Sindh 77.87% were deprived of boats and among balanced fishermen only 18.72% had the ownership of boats and other small portion 02.55% used rented boats for fishing practices.

Motorboat was considered an outstanding privilege by the fishmen communities because it boosted the travelling and transportation activities. However, in Punjab almost half of the fisherfolks (45.80%) were deprived of this facility. Almost same number of respondents (48.00%) had 01 motorboat to facilitate their livelihood. Total 32.97% fishermen claimed that the working ability of the motorboat was normal and almost all (53.88%) population was having motorboats with some financial help by the power regime. The situation regarding having motorboats in Sindh

was worse as compared to Punjab. Almost all fishermen (98.29%) did not have this basic facility for their livelihood.

Fish industry needs some basic storage facilities for the preservation of fresh fish because it decomposes more rapidly in hot weather. Indus River fishermen were almost deprived of equipment for storage of fish. In Punjab almost, all (99.20%) fishermen did not have ice boxes. Table 5.33 described the same situation in Sindh as 99.14% population was also lacking this necessity. Deficiency of storage facility caused serious decline in their income as middlemen did not accept the decomposed fish catch. As discussed earlier that means of fish catching had direct relation with the livelihood of fishermen. Proper and efficient techniques can increase the income of fishermen but due to low income they often depended on traditional ways.

Hooks are considered one of the very slow and low catching gears among fishermen. Total 66.29% population in Punjab had hooks in good quantity which they used with other catching gears. In Sindh 71.92% of fishermen had the hooks for fishing while in Punjab 09.70% population used hooks for fishing.

Most of the net holders claimed that this equipment was of normal quality and maximum (89.27%) had the ownership of nets. About 35.00% were those fishermen which possessed more than 30 nets. In Sindh 80.00% population had net facility with normal (45.10%) and bad (30.21%) working conditions. Maximum (74.89%) population were owning nets. In Punjab and Sindh almost all (99.50% and 99.14%, respectively) population had not a single life jacket.

Table 5.32

Gear for Fishing Practices Used by Fisherfolks of the Punjab Province

Gear	Status	*f*	%	Condition	*f*	%	Ownership	*f*	%
Boat	No Boat	110	29.50	No Boat	110	29.49	No Boat	110	29.49
	01	224	60.10	Good	38	10.18	Own	255	68.36
	02	34	09.10	Normal	152	40.75	Contractor/Feudal	02	00.53
	02 Plus	05	01.50	Bad	73	19.58	Rent	05	01.35
	Total	373	100.00	Total	373	100.00	Total	373	100.00
Boat Motor	No Boat Motor	171	45.80	No Boat Motor	171	45.84	No Boat Motor	171	45.84
	01	179	48.00	Good	46	12.33	Own	201	53.88
	02	21	05.60	Normal	123	32.97	Contractor/Feudal	01	00.26
	02 Plus	02	00.50	Bad	35	09.38	Rent	00	00.00
	Total	373	100.00	Total	373	100.00	Total	373	100.00
Ice Box	No Ice box	370	99.20	No Ice box	370	99.19	No Ice box	370	99.19
	01	02	00.50	Good	00	00.00	Own	03	00.80
	02	01	00.30	Normal	03	00.81	Contractor/Feudal	00	00.00
	02 Plus	00	00.00	Bad	00	00.00	Rent	00	00.00
	Total	373	100.00	Total	373	100.00	Total	373	100.00
Hooks	No Hooks	125	33.51	No Hooks	125	33.52	No Hooks	125	33.51
	1-250	134	35.92	Good	50	13.40	Own	248	66.48
	251-500	76	20.37	Normal	157	42.09	Contractor/Feudal	00	00.00
	500 Plus	38	10.18	Bad	41	10.99	Rent	00	00.00
	Total	373	100.00	Total	373	100.00	Total	373	100.00
Net	No Net	36	09.70	No Net	36	09.65	No Net	36	09.65
	01-15	129	37.40	Good	38	10.18	Own	333	89.27
	16-30	74	19.00	Normal	206	55.23	Contractor/Feudal	03	00.80
	30 Plus	134	35.00	Bad	92	24.66	Rent	01	00.26
	Total	373	100.00	Total	373	100.00	Total	373	100.00
Life Jacket	No Jacket	371	99.50	No Jacket	371	99.46	No Jacket	371	99.46
	01	02	00.50	Good	00	00.00	Own	02	00.54
	02	00	00.00	Normal	02	00.54	Contractor/Feudal	00	00.00
	02 Plus	00	00.00	Bad	00	00.00	Rent	00	00.00
	Total	373	100.00	Total	373	100.00	Total	373	100.00
Transportation Vehicle	No Vehicle	312	83.60	No Vehicle	312	83.64	No Vehicle	312	83.64
	01	60	16.10	Good	18	04.82	Own	59	15.80
	02	01	00.30	Normal	33	08.84	Contractor/Feudal	01	00.26
	02 Plus	00	00.00	Bad	10	02.68	Rent	00	00.00
	Total	373	100.00	Total	373	100.00	Total	373	100.00

Table 5.33

Gear for Fishing Practices Used by Fisherfolks of Sindh Province

Gear	Status	*f*	%	Condition	*f*	%	Ownership	*f*	%
Boat	No Boat	183	77.87	No Boat	183	77.87	No Boat	183	77.87
	01	47	20.00	Good	06	02.55	Own	44	18.72
	02	05	02.12	Normal	29	12.34	Contractor/Feudal	00	00.00
	02 Plus	00	00.00	Bad	11	04.68	Rent	06	02.55
	Total	235	100.00	Total	235	100.00	Total	235	100.00
Boat Motor	No Boat Motor	231	98.29	No Boat Motor	231	98.29	No Boat Motor	231	98.29
	01	04	01.70	Good	01	00.42	Own	04	01.70
	02	00	00.00	Normal	03	01.27	Contractor/Feudal	00	00.00
	02 Plus	00	00.00	Bad	00	00.00	Rent	00	00.00
	Total	235	100.00	Total	235	100.00	Total	235	100.00
Ice Box	No Ice box	233	99.14	No Ice box	233	99.14	No Ice box	233	99.14
	01	02	00.85	Good	00	00.00	Own	02	00.85
	02	00	00.00	Normal	02	00.85	Contractor/Feudal	00	00.00
	02 Plus	00	00.00	Bad	00	00.00	Rent	00	00.00
	Total	235	100.00	Total	235	100.00	Total	235	100.00
Hooks	No Hooks	66	28.08	No Hooks	66	28.08	No Hooks	66	28.08
	1-250	134	57.02	Good	21	08.93	Own	162	68.93
	251-500	20	08.51	Normal	87	37.02	Contractor/Feudal	00	00.00
	500 Plus	15	06.38	Bad	61	25.95	Rent	07	02.97
	Total	235	100.00	Total	235	100.00	Total	235	100.00
Net	No Net	47	20.00	No Net	47	20.00	No Net	47	20.00
	01-15	182	77.44	Good	11	04.68	Own	176	74.89
	16-30	03	01.27	Normal	106	45.10	Contractor/Feudal	00	00.00
	30 Plus	03	01.27	Bad	71	30.21	Rent	13	05.53
	Total	235	100.00	Total	235	100.00	Total	235	100.00
Life Jacket	No Jacket	233	99.14	No Jacket	233	99.14	No Jacket	233	99.14
	01	00	00.00	Good	00	00.00	Own	02	00.85
	02	01	00.42	Normal	02	00.85	Contractor/Feudal	00	00.00
	02 Plus	01	00.42	Bad	00	00.00	Rent	00	00.00
	Total	235	100.00	Total	235	100.00	Total	235	100.00
Transportation Vehicle	No Vehicle	209	88.93	No Vehicle	209	88.93	No Vehicle	209	88.93
	01	25	10.63	Good	01	00.42	Own	26	11.06
	02	01	00.42	Normal	18	07.65	Contractor/Feudal	00	00.00
	02 Plus	00	00.00	Bad	07	02.97	Rent	00	00.00
	Total	235	100.00	Total	235	100.00	Total	235	100.00

Table 5.34

Gear for Fishing Practices Used by Fisherfolks of CIWC

GEAR	Status	*f*	%	Condition	*f*	%	Ownership	*f*	%
Boat	No Boat	293	48.19	No Boat	293	48.19	No Boat	293	48.19
	01	271	44.57	Good	44	07.23	Own	299	49.17
	02	39	06.41	Normal	181	29.76	Contractor/Feudal	02	00.32
	02 Plus	25	04.11	Bad	84	13.81	Rent	11	01.80
	Total	608	100.00	Total	608	100.00	Total	608	100.00
Boat Motor	No Boat Motor	402	66.11	No Boat Motor	402	66.11	No Boat Motor	402	66.11
	01	183	30.09	Good	47	07.73	Own	205	33.71
	02	21	03.45	Normal	126	20.72	Contractor/Feudal	01	00.16
	02 Plus	02	00.32	Bad	35	05.75	Rent	00	00.00
	Total	608	100.00	Total	608	100.00	Total	608	100.00
Ice Box	No Ice box	603	99.17	No Ice box	603	99.17	No Ice box	603	99.17
	01	04	00.65	Good	00	00.00	Own	05	00.82
	02	01	00.16	Normal	05	00.82	Contractor/Feudal	00	00.00
	02 Plus	00	00.00	Bad	00	00.00	Rent	00	00.00
	Total	608	100.00	Total	608	100.00	Total	608	100.00
Hooks	No Hooks	191	31.41	No Hooks	191	31.41	No Hooks	191	31.41
	1-250	268	44.07	Good	71	11.67	Own	410	67.43
	251-500	96	15.78	Normal	244	40.13	Contractor/Feudal	00	00.00
	500 Plus	53	08.71	Bad	102	16.77	Rent	07	01.15
	Total	608	100.00	Total	608	100.00	Total	608	100.00
Net	No Net	83	13.65	No Net	83	13.65	No Net	83	13.65
	01-15	311	51.15	Good	49	08.05	Own	509	83.71
	16-30	77	12.66	Normal	312	51.31	Contractor/Feudal	03	00.49
	30 Plus	137	22.53	Bad	162	26.64	Rent	14	02.30
	Total	608	100.00	Total	608	100.00	Total	608	100.00
Life Jacket	No Jacket	604	99.34	No Jacket	604	99.34	No Jacket	604	99.34
	01	02	00.32	Good	00	00.00	Own	04	00.65
	02	01	00.16	Normal	04	00.65	Contractor/Feudal	00	00.00
	02 Plus	01	00.16	Bad	00	00.00	Rent	00	00.00
	Total	608	100.00	Total	608	100.00	Total	608	100.00
Transportation Vehicle	No Vehicle	521	85.69	No Vehicle	521	85.69	No Vehicle	521	85.69
	01	85	13.98	Good	19	03.12	Own	85	13.98
	02	02	00.32	Normal	51	08.38	Contractor/Feudal	02	00.32
	02 Plus	00	00.00	Bad	17	02.79	Rent	00	00.00
	Total	608	100.00	Total	608	100.00	Total	608	100.00

Table 5.34 depicts very low level of awareness among fishermen and the value of their lives in the eyes of contractor/feudal. Road transportation is also compulsory for fishing as it needs fast supply to the nearby market but in Punjab and Sindh majority (83.60% and 88.93%, respectively) fisherfolks were deprived of the road transportation, even the motorbikes facility.

5.1.16 Alternative Livelihood

Table 5.35 illustrates the data and information which were gathered during the survey to judge the alternative livelihoods other than fishing in the economic sector for local fishermen. Data revealed the fisherfolks could work only as unskilled labor (Punjab 27.88%, Sindh 80.42 %) and to some extent produced goods of cultural value products (Punjab 05.65%, Sindh 01.30%) to have alternative livelihood. Unskilled labor activities can easily be performed by Sindh fishermen because in Punjab they are more bonded than those in Sindh. The contractors do not allow the fishermen in Punjab for any other activity, however, in off season for fishing (during breeding season the Punjab Fisheries Department bans fishing for four months) they were temporarily allowed for the alternative source of income. Due to absence of skills they usually get unskilled labor jobs within the local area. However, having heavy fake loans they were not allowed to leave the area without the permission of contractor. Furthermore, in Punjab 65.41% and in Sindh 17.02% fishermen had no alterative mode of earning for their livelihood except self-employment activities. Data about the income from various alternative livelihood shows that rupees 1073.15 in Punjab and rupees 4038.30 in Sindh was the contribution made through unskilled

Table 5.35
Alternative Livelihood of Fisherfolks of Study Area

	Punjab		Sindh		CIWC	
Occupations	*f*	*%*	*f*	*%*	*f*	*%*
No Alternative Livelihood	244	65.41	40	17.02	284	46.71
Unskilled Labor	104	27.88	189	80.42	293	48.19
Skilled Labor	02	00.53	00	00.00	02	00.32
Cultural Products	21	05.65	03	01.30	24	03.94
Jobs	02	00.53	02	00.85	04	00.65
Business	00	00.00	01	00.42	01	00.20
Total	373	100.00	235	100.00	608	100.00

Categories Wise Average Income (Rupees) of the Fishermen Communities of Study Area

Categories	Average Income of the Punjab	Average Income of Sindh	Average Income of CIWC
Fishing	8812.15	10094.47	9308.21
Tourism	29.67	12.77	23.13
Cultivation	09.38	63.83	30.43
Livestock & Poultry	24.10	00.00	14.79
Service	00.00	442.55	171.05
Business	00.00	10.00	00.50
Skilled Labor	134.83	136.17	135.35
Unskilled Labor	1073.15	4038.30	2219.22
Lake Goods	00.89	00.00	00.55
Lake Services	30.29	01.70	19.24
Forest based Goods & Services	00.00	08.51	03.29
Non-Timber Forest Products	00.00	04.26	01.64
Cultural Products	122.75	61.70	99.15
Kitchen Gardening	00.00	00.00	00.00

labor in their monthly income. Obviously, it was more in Sindh because more family members were attached with this work due to comparative freedom to work in their lives. The maximum part of their earning was directly dependent on fishing however, a very little earning they also get from cultural products especially in the Punjab because this was an indoor activity.

