



# DASU HYDROPOWER PROJECT



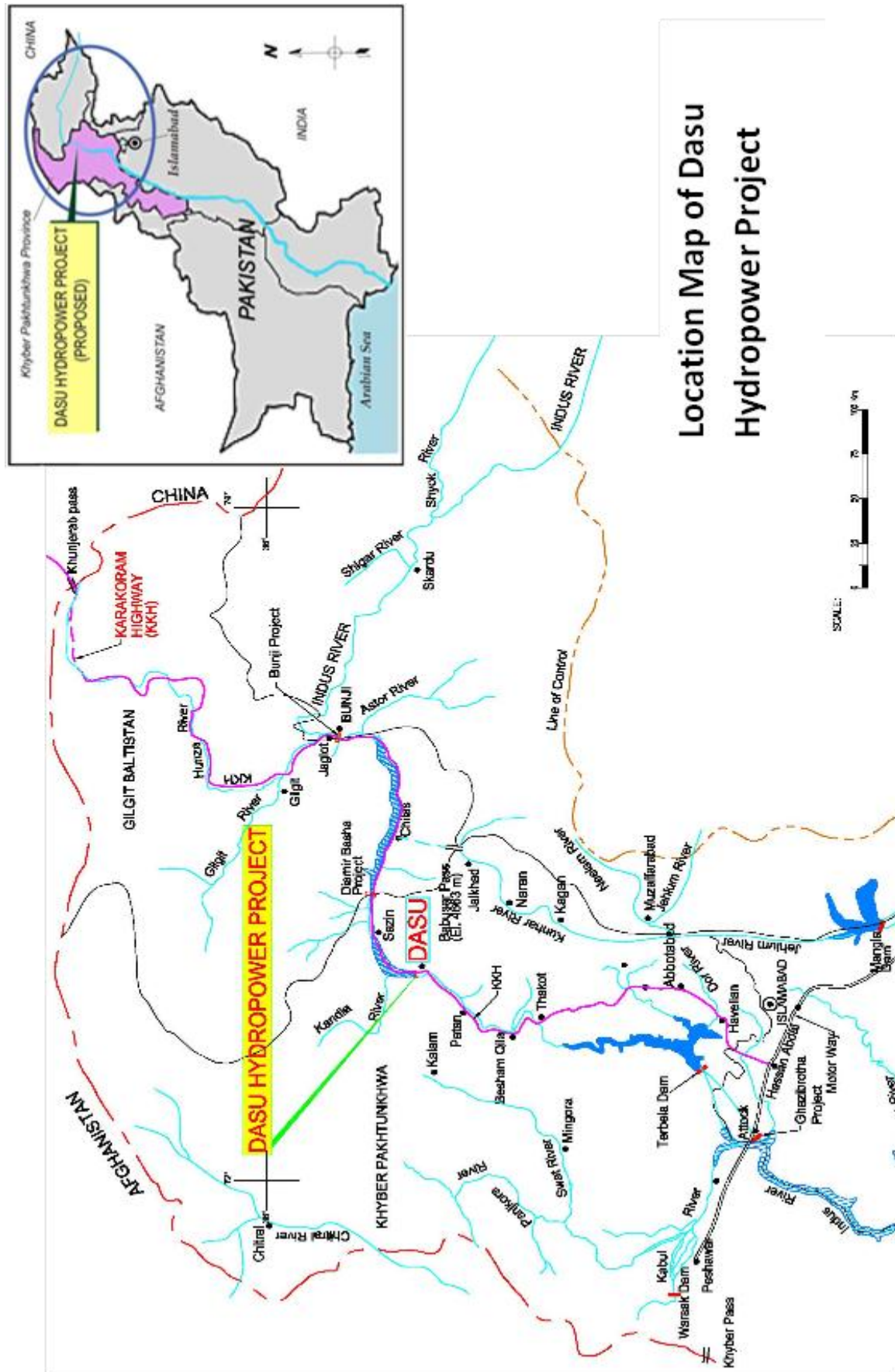
## SOCIAL AND RESETTLEMENT MANAGEMENT PLAN

### Volume 11: DOWNSTREAM FISHING COMMUNITIES: BASELINE AND IMPACTS ASSESSMENT

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Final Version 08 March 2014





## **SOCIAL AND RESETTLEMENT MANAGEMENT PLAN**

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## ABBREVIATIONS

ADB	Asian Development Bank
Asl	Above Sea Level
DD	Deputy Director
DG	Director General
DHP	Dasu Hydropower Project
DO	District Officer
DPA	Dasu Project Area
EIA	Environment Impact Assessment
EMAP	Environment Management Action Plan
EPA	Environment Protection Agency
FGDs	Focus Group Discussions
GRC	Grievance Redressal Committee
IDIs	In-depth Interviews
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
KKH	Karakoram Highway
Km	Kilometer
KP	Khyber Pakhtunkhwa
KPK	Khyber Pakhtunkhwa
LAC	Land Acquisition Collector
M	Meter
MW	Mega Watt
NCS	National Conservation Strategy
NCS	National Conservation Strategy
NGOs	Non Governmental Organizations
NTDC	National Transmission and Despatch Company
OP	Operational Policy
PAP	Project Affected Person
PAV	Project Affected Village
PD	Project Director
PEPA	Pakistan Environmental Protection Act
PEPO	Pakistan Environmental Protection Ordinance
PKR	Pakistan Rupees
PMU	Project Management Unit
PRO	Project Resettlement Office
RCC	Roller compacted Concrete
SAP	Social Action Plan
SEAP	Socio-Economic Assessment Profile
SFA	Social Framework Agreement
SMP	Social Management Plan
TMA	Tehsil Municipal Administration
TOR	Terms of Reference
ToRs	Terms of Reference
WAPDA	Water and Power Development Authority
WB	World Bank
Xen	Executive Engineer

### Units of Measurements

GWh	Giga watt hour (Unit of Energy)
Kg	Kilogram (Unit of mass – 1000 gm)
MW	Mega Watt ( Unit of Power)



## GLOSSARY OF TERMS

Affected Persons	Any person or household adversely affected by any project related change or changes in use of land, water or other natural resources, or the person/s who loses his/her/their asset or property movable or fixed, in full or in part including land, with or without displacement, after the commencement and during execution of a project.
Compensation	includes cash payment, deferred payment, a bond, an insurance policy, stipend, payment in kind, rendition of services, grant of privileges and disturbance money entitlement to special treatment by Government and Semi Government, grant of alternative land, grant of import licenses and business, trade and commercial facilities in addition to the rehabilitation and resettlement of an affected person.
Commercial Fishing	Commercial fishing refers to the harvesting of fish, either in whole or in part, for sale, barter or trade
Consultation	Consultation refers to two-way transfer of information or joint discussion between project staff and the affected population. Systematic consultation implies a sharing of ideas. Bank experience shows that consultation often yields the best resettlement alternatives, fruitful procedures for continued participation, and independent information on actual conditions or implementation
Entitlement	Means the sum total of compensation and other assistance assessed according to the status of each individual belonging to the project area or related therewith and dependent thereon, by the designated Evaluation Committee or any other such body
Fisheries	The occupation, industry, or season of taking fish or other sea animals (as sponges, shrimp, or seals)
Household	People residing under one roof, using the same hearth and operating as a single economic unit
Income Restoration	Re-establishing income sources and livelihood of the affected persons according to their status as determined under the law
Land Acquisition	Means, the process whereby a person is compelled by a public agency to alienate all or part of the land a person owns or possesses, to the ownership and possession of that agency, for public purpose in return for compensation
Primary Data	PRIMARY DATA is data that has not been previously published, i.e. the data is derived from a new or original research study and collected at the source, e.g., in marketing, it is information that is obtained directly from first-hand sources by means of surveys, observation or experimentation.
Random Sampling	A sample in which every element in the population has an equal chance of being selected
Resettlement	Means all measures taken to mitigate any and all adverse impacts, resulting due to execution of a Project on the livelihood of the project affected persons, their property, and includes compensation, relocation and rehabilitation
Run-of-River	ROR is a type of hydroelectric generation whereby little or no water storage is provided. Run-of-the-river power plants may either have no storage at all, or a limited amount of storage, in which case the storage reservoir is referred to as pondage. A plant without pondage has no storage and is, therefore, subject to seasonal river flows and serves as a peak power plant while a plant with pondage can regulate water flow and serve either as a peaking or base load

	power plant.
Secondary Data	It refers to the statistical material which is not originated by the investigator himself but obtained from someone else's records, or when Primary data is utilized for any other purpose at some subsequent enquiry it is termed as Secondary data. This type of data is generally taken from newspapers, magazines, bulletins, reports, journals etc. e.g. if the data published by RBI on currency, National Income, Exports or Imports, is used in some other statistical enquiry, it will be termed as Secondary data. According to M.M. Blair, "Secondary data are those already in existence for some other purpose than the answering of the question in hand."
Stakeholders	Include, affected persons and communities, proponents, private and public businesses, NGOs, host communities and EPA, etc.



# **DOWNSTREAM FISHING COMMUNITIES: BASELINE AND IMPACT ASSESSMENTS**

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## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

The Dasu Hydropower Project (DHP) is among the list of projects to be implemented on priority as per the Vision 2025 program prepared by Water and Power Development Authority (WAPDA). The proposed DHP is estimated to generate 18,440 GWh of energy per annum which when injected into the transmission and distribution system would curtail shortage of electricity in the country. This project would be operated on run of river daily cycle basis. DHP is not expected to affect adversely in any context on the water sharing between the provinces as per 1991 Water Accord among all four provinces of Pakistan. WAPDA is the Executing Agency of the project while the World Bank is the main financier of Dasu Hydropower Project.

The dam site of the Dasu Hydropower Project (DHP) is located at about 8 km north of Dasu town, the administrative headquarters of District Kohistan at geographic location N 35° 19' 6.61", E 73° 11' 41.33" on Indus River in Khyber Pakhtunkhwa (KP) province of Pakistan. DHP will build a 242 m high concrete gravity dam and 74 km long reservoir behind the dam with an average width of 365m. The project will have an underground powerhouse having 12 turbines, each of which will produce 360 MW power, and a final maximum capacity to produce 4320 MW. A 46 km of KKH will be submerged in DHP reservoir and hence will be relocated to a higher level above the reservoir. It is a phased project and will be completed during 2014-2035.

### **AQUATIC CHARACTERISTICS OF INDUS RIVER**

Indus and its tributaries are characterized by relatively steep gradients and substrate sizes, fast-flowing, turbulent and turbid water. Physico-chemical conditions of river water changes between the summer and winter seasons. During summer, river water is very turbid and carries a high sediment load. Snow carp species are the dominant fish species in the project area representing more than 90 percent of total fish catch. Snow carps mainly inhabit the tributaries and the confluences of Indus. These are short distant migrants and migrate within the tributaries. The triggers for migrations are high flows, high sediment load and low temperatures. During spring, when flows started increasing in the rivers due to melting of snow, the fish migrate upstream to the head waters from April and May (within tributaries) due to high flows and turbidity at lower elevations. During autumn, when the temperatures are starts to drop at higher elevations in head waters, the fish migrate downstream from September and October. The fish spawns in tributaries, during March and April and again during September and October.

### **LEGAL FRAMEWORK**

The Pakistan Environmental Protection Act (PEPA), 1997 is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The Act is applicable to a broad range of issues like (a) the ecosystem and ecological relationships; and (b) all social and economic conditions affecting community life.

The Pakistan National Conservation Strategy (NCS) is the principal policy document for environmental issues in the country and was developed and approved by the Government of Pakistan on March 1, 1992. The NCS works on a ten-year planning and implementation cycle. The NCS deals with protecting water bodies and sustaining fisheries.

According to Khyber Pakhtunkhwa Fisheries Rule 1976, power granted to Director General (DG) Fisheries to issue permits to catch fish. The ordinance provides protection against 1) Destruction of fish by explosives, and 2) Destruction of fish by poisoning water. There are other clauses giving protection to fish. Penalties are provided for violating the provisions of the ordinance.

## OBJECTIVES OF THE STUDY

This study evaluates potentiality of socio-economic impacts on fishing communities downstream of Dasu Dam Axis. The main focus of this study is to determine the impacts of Dasu Hydropower Project (DHP) on downstream fishing community and other direct and indirect stakeholders of fishery downstream of the Dasu Dam Axis to Tarbela Reservoir reach.

The objectives of the study are to:

- (i) establish baseline conditions of communities engaged in fishing downstream of Dasu Dam;
- (ii) assess the present income level of the fishing communities downstream of the dam;
- (iii) identify and assess the overall socio-economic impacts on downstream fishing communities during and after project construction; and
- (iv) suggest mitigation measures for the adverse impacts of the Project keeping in view the sustainable livelihood of the downstream fishermen communities' upto Tarbela reservoir reach on left and right banks of the river Indus.

## METHODOLOGY

The study area for downstream fishing communities starts from downstream of Dasu Dam Axis and ends at Tarbela reservoir reach. Four concerning districts/areas were covered in this study. The length of the study area along the river Indus is approximately 200 km.

For the survey, village representatives or identifying persons were initially interviewed to proceed further in that village. These representatives/identifying persons further indicated fishermen in their respective villages. Five fishermen from each village were selected to be interviewed. Extensive consultation and discussion was also done with the concerned community in each village to get maximum information in relevance to the study. Primary data was collected in this activity through prescribed questionnaires. A set of three kinds of questionnaires, i) for interviews with Identifying Persons/Key Informants; ii) for village community focus group discussion; and iii) for interviews with individual fisherman were used. The secondary data was collected from published material and locally posted government officials such as the Assistant Director Fisheries, Pattan (Kohistan District), Assistant Director Fisheries, Shangla District, Assistant Director Fisheries, Battagram District, Assistant Director Fisheries, Mansera District and Deputy Director Fisheries, Khalabat/Tarbela.

## BASELINE CONDITIONS

A total of 110 fishermen from 22 villages were interviewed for this study.

The baseline survey results revealed that:

- (i) Out of 5,294 total households of 22 sampled villages (10 on right bank and 12 on left bank), 626 (11.8 %) were involved in fishing. District Kohistan and Shangla have surveyed villages on both banks (Left & Right) of the Indus river while; the Battagram and Torgher districts exist on left bank of the Indus River. In District Kohistan, fishermen HHs living on left bank (16.9%) are higher in number than right bank (8%) of the river.
- (ii) The common fishing gear used in the study area is gill net (83%) to catch the fish from the river. The fishermen also use hook & line (73%) and cast net (20%). The fishermen use cast net to catch fish from tributaries only. In District Torgher, only two fishermen told that they sometimes use poison (agriculture pesticide) for catching fish from the river or nullah.
- (iii) The overall average catch is 4.12 kg/day. On an average, the fishermen practice fishing about 18 days in a month. The trend of fish catchings significantly decreases from Kohistan to Torgher district areas. The

highest fish catch (5.04 kg/day) recorded in district Kohistan while lowest (2.02 kg/day) in district Torgher.

- (iv) 83 fishermen (75% of the sample survey) catch fish for domestic use only while, 27 fishermen (25%) catch fish for domestic use but also sell a part of it.
- (v) The overall total 110 fishermen's average household income is around Rs. 137,629/year. While, the total average income of 27 fishermen who sell a part of their fish catch is Rs. 146,667/year with average income from fishing is Rs. 58,641/year (40%). The highest average HH income from fishing in District Kohistan is Rs. 73,621/year i.e. 49% of total income. The highest income from fish catch is in Pattan which is Rs. 142,650/year (86%).
- (vi) The age of surveyed fishermen ranged between 18 to 72 years.
- (vii) Out of total of 110 surveyed fishermen, 98(89%) are married while remaining 12(11%) fishermen were single.
- (viii) The 53 (47%) out of 110 total fishermen were literate, 19 fishermen were educated up to primary level. Out of all the interviewed, only one fisherman has an education up to masters level.