5.2 Environment

Data (Table 5.36) was also collected about some parameters of environmental pollution faced globally by local population. Water of Indus River is facing lot of threats due to contamination throughout its length especially when it passes through Pakistan. Fisherfolks shared that cities and towns situated all along the banks of River Indus discharged their effluents in the river and in some associated wetlands in both the provinces of Punjab and Sindh. Total 82.00% of the respondents in Punjab recorded their observations of water pollution caused by local human populations. This is a very serious threat to the lives of both aquatic fauna and associated human population. Contrary to the observations made in Punjab only 14.00% respondents agreed with the sewerage pollution of Indus River in Sindh.

In case of industrial effluents, almost one third (37.00%) in Punjab and only (00.90%) in Sindh expressed their concerns against this hazard. Realizing the threats of the discharge of industrial effluents in the river, provincial governments of Punjab and Sindh have banned all such activities by the industries without prior to recycling.

A total of 9 household heads in Punjab and Sindh were using urea for fish growth in local wetlands which is also hazardous. It is worthwhile to mention that private fish farms and dam-

based fishing in Pakistan are mostly using the urea for the growth of fish. Urea causes very serious malfunctions in human body and against the norms of sustaining natural or man-made water reservoirs. Total 24.40% in Punjab and 03.80% in Sindh throw the solid waste in the river, however, rest of the population is aware of the hazards of this anti-environmental activity.

Fishermen showed their concerns in Punjab that almost half of the total tourists (47.70%) throw their waste in the Indus River. This is highly dangerous activity which also highlights the needs for public awareness through environmental education and media campaigns. In Sindh, only 07.20% tourists undertook such type of unhealthy activity. The data concerning throwing of animal dung was also high in percentage in Punjab as 29.20% of the total population threw animal waste in the river while in Sindh only 08.10% population threw animal dung in the wetlands. Fishermen shared their opinion in case of watching human or animal dead bodies in Indus River as 45.8% in Punjab and 20% in Sindh.

Alternate energy resources are one of the best options considered to reduce environmental pollutants globally and also decrease the household expenditure and reduce the burden on natural flora. NGOs also use to distribute different units of energy saving appliances; however, poor fishermen of the study area did not have access to these sources. The data collected in the study area revealed only 1 family in both the provinces that was using the facility of Biogas. Solar panels were also found but in very few as only 07.00% in Punjab and 08.10% in

Table 5.36

Environmental Contamination of Indus River and Alternative Energy Resources Among Fisherfolks of Study Area

Contamination Types		Status	*F*	%		Status	*f*	%		Status	*f*	%
Sewerage (City/Village)	PUNJAB	Yes	306	82.00	SINDH	Yes	33	14.00	CIWC	Yes	339	55.80
		No	67	18.00		No	202	86.00		No	269	44.20
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Industrial Excretion		Yes	138	37.00		Yes	2	00.90		Yes	140	23.00
		No	235	63.00		No	233	99.10		No	468	77.00
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Urea Used for Fish Growth		Yes	9	02.40		Yes	9	03.80		Yes	18	03.00
		No	364	97.60		No	226	96.20		No	590	97.00
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Community Garbage		Yes	91	24.40		Yes	9	03.80		Yes	100	16.40
		No	282	75.60		No	226	96.20		No	508	83.60
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Tourist Waste		Yes	178	47.70		Yes	17	07.20		Yes	195	32.00
		No	195	52.30		No	218	92.80		No	413	68.00
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Animal Dung		Yes	109	29.20		Yes	19	08.10		Yes	128	21.10
		No	264	70.80		No	216	91.90		No	480	78.90
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Human Animals Dead Bodies		Yes	171	45.80		Yes	47	20.00		Yes	218	35.90
		No	202	54.20		No	188	80.00		No	390	64.10
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Biogas		Yes	01	00.30		Yes	01	00.40		Yes	02	00.30
		No	372	99.70		No	234	99.60		No	606	99.70
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Solar Panel		Yes	26	07.00		Yes	19	08.10		Yes	45	07.40
		No	347	93.00		No	216	91.90		No	563	92.60
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Energy Efficient Mud Stoves		Yes	13	04.50		Yes	0	00.00		Yes	13	02.10
		No	360	95.50		No	235	100.00		No	595	97.90
		Total	373	100.00		Total	235	100.00		Total	608	100.00
Solar Geyser		Yes	43	11.50		Yes	0	00.00		Yes	43	07.07
		No	330	88.50		No	235	100.00		No	565	92.92
		Total	373	100.00		Total	235	100.00		Total	608	100.00

Sindh were having this facility in study areas. There was not a single energy efficient mud stove and Solar geyser found in Sindh, however, in contrary 13 and 43 households had both facilities respectively, in Punjab.

5.3 Summary (Chapter Five)

Chapter five elaborates the socio-economic status of the Punjab province, Sindh province and CIWC overall in terms of total income, expenditure, savings, remaining debt, education, health, land ownership, cultivation status, house and animal coral status, livestock status, communal facilities, domestic energy, wetlands based primary and secondary goods and services, hedges and timber, non-timber forest products, means of fish catching, gears for fishing, alternative livelihood and environment. Data show that fisherman communities of both provinces are deprived, underprivileged, and poverty-stricken due to power regimes which include contractors and feudal in both the provinces. The situation of Punjab province is more miserable as contractual system makes fisherfolks more vulnerable. The fishermen have no skills and opportunities to shift or partially engage in the alternative livelihood due to the said circumstances. They are also unable to take the true benefits from the river in terms of goods and services because of political circumstances and lack of indigenous knowledge. However, the environmental condition of CIWC is not at extreme risk due to less approach of sideways communities.

CHAPTER SIX
HYPOTHESES TESTING

Chapter six presents the Bi-Variate analyses for the testing of hypotheses. Keeping in view the objectives of the study, following three hypotheses were formulated to examine the influence of Indus River on socio-economic status of the dependent fishermen communities in CIWC.

(i). Goods: Floating wood, aquatic flora and fauna, migratory birds, fingerlings, fish oil

(ii). Services: Tourism, boating, dead body recovery, flood rescue services, river transportation and services of government and non-governmental organizations.

(iii). Indirect Goods: Fuelwood, timber, hedges, medicinal plants, honey and wild fruits and vegetables

(iv). Socio-economic status: Income, expenditure, savings, remaining debt, health, education, house status and residential land status

(v). Provincial Policies: Contractual system in Punjab and permit system for fishing in Sindh

(vi). Domestic and Communal Facilities: Electricity, LPG, television, mobile phone, masjid, drinking water, toilet, boys' school, girls' school, paved road, government allocated land and hospital

6.1 Hypothesis A

There is an association between goods and services obtained from wetlands and socio-economic status of the fishermen communities;
More goods and services obtained from wetlands better will be the socio-economic status of the fishermen communities.

H_o: There is no association between the goods obtained from wetlands and socio-economic status of the fishermen communities;
H_A: There is an association between the goods obtained from wetlands and socio-economic status of the fishermen communities;

To find out the relationship between wetlands-based goods and services and socio-economic status of the dependent communities the Chi-Square test was applied and to check the strength of association the Cramer V test was run. All the variables were categorical in nature further income, expenditure, savings and remaining debt had also been converted in categorical data based on the categories in uni-variated analyses. Tables 6.1 and 6.2 gives the detailed picture of association between goods (floating wood, aquatic flora and fauna, migratory birds, fingerlings, fish oil) obtained from CIWC and socio-economic status (income, expenditure, savings and remaining debt) of the dependent communities. There is a significant relationship between income and floating wood (0.042), expenditure and floating wood (0.042), savings and aquatic flora (0.001), remaining debt and fingerlings (0.000), income and fish oil (0.002) and expenditure and fish oil (0.000) and these goods strengthen the socio-economic status of the fisherfolks by increasing income and savings and decreasing expenditure and loan. In case of fish oil, the Cramer V value for income (0.165) and expenditure (0.202) are also showing more strength of dependency between the variables. There is no association found between rest of wetland-based goods and income, expenditure, savings and expenditure of the fishermen. Tables 6.3 and 6.4 depict the picture of association between services provided by wetlands (tourism, boating, dead body recovery, flood rescue services, river transportation and government and non-governmental organization services) and socio-economic status (income, expenditure, savings and remaining debt) of the dependent fishermen. Chi-Square and Cramer V tests were applied to check the dependency and its strength between services and socio-economic status. Tests' results show that

there were only three (income and dead body recovery (0.000), expenditure and dead body recover (0.000) and income and transportation

Table 6.1

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Goods

Socio-economic status & Wetland Based Goods	Status of Goods	Categories						Statistical Tests	
		<10000 *f (%)*	10001-15000 *f (%)*	150001-20000 *f (%)*	20001-25000 *f (%)*	>25000 *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Income & Floating Wood	Yes	227 (50.80)	154 (34.50)	42 (09.40)	12 (02.70)	12 (02.70)	447 (100.00)	9.927 (0.042)	0.128 (0.042)
	No	67 (41.60)	55 (34.20)	22 (13.70)	11 (06.80)	06 (03.70)	161 (100.00)		
Expenditure & Floating Wood	Yes	113 (25.30)	188 (42.10)	103 (23.00)	25 (05.60)	18 (04.00)	447 (100.00)	9.922 (0.042)	0.128 (0.042)
	No	33 (20.50)	58 (36.00)	42 (26.10)	13 (08.10)	15 (09.30)	161 (100.00)		
Savings & Floating Wood	Yes	414 (92.60)	01 (00.20)	00 (00.00)	05 (01.10)	27 (06.00)	447 (100.00)	0.382 (0.944)	0.025 (0.944)
	No	149 (92.50)	00 (00.00)	00 (00.00)	02 (01.20)	10 (06.20)	161 (100.00)		
Remaining Debt & Floating Wood	Yes	118 (26.40)	06 (03.70)	19 (04.30)	09 (02.00)	295 (66.00)	447 (100.00)	0.997 (0.910)	0.040 (0.910)
	No	49 (30.40)	02 (01.20)	06 (03.70)	03 (01.90)	101 (62.70)	161 (100.00)		
Income & Aqua Flora	Yes	03 (33.00)	03 (33.00)	03 (33.000	01 (11.10)	00 (00.00)	10 (100.00)	8.428 (0.393)	0.083 (0.393)
	No	291 (48.70	206 (34.40)	61 (10.20)	22 (03.70)	18 (03.00)	598 (100.00)		
Expenditure & Aqua Flora	Yes	00 (00.00)	04 (44.44)	04 (44.44)	02 (11.10)	00 (00.00)	10 (100.00)	6.173 (0.628)	0.071 (0.628)
	No	146 (24.40)	241 (40.30)	141 (23.60)	37 (06.20)	33 (05.50)	598 (100.00)		
Savings & Aqua Flora	Yes	06 (56.00)	00 (00.00)	00 (00.00)	00 (00.00)	04 (44.00)	10 (100.00)	23.630 (0.001)	0.139 (0.001)
	No	557 (93.10)	01 (00.20)	00 (00.00)	07 (01.20)	33 (05.50)	598 (100.00)		
Remaining Debt & Aqua Flora	Yes	06 (66.70)	00 (00.00)	00 (00.00)	01 (11.10)	03 (22.20)	10 (100.00)	12.570 (0.128)	0.102 (0.128)
	No	161 (26.90)	08 (10.30)	25 (04.20)	11 (01.80)	393 (65.70)	598 (100.00)		
Income & Aqua Fauna	Yes	01 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	01 (100.00)	1.070 (0.899)	0.042 (0.899)
	No	293 (48.30)	209 (34.40)	64 (10.50)	23 (03.80)	18 (03.00)	607 (100.00)		
Expenditure & Aqua Fauna	Yes	00 (00.00)	01 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	01 (100.00)	1.474 (0.831)	0.049 (0.831)
	No	146 (24.10)	245 (40.40)	145 (23.90)	38 (06.30)	33 (05.40)	607 (100.00)		
Savings & Aqua Fauna	Yes	01 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	01 (100.000)	0.080 (0.994)	0.011 (0.994)
	No	562 (92.60)	1 (00.02)	00 (00.00)	07 (01.20)	37 (06.10)	607 (100.00)		
Remaining Debt & Aqua Fauna	Yes	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	01 (100.00)	01 (100.00)	0.536 (0.970)	0.030 (0.970)
	No	167 (27.50)	08 (01.30)	25 (04.10)	12 (02.00)	395 (65.10)	607 (100.00)		