## **PUBLIC AND OFFICIAL CONSULTATION**

The study is based on thorough consultation and participation in all the downstream target areas. In all villages, focus group discussions and individual discussions with the key informants were made. In total, 22 focus group discussions were made and, 229 community fishing persons participated in the FGDs. In parallel, 4 surveyed Districts Fisheries Officials were also interviewed on the fishing in their district areas including on Rules Regulations applying to fishing from the river as well as penalties, if imposed ever. Likewise, fish vendors on all the spots which are significantly low in number were interviewed. These consultations in addition to interviews and survey questionnaires filling strengthened the in-depth picture of the overall perceptions of the downstream community and; information required for developing safeguard volume on dam/reservoir construction and its impacts on downstream fishing communities.

## **PROJECT IMPACTS AND MITIGATION MEASURES**

### **Impacts of DHP**

Downstream impact of DHP is limited to first 4.4 km, between damsite and tailrace, due to reduced flows during low flow season. A flow of 20 cumecs will be released as environmental flow in this section. Below tailrace, the instantaneous inflow to the dam will be equal to the instantaneous outflow from the dam. Hence any impacts further to the downstream of tailrace are not expected.

Generally hydropower projects will impact the downstream fish and thereby fisheries due to changes in water flow, water quality and blockage of fish migration. But these types of impacts are very limited for DHP due to the following reasons

- DHP is a run-of-river Project with a continuous flow of water to the downstream, and hence it will not alter any downstream flow
- Due to limited storage area of the reservoir (2,85 ha) and high water inflows (up to 7,000 cumecs), the water retention time in the reservoir is very low and hence impacts associated with altered water quality (dissolved oxygen and temperature) will not occur in downstream of DHP
- Very fine sediments will continue to pass through dam site. Further sedimentation will be brought to Indus through tributaries located on the downstream of the dam.
- There is no migratory fish on the Indus in the dam site. The snow carp (or snow trout), the main fish species of the project area breeds, spawns and migrates within the tributaries – not in the main Indus.

However, during construction the quality in Indus would be affected due to large scale construction activities in the river, which could further affect the fish habitat and fish.

These impacts will be mitigated by the implementation of project's environmental management plans.

### **Mitigation and Enhancement Measures**

The impact of DHP on downstream fish is minimal. However, the following mitigations measures are proposed as part of the overall project environmental management plans will mitigate any potential impacts on the downstream fisheries

Proposed mitigation measures are given below:

- Development of a fish hatchery with native snow caprs and stocking the fingerlings in the tributaries of the downstream, upstream and reservoir
- Continuous monitoring program to assess the impact on the fish
- Raising awareness among the local population to avoid fishing in spawning season (March/April and September/October)

In addition, the Project will take up following enhancement measure to support the fishing communities

- education and outreach to address information needs related to fisheries in the downstream area including some training programme for skill enhancement of the fishing community

For the above said main activities, the required funds for implementation of the fishery development in response to DHP development in downstream areas will be spent in collaboration with the Provincial Fisheries Department in the concerned Districts areas along the river. The total budget for the implementation of the proposed development measures is USD 5.12 million.

### **MONITORING AND EVALUATION**

Socio-economic and environmental impacts mitigation measures by the project will be monitored regularly during the DHP implementation and operation. The evaluation will be made by using the findings and results of the mitigation measures adopted by the project.



# **1 INTRODUCTION**

## **1.1 BACKGROUND**

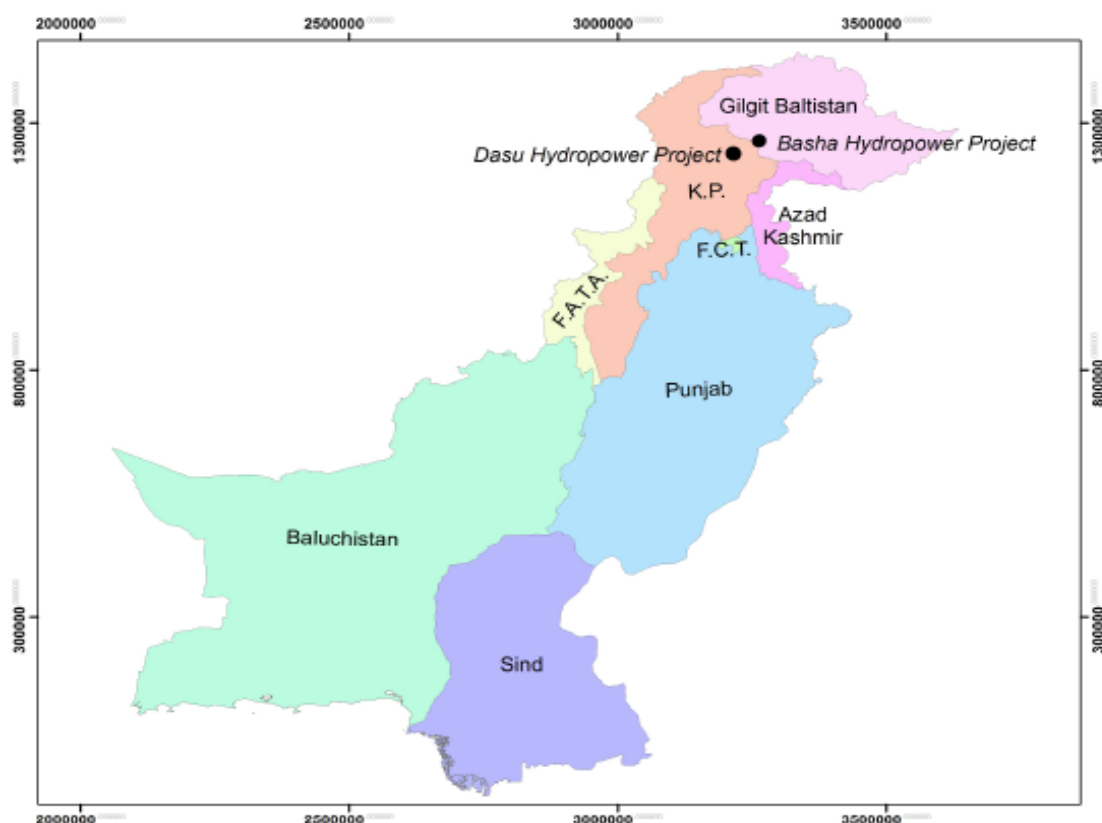
The power availability situation in Pakistan is extremely critical with the periods of load-shedding that is causing adverse economic and social impacts across the country. To meet the short-fall, generation from burning of fossil fuel is being expanded, which is environmentally damaging due to the emissions produced and is also unsustainable. Added to this is the fact that much of the fuel has to be imported. The River Indus provides perennial flow and a large number of potential sites for hydropower development in the northern Pakistan. Dasu is one of such sites where a detailed feasibility study has been completed in early 2009. Pakistan Water and Power Development Authority (WAPDA) undertook the study through a consortium of indigenous and expatriate consultants. Construction of about 242m high dam at this site will provide a gross head of over 200 m for power generation with an installed capacity of 4320 MW.

The Dasu Hydropower Project (DHP) is among the list of projects to be implemented on priority as per the vision 2025 program prepared by Water and Power Development Authority (WAPDA). The proposed DHP is estimated to generate 18,440 GWh of energy per annum which when injected into the transmission and distribution system would curtail shortage of electricity in the country. The Project will not require permanent water diversion from the main river body. Water diverted through power tunnels would be re-diverted to the river through tail race tunnels, and, therefore, no consumptive use of water is anticipated. DHP is not expected to affect adversely, in any context, the water sharing between the provinces as per 1991 Water Accord between all four provinces of Pakistan. WAPDA is the Executing Agency of the project while the World Bank is the main donor.

The main purpose of the DHP is to assist in resolving the shortage of power supply and load shedding crisis in the country. This project would be operated on run of river daily cycle basis with little storage. The project will be completed in four phases with a final power generation capacity of 4320 MW.

## **1.2 PROJECT LOCATION**

The dam site of the Dasu Hydropower Project (DHP) is located about 8 km north of Dasu town, the administrative headquarters of District Kohistanon Indus River in Khyber Pakhtunkhwa (KP) province of Pakistan. The dam is also located about 74 km downstream of proposed Basha Hydropower Project site. Location of the Project site in Pakistan is shown in Figure 1.1.



**Figure 1.1: DHP Location Map**

The dam site is located about 350 km north of Islamabad and can be reached by road only in about 10 hours through G.T Road up to Hassan Abdal and then through Karakoram Highway (KKH).

### 1.3 PROJECT DESCRIPTION

As a run-of-the river Project, the Dasu Hydropower Project reservoir extension will reach maximally 74 km upstream of the dam flooding an area of 23.85 sq. km at a maximum flood level of 957 m above mean sea level (amsl). The average discharge at the dam site will be 2,068 cubic meters per second (cumecs). Another important component of the project is the transmission line from Dasu to Rawat with a total length of almost 300 km. Design of the transmission line is under preparation by NTDC which includes Social and Environment Safeguards.

WAPDA will build a 242 m high concrete gravity dam and 74 km long reservoir behind the dam with an average width of 365m. The project will have an underground powerhouse having 12 turbines, each of which will produce 360 MW power, and a final maximum capacity to produce 4,320 MW. 46 km of KKH will be submerged in DHP reservoir and hence will be relocated to a higher level above the reservoir. It is a phased project and its completion period is 2014 to 2035.

### 1.4 OBJECTIVES OF THE STUDY

This study evaluates potentiality of socio-economic impacts on fishing communities downstream of Dasu Dam Axis. The main focus of this study is to determine the impacts of Dasu Hydropower Project (DHP) on downstream fishing community and other direct and indirect stakeholders of fishery downstream of the Dasu Dam Axis to Tarbela Reservoir reach.

The objectives of the study are to:

- (i) establish baseline conditions of communities engaged in fishing downstream of Dasu Dam;

- (ii) assess the present income level of the fishing communities downstream of the dam;
- (iii) identify and assess the overall adverse socio-economic impacts on downstream fishing communities during and after project construction; and
- (iv) suggest mitigation measures for the potential adverse impacts of the Project keeping in view the sustainable livelihood of the downstream fishermen communities'uptoTarbela reservoir reach on both left and right banks of the river Indus.



## **2 REGULATORY FRAMEWORK**

In Pakistan, different Rules and Regulations govern the operational systems of certain public sector departments and development projects. The development of Dasu Hydropower Project concerns to a number of certain public sector departments which owe their own rules and regulations to operate and implement such developments, efficiently and smoothly. This chapter explains the relevant regulatory framework covering the proposed Dasu Hydropower Project development.

### **2.1 THE PAKISTAN ENVIRONMENTAL PROTECTION ACT, 1997**

The Pakistan Environmental Protection Act, 1997 is the basic legislative tool empowering the government to frame regulations for the protection of the environment. This Act is applicable to a broad range of issues and extends to air, water, industrial liquid effluent, soil, marine, and noise pollution, as well as to the handling of hazardous wastes. In context of the Act "environment" means- "(a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the inter-relationships between any of the factors in sub-clauses (a) to (f). The following key features of the Act have a direct bearing on the proposed project:

- Section 12-1 (IEE and EIA): requires that "No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an IEE or, where the project is likely to cause an adverse environmental effect, an EIA, and has obtained from the Federal Agency approval in respect thereof."
- Section 12-2b (Review of IEE and EIA): The Federal Agency shall review the EIA report and accord its approval subject to such conditions as it may deem fit to impose, or require that the EIA be re-submitted after such modifications as may be stipulated or rejected, the project as being contrary to environmental objectives.

### **2.2 THE PAKISTAN NATIONAL CONSERVATION STRATEGY (NCS)**

The Pakistan National Conservation Strategy (NCS) is the principal policy document for environmental issues in the country and was developed and approved by the Government of Pakistan on March 1, 1992. The NCS works on a ten-year planning and implementation cycle. The NCS deals with 14 core areas which are;

- maintaining soils in cropland;
- increasing irrigation efficiency;
- protecting watersheds;
- supporting forestry and plantations;
- restoring rangelands and improving livestock;
- protecting water bodies and sustaining fisheries;
- conserving biodiversity;
- increasing energy efficiency;
- developing and deploying material for renewable energy;
- preventing/abating pollution;
- managing urban wastes;
- supporting institutions for common resources;
- integrating population and environmental programs; and
- Preserving the cultural heritage.

### **2.3 KP FISHERIES RULES 1976**

An ordinance to amend the West Pakistan Fisheries Ordinance 1961 was issued by the Provincial Government of KP in 1976. The objective of the ordinance is to amend and

consolidate the law relating to fisheries in the province of KP. This ordinance is now enforced as Khyber Pakhtunkhwa Fisheries Rule 1976.

This grants power to Director General (DG) Fisheries to issue permits to catch fish. The ordinance provides protection against 1) Destruction of fish by explosives, and 2) Destruction of fish by poisoning water. There are other clauses giving protection to fish. Penalties are provided for violating the provisions of the ordinance. Fishing is controlled as shown in Table 2.1:

**Table 2.1: First Schedule (Section 8) Species of Fish and Prohibitions**

Sr.No.	Fish Species		Size (In Inches)	Closed Fishing Season
	Local Name	Scientific Name		
1.	Trout	<i>Salmo trutta</i>	9	10th October to 9th March.
2.	Mahaseer	<i>Tor putitora</i>	12	1st June to 31st August.
3.	Rahu	<i>Labeo rohita</i>	12	1st June to 31st August.
4.	Mori	<i>Cirrhinus mrigala</i>	12	1st June to 31st August.
5.	Thaila	<i>Catla catla</i>	12	1st June to 13th August.
6.	Kalban	<i>Labeo calbasu</i>	12	1 <sup>st</sup> June to 31 <sup>st</sup> August.

## 2.4 WB OP 4.12, INVOLUNTARY RESETTLEMENT

This policy covers direct social and economic impacts that are caused by the involuntary taking of land which would result in:

- Relocation or loss of shelter;
- Loss of assets or access to assets; or
- Loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or
- The involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

Where necessary to achieve the objectives of the policy, the resettlement plan or resettlement policy framework to be prepared should also include measures to ensure that displaced persons are:

- Offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; and
- Provided with development assistance in addition to compensation measures such as land preparation, credit facilities, training, or job opportunities.

## **3 INDUS RIVER: AQUATIC CHARACTERISTICS**

### **3.1 AQUATIC ECOSYSTEMS**

The Indus originates in Mansorawar Lake in Tibet, is approximately 3,058 km long and drains an area of 963,480 km<sup>2</sup> before discharging into the Arabian Sea. Physical geological, meteorological and hydro-biological conditions vary substantially along the river as do corresponding important human uses of the river and dependent economic conditions. The uppermost section of the river flows east-west in the mountain peak zone for about 950 km before it reaches the Dasu Project area. The catchment in that area is mountainous and characterized by towering peaks covered with snow and glaciers. The river is mainly fed by melting of mountain snow; flow is high during summer and contribution from rainfall is very small. The mean annual flow and annual runoff at Dasu amounts to 2,100 m<sup>3</sup>/s and 68 BCM respectively, but differences between summer and winter are large: 80 percent of the water flows between June and October.

Physico-chemical conditions of river water changes between the summer and winter seasons. During summer, river water is very turbid and carries a high sediment load. Annual sediment inflow at DHP damsite is about 200 million tons and 97% of it occurs during high flow season of June to October.

During the 2012 April surveys the ranges of physico-chemical parameters were: water temperature 15-24°C; conductivity 63-149 µS/cm; calcium carbonate hardness 30-110 mg/l; dissolved oxygen 4.8-7.4; and NO<sub>3</sub> 0.20-1.20 mg/l. Low concentrations of NO<sub>3</sub> suggest mainly low nutrient levels and oligotrophic conditions. There were rather large differences in chemical parameters between sample stations, mainly related to close-by human residences.

Several river tributaries join the Indus between Basha and Tarbela. Catchment areas vary greatly. All streams pass along steep gradients through rocky areas of high mountains, exhibiting variable cascades. At confluences with other tributaries and the Indus River they discharge gravel and sand from river bed erosion. Water quality in the main tributaries was also surveyed during the summer of 2012. The water in these nullahs/streams was generally colorless, odorless, transparent and cool. Dissolved oxygen concentrations ranged from 5.0 to 10.0 mg/l and conductivity ranged from 28 to 105 µS/cm indicating variable but generally low concentrations of dissolved solids. During winter months temperatures were reported to be substantially lower: data averaged around 8°C, against some 20°C during summer. The banks of some tributaries show patches of vegetation.