Table 6.2

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Goods

Socio-economic status & Wetland Based Goods	Status of Goods	Categories						Statistical Tests	
		<10000 *f (%)*	10001-15000 *f (%)*	150001-20000 *f (%)*	20001-25000 *f (%)*	>25000 *f (%)*	Total *f (%)*	Chi-Square Value (Sig)	Cramer V Value (Sig)
Income & Migratory Birds	Yes	07 (46.70)	07 (46.70)	02 (06.60)	00 (0.00)	00 (00.00)	16 (100.00)	3.008 (0.934)	0.050 (0.934)
	No	286 (48.30)	202 (34.10)	63 (10.60)	23 (03.90)	18 (03.00)	592 (100.00)		
Expenditure & Migratory Birds	Yes	03 (13.30)	7 (46.70)	05 (33.30)	01 (06.70)	00 (00.00)	16 (100.00)	3.778 (0.877)	0.056 (0.877)
	No	144 (24.30)	238 (40.20)	140 (23.60)	37 (06.30)	33 (05.60)	592 (100.00)		
Savings & Migratory Birds	Yes	14 (86.70)	01 (06.70)	00 (00.00)	00 (00.00)	01 (60.70)	16 (100.00)	3.778 (0.877)	0.056 (0.877)
	No	549 (92.70)	00 (00.00)	00 (00.00)	07 (01.20)	36 (06.10)	592 (100.00)		
Remaining Debt & Migratory Birds	Yes	03 (20.00)	01 (06.70)	01 (06.70)	01 (06.70)	10 (60.00)	16 (100.00)	6.214 (0.623)	0.071 (0.623)
	No	164 (27.70)	07 (10.20)	24 (40.10)	11 (01.90)	386 (65.20)	592 (100.00)		
Income & Fingerling	Yes	20 (64.30)	09 (32.10)	01 (36.20)	00 (00.00)	00 (00.00)	30 (100.00)	7.916 (0.792)	0.066 (0.792)
	No	275 (47.60)	199 (34.40)	63 (10.90)	23 (04.00)	18 (03.10)	578 (100.00)		
Expenditure & Fingerling	Yes	11 (32.10)	14 (50.00)	03 (10.70)	01 (03.60)	01 (03.10)	30 (100.00)	8.754 (0.724)	0.069 (0.724)
	No	137 (23.70)	231 (40.00)	141 (24.40)	37 (06.40)	32 (05.50)	578 (100.00)		
Savings & Fingerling	Yes	27 (89.30)	00 (00.00)	00 (00.00)	01 (03.60)	02 (07.10)	30 (100.00)	1.784 (0.994)	0.031 (0.994)
	No	536 (92.70)	01 (00.20)	00 (00.00)	06 (01.00)	35 (06.70)	578 (100.00)		
Remaining Debt & Fingerling	Yes	09 (28.60)	00 (00.00)	03 (10.70)	01 (03.60)	16 (57.10)	29 (100.00)	54.531 (00.00)	0.173 (0.00)
	No	159 (27.50)	08 (01.40)	22 (03.80)	10 (01.70)	379 (65.60)	578 (100.00)		
Income & Fish Oil	Yes	103 (60.60)	46 (27.10)	12 (07.10)	03 (01.80)	06 (03.50)	170 (100.00)	16.472 (0.002)	0.165 (0.002)
	No	191 (43.60)	163 (37.20)	52 (11.90)	20 (04.60)	12 (02.70)	438 (100.00)		
Expenditure & Fish Oil	Yes	54 (31.80)	81 (47.60)	26 (15.30)	06 (05.50)	03 (01.80)	170 (100.00)	24.787 (0.000)	0.202 (0.000)
	No	92 (21.00)	165 (37.70)	119 (27.20)	32 (07.03)	30 (06.08)	438 (100.00)		
Savings & Fish Oil	Yes	158 (92.90)	00 (00.00)	00 (00.00)	02 (01.20)	10 (05.90)	170 (100.00)	0.408 (0.938)	0.026 (0.938)
	No	405 (92.50)	01 (00.20)	00 (00.00)	05 (01.10)	27 (06.20)	438 (100.00)		
Remaining Debt & Fish Oil	Yes	50 (29.40)	00 (00.00)	09 (05.30)	03 (01.80)	108 (63.30)	170 (100.00)	4.377 (0.357)	0.085 (0.357)
	No	117 (26.70)	08 (01.80)	16 (03.70)	09 (02.10)	288 (65.80)	438 (100.00)		

Table 6.3

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Services

Socio-economic status & Wetland Based Services	Status of Goods	Categories						Statistical Tests	
		<10000 *f (%)*	10001-15000 *f (%)*	150001-20000 *f (%)*	20001-25000 *f (%)*	>25000 *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Income & Tourism	Yes	08 (50.00)	03 (18.80)	03 (18.80)	01 (06.30)	01 (06.80)	16 (100.00)	3.097 (0.542)	0.07 (0.542)
	No	286 (48.30)	206 (34.80)	61 (10.30)	22 (03.70)	17 (02.90)	592 (100.00)		
Expenditure & Tourism	Yes	03 (18.80)	09 (56.30)	01 (06.30)	01 (06.30)	02 (12.50)	16 (100.00)	4.850 (0.030)	0.089 (0.303)
	No	143 (24.20)	237 (40.00)	144(24.30)	37 (06.30)	31 (05.20)	592 (100.00)		
Savings & Tourism	Yes	14 (87.50)	00 (00.00)	00 (00.00)	01 (06.30)	01 (06.30)	16 (100.00)	3.784 (0.286)	0.079 (0.286)
	No	549 (92.70)	01 (00.20)	00 (00.00)	06 (01.00)	36 (06.10)	592 (100.00)		
Remaining Debt & Tourism	Yes	05 (31.30)	00 (00.00)	01 (06.30)	01 (06.30)	09 (56.30)	16 (100.00)	2.206 (0.698)	0.060 (0.698)
	No	162 (27.40)	08 (01.40)	24 (04.10)	11 (01.90)	387 (65.40)	592 (100.00)		
Income & Boating	Yes	10 (45.50)	07 (31.80)	02 (09.10)	02 (09.10)	01 (04.50)	22 (100.00)	2.022 (0.732)	0.058 (0.732)
	No	284 (48.50)	202 (34.50)	62 (10.60)	21 (03.60)	17 (02.90)	586 (100.00)		
Expenditure & Boating	Yes	05 (22.70)	09 (40.90)	05 (22.70)	01 (04.50)	02 (09.10)	22 (100.00)	0.699 (0.699)	0.034 (0.699)
	No	141 (24.10)	237 (40.40)	140 (23.90)	37 (06.30)	31 (05.30)	586 (100.00)		
Savings & Boating	Yes	19 (86.40)	00 (00.00)	00 (00.00)	01 (04.50)	02 (09.10)	22 (100.00)	2.756 (0.431)	0.067 (0.431)
	No	544 (92.80)	01 (00.20)	00 (00.00)	06 (01.00)	35 (06.00)	586 (100.00)		
Remaining Debt & Boating	Yes	07 (31.80)	00 (00.00)	00 (00.00)	00 (00.00)	15 (68.20)	22 (100.00)	1.879 (0.758)	0.056 (0.758)
	No	160 (27.30)	08 (01.40)	25 (04.30)	12 (02.00)	381 (65.00)	586 (100.00)		
Income & Dead Body Recovery	Yes	178 (42.30)	163 (38.70)	47 (11.20)	19 (04.50)	14 (03.30)	421 (100.00)	21.029 (0.000)	0.186 (0.000)
	No	116 (62.00)	46 (24.60)	17 (09.10)	04 (02.10)	04 (02.10)	187 (100.00)		
Expenditure & Dead Body Recovery	Yes	77 (18.30)	177 (42.00)	116 (27.60)	26 (06.20)	25 (05.90)	421 (100.00)	28.067 (0.000)	0.215 (0.000)
	No	69 (36.90)	69 (36.90)	29 (15.50)	12 (06.40)	08 (04.30)	187 (100.00)		
Savings & Dead Body Recovery	Yes	394 (93.60)	01 (00.20)	00 (00.00)	05 (01.20)	21 (05.00)	421 (100.00)	3.313 (0.346)	0.074 (0.346)
	No	169 (90.40)	00 (00.00)	00 (00.00)	02 (01.10)	16 (08.60)	187 (100.00)		
Remaining Debt & Dead Body Recovery	Yes	105 (24.90)	07 (01.70)	18 (04.30)	08 (01.90)	283 (67.20)	421 (100.00)	5.477 (0.242)	0.095 (0.242)
	No	62 (33.20)	01 (00.50)	07 (03.70)	04 (02.10)	113 (60.40)	187 (100.00)		

Table 6.4

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Services

Socio-economic status & Wetland Based Services	Status of Goods	Categories						Statistical Tests	
		<10000 *f (%)*	10001-15000 *f (%)*	150001-20000 *f (%)*	20001-25000 *f (%)*	>25000 *f (%)*	Total *f (%)*	Chi-Square Value (Sig)	Cramer V Value (Sig)
Income & Flood Rescue Services	Yes	159 (48.90)	104 (32.00)	37 (11.40)	14 (04.30)	11 (03.40)	325 (100.00)	2.613 (0.624)	0.066 (0.624)
	No	135 (47.70)	105 (37.10)	27 (09.50)	9 (03.20)	07 (02.50)	283 (100.00)		
Expenditure & Flood Rescue Services	Yes	76 (23.40)	131 (40.30)	82 (25.20)	20 (06.20)	16 (04.90)	325 (100.00)	1.016 (0.907)	0.041 (0.907)
	No	70 (24.70)	115 (40.60)	63 (22.30)	18 (06.40)	17 (06.00)	283 (100.00)		
Savings & Flood Rescue Services	Yes	299 (92.00)	01 (00.30)	00 (00.000	06 (01.80)	19 (05.80)	325 (100.00)	3.892 (0.237)	0.080 (0.273)
	No	264 (93.33)	00 (00.00)	00 (00.00)	01 (00.40)	18 (06.40)	283 (100.00)		
Remaining Debt & Flood Rescue Services	Yes	89 (27.40)	07 (02.20)	16 (04.90)	09 (02.80)	204 (62.80)	325 (100.00)	7.684 (0.104)	0.112 (0.104)
	No	78 (27.60)	01 (00.40)	09 (03.20)	03 (01.10)	192 (67.80)	283 (100.00)		
Income & River Transportation	Yes	06 (33.30)	06 (33.30)	01 (05.60)	03 (16.70)	02 (11.10)	18 (100.00)	13.608 (0.009)	0.150 (0.009)
	No	288 (48.80)	203 (34.40)	63 (10.70)	20 (03.40)	16 (02.70)	590 (100.00)		
Expenditure & River Transportation	Yes	03 (16.70)	06 (33.30)	05 (27.80)	01 (05.60)	03 (16.90)	18 (100.00)	5.101 (0.277)	0.092 (0.277)
	No	143 (24.20)	240 (40.70)	140 (23.70)	37 (06.30)	30 (05.10)	590 (100.00)		
Savings & River Transportation	Yes	17 (94.40)	00 (00.00)	00 (00.00)	01 (05.60)	00 (00.00)	18 (100.00)	4.291 (0.232)	0.084 (0.232)
	No	546 (92.50)	01 (00.20)	00 (00.00)	06 (01.00)	37 (06.30)	590 (100.00)		
Remaining Debt & River Transportation	Yes	03 (16.70)	00 (00.00)	00 (00.00)	00 (00.00)	15 (83.30)	18 (100.00)	3.104 (0.542)	0.071 (0.541)
	No	164 (27.80)	08 (01.40)	25 (04.20)	12 (02.00)	381 (64.60)	590 (100.00)		
Income & Govt & NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	608 (100.00)		
Expenditure & Govt & NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	608 (100.00)		
Savings & Govt & NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	608 (100.00)		
Remaining Debt & Govt & NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	00 (00.00)	608 (100.00)		

services across the river (0.009) significant associations has been found and rest of all (21) relationships were insignificant. Further four tests in table 6.4 could not be run due to 0 value for one variable in all mentioned categories.

Tables 6.5 and 6.6 show the dependency status among the indirect goods (fuelwood, timber, hedges, medicinal plants, honey and wild fruits and vegetables) provided by wetlands and socio-economic status (income, expenditure, savings and remaining debt) of the fisherfolks. Due to the categorical nature of both sides of the variables, the Chi-Square test was run to find out the association among indirect goods and socio-economic status of fishermen. Results revealed that there is a significant relationship between income and fuelwood (0.000) with Cramer V value (0.241) that indicates the strong dependency among both variables. Expenditure and fuelwood relationship have also been found highly significant (0.000) that shows that fuelwood is very beneficial for the fisherfolks for increasing income sand decreasing expenditure. Timber obtained from the wetlands-based forests is also helping the fisherfolks in terms of increasing savings (0.007) and decreasing loan (0.007) and Cramer V values (0.141) for both also shows the strong relationship between variables. Hedges from natural vegetation also have the positive effect on socio-economic status of the fishermen as they increase income and decreasing expenditure and loan. Further, medicinal plants and honey also help the fishermen by decreasing the expenditure for medication. Wild fruits and vegetables were also having weak but positive relationship for the uplift of the socio-economic status of the fishermen.

Table 6.5

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Indirect Goods

Socio-economic status & Wetland Based Indirect Goods**	Status of Goods	Categories						Statistical Tests	
		<10000 *f (%)*	10001-15000 *f (%)*	150001-20000 *f (%)*	20001-25000 *f (%)*	>25000 *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Income & Fuel Wood[1]	Yes	288 (49.60)	202 (34.80)	58 (10.00)	20 (03.40)	13 (02.20)	581 (100.00)	35.361 (0.000)	0.241 (0.000)
	No	06 (22.20)	07 (25.90)	06 (22.20)	03 (11.10)	05 (18.50)	27 (100.00)		
Expenditure & Fuel Wood	Yes	144 (24.80)	240 (41.30)	138 (23.80)	30 (05.20)	29 (05.00)	581 (100.00)	34.917 (0.000)	0.240 (0.000)
	No	02 (07.40)	06 (22.40)	07 (25.90)	08 (29.60)	04 (14.80)	27 (100.00)		
Savings & Fuel Wood	Yes	537 (92.40)	01 (00.20)	00 (00.00)	07 (01.20)	36 (06.20)	581 (100.00)	0.677 (0.879)	0.033 (0.879)
	No	26 (96.30)	00 (00.00)	00 (00.00)	00 (00.00)	01 (03.70)	27 (100.00)		
Remaining Debt & Fuel Wood	Yes	157 (27.00)	08 (01.40)	23 (04.00)	11 (01.90)	382 (65.70)	581 (100.00)	3.254 (0.516)	0.073 (0.516)
	No	10 (37.00)	00 (00.00)	02 (07.40)	01 (03.70)	14 (51.90)	27 (100.00)		
Income & Timber[2]	Yes	16 (69.60)	06 (26.10)	00 (00.00)	01 (04.30)	00 (00.00)	23 (100.00)	5.946 (0.203)	0.099 (0.203)
	No	278 (47.50)	203 (34.70)	64 (10.90)	22 (03.80)	18 (03.10)	585 (100.00)		
Expenditure & Timber	Yes	11 (47.80)	10 (43.50)	02 (08.70)	00 (00.00)	00 (00.00)	23 (100.00)	10.792 (0.029)	0.133 (0.029)
	No	20 (87.00)	00 (00.00)	00 (00.00)	02 (08.70)	01 (04.30)	23 (100.00)		
Savings & Timber	Yes	20 (87.00)	00 (00.00)	00 (00.00)	02 (08.70)	01 (04.30)	23 (100.00)	12.058 (0.007)	0.141 (0.007)
	No	543 (92.80)	01 (00.02)	00 (00.00)	05 (00.90)	36 (06.20)	585 (100.00)		
Remaining Debt & Timber	Yes	05 (21.70)	02 (08.70)	02 (08.70)	00 (00.00)	14 (60.90)	23 (100.00)	12.058 (0.007)	0.141 (0.007)
	No	162 (27.70)	06 (01.00)	23 (03.90)	12 (02.10)	382 (65.30)	585 (100.00)		
Income & Hedges	Yes	33 (30.30)	45 (41.30)	18 (16.50)	08 (07.30)	05 (04.60)	109 (100.00)	11.940 (0.018)	0.140 (0.018)
	No	261 (52.30)	164 (32.90)	46 (09.20)	15 (03.00)	13 (02.60)	499 (100.00)		
Expenditure & Hedges	Yes	13 (11.90)	40 (36.70)	34 (31.20)	11 (10.10)	11 (10.10)	109 (100.00)	20.007 (0.000)	0.181 (0.000)
	No	133 (26.70)	206 (41.30)	111 (22.20)	27 (05.40)	22 (04.40)	499 (100.00)		
Savings & Hedges	Yes	98 (88.90)	00 (00.00)	00 (00.00)	01 (00.90)	10 (09.20)	109 (100.00)	2.467 (0.481)	0.064 (0.481)
	No	465 (93.20)	01 (00.20)	00 (00.00)	06 (01.20)	27 (05.40)	499 (100.00)		
Remaining Debt & Hedges	Yes	18 (16.50)	00 (00.00)	03 (02.80)	02 (01.00)	86 (78.90)	109 (100.00)	12.024 (0.017)	0.141 (0.017)
	No	149 (29.90)	08 (01.60)	22 (04.40)	10 (02.00)	310 (62.10)	499 (100.00)		