### **3.2 FISH DIVERSITY**

Fish diversity in the Indus is low compared to other major rivers. 177 fish species are reported from the Indus River system, including 12 exotic species. This is substantially lower than in other major rivers in Asia; the Ganges houses 350 fish species, the Brahmaputra and the Mekong around 400, and the Hwang 320. Fish species of Northern Pakistan is given in Table 3.1. Five species of fish are recorded in the project area. The first of two sampling trips (6 persons, 10 days) yielded only 25 fish, and the second only 50, belonging to four species: three carps and one catfish. The distribution of sexes was equal. Nearly all fish were captured in small riffles and pools of tributaries; fish caught in the Indus River were mostly from confluence areas, close to the tributaries. The main reasons for poor fish diversity and density are the long torrential upper courses in the Himalayas, glacier fed water and high sediment load or low mean discharge rate of water. Fish sampling for the Diamer Basha Hydropower Project (2006) yielded 14 species, but also this can be considered low, probably due to high-altitude tributaries, low water temperature, high water velocity, low benthic productivity and long stretches of gorges.

Most species in the project area are members of the carp family (Cyprinidae) and loach family (Noemacheilidae). The piscifauna is dominated by endemic genera of the cyprinid sub-family Schizothoracinae (snow carps or snow trouts: Schizothorax, Esocinus and Labitus spp.) and one genus of the Noemacheilidae family (Triplophysa sp.) and one species of the Sisoridae family (the catfish Glyptosternum reticulatum). These genera inhabit torrential and swift streams and rivers of the mountain region and have evolved morphologic features adapted to these habitat conditions. In order to enhance fish production two species of Salmonidae (brown trout and rainbow trout) were introduced in the upper part of Indus in Gilgit river and adjoining streams during the early nineties. No brown/rainbow trout was observed in any of the samples.

Downstream of the project site the number of species increases. From the area between Dasu and Pattan seven species are reported by fisheries authorities, especially from the tributaries. Prior to construction of the Tarbela dam, 35 fish species were recorded in the Indus River and tributaries around Tarbela.

Snow carp and Mahaseer are the two important fish species of cold waters of Himalayan waters. Snow carps are the major fish species in the Indus and as one moves to south to transitional or semicold waters, schizothoracines are joined by mahseers. The snow carp species and the two Mahaseer species (Tor putitora and Tor tor) were common and utilized as food fish. The other native fish species are resident species and have no commercial value.

**Table 3.1: Fish Species of Northern Pakistan**

Family / Species			Local Name
<b>A – Indigenous species</b>			
1.	Family – Cyprinidae		
	Sub family – Schizothoracinae		
	1.	Schizothorax plagiostomus	Gahi, Cheemo
	2.	Schizothorax labiatus	Chochan
	3.	Schizothorax esocinus	Chakhat
	4.	Schizothorax skarduensis	Khaduk
	5.	Schizothorax intermedius	Khaduk
	6.	Schizothorax longipinnis	Khaduk
	7.	Schizopygopsis stoliczkai	-
	8.	Schizocypris curviformis	-
	9.	Ptychobarbus conirostris	-
	10.	Diptychus maculatus	-
	11.	Racoma labiata	Snowcarp
2.	Family – Sisoridae		
	12.	Glyptosternum reticulatum	-
3.	Family – Noemacheilidae		
	13.	Triplophysa stoliczkai	-
	14.	Triplophysa gracilius	-
	15.	Triplophysa yaseenis	-
	16.	Triplophysa trawovasea	-
	17.	Triplophysa tenuicauda	-
	18.	Triplophysa microps	-
<b>B – Exotic species</b>			
4.	Family – Salmonidae		
	19.	Salmo trutta faria	Brown Trout



Family / Species			Local Name
	20.	Oncorhynchus Mysis	Rainbow Trout
5.	Family – Cyprinidae		
	21.	Cyprinus carpio	Chinese carp / Gulfam

*Source: M. Rafique (2000) Pak. Museum of National History, Islamabad.*

### 3.3 SNOW CARPS HABITAT, MIGRATION AND SPWANING

Schizothoracines (genera Schizothorax and Schizopyge) are the major fish of cold water streams and rivers of Himalayan regions, with the dominant species being Schizothorax plagiostomus. In Dasu project area three species of scizothorax (plagiostomus, esocinus and labitus) are present. Plagiostomus is the dominant fish species in Dasu area representing more than 75% of total fish catch and other two species represent about 15% of total fish catch. None of these species are listed in IUCN Red List.

**Habitat:** Snow carps thrive in the snow fed river habitat of clear, shallow water of stony substratum with an average depth from 0.5 to 3 meters, and river flows with low to high velocities (0.5 to 1.5 m/s). Average temperature requirements are 4 to 20 oC and dissolved oxygen requirements are 8 to 12 mg/l. Snow carps are bottom feeders and mainly feed on peryphytic algae and diatoms.

During fish surveys, conducted in April and August of 2013 in the Indus and its tributaries in the Project area, fish found mainly in the tributaries, while in the mainstem they are found near the confluences.

**Migration:** Snow carps are short distant migrants. In the project area, they migrate within the tributaries, not along the mainstem Indus. During April to September (spring and summer, high flow season), they prefer upstream head waters habitat at higher elevations. During September to April (low flow season and winter), they prefer lower elevations and confluence zone with Indus. The triggers for migrations are high flows, high sediment load and low temperatures. During spring, when flows started increasing in the rivers due to melting of snow, the fish migrate upstream from April and May (within tributaries) due to high flows and turbidity at lower elevations. During autumn, when the temperatures are starts to drop at higher elevations in head waters, the fish migrate downstream from September and October.

**Spawning:** Female fishes spawn in two seasons, one in September-October and other in March - April. Sexually matured snow carp (when they reach 18-24 cm length, at the age of 2-3 years) spawn in tributaries in clear water (along stream banks, backwater pools and near confluences of other tributaries and Indus) on gravelly/stony ground or on fine pebbles at 10-30 cm depth. Low water currents of 0.5- 1.5 m/sec, pH 7.5, dissolved oxygen concentration of 8-12 mg/L and gravel size of 50-60 mm is the optimum conditions for spawning.

### 3.4 MAHASEER

Golden Mahaseer (Tor Putitora) is a long distant migratory and endangered fish species of Indus. Snow caprs are the major fish species in the Indus and as one moves to south to transitional or semicold waters, schizothoracines are joined by mahseers. Mahaseer habitat starts about 70 to 80 km downstream of the DHP damsite. Tor species habituated in slow moving streams and rivers of the foothill regions and bred in gravels and sandy beds. Mahaseer is reported to ascend the Indus River to Besham Qila and above and to spawn in Allai Khwar which has been described as the last upstream safe-haven for the species. The Golden Mahaseer was the primary quality food fish in the region and an attractive fish for anglers. Its economic significance was substantial. However, due to permanent deep submergence of many natural breeding grounds of Mahaseer in the Tarbela reservoir, natural propagation of the species drastically declined. Mahaseer migrated into upstream tributaries where breeders were

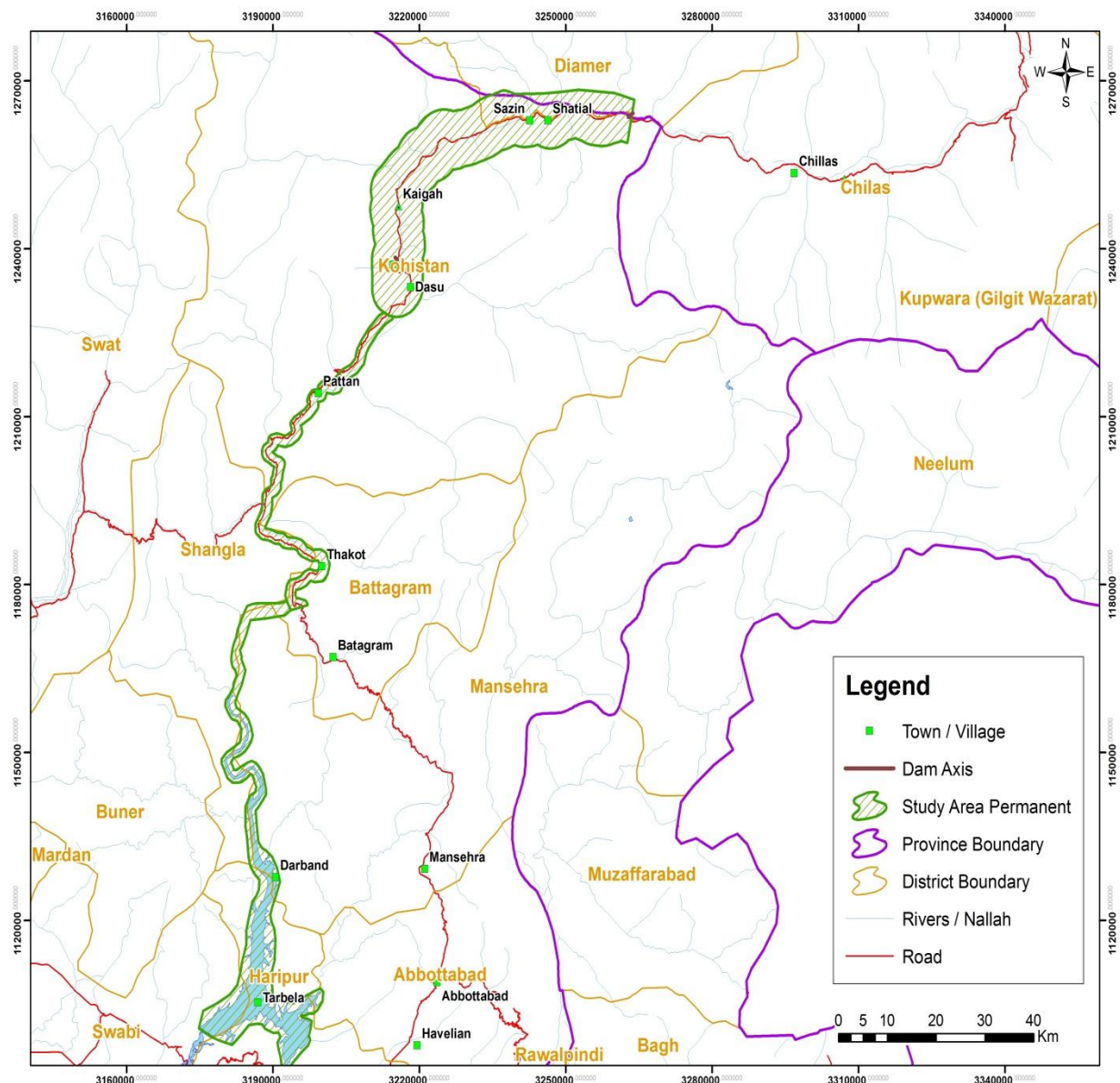
indiscriminately fished; enforcement of protective regulations proved to be ineffective. During fish sampling in the Dasu project area no Mahaseer specimen could be caught; local people confirmed its absence from the area. In recent literature the information on the status of Mahaseer is often called somewhat exaggerated. Although a considerable impact from the Tarbela project cannot be denied, there is still a reasonable proportion of Mahaseer in total catches, especially in the rivers Haro, Soan and Korang (60-80 percent). Even in the Tarbela reservoir Golden Mahaseer maintains a share of 5-11 percent in the catches.

## 4 METHODOLOGY

This chapter includes the methodology being adopted to get the required information for assessing the in-depth knowledge and feedback for the impacts of the proposed project on downstream fishing communities.

### 4.1 TASKS

This study evaluates socio-economic impacts on fishing communities downstream of Dasu Dam up to Tarbela Reservoir reach. The main focus of this study is to determine the impacts of Dasu Hydropower Project (DHP) development on fishermen populations and other direct and indirect stakeholders of fishery downstream of the Dam axis to Tarbela Reservoir site as shown in Figure 4.1.



**Figure 4.1: Dasu Dam Reservoir and Downstream Area**

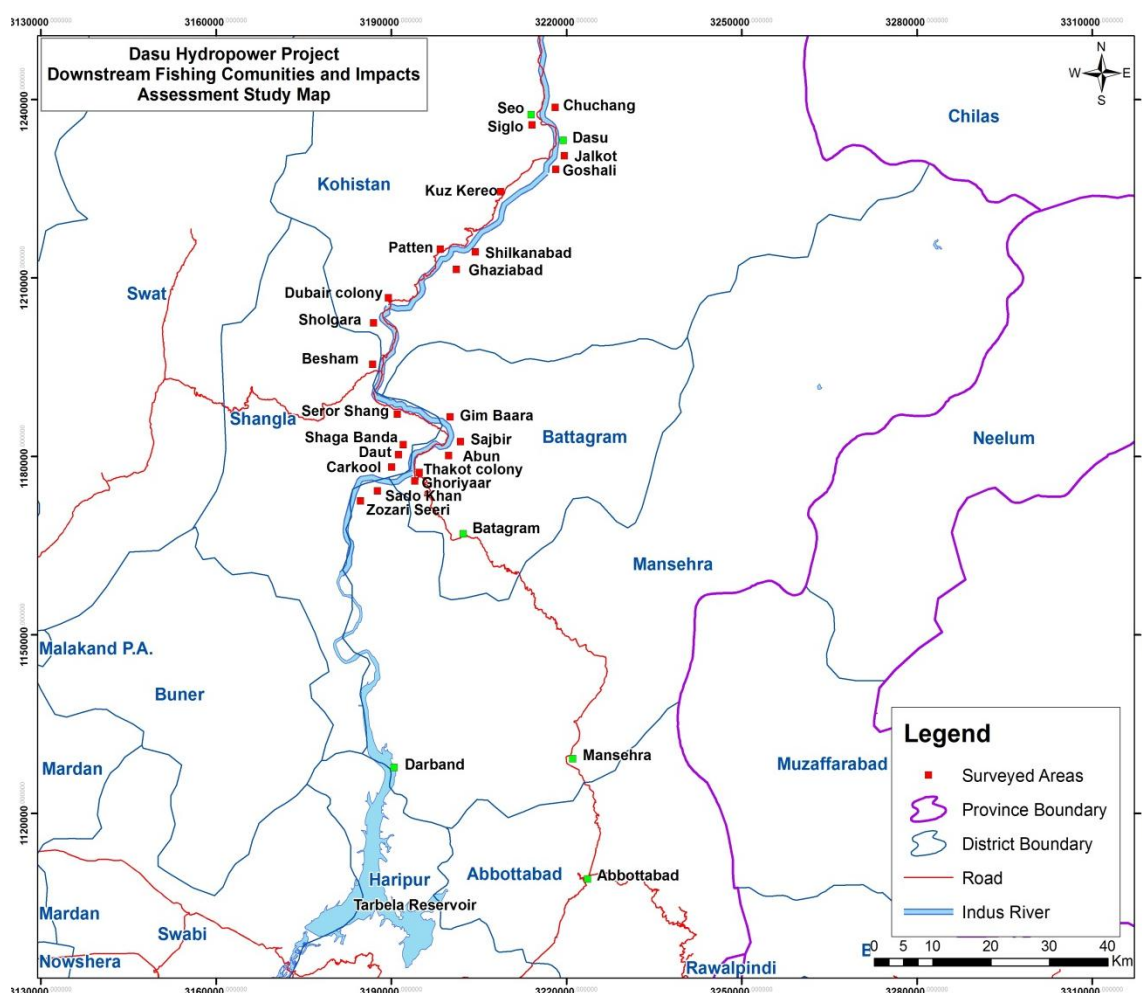
The present study provides the baseline conditions of the downstream fishing communities and assessment of adverse impacts along with their mitigation measures.

## 4.2 STUDY AREA

The study area for downstream impacts study on fishing communities starts from downstream of Dasu dam axis and ends at Tarbela reservoir reach. Four districts were covered in this study area. The length of study area was approximately 200Km along the river Indus. District wise study area is given in Table 4.1 and study area map is given in Figure 4.2.

**Table 4.1: District wise Study Area**

Sr. No.	District	Location	No. of Surveyed Villages
1.	Kohistan	Dasu Dam Axis to Sholgara	10
2.	Shangla	Besham to Carkool Khas	8
3.	Battagram	Thakot Colony to Ghoriyaar	2
4.	Torgher	Sado Khan to Zozari Seeri	2



**Figure 4.2: Study Area showing Downstream Settlements**

## 4.3 SAMPLING TECHNIQUE

Since it was not possible to include the entire population due to resource and temporal constraints, a representative sample was considered in the study. Random sampling was used to select the persons to be interviewed to avoid human bias influencing the choice. As the study assessed a statistically representative sample of the stakeholder group, the data are statistically representative of the entire population.

For the survey, village representative or identifying persons were interviewed and from that information, village profile was prepared. With the help of these representatives / identifying persons further five fishermen in each of respective village were selected and interviewed. Then, extensive consultation and discussions were done with the concerned Communities in their village.

#### **4.4 PRIMARY DATA COLLECTION**

Primary data were collected by the field survey team. For this purpose a comprehensive baseline survey was conducted. The main tool used in this survey was the questionnaires.

A set of three kinds of questionnaires, i) interviews with Identifying Persons/ key informants; ii) Village community group discussion; and iii) interviews with Fishermen were performed. The questionnaires used in this study are given in Appendix A. These questionnaires contained a combination of both specific and open-ended questions along with certain guided questions, where necessary. The field survey team included two fishery experts and a sociologist. The survey team visited the project area in May 2013 and collected the data. The techniques used for data collection are as follow:

##### **4.4.1 Focus Group Discussions (FGDs)**

At all main spots/villages in the downstream area to get insight of the fishing community, focus group discussions were conducted. This activity led to the participation of both fishing and relevant community in the discussion for required information and perceptions of the fishermen community.

##### **4.4.2 In-depth Interviews (IDIs)**

With the officials of provincial Fisheries Department of all the relevant districts in the downstream areas of Dasu Dam Axis, formal in-depth interviews were taken. These officials are handling the fisheries sector in their respective districts. Information about the department's working, fishing status, fish fauna and the secondary data was collected from the offices. Also, Trout Fish Hatchery in particular was visited to see the prospects in future after the project development in project affected area.

##### **4.4.3 Sample Survey through Questionnaire Filling**

For sample survey, questionnaires of the fishermen were filled on sample basis in the villages of downstream area. This activity led to have the household information of a fisherman in terms of his socio-economic conditions.

#### **4.5 SECONDARY DATA COLLECTION**

The secondary data were collected from published material and locally posted government officials such as the Assistant Director Fisheries, Pattan (Kohistan), Assistant Director Fisheries, Alpuri (Shangla), Assistant Director Fisheries, Battagram, Assistant Director Fisheries, Mansera/Thakot, Deputy Director Fisheries, Khalabat/Tarbela.

#### **4.6 LIMITATIONS IN THE STUDY**

- (i) The information presented here are collected from survey of 110 fishermen (18% of total fishing community) from 22 surveyed villages; community consultations in 22 villages, and meetings with six fisheries officials', due to limitations of time resource.
- (ii) Fishermen do not maintain records on fishing and socio-economic conditions and therefore validity of information provided by the respondents is subjective as they informed. However personal judgment was used interactively at certain places.



## **5 SOCIO-ECONOMIC BASELINE CONDITIONS**

This section provides the baseline socio-economic conditions of the concerned districts and the fishing communities in the downstream study area.

### **5.1 DISTRICTS POFILES**

#### **5.1.1 Kohistan**

According to the 1998 Census, the total population of Kohistan was 472,570. The male to female ratio was 124.4 (i.e. for every 100 females, there are 124.4 males). At the time of the 5<sup>th</sup> Population Census in 1998, Kohistan had three Tehsils, of which Dasu had the highest population with 184,746; Palas had 165,613; and Pattan 122,244. Population density was 63.1 people per sq. km. Both literacy and enrolment rates in Kohistan are among the lowest in the country. Only one-quarter of the population is active economically. The female labor force participation is less than 1 percent. The 1998 Census reported the district's literacy rate among those aged 10 years and above, as 11.1 percent, but there were significant gender differences: male literacy was 17.23 percent and female literacy 2.95 percent. The total school enrolment rate was 6.89 percent (10.60 percent for males and 1.34 percent for females). Fishery department exists and actively involved in issuing licenses for fish catch and fishery development.

#### **5.1.2 Shangla**

According To 1998 Census, the total population of Shangla was 434,563 with an average annual growth rate of 3.27 percent. The male to female ratio was 106.1 (i.e. for every 100 females, there are 106.1 males). The population density was 274 persons per sq. km. The district's literacy rate among those aged 10 years and above, as 14.73 percent, male literacy was 25.16 percent and female literacy 3.71 percent. Shangla district had 5 tehsils and 24 union councils. Fishery department exists and actively involved in issuing licenses for fish catch and fishery development.

#### **5.1.3 Battagram**

According To 1998 Census, the total population of Batagram was 307,278 with an average annual growth rate of 0.58 percent. The male to female ratio was 106.6 (i.e. for every 100 females, there are 106.6 males). The population density was 236.2 persons per sq. km. The district's literacy rate among those aged 10 years and above, as 18.31 percent, male literacy was 29.40 percent and female literacy 6.48 percent. Batagram district had 2 tehsils and 20 union councils. Fishery department exists and actively involved in issuing licenses for fish catch and fishery development.

#### **5.1.4 Torgher**

Torgher was given the status of district in 2010. It was a part of district Mansehra before this. No official Census data was available. According to unofficial sources, the present population of district is 170,000. Fishery department exists but not fully active in issuing fish catch licenses etc.

### **5.2 HOUSEHOLDS INVOLVED IN FISHING IN SAMPLE VILLAGES**

In downstream of DHP the Indus River passes through four districts of KP province, up to Tarbela reservoir area and there are about 50 villages along the river. Out of which during downstream baseline fishing communities' survey, twenty two main villages (44%) in four districts were surveyed located on both left and right bank of river Indus. The survey data details are shown in Appendix B (B-1 – B-7). Overall Households involved in fishing were 626(11.8%) out of 5,294 total households of twenty two sampled villages. District Kohistan and Shangla have selected villages on both banks (Left and Right) of the river. While, the Battagram and Torgher districts exist on the left bank of Indus River. In District Kohistan fishermen HHs living on left bank (16.9%) are higher in number than



right bank (8%) of the river. Similar trend was observed in Shangla District (Table 5.1) and details shown in Appendix B (B-1).

**Table 5.1: District-wise Villages & Households involved in Fishing**

Sr. No.	District	Location (Right/ Left)	No. of Villages Surveyed	Overall HHs of the Sampled Villages	HHs Involved in Fishing	Percentage of HHs involved in Fishing
1.	Kohistan	Right	5	1,040	83	8.0
		Left	5	2,304	390	16.9
2.	Shangla	Right	5	970	62	6.4
		Left	3	180	28	15.6
3.	Battagram	Left	2	140	28	20
4.	Torgher	Left	2	660	35	5.3
<b>Total</b>	<b>4</b>	<b>2 Right/ 4 Left</b>	<b>22</b>	<b>5,294</b>	<b>626</b>	<b>11.8</b>

### 5.3 FISHING GEAR

The common fishing gear used in the study area is gill net (83%) to catch the fish from the river. The fishermen also use hook & line (73%) and cast net (20%). The fishermen use cast net to catch fish from tributaries only. Among fishermen, the use of a combination of fishing gear is common (Table 5.2). Only in District Torgher, two fishermen admitted during the consultations, informal discussion that poison is also used for the fish catch. The details are shown in Appendix B (B-2).

**Table 5.2: Districtwise Use of Fishing Gear by the Fishermen**

Sr. No.	District	Location (Right/ Left)	No of fishermen HHs surveyed	Fishing Gear				
				Cast Net	Gill Net	Hook & Line	Poison	Blast
1.	Kohistan	Right	25	12 (48%)	19 (76%)	22 (88%)	-	-
		Left	25	9 (36%)	17 (68%)	19 (76%)	-	-
2.	Shangla	Right	25	01 (4%)	25 (100%)	11 (44%)	-	-
		Left	15	-	15 (100%)	15 (100%)	-	-
3.	Battagram	Left	10	-	07 (70%)	09 (90%)	-	-
4.	Torgher	Left	10	-	08 (80%)	04 (40%)	02 (20%)	-
<b>Total</b>	<b>4</b>	<b>2 Right and 4 Left</b>	<b>110</b>	<b>22 (20%)</b>	<b>91 (83%)</b>	<b>80 (73%)</b>	<b>02 (1.8%)</b>	<b>-</b>

### 5.4 AVERAGE FISH CATCH

The overall average catch is 4.12 kg/day. On an average the fishermen practice fishing about 18 days in a month. The trend of fish catching significantly decreases from Kohistan to Torgher district areas. The highest fish catch (5.04 kg/day) recorded in district Kohistan while lowest (2.02kg/day) in district Torgher. Month-wise fishing practice also decreases towards downstream in the study area (Table 5.3). The details are shown in Appendix B (B- 3).



**Table 5.3: Districtwise Fish Catch by surveyed Fishermen**

Sr. No.	District	Location (Right/ Left)	No of fishermen HHs surveyed	Average Catch (kg/Day)	Days/ Month	Months/ Year
1.	Kohistan	Right	25	5.04	19.16	5.94
		Left	25	4.55	12.74	5.04
2.	Shangla	Right	25	4.03	21.38	3.72
		Left	15	4.06	21.70	3.78
3.	Battagram	Left	10	3.13	18.85	2.1
4.	Torgher	Left	10	2.02	13.15	3.1
<b>Total</b>	<b>4</b>	<b>2 Right and 4 Left</b>	<b>110</b>	<b>4.12</b>	<b>17.99</b>	<b>4.33</b>

## 5.5 END USE OF FISH CATCH

Usually, the fish catching is for domestic consumption. 73 fishermen (66%) catch fish only for domestic consumption while 27 fishermen (34%) catch fish for domestic consumption but also sell a part of it. There is no middle man concept in this region. There is no designated fish market in the studied area. People sell their catch to local fish vendors. Detail of fish vendors are mentioned in Appendix-A. Some people also sell their catch on nearby road to the passersby. Some fishermen sell their catch directly to different landlords and officials. The fishermen of Shangla (left side) and Torgher District practice fishing only for domestic use (Table 5.4). The detail of end use of fish catch is shown in Table 5.5 and Appendix B (B-.3).

**Table 5.4: Districtwise End Use of Fish Catch**

Sr. No.	District	Location (Right/ Left)	No of fishermen HHs surveyed	End use	
				Domestic use	Domestic + Commercial
1.	Kohistan	Right	25	16 (64%)	9 (36%)
		Left	25	15 (60%)	10 (40%)
2.	Shangla	Right	25	22 (88%)	3 (12%)
		Left	15	15 (100%)	0
3.	Battagram	Left	10	5 (50%)	5 (50%)
4.	Torgher	Left	10	10 (100%)	0
<b>Total</b>	<b>4</b>	<b>2 Right and 4 Left</b>	<b>110</b>	<b>73 (66%)</b>	<b>27 (34%)</b>

**Table 5.5: Downstream Fishermen and their Livelihood Trend**

District	Sr. No.	River bank	Name of Village	Overall HHs of Sampled Village	HHs Involved in Fishing	% age of HHs Involved in Fishing	End Use
Kohistan	1.	R	Siglo	30	8	26.7	Domestic
	2.	L	Chuchang	104	10	9.6	Domestic + Commercial
	3.	L	Goshali	300	100	33.3	Domestic
	4.	L	Jalkot	1000	150	15.0	Domestic + Commercial
	5.	R	Kuz Kereo	40	25	62.5	Domestic
	6.	L	Shilkan Abad	500	80	16.0	Domestic
	7.	L	Ghaziabad	400	50	12.5	Domestic
	8.	R	Patten	800	25	3.1	Domestic + Commercial
	9.	R	Dubair colony	100	15	15.0	Domestic + Commercial

	10.	R	Sholgara	70	10	14.3	Domestic
Right side				1040	83	8.0	
Left side				2304	390	16.9	
Overall (Kohistan)				3344	473	14.1	
<b>Shangla</b>	1.	R	Besham	300	20	6.7	Domestic
	2.	R	Seror Shang	50	7	14.0	Domestic
	3.	R	Shaga Banda	120	10	8.3	Domestic
	4.	L	Sajbir	100	8	8.0	Domestic
	5.	L	Gim Baara	40	8	20.0	Domestic
	6.	L	Abun	40	12	30.0	Domestic
	7.	R	Daut	350	15	4.29	Domestic + Commercial
	8.	R	Carkool	150	10	6.67	Domestic
Right side				970	62	6.4	
Left side				180	28	15.6	
Overall (Shangla)				1150	90	7.8	
<b>Battagram</b>	1.	L	Thakot colony	80	20	25.0	Domestic + Commercial
	2.	L	Ghoriyaar	60	8	13.3	Domestic
Overall (Battagram)				140	28	20	
<b>Torgher</b>	1.	L	Sado Khan	360	15	4.2	Domestic
	2.	L	Zozari Seeri	300	20	6.7	
Overall (Torgher)				660	35	5.3	
<b>Right side total 10 villages</b>				<b>2010</b>	<b>145</b>	<b>7.2</b>	
<b>Left side total 12 villages</b>				<b>3284</b>	<b>481</b>	<b>14.6</b>	
<b>Domestic consumption in 16 village</b>				<b>2860</b>	<b>391</b>	<b>13.7</b>	
<b>Domestic + commercial use in 6 villages</b>				<b>2434</b>	<b>235</b>	<b>9.7</b>	
<b>Over all total 22 villages</b>				<b>5294</b>	<b>626</b>	<b>11.8</b>	

## 5.6 FISH CATCH LOCATIONS

Fishing will be carried out mostly in tributaries and occasionally in Indus during low flow season of winter near the confluence areas. Fishermen pointed out during the consultations/informal discussion that riverine fishes are more health promoting and tasty. The details of fishing locations are given in Appendix B (B-4).

## 5.7 AVERAGE INCOME FROM FISHING

Out of twenty two surveyed villages, the twenty seven fishermen of six villages sell part of their fish catch. The overall average income of household is Rs. 146,667/year. The income from fishing is Rs. 58,641 (40% per annum). The highest average HH income from fishing in District Kohistan is Rs. 73,621 i.e., 49% of total income. However, these fishermen do not catch fish regularly (Table 5.7). The highest income from fish catch is in Pattan which is Rs. 142,650 (86%). The details are shown in Appendix B (B- 5&B-6).

**Table 5.4: Annual Fishermen' Income in Different Downstream Districts**

Sr. No.	District	Location (Right/ Left)	Village name	Ave. Income of HHs/Year (PKR)	Ave. Income of HHs From Fishing/Year (PKR)	Percentage of HHs Income from Fishing/Year (PKR)
1.	Kohistan	Left	Chuchang	115200	62,000	53.82
		Left	Jalkot	160800	35,800	22.26
		Right	Patten	165600	142,650	86.14
		Right	Dubair Colony	162000	49,140	30.33
	Left side			138000	48,900	38.04
	Right side			164000	101,090	61.64
	Overall (Kohistan)			150316	73,621	48.98
2.	Shangla	Right	Dawoot	152000	23,667	15.57
3.	Battagram	Left	Thakot Colony	129600	22,700	20.83
4.	Torgher	-	-	-	-	-
<b>Overall</b>				146667	58,641	40

## 5.8 LITERACY LEVEL OF FISHERMEN

Total twenty two villages were surveyed situated alongside the bank of River Indus taking five fishermen from each village. Out of 110 fishermen, 53 (47%) were not literate, 19 (17%) fishermen were educated up to primary and 18(16%) have passed middle school grade. The other 6 (5%) fishermen are educated to a matric level. Only one fisherman has education up to master level. The details are shown in Appendix B (B-7).