Table 6.6

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Indirect Goods

Socio-economic status & Wetland Based Indirect Goods	Status of Goods	Categories						Statistical Tests	
		<10000 *f (%)*	10001-15000 *f (%)*	150001-20000 *f (%)*	20001-25000 *f (%)*	>25000 *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Income & Medicinal Plants	Yes	08 (88.90)	01 (11.10)	00 (00.00)	00 (00.00)	00 (00.00)	09 (100.00)	6.120 (0.190)	0.100 (0.190)
	No	286 (47.70)	208 (34.70)	64 (10.71)	23 (03.80)	18 (03.00)	599 (100.00)		
Expenditure & Medicinal Plants	Yes	07 (77.80)	02 (22.20)	00 (00.00)	00 (00.00)	00 (00.00)	09 (100.00)	14.993 (0.005)	0.157 (0.005)
	No	139 (23.20)	244 (40.70)	145 (24.20)	38 (06.30)	33 (05.50)	599 (100.00)		
Savings & Medicinal Plants	Yes	07 (77.80)	00 (00.00)	00 (00.00)	01 (11.10)	01 (11.10)	09 (100.00)	8.482 (0.037)	0.118 (0.037)
	No	556(92.80)	01 (00.20)	00 (00.00)	06 (01.00)	36 (06.00)	599 (100.00)		
Remaining Debt & Medicinal Plants	Yes	03 (33.30)	00 (00.00)	00 (00.00)	00 (00.00)	06 (66.70)	09 (100.00)	0.794 (0.939)	0.036 (0.939)
	No	164 (27.40)	08 (01.30)	25 (04.20)	12 (02.00)	390 (65.10)	599 (100.00)		
Income & Honey	Yes	29 (64.40)	12 (26.70)	04 (08.90)	00 (00.00)	00 (00.00)	45 (100.00)	6.842 (0.144)	0.106 (0.144)
	No	265 (47.10)	197 (35.00)	60 (10.70)	23(04.10)	18 (03.20)	563 (100.00)		
Expenditure & Honey	Yes	16 (35.60)	21 (46.70)	08 (17.80)	00 (00.00)	00 (00.00)	45 (100.00)	9.585 (0.048)	0.126 (0.048)
	No	130 (23.10)	225 (40.00)	137 (24.30)	38 (06.70)	33 (05.90)	563 (100.00)		
Savings & Honey	Yes	40 (88.90)	01 (02.20)	00 (00.00)	01 (02.20)	03 (06.70)	45 (100.00)	13.094 (0.004)	0.147 (0.004)
	No	523 (92.90)	00 (00.60)	00 (00.00)	06 (01.10)	34 (06.00)	563 (100.00)		
Remaining Debt & Honey	Yes	11 (24.40)	03 (06.70)	03 (06.70)	01 (02.20)	27 (60.00)	45 (100.00)	11.720 (0.020)	0.139 (0.020)
	No	156 (27.70)	05 (00.90)	22 (03.90)	11 (02.00)	369 (65.50)	563 (100.00)		
Income & Wild Fruits and Vegetables	Yes	00 (00.00)	02 (28.69)	04 (57.10)	01 (14.30)	00 (00.00)	07 (100.00)	20.388 (0.000)	0.183 (0.000)
	No	294 (48.90)	207 (34.40)	60 (10.00)	22 (03.70)	18 (03.00)	601 (100.00)		
Expenditure & Wild Fruits and Vegetables	Yes	00 (00.00)	04 (57.10)	03 (42.90)	00 (00.00)	00 (00.00)	07 (100.00)	4.087 (0.394)	0.082 (0.394)
	No	146 (24.30)	242 (40.30)	142 (23.60)	38 (06.30)	33 (05.50)	601 (100.00)		
Savings & Wild Fruits and Vegetables	Yes	04 (57.10)	00 (00.00)	00 (00.00)	00 (00.00)	03 (42.90)	07 (100.00)	16.789 (0.001)	0.166 (0.001)
	No	559 (93.00)	01 (00.20)	00 (00.00)	07 (01.20)	34 (05.70)	601 (100.00)		
Remaining Debt & Wild Fruits and Vegetables	Yes	04 (57.10)	00 (00.00)	00 (00.00)	01 (14.30)	02 (28.60)	07 (100.00)	9.547 (0.049)	0.125 (0.049)
	No	163 (27.10)	08 (01.30)	25 (04.20)	11 (01.80)	394 (65.60)	601 (100.00)		

Table 6.7 reflects the relationship between health (as socioeconomic indicator) and wetlands-based goods and services. Data show that only tourism (0.011) and river transportation (0.026) had significant association with health while rest of all the goods and services showed no relationship with socio-economic status in the form of health. Table 6.8 depicts that the education has been associated with the goods and services of the Indus River and found that only aquatic flora (0.000) and flood rescue services had dependency with education while other all goods and services were found independent. Table 6.9 demonstrate the dependency between house status (paved/unpaved) as socioeconomic indicator and CIWC goods and services. Here, only a single significant (0.0001) relationship was found between the house status and migratory birds also the Cramer V value (0.140) is showing the good relation between variables while other variables are insignificant. Table 6.10 takes a picture of dependency between the residential land ownership as socioeconomic indicator while goods and services provided by wetlands of Punjab and Sindh provinces of Pakistan. Data show that floating wood (0.009), fingerlings (0.023), fish oil (0.000) and flood rescue services (0.000) had positive association with residential land status as socioeconomic indicator. Last two variables also had strong dependency indicated by Cramer V value. Table 6.11 and 6.12 depicts the relationship between socio-economic status and indirect goods obtained from the river-based forests. Data show that only 03 associations were positive amongst the 24 tests. Compiling all the results in above mentioned tables (6.1-6.12) total 144 Chi-Square and Cramer V tests were run among which only 33 were found with having dependency while rest of all 111 tests were found insignificant. This clarifies that only 22.91% of total goods and services had strengthened the socio-economic status of Indus River fishermen.

Table 6.7

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses (Health) in CIWC and Wetlands' Goods

Socio-economic status & Wetland Based Goods	Status of Goods & Services	Categories			Statistical Tests	
		Healthy *f (%)*	Diseased *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Health & Floating Wood	Yes	400 (89.50)	47 (10.50)	447 (100.00)	1.167 (0.280)	0.044 (0.280)
	No	139 (86.30)	22 (13.70)	161 (100.00)		
Health & Aqua Flora	Yes	07 (77.80)	22 (13.70)	160 (100.00)	1.068 (0.301)	0.042 (0.301)
	No	531 (88.80)	67 (11.20)	598 (100.00)		
Health & Aqua Fauna	Yes	01 (100.0)	00 (00.00)	01 (100.00)	Statistical Tests Not performed	
	No	538 (88.60)	69 (11.40)	607 (100.00)		
Health & Migratory Birds	Yes	13 (86.70)	02 (13.30)	15 (100.00)	0.059 (0.808)	0.010 (0.808)
	No	525 (88.70)	67 (11.30)	592 (100.00)		
Health & Fingerling	Yes	23 (82.10)	05 (17.90)	28 9100.00)	1.218 (0.270)	0.045 (0.270)
	No	514 (88.90)	64 (11.10)	578 (100.00)		
Health & Fish Oil	Yes	157 (92.40)	13 (07.60)	170 (100.00)	3.214 (0.073)	0.073 (0.073)
	No	382 (87.20)	56 (12.80)	438 (100.00)		
Health & Tourism	Yes	11 (68.80)	05 (31.30)	16 (100.00)	6.469 (0.011)	0.103 (0.011)
	No	528 (89.20)	64 (10.80)	592 (100.00)		
Health & Boating	Yes	17 (77.30)	05 (22.70)	22 (100.00)	2.937 (0.087)	0.070 (0.087)
	No	522 (89.10)	64 (10.90)	586 (100.00)		
Health & Dead Body Recovery	Yes	370 (87.90)	51 (12.10)	421 (100.00)	0.797 (0.372)	0.036 (0.372)
	No	169 (90.40)	18 (09.60)	187 (100.00)		
Health & Flood Rescue Services	Yes	282 (86.80)	43 (13.20)	325 (100.00)	2.458 (0.117)	0.064 (0.117)
	No	257 (90.80)	26 (09.20)	283 (100.00)		
Health & River Transportation	Yes	13 (72.20)	05 (27.80)	18 (100.00)	4.976 (0.026)	0.090 (0.026)
	No	526 (89.20)	64 (10.80)	590 (100.00)		
Health & Government and NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	608 (100.00)		

Table 6.8

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses (Education) in CIWC and Wetlands' Goods

Socio-economic status & Wetland Based Goods	Status of Goods & Services	Categories			Statistical Tests	
		Educated *f (%)*	Uneducated *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Education & Floating Wood	Yes	42 (09.40)	405 (90.60)	447 (100.00)	0.424 (0.515)	0.026 (0.515)
	No	18 (11.20)	143 (88.80)	160 (100.00)		
Education & Aqua Flora	Yes	05 (55.60)	04 (44.40)	09 (100.00)	21.392 (0.000)	0.188 (0.000)
	No	55 (09.20)	543 (90.80)	598 (100.00)		
Education & Aqua Fauna	Yes	01 (100.0)	00 (00.00)	01 (100.00)	Statistical Tests Not performed	
	No	60 (09.90)	547 (90.10)	607 (100.00)		
Education & Migratory Birds	Yes	00 (00.00)	15 (100.0)	15 (100.0)	1.687 (0.194)	0.053 (0.194)
	No	60 (10.10)	532 (89.90)	592 (100.0)		
Education & Fingerling	Yes	03 (10.70)	25 (89.30)	28 (100.00)	0.032 (0.858)	0.007 (0.858)
	No	56 (09.70)	522 (90.30)	578 (100.00)		
Education & Fish Oil	Yes	16 (09.40)	154 (90.60)	170 (100.00)	0.055 (0.814)	0.010 (0.814)
	No	44 (10.00)	394 (90.00)	438 (100.00)		
Education & Tourism	Yes	00 (00.00)	16 (100.0)	16 (100.00)	1.799 (0.180)	0.054 (0.180)
	No	60 (10.10)	532 (89.90)	592 (100.00)		
Education & Boating	Yes	04 (18.20)	18 (81.80)	22 (100.00)	1.774 (0.183)	0.054 (0.183)
	No	56 (09.60)	530 (90.40)	586 (100.00)		
Education & Dead Body Recovery	Yes	41 (09.70)	380 (90.30)	421 (100.00)	0.026 (0.872)	0.007 (0.872)
	No	19 (10.20)	168 (89.80)	187 (100.00)		
Education & Flood Rescue Services	Yes	42 (12.90)	283 (87.10)	325 (100.00)	7.325 (0.007)	0.110 (0.007)
	No	18 (06.40)	265 (93.60)	283 (100.00)		
Education & River Transportation	Yes	02 (11.10)	16 (88.90)	18 (100.00)	0.032 (0.858)	0.007 (0.858)
	No	58 (09.80)	532 (90.20)	590 (100.00)		
Education & Government and NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	608 (100.00)		

Table 6.9

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses (House Status) in CIWC and Wetlands' Goods