**Table 5.5: District wise Surveyed LiteracyLevel of Fishermen**

District	No. of Surveyed Villages	Fishermen LiteracyLevel						
		Illiterate	Primary	Middle	Matric	Inter	B.A	Master
Kohistan	10	12	12	11	8	3	3	1
Shangla	8	28	5	4	2	1	-	-
Battagram	2	8	1	1	-	-	-	-
Torgher	2	4	1	2	1	2	-	-
<b>Overall</b>		<b>52 (47%)</b>	<b>19 (17%)</b>	<b>18 (16%)</b>	<b>11 (10%)</b>	<b>6 (5%)</b>	<b>3 (3%)</b>	<b>1 (1%)</b>

## 5.9 AGE AND MARITAL STATUS OF FISHERMEN

Of the 110 consulted, 8(7%) fishermen are up to 20 years of age, 53(36%) fishermen are between 21 and 35 years, 46 fishermen (42%) are between 36 to 50 years and 9 fishermen (8%) are between 51 to 65 years of age while one fishermen not respond. Ninety eight (89%) out of the total of 110 surveyed fishermen, 98 (89%) are married while remaining 12(11%) fishermen were single. The details are shown in Appendix B (B-7).

**Table 5.6: District wise Age and Marital Status of Surveyed Fishermen**

District	No. of Surveyed Villages	Age of Fishermen					Not Responded	Married status	
		Up to 20	21-35	36-50	51-65	Above 65		Single	Married
Kohistan	10	3	31	9	5	1	1	6	44
Shangla	8	1	15	21	2	1	-	4	36
Battagram	2	1	2	4	2	1	-	1	9
Torgher	2	3	5	2	-	-	-	1	9
<b>Overall</b>	<b>22</b>	<b>8 (7%)</b>	<b>53 (48%)</b>	<b>46 (42%)</b>	<b>9 (8%)</b>	<b>3 (3%)</b>	<b>1 (1%)</b>	<b>12 (11%)</b>	<b>98 (89%)</b>

## 6 CONSULTATIONS AND DISCUSSION

This chapter presents consultations and discussions carried out during the study in 2013 on downstream impacts. A major objective was to consult concerned persons and communities and list their information and concerns regarding Dasu Hydropower Project Development related to fish catching including their expectations regarding any support and mitigation measures.

### 6.1 CONSULTATIONS CONDUCTED DURING STUDY

During the project detailed design stage, visits and consultations with major community engaged in fishing and living along the river. For this study, scoping sessions were held with persons in the villages on both banks starting from Dasu Dam Axis to Tarbela reservoir reach. Also, concerning districts officials of provincial Fisheries Department were consulted. On the basis of these scoping sessions and consultation, an assessment of the views of the community and officials was made regarding their perceptions, apprehensions and reactions about the construction of the Dasu Hydropower Project and its impacts on downstream area in relevance to fishing and others. However, these scoping activities were undertaken in all major areas and villages along the river on both banks. About 229 persons attended the discussion in 22 different sessions at different locations throughout the project downstream area including 6 in-depth interviews with Fisheries Department Officials shown in Table 6.1. (Appendix D)

**Table 6.1: Consultations Undertaken during Study on Downstream Impacts**

No.	Date	Venue/Situation	Community Head/Official Consulted	No. of Respondents
<b>a) Focus Group discussions with Fishing Community</b>				
1.	17-05-13	Siglo	Ashraf Khan	11
2.	18-05-13	Chuchang	Abdul Jabbar	15
3.	18-05-13	Goshali	Sher Khan	13
4.	18-05-13	Jalkot	Faiz malik	16
5.	19-05-13	Kuz Kereo	Rahim Dad	18
6.	19-05-13	Shilkanabad	Abdul Qayoom	14
7.	19-05-13	Ghaziabad	Ijaz Ali	10
8.	19-05-13	Patten	Ibrahim	18
9.	20-05-13	Dubair colony	Khan Muhammad	10
10.	20-05-13	Sholgara	Muhammad Duraj	18
11.	21-05-13	Besham	Shah Khalid	13
12.	22-05-13	Seror Shang	Umer Tesar	11
13.	22-05-13	Shaga Banda	Gul Nabi	10
14.	23-05-13	Sajbir	Zafar Khan	12
15.	24-05-13	Gim Baara	Umer Zada	13
16.	25-05-13	Abun	Janat Gul	10
17.	25-05-13	Dawoot	Abdul Aziz	16
18.	26-05-13	Carkool	Sangeen	14
19.	27-05-13	Thakot colony	Mujahidin	12
20.	28-05-13	Ghoriyaar	Munawar Khan	17
21.	29-05-13	Sado Khan	Rehman Zada	15
22.	30-05-13	Zozari Seeri	Wajid Ali	13
<b>Total</b>				<b>229</b>
<b>b) In-depth Interviews with Fisheries Department Officials</b>				
1.	21.5.13	District	Taj Muhammad (Assistant	1

		office Fisheries, Patton	Director Fisheries, Kohistan district)	
2.	23.5.13	District office Fisheries, Alpuri	Shahid Mahmood (Assistant Director Fisheries, Shangla district)	1
3.	26.5.13	District office Fisheries, Battagram	Faheem Akhtar (Assistant Director Fisheries, Battagram distric)	1
4.	28.5.13	District office, Torgher	Akbar Khan (Assistant Commissioner, Torgher district)	1
5.	29.5.13	District office Fisheries, Manshera	Khalid Khan (Assistant Director Fisheries, Torgher/Manshera)	1
6.	30.5.13	District office Fisheries, Haripur	Muhammad Shafi Marwat (Depty Director Fisheries, Haripur/Tarbela Dam)	1
<b>.Total</b>				<b>6</b>

The main expectations of the community at different locations during consultations mainly at that time were: (1) jobs in the project; (2) technical training by the project; and (3) support for development of fisheries in their area.

## 6.2 CONSULTATIONS – DASU DAM CONSTRUCTION AND DOWNSTREAM IMPACTS

During the study, starting from 17th to 30th in May 2013, a series of downstream community consultation meetings and focus group discussions were conducted with particular focus on project information, fishing, income and livelihood, impacts, mitigation measures and expectations etc. Key discussion points and description are listed in Table 6.2. List of identify persons, district officials and fish vendors is given in Appendix D (D1 to D-3). The photo-log of consultation meetings is given in Appendix E.

**Table 6.2: List of Key Issues Discussed**

Issues	Perception of the Fishing Community
Information on Dasu Hydropower Project	Generally, the fishermen communities in the downstream area of the project know about development of the Dasu Hydropower project. They generally don't know how and when the project will be implemented. .
Possible Impacts of the Project on Fishing	The community living near the towns is a general idea that the construction of the dam will affect fish in the river. They are of the opinion that the dam will restrict water flow which will lead to lessen the fish in the main stream of the river. Some people have reported that in some occasions they also collect wood (during high flow season, when they were deposited on the banks) from rivers and make some money (not as a regular source of income)
Fishermen Organization	There in the entire project downstream area, no fishermen organization exists even, some of them responded that they don't even understand it.
Situation of Fish in the River and Nullahs	Community is well aware that presence of fish in Indus is limited and fish mainly occurs in the nullahs (tributaries). Generally they do not fish in Indus due to deep water and high water currents. They fish mainly in tributaries and however, during low flow season (winter) they also prefer to catch fish near Indus river bank where speed and depth of the water is low. The reason only being is less resources and expensive nets. They mentioned clearly that the fish (Swati, snow carp) is mainly present in the nullahs.
Skills in Fish Catching	The fishing community catches fish with the help of nets and other traditional methods. At some places, they also told that other non-traditional methods like poison; blasting and electric current is also used in fish catching. Mostly, the catching is through nets of different types.
Fish Consumption	The information reveals that all the fish catching households

	consume fish on alternate day in a month. Mainly the fishing community is marginal and catches fish for their household consumption.
Fish Selling	Very less community at certain areas which are closer to towns, sell fish. They sell fish to get income/money for arranging their other household need like grocery or the general expenditures.
Prospect Buyers	All the commercial fishermen told that they sell fish in the nearby markets as well as to direct buyers in the area who ask to provide fish at their doorsteps. There are some small restaurants in the towns, the owners of which also buy fish from them.
Role of Gender	In discussion with the community, it was found that there is no role of gender in fish catching except cooking in their own houses or maximum to the repair of nets but in very rare cases.
Suggestions or Proposals for Impact mitigation	The downstream fishing communities demand employment in the project during construction and in post-construction periods. In one of the meetings, a request was made for free vocational training for boys to prepare themselves for employment in the project. Some of the fishermen proposed that better nets may be provided to the community for more fishing to have better consumption and livelihood. Further, some asked for some fish ponds in their area etc.

## 6.3 FEEDBACK FROM CONSULTATIONS

### 6.3.1 Overall Information and Attitude towards the Project

The overall attitude of the communities towards the Project is positive, they support the Project and substantial assistance has been provided to the consultant team for carrying out downstream impacts study. However, at some places, there are concerns on the impact on fish and fish catch. That situation considerably changed after the description of the project as being a run-of-river and river flow continuation.

### 6.3.2 Key Concerns of Downstream Communities

The key concerns raised in the consultation meetings are mainly relating to lessening in fish catch from the river. The community who were well aware of the project emphasised that project should assist the fishing community in terms of the needs like livelihood opportunities, trainings and jobs in the project and others as this all may not happen for them as being from outside the project area.

## 6.4 FEEDBACK FROM IN-DEPTH INTERVIEWS WITH DEPARTMENTAL OFFICIALS

The method of the in-depth interviews with the officials of the Provincial Fisheries Department was direct meeting and pre-planned meeting and using the segments as follows:

- (i) a brief presentation on the technical/engineering design;
- (ii) a presentation on the project social and environmental impacts;
- (iii) status of fish in the river and main nullahs;
- (iv) fish catching from the river;
- (v) licensing and penalties on illegal fishing;
- (vi) downstream impacts of dam construction;
- (vii) mitigation of the impacts; and
- (viii) recommendations and proposals.

A total of 6 in-depth interviews with 4 district heads including Assistant Commissioner, Torgher district. During all the in-depth interviews with the officials of Provincial Fisheries Department, it was expressed by them that the Dasu Hydropower Project is not a project only for Kohistan District; it has country wide significance since electricity would be available to the entire country. Therefore, this is a project of national significance. The key outcomes of the meetings are summarized below:

- Fish is caught mainly for food, income and sports.
- The fishing activities are more predominant in tributaries than the main stream of Indus River. In the downstream of the dam site up to Dubair Khawar, much of the fishing is practiced in the tributaries located on both side of Indus, and partially from Indus. Fishermen depend mostly on fish meat for household consumption. There is a project in running by the KP government for the development of trout and establishing fish ponds at certain spots both in the up and downstream area but the capacity of the community is low in managing those. Government or the Project at the start of the project may start some training programme for skill enhancement of the fishing community.
- The public sector due to its weak organization and resources is unable to regulate fishing in the area instead; the officials facilitate and motivate the community for fishing.
- Awareness rising for the community about size, breeding season and species is the must for protecting the endangered species.
- In the middle reach of the downstream area ranging around Besham, community is not dependent on fish as being some well-off but; the method of fishing sometimes is not appropriate.
- For the promotion of fishery in entire downstream of the Dasu Project area, Information, Education & Communication (IEC) material may be developed and distributed which will help in organizing the fishing.
- There are people who occasionally catch wood logs (when there were huge landslides during flood season on the upstream (both Indus and tributaries) uproot trees or when the illegal logging in the upstream accidentally drifted downstream) and use for domestic consumption and also sell in the market. But it is not a regular activity in the area and also not a regular source of income to the community. The inflow of logs in to Indus and tributaries have been reduced considerably in recent years due to conservation measures taken upstream by the forest departments.
- The project may support downstream fishing communities by giving them assistance in livelihood resources, education or technical training or investment in the small ponds establishment at suitable places in collaboration with the relevant fishermen. The coordination with the provincial Fisheries Department will play a positive role in sustainability of the local developments.

## **6.5 INCORPORATION OF FEEDBACK AND CONCERNS**

All outcomes, feedbacks and concerns from various consultation meetings, surveys and interviews have been considered in the detail design phase to mitigate the concerns of downstream fishing community. Some of the proposals, demands and mitigation measures are beyond the jurisdiction of WAPDA but for such activities, WAPDA will consult and coordinate with KP provincial government on addressing these matters.



## 7 IMPACTS

Potential impacts of DHP on the downstream fish are explained in detail in EIA report. A summary of this report is presented in this chapter. The following social and environmental effects of DHP during construction and operational stage are studied:

- Impact on fish habitat during construction activities on the river
- Impact on fish migration
- Impact on fish habitat in the upstream of Indus and tributaries due to formation of reservoir
- Impact on fish habitat and ecological connectivity of about 4 km dewatered section between dam and tailrace
- Impact on fish habitat on downstream of Indus due to reservoir operations due to change in downstream water quality, temperature and sediment
- Impacts on fishermen in fish catch thereby effecting the income and livelihood as well as household fish consumption

Mitigation measures adopted to reduce above impacts to acceptable and minor levels are also presented in this section.

### 7.1 IMPACT ON FISH AND FISH HABITAT DURING CONSTRUCTION

**Potential Effects:** Construction activities within the river (coffer dams, main dam and diversion tunnels) and along banks will have potential to adversely affect aquatic biota by release of high concentrations of sediment, fuels/oils and other toxic compounds, and solid waste and use of explosives. Sediment concentrations above natural levels can cause mortality of biota directly; for fish, damaged gills and sediment clogging of gill chambers eventually leads to death. Indirectly, sediment deposition downstream can affect biota by altering habitat features and reduced benthic production and food abundance for herbivorous fish such as snow carp and fish preying on algae-feeding invertebrates. Toxic compounds can have direct lethal and sub-lethal effects on organisms or have indirect effects for example by reducing food-organisms. Solid wastes can be ingested causing injury or death and can impair habitat. Explosives can kill aquatic organisms immediately or cause sufficient damage to internal organs even at long distances that death will eventually occur.

**Mitigation:** Mitigation measures proposed in project's environmental management plans to control sediment releases in construction areas will minimize potential adverse effects on aquatic resources. Similarly measures outlined in environmental management plans regarding use and handling of fuels, explosives and other hazardous materials and control and disposal of solid waste will also minimize potential adverse effects on aquatic biota. No explosives are planned for underwater during construction.

### 7.2 IMPACT ON FISH MIGRATION

**Potential Effects:** Snow carp is the main fish species in the project area. Snow carp habitat is mainly located along the tributaries and in Indus it is found only near the confluence areas during winter when the water currents and turbidity levels in Indus are very low. Snow carp is a short distant migrant and it migrates within the tributaries from lower elevations to head waters of the tributaries, not along the main Indus. Mahaseer, a long distant migratory fish in Indus is located about 70 to 80 km downstream of Dasu dam site and its migration starts further downstream. Hence Dasu dam will create any barrier to migratory fish in Indus.

**Mitigation:** No mitigation measures are proposed. Further studies and monitoring of fish will be carried out through project implementation to understand their biological behavior and address if any impacts are noticed.

### 7.3 IMPACT ON UPSTREAM FISH HABITAT

**Potential Effects:** Habitat upstream of the dam will be changed from current riverine habitat to lake-like habitat commencing with first-filling of the reservoir once dam construction has been completed. Physical, chemical and biological conditions along the Indus River will be altered from current conditions, though river-like attributes, notably high water velocity in upstream segments of the reservoir, will be retained. Habitat in lower portions of tributaries will be submerged and replaced in some locations by small embayments. Overall reservoir habitat, including newly formed embayments in tributary valleys, will rapidly be reduced due to sedimentation. This may affect the breeding and spawning sites of the snow carp in the tributaries and confluence points.

**Mitigation:** Fish hatchery will be developed for production of artificial seed of snow carps, which will be stocked in the tributaries and river stretches downstream and upstream of the dam to compensate the loss of natural spawning grounds and enhancing the fish stocks affected by dam. Further, spawning grounds will be maintained and/or developed near the new confluence areas of the tributaries and reservoirs. Maintaining spawning grounds include depositing gravel to increase the spawning habitat; manipulating angular and large boulders to create pools for spawning and as an escape cover for fish during low water levels. Further studies and monitoring will be carried out as part of project's environmental management plan to monitor and address the impacts on fish.

### 7.4 IMPACT ON THE DOWNSTREAM UP TO TAILRACE OUTLET

**Potential Effects:** The river reach between dam-axis to tailrace discharge point is about 4.4 km long. During June to September, when the average river flow is higher than 2600 m<sup>3</sup>/s, the excess water will be discharged through the spillways/low level outlets of the dam. However, during October to May, when the average flow is less than 2,600 m<sup>3</sup>/s, there will be no water released downstream of the dam and all the water will be diverted to the power house and will be released to the river through tailrace outlet (. A small tributary, Siglo stream joins the Indus in this reach (about 1.2 km downstream of dam). The average annual runoff from Siglo stream is 1.7 m<sup>3</sup>/s with average runoffs less than 0.5 m<sup>3</sup>/s during low flow season, which indicates most part of this section will be dry during low flow season. The riverine ecosystem component that will be affected between the dewatered section is aquatic ecosystem and aesthetics.

**Mitigation Measures:** An environmental flow of 20 m<sup>3</sup>/s is recommended to be released from dam as environmental flow in line with the Tarbela/Ghazi Barotha Hydropower in Indus (which has a dewatered section of 54 km Indus). In addition it is recommended to always operate one turbine and release 222.5 m<sup>3</sup>/s of water from tailrace. Thus maximum length of the dewatered section will receive about 242 m<sup>3</sup>/s of environmental flow. The release of environmental flows represents 44% of average winter flows, 67 to 97% of average winter depth, 72 to 95% average winter wetted perimeter, and 4 to 7% of average winter velocities. Below tailrace, the instantaneous inflow to the dam will be equal to the instantaneous outflow from the dam during run-of-river operations, or minimum 242 m<sup>3</sup>/s of environmental flow will be maintained downstream of tailrace if the reservoir will be operated as peaking plant after construction of Diamer Basha dam.

### 7.5 IMPACT ON DOWNSTREAM WATER QUALITY

**Potential Effects:** Generally water quality in reservoirs will be deteriorated due to thermal stratification and depletion of dissolved oxygen at deeper levels. Average water retention time (residence time) in the reservoir is an important determinant of the extent of the change in water quality. Generally, long retention times in the reservoir will affect the reservoir water quality through changes in dissolved oxygen, eutrophication and thermal stratification. Average water retention time in Dasu reservoir found to be very short varying from 1 to 6 days during high flow season, and about 19 days during low

flow season. The impacts on water quality are estimated to be minor due to these short retention times.

**Mitigation Measures:** Temperature and oxygen sensors will be used for continuous monitoring of their levels in the reservoir near the dam. If low oxygen conditions are evident during monitoring prior to flushing, a lead-in period may be required whereby the lower-level outlets are used to draw out low oxygen-concentration lower-elevation water in combination with spillway releases to provide adequate oxygen concentrations in water downstream of the plunge pool.

## **7.6 CHANGE IN DOWNSTREAM SEDIMENT**

**Potential Effects:** Under natural conditions, seasonal scouring typically would occur during the summer high flow period, with some particles setting in low-energy areas of the river (e.g., back eddies and small embayments). Downstream habitat, particularly depositional areas where sediments normally would accumulate, will be altered with chronic non-replenishment of particle sizes removed by the reservoir. Some but not all sediment trapped in the reservoir will be released downstream in pulses during periodic flushing of sediment from the reservoir after 15 years of operation. Overall downstream aquatic habitat will experience a net decrease in sediment deposition and associated change in biotic assemblages, likely favoring species that will benefit from reduced amounts of sand and gravel in seasonal deposition and scouring cycles. However, very fine sediments will continue to pass through dam site. Further sedimentation will be brought to Indus through tributaries located on the downstream of the dam.

**Mitigation:** Mitigation measures are not proposed because retention of sediment in the reservoir could yield a net benefit to downstream biota and resource use. Environmental effects monitoring during the DHP operations phase will include downstream sample stations and methods selected to assess long-term ecological effects of reduced sediment and, as necessary, with findings used to support development of adaptive mitigation measures.

## **7.7 IMPACTS ON THE FISH CATCHES AND LIVELIHOOD OF FISHERMEN**

**Potential Effects:** It is difficult to estimate the reduction in fish yield and impact on livelihood of fishermen. The impact on the downstream fish yield will mainly occur within 4.4 km of from downstream of the dam. Further downstream the impact on fish yield will be minimal during regular operation of the project due to changes in water quality and sediment flow. During construction stage also the impacts will be minimal if the environmental management plans are properly implemented.

**Mitigation Measures:** Implementation of environmental management plans during construction activities and release of environmental flows will mitigate any impacts on the downstream fisheries. Further monitoring will be carried on the fish yield. To enhance the natural fisheries in the downstream tributaries and Indus, it is recommended to establish a fish hatchery of snow carps and stock the tributaries and Indus with fingerlings. It is also recommended to raise awareness among the local population for the need to protect fishery resource to avoid fishing in spawning season (March/April and September/October). In addition it is also recommended that the project will take up education and outreach to address information needs related to fisheries in the downstream area including some training programme for skill enhancement of the fishing community as an enhancement measure.

## **7.8 IMPACTS ON OTHER STAKEHOLDERS**

There is no established fish market in the study areas. There are four fish vendors in the project downstream as given in Appendix D (D-3). They are involved in selling fish both in uncooked and cooked form in local market. These vendors purchased fishes directly

from local fishermen which sell the part of their catch. There is no middle man involved in fish selling because the number of catch is small. The fish vendors not totally dependent on the supply of fish catch by local fishermen. The major sell fish of fish vendors belong to other water bodies. The fish vendors of this studied area sell fish after purchasing the other fish species from other cities like Swat. Furthermore, the fish sell duration in study area is very limited. The fish vendors sell fish as a part time. During field survey and village community based discussion, it was found that there are no fishermen's organizations working in the area. There are also suppliers of fishing gears present in local market who would be depending on fishing for their income in some extent. All gears supplier mainly sell the cast net. From the suppliers of fishing gears, the fishermen bought the fishing gears to practice the fishing from river Indus and other water bodies. Fishing gears supplier community based discussion during field survey revealed that most of the customer/fishermen purchased the net once and then used this net after repairing if needed and the customer of supplier practice fishing in tributaries using cast net. Furthermore, the fishing gears supplier not totally dependent on this income. No impacts are expected on other stakeholders involved in fishing activities.

## 8 BUDGET

The study recommended future monitoring, establishment hatchery for producing fish seed, education and outreach programs. The costs of monitoring programs are covered in the project's environmental management plans. The cost of implementation of other two mitigation measures is US\$ 5.12 million. Fisheries Departments of the concerned districts and PMU will jointly implement these mitigation measures.

### 8.1 ESTABLISHMENT OF HATCHERY

Main objective of the proposed hatchery is to propagate fry in the River Indus and tributaries in the surrounding area while leads the conservation of indigenous species especially for *Schizothorax plagiostomus*. The hatchery would be constructed in consultation with the Fisheries Department of concerned district. However, project authorities will be the final authority to select the site in consultation with fishery department. The department can use the proposed hatchery for the ova production of fish species. Also, the ova and fry of fish could be supplied for the farmers, interested in fish culture in the area, if any. The fish brooders will be selected from river Indus in the vicinity of project area. The varieties of selected species should be well adapted to the bio-physical conditions of river Indus.

Proposed hatchery unit would comprise of indoor nursery tanks (10m x 5m x 0.5m) for fry, rearing tanks (20m x 10m x 1m) for juveniles and stocking tanks (30m x 15 m x 1.5m) for brooders. The hatchery is of small size, comprising of two nursery tanks, two rearing tanks and two stocking tanks. The hatchery complex will include water supply channel, nursery tanks, rearing tanks, stocking tanks and spawneries. After complete digestion of yolk, spawns would be transferred into the nursery tanks. From nursery tanks and rearing tanks fry and fingerlings would be shifted to the Indus River and other water bodies. The stocking tanks would be used to develop brooders for induced breeding. Tributaries like Siglo, Jalkot and Goshali are perennial streams and have sufficient water discharge in addition to rich aquatic biodiversity, which may be able to support the fish seed and further fish fauna by providing suitable breeding, spawning and feeding grounds to the most of the fishes found in the Indus River. The cost estimates for development of fish hatchery is given in Table 8.1.

**Table 8.1: Cost for Development of Fish Hatchery**

Sr. No.	Activity	Quantity	Unit	PKR/Uni	Total	Total (Million PKR)
A	Development Cost					
A.1	Cost of Land	40	Kanal	1000000	40,000,000	40
A.2	Nursery tank (10m x 5m x 0.5m)	40	Number	500000	20,000,000	20
A.3	Rearing tank (20m x 10m x 1m)	30	Number	500000	15,000,000	15
A.4	Stocking tank (30m x 15 m x 1.5m)	20	Number	500000	10,000,000	10
A.5	Water channel	20	Number	2500000	50,000,000	50
A.6	Fish feed (for 4 years)	Lump sum			120,000,000	120
A.7	(Leveling, digging, walls, partitions, generators, etc.)	Lump sum			100,000,000	100
Total – A					355,000,000	355
B	Contingency (3% of A)				10,650,000	10.65
Grand Total					365,650,000	365.65
Total (US \$*)					3,848,947	3.85
* US \$ 1= 95 Pak Rupees						

## 8.2 EDUCATION AND OUTREACH PROGRAMS

Education and outreach to address information needs related to fisheries in the downstream area including some training programme for skill enhancement of the fishing community will be taken up under this activity. These programs will be implemented in collaboration of District Fisheries officials. These programs will also address protection of broodstock and spawning grounds and prevention illegal fishing. The costs are given in Table 8.2.

**Table 8.2: Cost for Education and Outreach Programs**

Sr. No.	Activity	Quantity	PKR/Unit	Total/PKR	Total (Million PKR)
A	Cost for development of improvement fishing				
A1	Awareness cost	lump sum		23,000,000	23.00
A2	Capacity building for improved fishing	lump sum		50,000,000	50.00
A3	IEC material development and distribution	lump sum		16,000,000	16.00
A4	Technicial support	Lump sum		10,00,000	10.00
A4	Administration cost / Management cost	lump sum		18,000,000	18.00
Sub Total A				117,000,000	117.00
B	Contingency (3% Sub total)			3,510,000	3.51
Grand Total				120, 510, 000	120.51
Total (US \$*)				1,268,526	1.23
* US \$ 1= 95 Pak Rupees					

## 8.3 IMPLEMENTATION AND MONITORING

During project implementation, the Project Resettlement Office (PRO) will prepare TORs and coordinate with the concerned District Fisheries Department for the development of fish hatcheries. The Livelihood Team will also be involved the planning and implementation of hatcheries. PRO Office will supervise and monitor the implementation and duly report all activities in the monthly progress report.

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# **APPENDICES**



## Appendix A: Sample Questionnaires

### Questionnaire 1: Interview with Identifying Persons

#### A-Interview with Identifying Person

Questionnaire # \_\_\_\_\_

Interview date			-			-			Interviewer	
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Name \_\_\_\_\_ Father's Name \_\_\_\_\_

CNIC # \_\_\_\_\_ Qualification \_\_\_\_\_

Resident of \_\_\_\_\_ Position \_\_\_\_\_

Contact No. \_\_\_\_\_

Q#1	Any fishing activity takes place in this area.		Yes		No
-----	--	--	-----	--	----

	If yes, Name of nullah / river
--	--------------------------------

	Fishing time of the year / season
--	-----------------------------------

	Magnitude of fishing		Regular		Often		Occasional		Rare
--	----------------------	--	---------	--	-------	--	------------	--	------

Q#2	Identify person/persons who fish in your area.
-----	--

	1. Name _____	2. Name _____
--	---------------	---------------

	Father's Name _____	Father's Name _____
--	---------------------	---------------------

	Resident of _____	Resident of _____
--	-------------------	-------------------

	3. Name _____	4. Name _____
--	---------------	---------------

	Father's Name _____	Father's Name _____
--	---------------------	---------------------

	Resident of _____	Resident of _____
--	-------------------	-------------------

	5. Name _____	6. Name _____
--	---------------	---------------

	Father's Name _____	Father's Name _____
--	---------------------	---------------------

	Resident of _____	Resident of _____
--	-------------------	-------------------

Q#3	Knowledge about types of fish caught.
-----	---------------------------------------

	1.		2.		3.	
--	----	--	----	--	----	--

	4.		5.		6.	
--	----	--	----	--	----	--

Q#4	Do you know about end use of fishing caught in your area?
-----	---

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Q#5	Average price at which fish is being sold in the market _____
-----	---

Q#6	Quantity of fish being sold _____ Kg/ Month
-----	---

Q#7	How many months do you fish in one year _____ Months/ Year
-----	--

## B-Village Profile

Village Name \_\_\_\_\_ GPS Coordinates N \_\_\_\_\_  
Distance from river \_\_\_\_\_ E \_\_\_\_\_  
Total Number of HH of village \_\_\_\_\_ Total Population of village \_\_\_\_\_  
Households involved in fishing \_\_\_\_\_ Name of nearest water body \_\_\_\_\_

1.	Purpose of fishing		Domestic consumption		Livelihood
2.	Rate at which fish is sold (specie wise) (i.e., Mahaseer, Swati, Any other)	1. _____ Rs. _____/kg 2. _____ Rs. _____/kg 3. _____ Rs. _____/kg 4. _____ Rs. _____/kg			
3.	Source of income other than fishing				
Agriculture			Business		Any other _____

### 4. Fishing Locations and Season

Fishing Location	Type of Fish	Fishing Season / Time					
		High Flow Season		Low Flow Season		Both Seasons	
		Months	Fishing Time	Months	Fishing Time	Months	Fishing Time
River							
Nullah _____							
River + Nullah _____							

### 5. Fishing Methods and Quantity of Catch

Fishing Gear	High flow season (From _____ To _____)		Low flow season (From _____ To _____)		Both seasons	
	No. caught / Day	Weight of catch / Day	No. caught / Day	Weight of catch / Day	No. caught / Day	Weight of catch / Day
Cast Net						
Gill Net						
Hook & Line						
Cast Net + Gill Net						
Gill Net + Hook						

& line						
Cast Net + Hook & line						

6. Consumption and income of the village

Season	Weight of catch/ Month	Consumed (Kg)	Sold (Kg)	Income Rs/Month	Income Rs/Season
High flow season (From _____ To _____ )					
Low flow season (From _____ To _____ )					
Total (Annual)					

**Questionnaire 2: Village Community Group Discussions**

Questionnaire # \_\_\_\_\_

Interview date			-			-			Interviewer	
----------------	--	--	---	--	--	---	--	--	-------------	--


1. What do you know about Dasu Hydropower Project?
  
2. Possible impacts due to Dasu Hydropower Project?

During Construction	During Operation

3.1 Direct Impacts on Fisheries

3.1.1 Impact on people depending on Fishery- Income

- Fishermen, their dependents etc.