Socio-economic status & Wetland Based Goods	Status of Goods & Services	Categories			Statistical Tests	
		Paved *f (%)*	Unpaved *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
House Status & Floating Wood	Yes	03 (00.90)	444 (99.30)	447 (100.00)	1.089 (0.297)	0.042 (0.297)
	No	00 (00.00)	161 (100.00)	161 (100.00)		
House Status & Aqua Flora	Yes	00 (00.00)	09 (100.00)	09 (100.00)	0.045 (0.831)	0.009 (0.831)
	No	03 (00.50)	595 (99.50)	598 (100.00)		
House Status & Aqua Fauna	Yes	01 (100.0)	00 (00.00)	01 (100.00)	Statistical Tests Not performed	
	No	60 (09.90)	547 (90.10)	607 (100.00)		
House Status & Migratory Birds	Yes	01 (06.70)	14 (93.30)	15 (100.00)	11.915 (0.001)	0.140 (0.001)
	No	02 (00.30)	590 (99.70)	592 (100.00)		
House Status & Fingerling	Yes	00 (00.00)	28 (100.00)	28 (100.00)	0.146 (0.702)	0.016 (0.702)
	No	03 (00.50)	575 (99.50)	578 (100.00)		
House Status & Fish Oil	Yes	01 (00.60)	169 (99.40)	170 (100.00)	0.43 (0.835)	0.008 (0.835)
	No	02 (00.50)	436 (99.50)	438 (100.00)		
House Status & Tourism	Yes	00 (00.00)	16 (100.00)	16 (100.00)	0.081 (0.775)	0.012 (0.775)
	No	03 (00.50)	589 (99.50)	592 (100.00)		
House Status & Boating	Yes	00 (00.00)	22 (100.0)	22 (100.00)	0.113 (0.737)	0.014 (0.737)
	No	03 (00.50)	583 (99.50)	586 (100.00)		
House Status & Dead Body Recovery	Yes	02 (00.50)	419 (99.50)	421 (100.00)	0.009 (0.923)	0.004 (0.923)
	No	01 (00.50)	186 (99.50)	187 (100.00)		
House Status & Flood Rescue Services	Yes	03 (00.90)	322 (99.10)	325 (100.00)	2.625 (0.105)	0.066 (0.105)
	No	00 (00.00)	283 (100.00)	283 (100.00)		
House Status & River Transportation	Yes	00 (00.00)	18 (100.00)	18 (100.00)	0.092 (0.762)	0.012 (0.762)
	No	03 (00.50)	587 (99.50)	590 (100.00)		
House Status & Government and NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	608 (100.00)		

Table 6.10

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses (Residential Land Status) in CIWC and Wetlands' Goods

Socio-economic status & Wetland Based Goods	Status of Goods & Services	Categories			Statistical Tests	
		Own Land *f (%)*	Disown Land *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Residential Land Ownership & Floating Wood	Yes	120 (26.80)	327 (73.20)	447 (100.00)	6.904 (0.009)	0.107 (0.009)
	No	61 (37.90)	100 (62.10)	161 (100.00)		
Residential Land Ownership & Aqua Flora	Yes	01 (11.10)	08 (88.90)	09 (100.00)	1.528 (0.216)	0.050 (0.216)
	No	180 (30.10)	418 (69.90)	598 (100.00)		
Residential Land Ownership & Aqua Fauna	Yes	01 (100.00)	00 (00.00)	01 (100.00)	Statistical Tests Not performed	
	No	60 (09.90)	547 (90.10)	607 (100.00)		
Residential Land Ownership & Migratory Birds	Yes	02 (06.70)	14 (93.30)	16 (100.00)	3.939 (0.047)	0.081 (0.047)
	No	180 (30.40)	412 (69.60)	592 (100.00)		
Residential Land Ownership & Fingerling	Yes	03 (10.70)	25 (89.30)	28 (100.00)	5.141 (0.023)	0.092 (0.023)
	No	178 (30.80)	400 (69.20)	578 (100.00)		
Residential Land Ownership & Fish Oil	Yes	17 (10.00)	153 (90.00)	170 (100.00)	44.114 (0.000)	0.269 (0.000)
	No	164 (37.40)	274 (62.60)	438 (100.00)		
Residential Land Ownership & Tourism	Yes	02 (12.50)	14 (87.50)	16 (100.00)	2.344 (0.126)	0.062 (0.126)
	No	179 (30.20)	413 (69.80)	592 (100.00)		
Residential Land Ownership & Boating	Yes	02 (09.10)	20 (90.20)	22 (100.00)	4.669 (0.031)	0.088 (0.031)
	No	179 (30.50)	407 (69.50)	586 (100.00)		
Residential Land Ownership & Dead Body Recovery	Yes	131 (31.10)	290 (68.90)	421 (100.00)	1.187 (0.276)	0.044 (0.276)
	No	50 (26.70)	137 (73.30)	187 (100.00)		
Residential Land Ownership & Flood Rescue Services	Yes	57 (17.50)	268 (82.50)	325 (100.00)	49.963 (0.000)	0.287 (0.000)
	No	124 (43.80)	159 (56.20)	283 (100.00)		
Residential Land Ownership & River Transportation	Yes	05 (27.80)	13 (72.20)	18 (100.00)	0.035 (0.851)	0.008 (0.851)
	No	176 (29.80)	414 (70.20)	590 (100.00)		
Residential Land Ownership & Government and NGOs Jobs	Yes	00 (00.00)	00 (00.00)	00 (00.00)	Statistical Tests Not performed	
	No	608 (100.00)	00 (00.00)	608 (100.00)		

Table 6.11

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Indirect Goods

Socio-economic status & Wetland Based Goods	Status of Goods & Services	Categories			Statistical Tests	
		Positive Socio-economic Status *f (%)*	Negative Socio-economic Status *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Health & Fuel Wood	Yes	516 (88.80)	65 (11.20)	581 (100.00)	0.337 (0.561)	0.024 (0.561)
	No	23 (85.20)	04 (14.80)	27 (100.00)		
Education & Fuel Wood	Yes	55 (09.50)	526 (90.50)	581 (100.00)	2.377 (0.123)	0.063 (0.123)
	No	05 (18.50)	22 (81.50)	27 (100.00)		
House status & Fuel Wood	Yes	03 (00.50)	578 (99.50)	581 (100.00)	0.146 (0.708)	0.015 (0.708)
	No	00 (00.00)	27 (100.00)	27 (100.00)		
Residential Land Ownership & Fuel Wood	Yes	181 (31.20)	400 (68.80)	581 (100.00)	11.977 (0.001)	0.140 (0.001)
	No	00 (00.00)	27 (100.00)	27 (100.00)		
Health & Timber	Yes	22 (95.70)	01 (04.30)	23 (100.00)	1.165 (0.281)	0.044 (0.281)
	No	517 (88.40)	68 (11.60)	585 (100.00)		
Education & Timber	Yes	04 (17.40)	19 (82.60)	23 (100.00)	1.521 (0.217)	0.050 (0.217)
	No	56 (09.60)	529 (90.40)	585 (100.00)		
House status & Timber	Yes	00 (00.00)	23 (100.0)	23 (100.00)	0.119 (0.731)	0.014 (0.731)
	No	03 (00.50)	582 (99.50)	585 (100.00)		
Residential Land Ownership & Timber	Yes	01 (04.30)	22 (95.70)	23 (100.00)	7.389 (0.009)	0.110 (0.009)
	No	180 (30.80)	405 (69.20)	585 (100.00)		
Health & Hedges	Yes	100 (91.70)	9 (08.30)	109 (100.00)	1.262 (0.261)	0.046 (0.261)
	No	439 (88.00)	60 (12.00)	499 (100.00)		
Education & Hedges	Yes	12 (11.00)	97 (89.00)	109 (100.00)	0.194 (0.659)	0.018 (0.659)
	No	48 (09.60)	451 (90.40)	499 (100.00)		
House status & Hedges	Yes	00 (00.00)	109 (100.00)	109 (100.00)	0.659 (0.417)	0.033 (0.417)
	No	03 (00.60)	496 (99.40)	499 (100.00)		
Residential Land Ownership & Hedges	Yes	76 (69.70)	33 (30.30)	109 (100.00)	101.408 (0.000)	0.408 (0.000)
	No	105 (21.00)	394 (79.00)	499 (100.00)		

Table 6.12

Cross Percentages and Test Statistics (Chi-Square Test and Cramer V) between Categorical Variables of Socio-economic statuses in CIWC and Wetlands' Indirect Goods

Socio-economic status & Wetland Based Goods	Status of Goods & Services	Categories			Statistical Tests	
		Positive Socio-economic Status *f (%)*	Negative Socio-economic Status *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Health & Medicinal Plants	Yes	09 (100.00)	00 (00.00)	09 (100.00)	1.169 (0.280)	0.044 (0.280)
	No	530 (88.50)	69 (11.50)	599 (100.00)		
Education & Medicinal Plants	Yes	02 (22.20)	07 (77.80)	09 (100.00)	1.567 (0.211)	0.051 (0.211)
	No	58 (09.70)	541 (90.30)	599 (100.00)		
House status & Medicinal Plants	Yes	00 (00.00)	09 (100.0)	09 (100.00)	0.045 (0.831)	0.009 (0.831)
	No	03 (00.50)	596 (99.50)	599 (100.00)		
Residential Land Ownership & Medicinal Plants	Yes	01 (11.10)	08 (88.90)	09 (100.00)	1.521 (0.217)	0.050 (0.217)
	No	180 (30.10)	419 (69.90)	599 (100.00)		
Health & Honey	Yes	37 (82.20)	08 (17.80)	45 (100.00)	1.997 (0.158)	0.057 (0.158)
	No	502 (89.20)	61 (10.80)	563 (100.00)		
Education & Honey	Yes	08 (17.80)	37 (82.20)	45 (100.00)	3.418 (0.064)	0.075 (0.064)
	No	52 (09.20)	511 (90.80)	563 (100.00)		
House status & Honey	Yes	00 (00.00)	45 (100.0)	45 (100.00)	0.241 (0.624)	0.020 (0.624)
	No	03 (00.50)	560 (99.50)	563 (100.00)		
Residential Land Ownership & Honey	Yes	03 (06.70)	42 (93.30)	45 (100.00)	12.406 (0.000)	0.143 (0.000)
	No	178 (31.60)	385 (68.40)	563 (100.00)		
Health & Wild Fruits and Vegetables	Yes	06 (85.70)	01 (14.30)	07 (100.00)	0.061 (0.805)	0.010 (0.805)
	No	533 (88.70)	68 (11.30)	601 (100.00)		
Education & Wild Fruits and Vegetables	Yes	05 (71.40)	02 (28.60)	07 (100.00)	30.172 (0.000)	0.223 (0.000)
	No	55 (09.20)	546 (90.80)	601 (100.00)		
House status & Wild Fruits and Vegetables	Yes	00 (00.00)	07 (100.0)	07 (100.00)	0.035 (0.851)	0.008 (0.851)
	No	03 (00.50)	598 (99.50)	601 (100.00)		
Residential Land Ownership & Wild Fruits and Vegetables	Yes	00 (00.00)	07 (100.0)	07 (100.00)	3.002 (0.083)	0.070 (0.083)
	No	181 (30.10)	420 (69.90)	601 (100.00)		

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while 77.09% goods and services had no significance on the socio-economic status of the dependent fisherfolks. In this scenario the Null Hypothesis (H_o) has been accepted and Alternative Hypothesis has been rejected which means that there is no association between the socio-economic status of the fisherfolks and goods and services provided by CIWC. The main reason behind this phenomenon had already been discussed that there were contractors (politicians) in the Punjab and feudalism in Sindh that had deprived the dependent communities to take the true benefits from the goods and services from Indus wetlands and secondly fishing as a primary occupation that kept them busy. The fishermen of CIWC had lack of indigenous knowledge about natural resources that how to get the benefits from natural flora and fauna.

6.2 Hypothesis B

There is an association between the provincial policy (Contractual and permit systems) and socio-economic statuses of fishermen communities of CIWC.
Permit system in Sindh results in higher socio-economic status and contractual system results lower socio-economic statuses of dependent fisherfolks.

H_o: There is no association between the provincial policy (contractual and permit systems) and socio-economic statuses of fishermen communities of CIWC.
H_A: There is an association between the provincial policy (contractual and permit systems) and socio-economic statuses of fishermen communities of CIWC.

H_o: There is no association between the socio-economic statuses of the Punjab and Sindh due to policy difference;
H_A: There is an association between the socio-economic statuses of the Punjab and Sindh due to policy difference;

H_o: There is no association between the availability of domestic and communal facilities of the Punjab and Sindh due to policy difference;
H_A: H_o: There is an association between the availability of domestic and communal facilities of the Punjab and Sindh due to policy difference;

To examine the effect of provincial policies, contractual system in Punjab and permit system in Sindh the Hypothesis B was formulated. The Chi-Square, Cramer V and Mann Whitney U tests were applied to examine the association between socio-economic status and provincial policies of the fisherfolks. Data in Table 6.13 show that provincial policies had high association with income (0.000), expenditure (0.000) and remaining debt (0.132) of fishermen. The Cramer V values of income (0.435) and expenditure (0.434) showed very strong strength of association between variables. Table 6.17 shows that in Punjab the fisherfolks had comparatively low income and less expenditure as compared to the Sindh based fishermen. The contractual system in Punjab suppressed the fisherfolks and caused low-income status, however, in Sindh due to freedom from contractor the fisherfolks incurred more expenditure to mitigate the fishing practices. In Punjab the contractor imposes the fake heavy loans on the fishermen which resulted more loans in Punjab. However, the policy had no effect on the savings in both provinces. The categorical data of income, expenditure, savings and remaining debt was used for the Chi-Square and Cramer V tests to fulfill the assumptions of the tests, however, to validate the results the Mann Whitney U test was also used for the same socioeconomic variables and categories for policy which is requirement of the test. The results showed very strong association between income (0.000), expenditure (0.000) and remaining debt (0.001) and provincial policies while savings in this case also remain insignificant. Only the residential land status remains highly significant (0.000) with high value of Cramer V (0.510) because the fishermen originally belonged to Sindh and majority of the respondents had own land for houses while in Punjab only 11.30% fishermen owned land for residence. The remaining variables of socio-economic status health, education and house status were

Table 6.13

Cross Percentages and Test Statistics (Chi-Square Test, Cramer V Test and Mann Whitney U Test) between Categorical Variables & Continuous Variables of Socio-economic status and Provincial Policies