- Fishermen organizations (cooperatives)


### 3.1.2 Impact on consumers- People depending on fish as a Food item


## 3.2 Other Impacts

### 3.2.1 Suppliers of Fishing gear and equipment


### 3.2.2 Middleman


### 3.2.3 Fish Vendors


### 3.2.4 Development activities undertaken by Fishermen's Organizations


4. Current Situation of Fishing in the Area

4.1 Present Status of Fish


4.2 Present Skill Level of Fish Catching/ Gear/ Equipment


4.3 Marketing (Fish Supplier, Middleman, Fish Vender)


4.4 Who are the people that buy fish from fish vendor? (Local / Outsider)


5. Role of women in fishing


6. Suggestions

6.1 Stock Enhancement


6.2 Skill Enhancement


### 6.3 Marketing


### Questionnaire 3: Interview with Fisherman

Questionnaire # \_\_\_\_\_

Interview date			-			-			Interviewer	
----------------	--	--	---	--	--	---	--	--	-------------	--

#### **A – Personal Particulars**

Name \_\_\_\_\_ Father's Name \_\_\_\_\_  
 CNIC # \_\_\_\_\_ Education \_\_\_\_\_  
 Resident of \_\_\_\_\_ Town / City \_\_\_\_\_  
 Age \_\_\_\_\_ Marital Status \_\_\_\_\_ Contact No. \_\_\_\_\_  
 No. of dependents: Wife \_\_\_\_\_ Children \_\_\_\_\_ Others \_\_\_\_\_

#### **B – Fishing Activities**

1.	Fishing activity	<b><u>Full Time</u></b>	<b><u>Part Time</u></b>
		<input type="checkbox"/> Contractor	<input type="checkbox"/> Domestic
		<input type="checkbox"/> Domestic or Livelihood	<input type="checkbox"/> Livelihood

2.	Fishing location	<input type="checkbox"/> River	Nullah _____	Village pond _____
----	------------------	--------------------------------	--------------	--------------------

3.	Fishing time /season wise	Month _____	Hour _____
----	---------------------------	-------------	------------

4.	Fishing gear	<input type="checkbox"/> Cast net	<input type="checkbox"/> Gill net	<input type="checkbox"/> Hook & line	<input type="checkbox"/> Other _____
----	--------------	-----------------------------------	-----------------------------------	--------------------------------------	--------------------------------------

5.	Type of catch / species _____ _____
----	--

6.	Species wise rate of daily catch _____
----	--

7.	Amount of catch _____ Kg / day, How many days you fish _____ / Month and how many months you fish _____ /year
----	--

8.	End use	<input type="checkbox"/> Domestic	<input type="checkbox"/> Commercial
----	---------	-----------------------------------	-------------------------------------

9.	If commercial, income generated (Rs.) _____ / day / month
----	---



10.	Source of income other than fishing					
				Agriculture	Business	Any other _____
11.	Is there any fishery organization?					
				Yes	No	
	If yes, are you member of that organization?					
				Yes	No	
12.	Did your ancestors involve in fishing?					
				Yes	No	
	If yes, from how many years? _____					
13.	Do you catch any other aquatic animals _____					
14.	Has the fish catch been higher, lower or the same over the last 20 years _____					
15.	For domestic consumption, who prepares/cooks fish after catching (you or other family member)					
16.	Do you fish in the nearby area or outside the area on Indus? _____					
17.	Who decides / makes decision regarding when fish are needed for food (domestic consumption) or for selling _____					

**C – Any suggestions for improving fisheries in the area**

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**D – Family Income**

**Relationship to Head of the Household**

Village \_\_\_\_\_

Name of HH Head	# of family members	Relationship with the HH	Occupation	Income Rs./ Month	Remarks
		Self			
		Wife			
		Father			
		Mother			
		Son			
		Daughter			
		Brother			
		Sister			
		Others			



## Appendix B: Data Collected during Field Survey (16 – 30 May, 2013)

### **B-1: District wise Villages Households Involved in Fishing**

Sr. No.	District	River Bank	Village Name	Total No. of HHs in TargetVillage	Population of Target Village	HHs Involved in Fishing
1.	Kohistan	R	Siglo	30	240	8
2.	Kohistan	L	Chuchang	104	800	10
3.	Kohistan	L	Goshali	300	1000	100
4.	Kohistan	L	Jalkot	1000	5000	150
5.	Kohistan	R	Kuz Kereo	40	500	25
6.	Kohistan	L	Shilkanabad	500	3000	80
7.	Kohistan	L	Ghaziabad	400	9000	50
8.	Kohistan	R	Patten	800	5000	25
9.	Kohistan	R	Dubair colony	100	400	15
10.	Kohistan	R	Sholgara	70	200	10
11.	Shangla	R	Besham	300	2500	20
12.	Shangla	R	Seror Shang	50	350	7
13.	Shangla	R	Shaga Banda	120	550	10
14.	Shangla	L	Sajbir	100	450	8
15.	Shangla	L	Gim Baara	40	500	8
16.	Shangla	L	Abun	40	600	12
17.	Shangla	R	Daut	350	1000	15
18.	Shangla	R	Carkool	150	350	10
19.	Battagram	L	Thakot colony	80	500	20
20.	Battagram	L	Ghoriyaar	60	500	8
21.	Torgher	L	Sado Khan	360	1000	15
22.	Torgher	L	Zozari Seeri	300	850	20

### **B-2: Village wise use of fishing gear by fishermen**

Sr. No.	Names of Fishermen	Village	Fishing Gears				
			Cast Net	Gill Net	Hook & Line	Poison	Blast
1.	Ashraf Khan	Siglo	+	+	+		
2.	Salamdar	Siglo	+	+	+		
3.	Faiz-ur-Rahman	Siglo	+		+		
4.	Jamras	Siglo	+				
5.	Sher Khan	Siglo	+	+	+		
6.	Abdul Jabbar	Chuchang		+			
7.	Izharul Haq	Chuchang		+			
8.	Gulzar Ahmed	Chuchang		+			
9.	M. Zarean Khan	Chuchang		+			
10.	Amanullah	Chuchang		+			
11.	Sher Khan	Goshali		+	+		
12.	Muhammad Gul	Goshali			+		
13.	Fazal-ul-Rehman	Goshali			+		
14.	Shafiq-ur-rehman	Goshali			+		
15.	Baju Khan	Goshali		+	+		
16.	Saib Haq	Jalkot	+	+	+		

17.	Ibrahim	Jalkot	+	+	+		
18.	Faiz Malik	Jalkot	+	+			
19.	Malik Mian	Jalkot		+	+		
20.	Sadam hussain	Jalkot		+	+		
21.	Khan Major	Kuz Kereo	+	+	+		
22.	Fazal Elahi	Kuz Kereo	+	+	+		
23.	Raheem Dind	Kuz Kereo			+		
24.	Amanullah	Kuz Kereo			+		
25.	Alam Zab Khan	Kuz Kereo			+		
26.	Siraj ud din	Shilkanabad		+	+		
27.	Abdul Qayoom	Shilkanabad		+	+		
28.	Sarfraz	Shilkanabad	+	+	+		
29.	Gul Badshah	Shilkanabad	+		+		
30.	Khalil ullah	Shilkanabad	+		+		
31.	Ijaz Ali	Ghaziabad	+		+		
32.	Riaz Ahmad	Ghaziabad	+		+		
33.	Zain	Ghaziabad	+		+		
34.	Muhammad Imtiaz	Ghaziabad		+	+		
35.	Muhammad Iqbal	Ghaziabad		+	+		
36.	Ibrahim	Patton	+	+	+		
37.	Sher Muhammad	Patton	+	+	+		
38.	Hayat ullah	Patton	+	+	+		
39.	Bakht Amin	Patton	+	+	+		
40.	Rahim ullah	Patton	+	+	+		
41.	Abdullah	Dubair Colony			+		
42.	Khan Muhammad	Dubair Colony		+	+		
43.	Muhammad Ayaz	Dubair Colony		+			
44.	Abdul Bari	Dubair Colony		+			
45.	Sher Muhammad	Dubair Colony		+	+		
46.	Muhammad Duraj	Sholgara		+	+		
47.	Nabeel khan	Sholgara		+	+		
48.	Alam sher	Sholgara		+	+		
49.	Rasool Khan	Sholgara		+	+		
50.	Abdulrehman	Sholgara		+	+		
51.	Bakhtezar Shah	Basham		+			
52.	Shah Khalid	Basham		+			
53.	Saed Ali Shah	Basham	+	+	+		
54.	Waseem Shah	Basham		+			
55.	Sadam hussain	Basham		+			
56.	Itibar Gul	Seror Shang		+	+		
57.	Hafeez ullah	Seror Shang		+	+		
58.	Umer Tesar	Seror Shang		+	+		
59.	Muhammad Khan	Seror Shang		+	+		
60.	Gul Nabi	Seror Shang		+	+		
61.	Shaib Zada	Shaga Banda		+	+		
62.	Umer Zada	Shaga Banda		+	+		
63.	Kositana	Shaga Banda		+	+		
64.	Naseeb Khan	Shaga Banda		+	+		
65.	Mujib Rahman	Shaga Banda		+	+		

66.	Saeed ur Rehman	Sajbir		+	+		
67.	Zafer Khan	Sajbir		+	+		
68.	Naitullah	Sajbir		+	+		
69.	Mabat khan	Sajbir		+	+		
70.	Ikram ullah	Sajbir		+	+		
71.	Umer Zada	Gim Baara		+	+		
72.	Dertab	Gim Baara		+	+		
73.	Hassan Zada	Gim Baara		+	+		
74.	Sahreen	Gim Baara		+	+		
75.	Muhammad Sharif	Gim Baara		+	+		
76.	Sheen Khan	Abun		+	+		
77.	Muhammad Zaid	Abun		+	+		
78.	Minhag	Abun		+	+		
79.	Ameer Zada	Abun		+	+		
80.	Jaanat Gul	Abun		+	+		
81.	Abdul Aziz	Daut		+			
82.	Salahudin	Daut		+			
83.	Nabi Ur Rehman	Daut		+			
84.	Muhammad Saleem	Daut		+			
85.	Amanullah	Daut		+			
86.	Abdul Razaq	Carkool		+			
87.	Sangeen	Carkool		+			
88.	Inam Ullah	Carkool		+			
89.	Fazle Hameed	Carkool		+			
90.	Hashim Ali Saeed	Carkool		+			
91.	Mujahedin	Thakot Colony		+			
92.	Ferhan	Thakot Colony		+			
93.	Hanif-Ur-Rehman	Thakot Colony		+			
94.	Fazal Muhammad	Thakot Colony		+			
95.	Zeralam Khan	Thakot Colony		+			
96.	Mustana Khan	Ghoriyar		+			
97.	Sakhiullah	Ghoriyar		+			
98.	Munawar Khan	Ghoriyar		+			
99.	Muhammad Arif	Ghoriyar		+	+		
100.	Shah Faisal	Ghoriyar			+		
101.	Rehman Zada	Sado Khan			+	+	
102.	Abdul Razaq	Sado Khan		+		+	
103.	Bakhi alam	Sado Khan			+		
104.	Khan Malik	Sado Khan		+			
105.	Saminullah	Sado Khan		+			
106.	Wajid Ali	Zozari Seeri		+			
107.	Noor Nabi Said	Zozari Seeri			+		
108.	Shabur Ahmad	Zozari Seeri			+		
109.	Said Nazeer	Zozari Seeri		+			
110.	Fazal Rabi	Zozari Seeri		+			

**B-3: Village wise Fish Catch and End Use**

Sr. No.	Names of Fishermen	Village	Fishing Catch			End use	
			Average Catch (Kg/Day)	Days/ Month	Months /Year	Domestic	Commercial
1.	Ashraf Khan	Siglo	4 to 5	20-25	8	Domestic	
2.	Salamdar	Siglo	7	20	08 to 09	Domestic	
3.	Faiz-ur-Rahman	Siglo	2	12 to 15	07 to 08	Domestic	
4.	Jamras	Siglo	5 to 6	15-20	12	Domestic	
5.	Sher Khan	Siglo	12 to 15	20	8	Domestic	
6.	Abdul Jabbar	Chuchang	8 to 9	20	5	Domestic	Commercial
7.	Izharul Haq	Chuchang	5 Kg	22	5	Domestic	Commercial
8.	Gulzar Ahmed	Chuchang	10 Kg	20	5	Domestic	Commercial
9.	Muhammad Zarean Khan	Chuchang	8 Kg	18	5	Domestic	Commercial
10.	Amanullah	Chuchang	10 Kg	20	3	Domestic	Commercial
11.	Sher Khan	Goshali	2 to 4 Kg	10	6	Domestic	
12.	Muhammad Gul	Goshali	1 to 2 Kg	4 to 5	10	Domestic	
13.	Fazal-ul-Rehman	Goshali	4-5 Kg	12 to 15	6	Domestic	
14.	Shafiq-ur-rehman	Goshali	3-4 Kg	10	4	Domestic	
15.	Baju Khan	Goshali	5-6 Kg	12 to 15	10	Domestic	
16.	Saib Haq	Jalkot	8 to 10 Kg	15 to 20	4	Domestic	Commercial
17.	Ibrahim	Jalkot	5 to 6	20 to 25	5	Domestic	Commercial
18.	Faiz Malik	Jalkot	6 to 7 Kg	10 to 15	4	Domestic	Commercial
19.	Malik Mian	Jalkot	4 to 5 Kg	15 to 20	5	Domestic	Commercial
20.	Sadam hussain	Jalkot	1.5 to 2 Kg	15 to 20	4	Domestic	Commercial
21.	Khan Major	Kuz Kereo	2.5 Kg	10 to 12	6	Domestic	
22.	Fazal Elahi	Kuz Kereo	4 Kg	20 to 25	4	Domestic	
23.	Raheem Dind	Kuz Kereo	4-5 Kg	10	3	Domestic	
24.	Amanullah	Kuz Kereo	1-2 Kg	10 to 12	5	Domestic	
25.	Alam Zab Khan	Kuz Kereo	4 Kg	8	6	Domestic	
26.	Siraj ud din	Shilkanabad	1-2 Kg	10 to 12	8	Domestic	
27.	Abdul Qayoom	Shilkanabad	5 Kg	7 to 10	4	Domestic	
28.	Sarfraz	Shilkanabad	4 to 5 Kg	10	5	Domestic	
29.	Gul Badshah	Shilkanabad	2	8 to 10	4	Domestic	
30.	Khalil ullah	Shilkanabad	1 to 10 Kg	6 to 10	5	Domestic	
31.	Ijaz Ali	Ghaziabad	2-3 Kg	8 to 10	3	Domestic	
32.	Riaz Ahmad	Ghaziabad	2-3 Kg	4 to 5	7	Domestic	
33.	Zain	Ghaziabad	1 to 1.5	5	2	Domestic	
34.	Muhammad Imtiaz	Ghaziabad	1-2 Kg	8	4	Domestic	
35.	Muhammad Iqbal	Ghaziabad	1-2 Kg	5 to 8	3	Domestic	

36.	Ibrahim	Patton	10 Kg	20 to 25	9	Domestic	Commercial
37.	Sher Muhammad	Patton	4 to 5 Kg	30	9	Domestic	Commercial
38.	Hayat ullah	Patton	6 Kg	30	9	Domestic	Commercial
39.	Bakht Amin	Patton	6 to 8 Kg	30	9	Domestic	Commercial
40.	Rahim ullah	Patton	7 to 10 Kg	15 to 20	9	Domestic	Commercial
41.	Abdullah	Dubair Colony	2 to 3 Kg	30	3	Domestic	
42.	Khan Muhammad	Dubair Colony	9 to 10 Kg	30	5	Domestic	Commercial
43.	Muhammad Ayaz	Dubair Colony	4 to 5 Kg	20 to 25	2	Domestic	Commercial
44.	Abdul Bari	Dubair Colony	4 to 5 Kg	25 to 26	4	Domestic	Commercial
45.	Sher Muhammad	Dubair Colony	3 to 4 Kg	15 to 20	2	Domestic	Commercial
46.	Muhammad Duraj	Sholgara	4	10	3	Domestic	
47.	Nabeel khan	Sholgara	2 to 3 Kg	15 to 20	4 to 5	Domestic	
48.	Alam sher	Sholgara	5 to 6 Kg	20 to 25	3	Domestic	
49.	Rasool Khan	Sholgara	1 to 2 Kg	12 to 15	5	Domestic	
50.	Abdulrehman	Sholgara	2 to 4 Kg	8 to 10	4	Domestic	
51.	Bakhtezar Shah	Basham	2 to 3 Kg	10 to 12	3	Domestic	
52.	Shah Khalid	Basham	3 Kg	15	4	Domestic	
53.	Saed Ali Shah	Basham	2 Kg	10	7	Domestic	
54.	Waseem Shah	Basham	2 to 3	3 to 5	6	Domestic	
55.	Sadam hussain	Basham	1 to 1.5 Kg	8 to 10	4	Domestic	
56.	Itibar Gul	Seror Shang	4 Kg	20	4	Domestic	
57.	Hafeez ullah	Seror Shang	5 Kg	21	3	Domestic	
58.	Umer Tesar	Seror Shang	7-8 Kg	24	4	Domestic	
59.	Muhammad Khan	Seror Shang	5-7 Kg	20	5	Domestic	
60.	Gul Nabi	Seror Shang	7 to 8 Kg	20	4	Domestic	
61.	Shaib Zada	Shaga Banda	3 to 4 Kg	20	3	Domestic	
62.	Umer Zada	Shaga Banda	6-7 Kg	25	5	Domestic	
63.	Kositana	Shaga Banda	4 Kg	25	5	Domestic	
64.	Naseeb Khan	Shaga Banda	5-6 Kg	25	3	Domestic	
65.	Mujib Rahman	Shaga Banda	3-4 Kg	22	4	Domestic	
66.	Saeed ur Rehman	Sajbir	4-5 Kg	20-22	2	Domestic	
67.	Zafer Khan	Sajbir	2-3 Kg	25	4	Domestic	
68.	Naitullah	Sajbir	5-6 Kg	22-25	4	Domestic	
69.	Mabat khan	Sajbir	5	30	3	Domestic	
70.	Ikram ullah	Sajbir	7-8 Kg	20	4	Domestic	
71.	Umer Zada	Gim Baara	7-8 Kg	20	4	Domestic	
72.	Dertab	Gim Baara	2-3 Kg	20	4	Domestic	
73.	Hassan Zada	Gim Baara	2-3 Kg	30	5	Domestic	
74.	Sahreem	Gim Baara	2-3 Kg	10 to 15	4	Domestic	