Socio-economic status & Policies		Contract and Permit System <10000 *f (%)*	10001-15000 *f (%)*	150001-20000 *f (%)*	20001-25000 *f (%)*	>25000 *f (%)*	Total *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Income	Contract Policy	241 (64.60)	102 (27.30)	19 (05.10)	5 (01.30)	6 (01.60)	373 (100.00)	114.842 (0.000)	0.435 (0.000)
	Permit Policy	53 (22.60)	107 (45.50)	45 (19.10)	18 (07.90)	12 (05.10)	235 (100.00)		
Expenditure	Contract Policy	133 (35.70)	157 (42.10)	67 (18.00)	08 (02.10)	08 (02.10)	373 (100.00)	114.323 (0.000)	0.434 (0.000)
	Permit Policy	13 (05.50)	89 (37.90)	78 (33.20)	30 (12.80)	25 (10.60)	235 (100.00)		
Savings	Contract Policy	348 (93.30)	01 (00.30)	00 (00.00)	06 (01.60)	18 (04.80)	373 (100.00)	4.950 (0.175)	0.090 (0.175)
	Permit Policy	215 (91.50)	00 (00.00)	00 (00.00)	01 (00.40)	19 (08.10)	235 (100.00)		
Remaining Debt	Contract Policy	117 (31.40)	6 (01.60)	18 (04.80)	07 (01.90)	225 (60.30)	373 (100.00)	10.643 (0.031)	0.132 (0.031)
	Permit Policy	50 (21.30)	02 (00.90)	07 (03.00)	05 (02.10)	171 (72.80)	235 (100.00)		

Continuous Variables	Mann Witney U Test; Value (Significance)
Income	21099.500 (0.000)
Expenditure	20942.500 (0.000)
Savings	43665.000 (0.756)
Remaining Debt	36865.000 (0.001)

Socio-economic status & Policies	Description	Contract Policy *f (%)*	Permit Policy *f (%)*	Chi-Square Value (Sig*)	Cramer V Value (Sig*)
Health	Healthy	335 (89.80)	204 (86.80)	1.293 (0.256)	0.046 (0.256)
	Diseased	38 (10.20)	31 (13.20)		
	Total	373 (100.00)	235 (100.00)		
Education	Educated	37 (09.90)	23 (09.80)	0.003 (0.958)	0.002 (0.958)
	Uneducated	336 (90.10)	212 (90.20)		
	Total	373 (100.00)	235 (100.00)		
House Status	Paved	03 (00.80)	00 (00.00)	1.899 (0.168)	0.056 (0.168)
	Unpaved	370 (99.20)	235 (100.0)		
	Total	373 (100.00)	235 (100.00)		
Residential Land Ownership	Own Land	42 (11.30)	139 (59.10)	158.141 (0.000)	0.510 (0.000)
	Disown Land	331 (88.70)	96 (40.90)		
	Total	373 (100.00)	235 (100.00)		

Table 6.14

Cross Percentages and Test Statistics (Chi-Square Test) between Categorical Variables of Socio-economic statuses in Sindh and the Punjab Provinces

Health & Provinces			
Health Status	Province		
	Sindh *f* (%)	Punjab *f* (%)	Total *f* (%)
Healthy	204 (86.80)	335 (89.80)	539 (88.70)
Diseased	31 (13.20)	38 (10.20)	69 (11.30)
	χ^2 Chi Square = 1.293	Significance Level= 0.256	

Education & Provinces			
Education Status	Province		
	Sindh *f* (%)	Punjab *f* (%)	Total *f* (%)
Educated	212 (09.80)	336 (09.90)	548 (09.90)
Illiterate	23 (90.20)	37 (90.10)	60 (90.10)
	χ^2 Chi Square = 0.003	Significance Level= 0.958	

House Status & Provinces			
House Status	Province		
	Sindh *f* (%)	Punjab *f* (%)	Total *f* (%)
Paved	00 (00.00)	03 (00.80)	605 (99.50)
Unpaved	235 (100.00)	370 (99.20)	03 (00.50)
	χ^2 Chi Square = 1.899	Significance Level= 0.168	

Residential Land Status & Provinces			
Residential Land	Province		
	Sindh *f* (%)	Punjab *f* (%)	Total *f* (%)
Own	139 (59.10)	42 (11.30)	181 (29.80)
Disown	96 (40.90)	331 (88.70)	427 (70.20)
	χ^2 Chi Square = 158.141	Significance Level= 0.000	

Table 6.15
Cross Percentages and Test Statistics (Chi-Square Test) between Domestic and Communal Facilities in Sindh and the Punjab Provinces

Facilities	Province						Chi-Square χ^2 (Significance)
	Punjab		Sindh		Total		
	Yes %/f	No %/f	Yes %/f	No %/f	Yes %/f	No %/f	
Electricity	33.80 (126)	62.20 (247)	31.90 (75)	68.10 (160)	33.10 (201)	66.90 (407)	0.227 (0.634)
LPG	02.40 (09)	97.60 (364)	00.00 (00)	100.00 (235)	01.50 (09)	98.50 (599)	5.755 (0.016)
Television	16.60 (62)	83.40 (311)	11.90 (28)	88.10 (207)	14.80 (90)	85.20 (588)	2.533 (0.111)
Mobile Phone	72.40 (270)	27.60 (103)	59.60 (140)	40.40 (95)	67.40 (410)	32.60 (198)	10.775 (0.001)
Masjid	78.60 (293)	21.40 (80)	98.30 (231)	01.70 (04)	86.20 (524)	13.80 (84)	47.207 (0.000)
Toilet	32.20 (124)	66.80 (249)	26.40 (62)	73.60 (173)	30.60 (186)	69.40 (422)	3.196 (0.074)
Drinking Water	81.20 (303)	18.80 (70)	96.60 (227)	03.40 (08)	87.20 (530)	12.80 (78)	30.425 (0.000)
Boys School	38.30 (143)	61.70 (230)	38.30 (90)	61.70 (145)	38.30 (233)	61.70 (375)	0.000 (0.992)
Girls School	38.30 (143)	61.70 (230)	37.90 (89)	62.10 (146)	38.20 (232)	61.80 (376)	0.013 (0.908)
Paved Road	26.30 (98)	73.70 (275)	03.00 (07)	97.00 (228)	17.30 (105)	82.70 (503)	54.757 (0.000)
Govt. Allocated Land	05.10 (19)	94.90 (354)	22.10 (52)	77.90 (183)	11.70 (71)	88.30 (537)	40.558 (0.000)
Hospital	06.20 (23)	93.80 (350)	00.40 (01)	99.60 (234)	03.90 (24)	96.10 (100)	12.531 (0.000)

insignificant and showed the independency between policy and theses socio-economic status indicators. To validate these results and examine the difference in socio-economic statuses of both provinces again Chi-Square test was applied on health, education, house status, residential land as socioeconomic indicators and province as second variable. Likewise, data in table 6.14 also verifies the results of table 6.13 and further indicates that there was no difference in mentioned socio-economic statuses in which the main force behind was provincial policies which directly affected the fishermen communities of both provinces except residential land status which also had the same significance level (0.000) over here. Data in Table 6.15 show that difference in domestic and communal facilities of the provinces and to check the significance Chi-Square test was applied due the categorical nature of the variables on both sides. Results showed that LPG (0.016), Masjid (0.000), drinking water (0.000), paved road (0.000) government allocated land (0.000) and hospital (0.000) showed the significant difference in availability of the facilities. LPG, paved road and hospitals were more in the Punjab due to neighborhood of cities while rest of the significant variables were more in the Sindh. Rest of all variables in Table 6.15 were insignificant and showed no difference in availability of resources.

6.3 Hypothesis C

There is an association between the socio-economic status of the fishermen communities of CIWC and national indicators of Pakistan.
Socio-economic status of the fishermen communities of the CIWC is equal to those of national indicators of Pakistan.

H_o: There is no association between the socio-economic status of the fishermen communities of CIWC and national indicators of Pakistan.
H_A: There is an association between the socio-economic status of the fishermen communities of CIWC and national indicators of Pakistan.

Previous hypotheses confirmed the miserable conditions of fisherfolks of both the provinces, while comparison of the socioeconomic indicators of the fisherfolks of CIWC and national indicators of the Pakistan (CEICDATA, 2019; Government of Pakistan, 2017; X-Rates, 2019) in table 6.17 indicated a wide difference. In income and expenditure total rupees 56762.039 and 48188.409 difference was recorded, respectively. This huge difference easily defines the despondent conditions of the fisherfolks of Pakistan. Moreover, in terms of education 53.10% was the difference of CIWC dependent communities from the national indicator of Pakistan. The house status had even more difference (64.33%) that reflect the low socio-economic status of the fisherfolks of CIWC. From data it is evident that there is huge difference between the national indicators of Pakistan vs CIWC, therefore, Ho is accepted concluding that there is no association between the socio-economic status of the fishermen communities of CIWC and national indicators of Pakistan.

Table 6.16
Comparison of Socio-Economic Status of Fisherfolks of CIWC and National Indicators of Pakistan

Socio-economic status Indicators	Pakistan	CIWC	Difference
Average per capita income (June 2016)	650.644 $ 68524.199 Rs	111.68 $ 11762.16 Rs	538.964 $ 56762.039 Rs
Average per capita expenditure (June 2016)	594.219 $ 62581.659 Rs	136.66 $ 14393.25 Rs	457.559 $ 48188.409 Rs
Education (2016-17)	Literacy 63.00% Illiteracy 37.00%	Literacy=09.90% Illiteracy=90.10%	Literacy=53.10% Illiteracy=-53.10%
House Status	Paved=65.48% Unpaved= 34.52%	Paved=01.15% Unpaved=98.85	Paved=64.33% Unpaved=-64.33

(CEICDATA, 2019; Government of Pakistan, 2017; X-Rates, 2019)

Table 6.17
Comparison of Means Socio-economic statuses in the Punjab and Sindh Provinces

Continuous Variables	SINDH Mean (S.D)	PUNJAB Mean (S.D)	Difference
Income	14518.72 (7678.507)	10025.45 (4645.356)	4493.27
Expenditure	17697.40 (9301.965)	12311.54 (4640.209)	5385.86
Saving	6622.13 (24413.836)	4297.59 (22353.975)	2324.54
Debt	116865.53 201162.985	65451.07 87617.057	51414.46

CHAPTER SEVEN
MAJOR FINDINGS, SUMMARY, CONCLUSION AND RECOMMENDATIONS

Current chapter summarizes the study including discussion, major findings, summary, conclusion and recommendations to oversee the social problems discussed earlier.

7.1 Discussion (Major Findings)

Total 608 (Punjab 373, Sindh 235) respondents and 14 villages (Punjab 10, Sindh 04) were selected from CIWC for this particular study. All the respondents were the household heads and men and their primary occupation was fishing under the contractual and permit provincial systems of Punjab and Sindh, respectively. Average age of household heads in Punjab was observed 38.75 years and 39.93 years in Sindh while overall in CIWC it was 39.10 years. Total 360 respondents in Punjab and 228 in Sindh (CIWC 588) were found married while remaining were categorized as unmarried, widow, separated or divorced. The average family size in CIWC was 7.05 members while in Punjab and Sindh it was 6.72 and 7.57 individuals, respectively. Total fishermen population including men, women, boys and girls was recorded as 2528, 1736 and 4264 for Punjab, Sindh and CIWC, respectively. The average income, expenditure, savings and remaining debt of the Punjab were rupees 10025.45, 12311.54, 4297.59 and 65451.07, respectively. The mean income, expenditure, savings and remaining debt of Sindh were rupees 14518.72, 17697.40, 6622.13 and 116865.53, respectively. Mean income, expenditure, savings and remaining

debt of CIWC were rupees 11762.16, 14393.27, 5196.05 and 85323.44, respectively. Total 90.10%, 90.20% and 90.10% household heads were illiterate in the Punjab, Sindh and CIWC, respectively while 75.30%, 74.00% and 74.80% of all family members were illiterate in the Punjab, Sindh and CIWC, respectively. Overall 107, 74 and 181 ailing persons were found in Punjab, Sindh and CIWC, respectively including family members. In Punjab the fisherfolks had almost no land (only 13 individuals were found with category of having residential land), however, in Sindh more than half (59%) families had the land for residence. Overall, in CIWC, 29.8% fishermen had the residential land while rest were resident over government or feudals' land. Overall, in Punjab only 3%, Sindh 4% and CIWC 7% had the facility of paved houses while rest of all the residents had unpaved or semi paved houses. Total 89.50%, 92.80% and 90.80% respondents had no livestock and similarly 85.80%, 97.40% and 90.30% fishermen had no poultry to uplift their economic status in Punjab, Sindh and CIWC, respectively. Among the communal and household facilities only Masjid, drinking water and cell phone were found with majority of the fisherfolk families while other amenities (electricity, LPG, television, boys' and girls' schools and paved roads) were absent to the large extent to facilitate them. Majority 83.60%, 91.00% and 86.60% respondents in Punjab, Sindh and CIWC, respectively used fuelwood for domestic energy and the main source for firewood was forests along and in the Indus River. Only floating wood (Punjab 78.30%, Sindh 66.00% and CIWC 73.50%) and goods that originated from River were allowed to facilitate the fisherfolks while other goods (aquatic flora and fauna, migratory birds and fish oil) were recorded very rare to

contribute in socioeconomic needs of the fishermen communities. Similarly, except dead body finding (Punjab 59.80%, Sindh 84.30% and CIWC 69.20%) and flood rescue service (Punjab 61.70%, Sindh 40.40% and CIWC 53.50%), there was no mentionable service (tourism, boating, transportation and jobs) to uplift the socio-economic status of the dependent families. There were numerous farms implements and domestic products regarded as indirect goods which are river's forest-based made by different communities in the world, but they were found absent from the lives of Indus based fishermen communities. Timber and Non-timber forest products (hedges, wild fruits, vegetables, honey and medicinal plants) were also having no use in the social and economic uplift of the fisherfolk communities of Indus. The main reason behind deprivation is the exploitation by the contractor and feudal.

Environmental data was also collected during current research, which revealed that sewerage (82.00%), Industrial Excretion (37%), tourist waste (47.70%), animal dung (29.20%) and human and animal dead bodies (45.80%) were main sources of contamination in the Indus River in Punjab while in Sindh there was no significant contamination. Nets and hooks (Punjab 61.90%, Sindh 70.20% and CIWC 65.10%) were found the most frequent means of fish catch, however, some cultural practices were observed to facilitate the fisherfolks. Use of modern technology was found rare in the Indus based fishermen as almost half of the total fishermen (45.84%) were not using motorboats to save the time and energy for more fish products. Total 99.19% fishermen were not having the ice boxes to store the fish catch. No life safety precautionary measures

were adopted by fisherfolks as almost all 99.46% were not facilitated by life jackets. Most of the fishermen of Punjab (65.41%) did not use alternate means of livelihood while in Sindh majority (80.42%) worked as unskilled labor to support their household income as a secondary source. Overall, almost half of the respondents (46.71%) had no alternate livelihood while half (48.19%) used the unskilled labor for earning. The average income of Indus based fishermen was recorded rupees 9308.21 while unskilled labor gave an average income of rupees 2219.22 in Punjab and Sindh, respectively. Total 56762.039- and 48188.40-rupees difference was recorded against average income and expenditure of Indus based fisherfolks from the national indicators of Pakistan which depicts the highly miserable condition of fishermen. Similarly, 53.10% and 64.33% difference were recorded for education and house statuses in comparison with the national indicators of Pakistan.

Only non-parametric tests were run for the hypotheses testing because the sampling technique was non-probability purposive sampling. In this case, the data did not show the normal distribution and best choice for this case are non-parametric tests. Chi-Square and Cramer V were used where the data was categorical on both sides while Mann Winey U test was applied when one variable was used in continuous form. Total three hypotheses were formulated to examine the impact of CIWC on the socio-economic statuses of the fishermen communities. Hypotheses one determined the association of socio-economic status and goods and services provided by the Indus River wetlands. Results showed that only 33 tests statistics (Chi-Square) were significant out of 144 tests while 111 were insignificant. This depicted that only 22.91% fisherfolks were taking benefits from the

goods and services of the CIWC while rest of the 77.09 were deprived thus null hypothesis was accepted. There is no association of goods and services of CIWC and socio-economic status of dependent communities. Second hypothesis was designed to examine the effect of provincial policies (contractual system in Punjab and Permit system in Sindh) on socio-economic status of the fishermen communities. Here Chi-Square and Mann Whitney tests were applied to validate the results. It was observed that income, expenditure, remaining debt and residential land statuses were highly significant and had strong relationship of dependency with policies while rest of all socioeconomic variables were insignificant and showing independency with provincial policies. The difference in income, expenditure and remaining debt of both provinces were rupees 4493.27, 5385.26 and 51414.46, respectively. Further the facilities' difference was also tested using Chi-Square as they were also categorical variables and found only masjid, mobile phone and drinking water significant as 0.000, 0.001 and 0.000, respectively while rest of all the variables were insignificant. The last hypothesis was formulated to check the comparison of socio-economic status of the CIWC based fishermen and national socioeconomic indicators of Pakistan. A huge difference was observed between both data which depicted the miserable condition of Indus based fisherfolks.

7.2 Summary

Humans are highly influenced by their surroundings comprised of social and physical environment. Social environment develops their personalities, behaviors and social interactions while physical environment (including air, water, soil, flora and fauna) provides the necessities and superfluities of life. Globally, societies (rural, urban, modern and traditional) are highly dependent on the ecological resources to fulfill their socioeconomic needs. Wetlands are considered as a significant component of environment that provides tangible and intangible benefits to fisherman communities regarding eco-resources and eco-services. Over the decades, the ecological resources are deemed as vital for economic progress of any country. Pakistan, being sixth on globe and fourth in Asia, populous country, has historical civilization and traditional culture which brings local communities nearer and more dependent on environment resources. Indus, the largest river of Pakistan, has most ancient civilizations, cultures, unique ecologies and biodiversity from the snow-covered lakes of the Himalayas to the deltaic regions of Sindh. Current study focuses the Central Indus Wetlands Complex that consists of Jinnah, Chashma, Tounsa, Guddu, and Sukkur barrages and Indus basin covering nine districts of Punjab and Sindh provinces. The main objective of the study is to examine the impact of fresh waterbodies on the socio-economic status of dependent fishermen communities. Provincial governments of Punjab and Sindh have framed policies for the Indus River both for hydrological and biological aspects. To store and distribute irrigation water, different barrages are constructed, and provincial departments of irrigation are looking after while the biological resources are being controlled and managed by the respective fisheries departments of both the provinces, The

dependent fishermen communities along the banks of River Indus are linked directly to the fishing polices framed by the provincial fisheries departments. Punjab fisheries department annually announces arranges the auctions for the fisheries resources of the River Indus of each barrage. The bids are widely circulated through print media and interested candidates submit their bids. However, ground realities are different for example the contractor at Chashma Barrage wins the bid every year for the last eighteen years because he gives loans to the fishermen and oppress them through this loan and any new contractor has to the pay the loans with auction money to win the bid and operate in this area. Thus, any new person does not have the courage for meeting such heavy financial commitments. Moreover, the fish contractors are politically more powerful and influential to hijack the auction system. Practically, the contractors are also involved in litigation against the provincial fisheries department and manages to obtain stay order from the court to stop the auction processes and continue fishing without any outside interruption. This is the way that same contractor manages to exploit the resources over the decades. At Chashma and Tounsa Barrages, the contractors used to export the fish in both within the country and abroad. Contractors usually purchase fish from the fishermen at lowest minimum price of Rupees 20 – 40 per kilogram while he sells at a high price of about rupees 600 per kilogram thus making huge profit. Any violation by fisherman against contractor is treated with heavy hands forcing him to not only to repay the heavy amount of debt but also subjecting him with physical punishment. During the off-season (fish breading season Notified by the Fisheries Department) when the fishermen cannot carry out fishing, the contractor lends rupees 500/- per week to each household of fisherman to meet their day to day

needs. Majority of the fishermen are from Sindh and migrated along the river for earning livelihood. In case of Sindh province, the Sindh government had amended the law to give a little relief to this deprived community and contractual system is replaced by the annual permit system issued by the Sindh Fisheries Department. However, Indus River along all its stretch within the Sindh province is ruled by feudal. The feudal system of Sindh does not allow the fisherfolks to get the actual benefit from fish sale and exploit fishermen communities as that by contractors in Punjab.

Under the current study a sample size of 618 fishermen (Punjab 373 and Sindh 235) was chosen which were pure fishermen and having fishing as major occupation working either under contractual or permit system. Non-Probability purposive sampling was used because the fishermen population was unknown and sometimes very difficult to approach in and along the Indus River. Analysis based on Non-Parametric statistical tests were used to study the impact of Indus River wetlands on the socio-economic status of the dependent fisherfolks both in Punjab and Sindh under contractual and permit systems, respectively. Results revealed that the fishermen of both provinces are lying under the poverty line and have a huge socio-economic while compared with similar indicators at national level of Pakistan. The core reasons behind this disparity were the provincial policies as the contractual system in Punjab treated the fishermen as slaves for generations. The fishermen in Punjab work as bonded labor and are facing high debts which are fake in most of the cases. Their exploitation increases when the same contractor is continues for year after year due to flaws in the system. The fishermen's miseries can be visualized from the fact that they cannot take benefits even from other aquatic

goods and services such wood, forage and fodder simply because of fear of the contractor or the feudal. In Sindh although permit policy has positive effect on the socio-economic status of fishermen, but the feudalism reduces the impact of this status due to the reasons explained earlier in the foregoing chapters. Hence, it is recommended that all these fishermen communities need an immediate attention by the respective governments to ensure their basic human rights according the rest of the citizens of the country.

7.3 Conclusion

In reality the natural resources especially water has deep influence on the socioeconomic well-being of human beings in the form of wetlands. However, communities dependent of these wetlands can only benefit from wetlands-based resources provided these community can work independently without any outside influence and fear. In case of Indus based fishermen communities, they carry out fishing practices under the provincial policies monitored by the respective fisheries departments of Punjab and Sindh governments. The contractual system in Punjab results in indefinite exploitation of the rights of the fishermen communities as explained earlier. Fishermen are either deprived of their basic needs such as appropriate wages, work safety, health, education for children or derivation of any direct and indirect benefits from the resources of Indus River. Similarly, Sindh government although had replaced the contractual system with permit system which resulted in a positive effect on the socioeconomic life of dependent fishermen communities, yet these communities cannot harvest real benefits under the influence of feudalism prevailing in these areas. Therefore, it is recommended that provincial governments take serious steps to minimize the sufferings of fisherfolks in the face inhuman treatment imposed by contractors and feudal.

7.4 Recommendations

Based on interactions with Indus fisherfolks of the Punjab and Sindh, experiences as consultant in GPAF (WWF-Pakistan) project and PhD dissertation's results, following recommendations are there (Table 7.1, 7.2 & 7.3) to improve the socio-economic status of Indus river-based fishermen.

Table 7.1
Short-Term Recommendations

S.No.	Recommendations	Steps to be Taken
01.	Equal wages	Indus-based fishermen are treated with very low wages. Their minimum remunerations should be increased as per government of Pakistan/provincial government minimum wage policy.
02.	Security	Many events have been reported which claims the risk to the life of fisherfolks therefore life of the fishermen and their families may be secured by the concerned officials and other related shareholders as per federal and provincial government guidelines.
03.	Freedom	The movement of fishermen is restricted, and their labor is exploited through debt bondage. Concerned provincial governments should take notice of this exploitation and their freedom of movement must be ensured as per the constitution of Islamic Republic of Pakistan.
04.	Health	Fishermen and their families have no health facilities; at least basic health units may be established within the geographical area of 3-4 localities of fisherfolks. This will improve the health situation of Indus dependent communities.
05.	Access to the Natural Resources	Contractors and feudal are individually adoring the all-natural resources of Indus river (floating wood, natural vegetations and aqua flora and fauna). Rights of the fishermen / Indus dependent communities in this regard may also be considered.
05.	Access to Main Market	Contractors in the Punjab do not allow fisherfolks to sell fish in market and exploit them by purchasing it with lowest rates to maximize their profit. Small fish markets or selling points may be established in the area where only Indus based fishermen are allowed to sell their catch.

Table 7.2
Medium-Term Recommendations

S.No.	Recommendations	Steps to be Taken
01.	Loan Settlement	Contractors in the Punjab tend to impose fines on fishermen and their families on even a minor mistake. These fines are converted into fake loans. These tactics are used to keep them under debt bondage for generations. This old tradition of exploitation is needed to deal severely. Both federal and provincial governments are suggested to legislate in this regard.
02.	Education	Education is key of prosperity for any society. Education for the children of fishermen is the effective tool to secure their bright future. It is highly recommended that government and nongovernmental organizations should take initiatives to provide free education opportunities to the children of these miserable people. Popular school chains may also be directed by the authorities at the time of registration to open one free campus in these miserable communities.
03.	Provision of Necessary Gadgets	Current research found lack of technology in fishing practices of Indus based fishermen. The Punjab provincial government with the help of related departments need to bound the contractors for the provision of modern technology for rapid and easy fish catch. Any violation by the contracts should lead to the cancellation of contract or at least heavy fine.
04.	Alternative Livelihoods	Contractors in the Punjab do not allow the fishermen for alternative livelihoods to secure their labor for more profit. Fishing is season-based activity therefore without the provision and permission of alternative livelihoods it is highly difficult to uplift the socio-economic status of Indus based fishermen. All such restrictions from the contractors should be clearly addressed in the contract and there may be a periodic monitoring procedure to ensure the implementation of the provisions of contract.

Table 7.3
Long-Term Recommendations

S.No.	Recommendations	Steps to be Taken
01.	Policy Transformation	Current research focused on the provincial policies for fishing in the Punjab and Sindh. The policy in Punjab is making fisherfolks more vulnerable to exploitation by pushing them into the situation of bonded labor. Policy for fishing in Sindh is comparatively good but it also does not secure the fisherfolks from the influence of Feudal. Therefore, legislation to provide the substitute for contractual system in the Punjab and feudalism in Sindh is urgently needed which could not only protect the rights of Indus based fisherfolks but also ensure the sustainability of natural resources.
02.	Environmental Education	Conservation of natural resources is real sustainable development for long run social and financial safekeeping of all stakeholders. For this, the environmental education is unique tool which can be mandatory using the public and private sector concurrently.
03.	Blue Economy	Although Pakistan has large freshwater bodies and long costal line, fishing has not been considered part of mainstream economy. Government can flourish it as an industry to uplift the status of dependent communities and strengthen the national economy.
04.	Documentation & Taxation	Documentation of Indus resources is required to avoid the exploitation by diverse forces along the Indus river. Taxes must be executed over the income generation by all stakeholders for revenue generation.

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Annexure-I

IMPACT OF CENTRAL INDUS WETLANDS COMPLEX ON SOCIO-ECONOMIC STATUS OF FISHERMEN COMMUNITIES

INTERVIEW SCHEDULE

i. Date		vii. Village	
ii. Code		viii. Enumerator Name	
iii. Barrage/Basin		ix. Enumerator Code	
iv. District		x. Edit/Checked by	
v. Tehsil		xi. Data Entry Operator Name	
vi. Union Council			

A. SOCIO-ECONOMIC BACKGROUND

A-1. Family socio-economic profile

Note: (please use the extra sheet if more data of family members is required)

Status & Relationship with Household head	Age (Completed Years)	Education (Completed No. of classes)	Marital status*	Primary Occupation	Secondary Occupation	Participation in Fishing Practices Yes/No	Healthy or Diseased
Respondent HH/Relation with HH							

*Married/Unmarried/Divorced/Widower/Separated

B. INCOME, EXPENDITURE, SAVING AND LOAN

B-1. Approximate and average distribution of House Hold income (Rupees/Month) from different sources?

Fishing	Boating	Cultivation	Livestock & poultry	Govt. or Private Job	Skilled Labor	Unskilled Labor
Aqua Flora and Fauna[1]	**Lake Services[2]**	**Forest Goods & Services[3]**	**NTFP[4]**	**Cultural Products**	**Kitchen Gardening**	**Job Public/Private**
Total						

[1] **Migratory Birds, Lake Animals, Fingerling, Fish oil, Aqua Plants,**

[2] **Tourism, Boating, Dead Body Finding, Flood Rescue, Transportation**

[3] **Fuel Wood, Timber, Hedges, Domestic Tools, Farm Implements**

[4] **Non-Timber Forest Products (Medicinal Plants, Honey, Miswak, Wild Fruits & Vegetables)**

B-3. Approximate and average House Hold expenditure (Rupees/Month)?

Food	Education	Health	Livestock Health	Utility Bills	House Hold Energy	Fuel & Transportation
Cloths	**Mobile**	**Rent**	**Boat and Net Maintenance**	**Grocery**	**Ceremonies**	**Any Other**
Total						

B-4. Approx. and Average saving of House Hold per Year?

Total Savings PKR	**Source**	**Mode of Saving** Cash, Commodity, Livestock, Gold

B-5. Total loan of House Hold

Total Loan PKR	Took from*	Total Time Period	Remaining Amount	Remaining Time Period	@ interest	Monthly Installment	Seasonal Installment

*Relatives, Friends, Middle man, Contractor, Feudal, Government, Bank,

B-6. Are you facing any problem in loan settlement? i. Yes ii. No

B-7. Problem Type?

B-7. Are you being harassed for the return of loan? i. Yes ii. No

B-8. Do you take loan regularly? i. Yes ii. No

C. HOUSEHOLD AND LOCAL FACILITIES

C-1. What facilities do you own?

Electricity	LPG	TV	Mobile	Paved House	Drinking Water	Toilet
●	●	●	●	●	●	●
Masjid	**Boys School**	**Girls School**	**Paved Road**	**Government Allocated House land**	**Hospital/ Dispensary**	**Any Other**
●	●	●	●	●	●	●

D. RESIDENCE, LAND, CULTIVATION AND LIVESTOCK STATUS

D-1. What is status of your residence and Animal Corals? (Encircle)

Residence						
Paved	**Sami-Paved**	**Un-Paved**	**Chappar**	**Tent**	**Boat Residenc**	**Any Other**
●	●	●	●	●	●	●
Total Number of Rooms:						

Animal Coral					
Paved	**Sami-Paved**	**Un-Paved**	***Chappar***	**Tent**	**Any Other**
●	●	●	●	●	●
Total Number of Rooms:					

D-2. What is the status of your land? (Encircle)

i. Land Status	**Residential Land**	**Cultivated Land**	**Barren Land**	**Rented Land**
ii. Personal Land	●	●	●	●
iii. Government (Occupied/River)	●	●	●	●
iv. Government (Allocated)	●	●	●	●
v. Feudal/Contractor Land	●	●	●	●

D-3. What is area of your land? (Kanals) (Encircle)

Land Status	**Less than 4 Kanals**	**5-8**	**9-12**	**13-16**	**17-20**	**21-24**	**25-28**	**28-32**	**More Than 32 Kanals**
i.. Residential Land	●	●	●	●	●	●	●	●	●
ii. Cultivated Land	●	●	●	●	●	●	●	●	●
iii. Barren Land	●	●	●	●	●	●	●	●	●
iv. Rented Land	●	●	●	●	●	●	●	●	●
v. Farm Land	●	●	●	●	●	●	●	●	●

D-4. Do you cultivate crops in your fields? i. Yes ii. No

D-5. What kind of crops do you cultivate? i. Wheat ii. Maize iii. Mustard iv. Any other (Please Specify)

_____

D-6. Do you cultivate vegetables in your fields? i. Yes ii. No

D-7. What kind of vegetables do you grow? i. Onion ii. Potatoes iii. Radish iv. Carrot v. Peas vi. Turnip vii. Cucumber viii. Any other (Please Specify) _____

_____

D-8. Do you have your own livestock? i. Yes ii. No

D-9. What is source of fodder and forage for your livestock? i. Forest ii. Cultivation iii. Forest & Cultivation iv. Purchase v. Any other (Please Specify)

_____

D-10. Status of livestock

Livestock	Number Owned	No. Sold Last 12 months	@ rate PKR	No. used in House
i. Buffaloes				
ii. Cow				
iii. Sheep/Goat				
iv. Camel				
v. Donkey				
vi. Horse				
vii. Any Other				

D-11. Do you raise poultry?) i. Yes ii. No

D-12. Status of poultry?

i. No. of Hens	Number Sold Last 12 months	@ rate PKR	Used in House
ii. No. of eggs/Day	Number Sold For 1 Month	@ rate PKR	Used in House

E. FORESTS SERVICES AND GOODS

E-1. What do you use for Domestic Energy? (Encircle)

Domestic Fuel Type					
i. Fuel wood	Yes	No	v. LPG	Yes	No
ii. Dung	●	●	vi. Electricity Heater	●	●
iii. Coal	●	●	vii. Any Other	●	●
iv. Kerosene oil	●	●	viii. Any Other	●	●

E-2. Fuel Wood Status

Source of Fuel Wood		Quantity Consumed Kg/Month (Approx. and Average)	
i. Forest		Summer	Winter
ii. Purchase			
iii. River Catch			
iv. All Mentioned Sources			
v. Any Other			

E-3. Did you use timber in your house? i. Yes ii. No

E-4. Did you use timber in your livestock shed? i. Yes ii. No

E-5. What is source of timber? Forest ii. Purchase iii. Both iv. Any other (Please justify)

E-6. Did you use timber during last 12 months? i. Yes ii. No

E-7. Do you use hedges (Fences)? i. Yes ii. No

E-8. What is the purpose to use hedges? i. Household protection ii. Crop protection iii. Animals corals protection iv. Boundary demarcation v. Any other (Please justify) ___

E-9. What is the type of hedges you used? i. Forest ii. Protection wires iii. Both

iv. Any other (Please Specify) _____

E-10. Do you use Medicinal Plants? Yes ii. No

E-11. What is the purpose to use Medicinal Plants? i. Own medication ii. Livestock medication iii. Both

E-12. What is the source of Medicinal Plants? i. Forest ii. Purchas iii. Both **E-**

13. Are you satisfied with the results of Medicinal Plants? i. Yes ii. No

E-14. Major species which have excellent results in human beings?

i. _____ ii. _____ iii. _____ iv. _____ v. _____

E-15. Do you use Wild Fruits/Vegetables?

E-16. What is the source of Wild Fruits/Vegetables? i. Forest ii. Purchas iii. Both

E-17. Do you use Honey? i. Yes ii. No

E-18. What is the source of Honey? i. Forest ii. Purchas iii. Both

E-19. Which type of farm implements you use for cultivation?

i. Traditional ii. New Technology iii. Both

E-20. Please tell which of the following farm implements you use for Agriculture and Livestock? (Encircle)

i. Wooden handles	***Yes***	**No**	**vii. Wooden plough**	***Yes***	**No**	Other Specify	***Yes***	**No**
ii. Wooden pegs	●	●	**viii. Wooden plank**	●	●	xiii.	●	●
iii. Wooden rake (2 & 3 prongs)	●	●	**ix.Wooden spade**	●	●	xiv.	●	●
iv Wooden rake	●	●	**x.Hand hoe for looping tree branches**	●	●	xv.	●	●
v. Wooden blade (leveler)	●	●	**xi. Donkey cart**	●	●	xvi.	●	●
vi. Yoke	●	●	**xii. Wooden coach box**	●	●	xvii.	●	●

E-21. Which farm implements did you make during last 12 months?

i. _____ ii. _____ iii. _____ iv ._____v. _____

E-22. Do you use different domestic products using forest? i. Yes ii. No

E-23. Which types of following domestic products obtained from Forest you use? (Encircle)

i. Wooden pen	***Yes***	**No**	**vii. Wooden ladder**	***Yes***	**No**	Other Specify	***Yes***	**No**
ii. Sticks	●	●	**viii. Wooden mesher**	●	●	xiii.	●	●
iii.Charpoy	●	●	**ix. Wooden churner**	●	●	xiv.	●	●
iv . Wooden weaven stool	●	●	**x. Wooden churner's stand**	●	●	xv.	●	●
v.Basket	●	●	**xi. Wooden roof drain**	●	●	xvi.	●	●
vi. Broom	●	●	**xii. Table & Chair**	●	●	xvii.	●	●

E-24. Which domestic products did you obtain from Forest during last 12 months?

i. _____ ii. _____ iii. _____ iv. _____ v. _____

F. LAKE BASED ENTERPRISES *(Goods & Services)*

F-1. Which type of goods and services do you take from waterbody? (encircle)

A. GOODS			B. SERVICES		
i. Floating Wood	**Yes**	**No**	**i. Tourism**	**Yes**	**No**
ii. Aqua Flora	●	●	**ii. Boating**	●	●
iii. Aqua Fauna	●	●	**iii. Dead Body Finding/Recovery**	●	●
iv. Migratory Birds	●	●	**iv. Flood Rescue Services**	●	●
v. Fingerling	●	●	**v. Transportation**	●	●
vi. Fish Oil	●	●	**vi. Fisheries, Wildlife or Forest Department Job**	●	●
vii. Any Other	●	●	**vii. Any Other**	●	●

F-2. Medicinal plants

Specie	Local Name	Used for Disease	Human	Animals	Results
i.					
ii.					
iii.					
iv.					
v					

G. HEALTH

G-1. Health status of household members?

House Hold Members	Healthy	Diseased	Minor Disease	Reason Minor Disease	Major Disease	Reason Major Disease	Type of Disease*
i. HH							
ii.							
iii.							
iv.							
v.							
vi.							
vii.							

*Chronic/Water Based/Heredity/Accidental

G-2. Wetland contamination (encircle)

A. Reasons Behind Water Contamination of Wetland	*Yes*	No	B. Reasons Behind Water Contamination of Wetland	*Yes*	No
i. Sewerage (City/Village)	●	●	**vi. Tourist Waste**	●	●
ii. Industrial Excretion	●	●	**vii. Animal Dung**	●	●
iii. Poison used by Fishermen	●	●	**viii. Human/Animal Dead Bodies**	●	●
iv. Urea used for Fish Growth	●	●	**ix. Any Other**	●	●
v. Community Garbage	●	●	**x. Any Other**	●	●

G-3. Impacts (positive/negative) of wetlands on human/animal health

i. Positive impacts of Wetlands on Human Health	ii. Negative impacts of Wetlands Human Health	iii. Positive impacts of Wetlands on Livestock Health	iv. Negative impacts of Wetlands on Livestock Health

H. FISHING

H-1. Equipment related to fishing

Asset	Quantity	Market Price	Age of Asset	Condition			Ownership			
				Good	Normal	Bad	Own	Contractor/ Feudal	Rent	Any Other
i. Boat										
ii. Boat Motor										
iii. Ice Box										
iv. Hooks										
v. Net										
vi. Life Jacket										
vii. Transportation Vehicle										
viii. Any Other										

H-2. Mode of fish catching

Net	Hook	Electric Shock	Poison	Blast	Any Other

H-3. Specie vise rate and weight of fish

S.No	Specie	Rate/Kg	S.No	Specie	Rate/Kg
i.			viii.		
ii.			ix.		
iii.			x.		
iv.			xi.		
v.			xii.		
vi.			xiii.		
vii.			xiv.		

I. Effect of Contractual /Permit System on Fishermen Community

Provisional System (Encircle)	Contractual System ●	Permit System ●

S.No.	Socio-economic Status		
	Socio-economic Variables	**Results**	
i.	Total **Income** of Household	**PKR**	
ii.	Total **Expenditure** of Household	**PKR**	
iii.	**House** Status	**Paved** **1**	**Unpaved** **0**
iv.	Maximum **Education** in Household	**Number of Classes Passed** **( )**	
v.	**Health**		
	Status	**Yes**	**No**
	i. Water Based Disease	**1**	**0**
	ii. Handicapped	**1**	**0**
	iii. Chronic Disease	**1**	**0**
	iv. Approach to Health Facility or medicines	**1**	**0**

J. Dependency of Local Communities on Wetlands in Context of Contractual and Permit System

Provisional System (Encircle)	Contractual System ●	Permit System ●

S.No.	Direct Benefit from Wetland's Goods & Services		
A.	**Goods**		
		Yes	**No**
i.	**Fish (Market)**	**1**	**0**
ii.	**Forest based products**	**1**	**0**
iii.	**Lake Animals**	**1**	**0**
iv.	**Migratory Birds**	**1**	**0**
B.	**Services**		
v.	**Boat Transportation**	**1**	**0**
vi.	**Boat Tourism**	**1**	**0**
vii.	**Rescue**	**1**	**0**
viii.	**Flood**	**1**	**0**
ix.	**Restaurant**	**1**	**0**
x.	**Job**	**1**	**0**

J. Alternative Livelihood (Encircle)

S.No.	Alternative Livelihood	Yes	No	Major Occupation	Minor Occupation
i.		●	●	●	●
ii.		●	●	●	●
iii.		●	●	●	●
iv.		●	●	●	●
v.		●	●	●	●

K-1. Satisfaction from alternative livelihood (encircle)

S.No.	Alternative Livelihood	Highly Satisfied	Same as Fishing	Highly Unsatisfied
i.		●	●	●
ii.		●	●	●
iii.		●	●	●
iv.		●	●	●
v.		●	●	●

L. Alternative Energy Resources (Encircle)

S.No.	Alternative Energy Resources	Yes	No	Source			Minor Occupation
				Purchased	NGO	Govt	
i.	Biogas	●	●	●	●	●	●
ii.	Solar Panel	●	●	●	●	●	●
iii.	Energy Efficient Mud Stoves	●	●	●	●	●	●
iv.	Solar Geyser	●	●	●	●	●	●
v.	Any Other	●	●	●	●	●	●

L-1 Satisfaction from alternative energy resources (encircle)

S.No.	Alternative Energy Resources	Highly Satisfied	Not Satisfied	Highly Unsatisfied
i.	Biogas	●	●	●
ii.	Solar Panel	●	●	●
iii.	Energy Efficient Mud Stoves	●	●	●
iv.	Solar Geyser	●	●	●
v.	Any Other	●	●	●

M. Any Suggestion for the Conservation of River/Barrage, Flora and Fauna?