75.	Muhammad Sharif	Gim Baara	3	15	4	Domestic	
76.	Sheen Khan	Abun	2-4 Kg	25	3	Domestic	
77.	Muhammad Zaid	Abun	4-5Kg	20	4	Domestic	
78.	Minhag	Abun	3-4Kg	25	4	Domestic	
79.	Ameer Zada	Abun	1-2 Kg	10	3	Domestic	
80.	Jaanat Gul	Abun	5-6 Kg	30	5	Domestic	
81.	Abdul Aziz	Daut	5-6 Kg	25	6	Domestic	commercial
82.	Salahudin	Daut	2-3 Kg	20	2	Domestic	Commercial
83.	Nabi Ur Rehman	Daut	3-4 Kg	30	2	Domestic	Commercial
84.	Muhammad Saleem	Daut	7-8 Kg	25	3	Domestic	
85.	Amanullah	Daut	3 Kg	30	3	Domestic	
86.	Abdul Razaq	Carkool	1-2 Kg	26	3	Domestic	
87.	Sangeen	Carkool	4-5 Kg	30	2	Domestic	
88.	Inam Ullah	Carkool	2-3 Kg	28	2	Domestic	
89.	Fazle Hameed	Carkool	3-4 Kg	25	3	Domestic	
90.	Hashim Ali Saeed	Carkool	2-3 Kg	25	3	Domestic	
91.	Mujahedin	Thakot Colony	5 to 6 Kg	25	2	Domestic	commercial
92.	Ferhan	Thakot Colony	4-5 Kg	25-30	3	Domestic	commercial
93.	Hanif-Ur-Rehman	Thakot Colony	4-5 Kg	20	2	Domestic	Commercial
94.	Fazal Muhammad	Thakot Colony	5-6 Kg	25	2	Domestic	Commercial
95.	Zeralam Khan	Thakot Colony	3-4 Kg	25	2	Domestic	Commercial
96.	Mustana Khan	Ghoriyar	1-2 Kg	15-20	3	Domestic	
97.	Sakhiullah	Ghoriyar	1-2 Kg	10 to 15	2	Domestic	
98.	Munawar Khan	Ghoriyar	1-2 Kg	5 to 10	2	Domestic	
99.	Muhammad Arif	Ghoriyar	2 to 3 Kg	15 to 20	2	Domestic	
100.	Shah Faisal	Ghoriyar	0.5 to 1 Kg	10 to 12	1	Domestic	
101.	Rehman Zada	Sado Khan	2 to 3 Kg	10 to 15	2	Domestic	
102.	Abdul Razaq	Sado Khan	2 to 3 Kg	15 to 20	2	Domestic	
103.	Bakhi alam	Sado Khan	2 to 3 Kg	10 to 15	4	Domestic	
104.	Khan Malik	Sado Khan	1 to 2 Kg	10 to 15	2	Domestic	
105.	Saminullah	Sado Khan	1 to 2 Kg	15 to 18	3	Domestic	
106.	Wajid Ali	Zozari Seeri	2 to 3 Kg	10	5	Domestic	
107.	Noor Nabi Said	Zozari Seeri	1 to 2 Kg	15 to 20	5	Domestic	
108.	Shabur Ahmad	Zozari Seeri	1 to 2 Kg	15	2	Domestic	
109.	Said Nazeer	Zozari Seeri	2 to 4 Kg	10 to 15	3	Domestic	
110.	Fazal Rabi	Zozari Seeri	1 to 1.5 Kg	5	3	Domestic	



**B-4: Fishermen's Fishing Catch Localities**

Sr. No.	Names of Fishermen	Village	Fishing Locations	
			River	Nullah
1.	Ashraf Khan	Siglo	Indus	Siglo
2.	Salamdar	Siglo	Indus	
3.	Faiz-ur-Rahman	Siglo	Indus	
4.	Jamras	Siglo	Indus	
5.	Sher Khan	Siglo	Indus	
6.	Abdul Jabbar	Chuchang	Indus	
7.	Izharul Haq	Chuchang	Indus	
8.	Gulzar Ahmed	Chuchang	Indus	
9.	Muhammad Zarean Khan	Chuchang	Indus	
10.	Amanullah	Chuchang	Indus	
11.	Sher Khan	Goshali		Goshali
12.	Muhammad Gul	Goshali		
13.	Fazal-ul-Rehman	Goshali		
14.	Shafiq-ur-rehman	Goshali		
15.	Baju Khan	Goshali		
16.	Saib Haq	Jalkot	Indus	Jalkot
17.	Ibrahim	Jalkot	Indus	
18.	Faiz Malik	Jalkot	Indus	
19.	Malik Mian	Jalkot	Indus	
20.	Sadam hussain	Jalkot	Indus	
21.	Khan Major	Kuz Kereo	Indus	Kuz Kereo
22.	Fazal Elahi	Kuz Kereo	Indus	
23.	Raheem Dind	Kuz Kereo	Indus	
24.	Amanullah	Kuz Kereo	Indus	
25.	Alam Zab Khan	Kuz Kereo	Indus	
26.	Siraj ud din	Shilkanabad	Indus	
27.	Abdul Qayoom	Shilkanabad	Indus	
28.	Sarfraz	Shilkanabad	Indus	Shilkan Abad
29.	Gul Badshah	Shilkanabad	Indus	
30.	Khalil ullah	Shilkanabad	Indus	
31.	Ijaz Ali	Ghaziabad	Indus	Ghazi Aabad
32.	Riaz Ahmad	Ghaziabad	Indus	
33.	Zain	Ghaziabad	Indus	
34.	Muhammad Imtiaz	Ghaziabad	Indus	
35.	Muhammad Iqbal	Ghaziabad	Indus	
36.	Ibrahim	Patton	Indus	Pattan
37.	Sher Muhammad	Patton	Indus	
38.	Hayat ullah	Patton	Indus	
39.	Bakht Amin	Patton	Indus	
40.	Rahim ullah	Patton	Indus	
41.	Abdullah	Dubair Colony	Indus	
42.	Khan Muhammad	Dubair Colony	Indus	
43.	Muhammad Ayaz	Dubair Colony	Indus	
44.	Abdul Bari	Dubair Colony	Indus	
45.	Sher Muhammad	Dubair Colony	Indus	
46.	Muhammad Duraj	Sholgara	Indus	

47.	Nabeel khan	Sholgara	Indus	
48.	Alam sher	Sholgara	Indus	
49.	Rasool Khan	Sholgara	Indus	
50.	Abdulrehman	Sholgara	indus	
51.	Bakhtezar Shah	Basham	Indus	
52.	Shah Khalid	Basham	Indus	
53.	Saed Ali Shah	Basham	Indus	Khan Khawar
54.	Waseem Shah	Basham	Indus	
55.	Sadam hussain	Basham	Indus	
56.	Itibar Gul	Seror Shang	Indus	
57.	Hafeez ullah	Seror Shang	Indus	
58.	Umer Tesar	Seror Shang	Indus	
59.	Muhammad Khan	Seror Shang	indus	
60.	Gul Nabi	Seror Shang	Indus	
61.	Shaib Zada	Shaga Banda	Indus	
62.	Umer Zada	Shaga Banda	Indus	
63.	Kositana	Shaga Banda	Indus	
64.	Naseeb Khan	Shaga Banda	Indus	
65.	Mujib Rahman	Shaga Banda	indus	
66.	Saeed ur Rehman	Sajbir	Indus	
67.	Zafer Khan	Sajbir	Indus	
68.	Naitullah	Sajbir	Indus	
69.	Mabat khan	Sajbir	Indus	
70.	Ikram ullah	Sajbir	Indus	
71.	Umer Zada	Gim Baara	Indus	
72.	Dertab	Gim Baara	Indus	
73.	Hassan Zada	Gim Baara	Indus	
74.	Sahreen	Gim Baara	Indus	
75.	Muhammad Sharif	Gim Baara	Indus	
76.	Sheen Khan	Abun	Indus	
77.	Muhammad Zaid	Abun	Indus	
78.	Minhag	Abun	Indus	
79.	Ameer Zada	Abun	Indus	
80.	Jaanat Gul	Abun	Indus	
81.	Abdul Aziz	Daut	Indus	
82.	Salahudin	Daut	Indus	
83.	Nabi Ur Rehman	Daut	Indus	
84.	Muhammad Saleem	Daut	Indus	
85.	Amanullah	Daut	Indus	
86.	Abdul Razaq	Carkool	Indus	
87.	Sangeen	Carkool	Indus	
88.	Inam Ullah	Carkool	Indus	
89.	Fazle Hameed	Carkool	Indus	
90.	Hashim Ali Saeed	Carkool	Indus	
91.	Mujahedin	Thakot Colony	Indus	
92.	Ferhan	Thakot Colony	Indus	
93.	Hanif-Ur-Rehman	Thakot Colony	Indus	
94.	Fazal Muhammad	Thakot Colony	Indus	
95.	Zeralam Khan	Thakot Colony	Indus	

96.	Mustana Khan	Ghoriyar	Indus	
97.	Sakhiullah	Ghoriyar	Indus	
98.	Munawar Khan	Ghoriyar	Indus	
99.	Muhammad Arif	Ghoriyar	Indus	
100.	Shah Faisal	Ghoriyar	Indus	
101.	Rehman Zada	Sado Khan	Indus	
102.	Abdul Razaq	Sado Khan	Indus	
103.	Bakhi alam	Sado Khan	Indus	
104.	Khan Malik	Sado Khan	Indus	
105.	Saminullah	Sado Khan	Indus	
106.	Wajid Ali	Zozari Seeri	Indus	
107.	Noor Nabi Said	Zozari Seeri	Indus	
108.	Shabur Ahmad	Zozari Seeri	Indus	
109.	Said Nazeer	Zozari Seeri	Indus	
110.	Fazal Rabi	Zozari Seeri	Indus	

### **B-5: Average Annual Income of Fishermen**

Sr. No.	Name	Village	End Use of Caught Fish		Total Income of HHs (Rs./Month)	Total Income of HHs (Rs./Year)
			Domestic	Commercial		
1.	Ashraf Khan	Siglo	Domestic		8000	96000
2.	Salamdar	Siglo	Domestic		5000	60000
3.	Faiz-ur-Rahman	Siglo	Domestic		15600	187200
4.	Jamras	Siglo	Domestic		10000	120000
5.	Sher Khan	Siglo	Domestic		10000	120000
6.	Abdul Jabbar	Chuchang	Domestic	commercial	10000	120000
7.	Izharul Haq	Chuchang	Domestic	commercial	8000	96000
8.	Gulzar Ahmed	Chuchang	Domestic	commercial	12000	144000
9.	Muhammad Zarean Khan	Chuchang	Domestic	commercial	10000	120000
10.	Amanullah	Chuchang	Domestic	commercial	8000	96000
11.	Sher Khan	Goshali	Domestic		7000	84000
12.	Muhammad Gul	Goshali	Domestic		8000	96000
13.	Fazal-ul-Rehman	Goshali	Domestic		7000	84000
14.	Shafiq-ur-rehman	Goshali	Domestic		9000	108000
15.	Baju Khan	Goshali	Domestic		12000	144000
16.	Saib Haq	Jalkot	Domestic	Commercial	20000	240000
17.	Ibrahim	Jalkot	Domestic	Commercial	15000	180000
18.	Faiz Malik	Jalkot	Domestic	Commercial	15000	180000
19.	Malik Mian	Jalkot	Domestic	Commercial	12000	144000
20.	Sadam hussain	Jalkot	Domestic	Commercial	5000	60000
21.	Khan Major	Kuz Kereo	Domestic		6000	72000
22.	Fazal Elahi	Kuz Kereo	Domestic		9000	108000
23.	Raheem Dind	Kuz Kereo	Domestic		7000	84000
24.	Amanullah	Kuz Kereo	Domestic		10000	120000

25.	Alam Zab Khan	Kuz Kereo	Domestic		8000	96000
26.	Siraj ud din	Shilkanabad	Domestic		7000	84000
27.	Abdul Qayoom	Shilkanabad	Domestic		10000	120000
28.	Sarfraz	Shilkanabad	Domestic		8000	96000
29.	Gul Badshah	Shilkanabad	Domestic		12000	144000
30.	Khalil ullah	Shilkanabad	Domestic		15000	180000
31.	Ijaz Ali	Ghaziabad	Domestic		10000	120000
32.	Riaz Ahmad	Ghaziabad	Domestic		7000	84000
33.	Zain	Ghaziabad	Domestic		13000	156000
34.	Muhammad Imtiaz	Ghaziabad	Domestic		15000	180000
35.	Muhammad Iqbal	Ghaziabad	Domestic		8000	96000
36.	Ibrahim	Patton	Domestic	Commercial	20000	240000
37.	Sher Muhammad	Patton	Domestic	Commercial	12000	144000
38.	Hayat ullah	Patton	Domestic	Commercial	15000	180000
39.	Bakht Amin	Patton	Domestic	Commercial	12000	144000
40.	Rahim ullah	Patton	Domestic	Commercial	10000	120000
41.	Abdullah	Dubair Colony	Domestic		12000	144000
42.	Khan Muhammad	Dubair Colony	Domestic	Commercial	11000	132000
43.	Muhammad Ayaz	Dubair Colony	Domestic	Commercial	15000	180000
44.	Abdul Bari	Dubair Colony	Domestic	commercial	8000	96000
45.	Sher Muhammad	Dubair Colony	Domestic	Commercial	20000	240000
46.	Muhammad Duraj	Sholgara	Domestic		15000	180000
47.	Nabeel khan	Sholgara	Domestic		12000	144000
48.	Alam sher	Sholgara	Domestic		8000	96000
49.	Rasool Khan	Sholgara	Domestic		12000	144000
50.	Abdulrehman	Sholgara	Domestic		8000	96000
51.	Bakhtezar Shah	Basham	Domestic		10000	120000
52.	Shah Khalid	Basham	Domestic		12000	144000
53.	Saed Ali Shah	Basham	Domestic		15000	180000
54.	Waseem Shah	Basham	Domestic		13000	156000
55.	Sadam hussain	Basham	Domestic		15000	180000
56.	Itibar Gul	Seror Shang	Domestic		25000	300000
57.	Hafeez ullah	Seror Shang	Domestic		20000	240000
58.	Umer Tesar	Seror Shang	Domestic		10000	120000
59.	Muhammad Khan	Seror Shang	Domestic		20000	240000
60.	Gul Nabi	Seror Shang	Domestic		12000	144000
61.	Shaib Zada	Shaga Banda	Domestic		20000	240000
62.	Umer Zada	Shaga Banda	Domestic		15000	180000
63.	Kositana	Shaga Banda	Domestic		12000	144000

64.	Naseeb Khan	Shaga Banda	Domestic		18000	216000
65.	Mujib Rahman	Shaga Banda	Domestic		9000	108000
66.	Saeed ur Rehman	Sajbir	Domestic		20000	240000
67.	Zafer Khan	Sajbir	Domestic		20000	240000
68.	Naitullah	Sajbir	Domestic		15000	180000
69.	Mabat khan	Sajbir	Domestic		20000	240000
70.	Ikram ullah	Sajbir	Domestic		8000	96000
71.	Umer Zada	Gim Baara	Domestic		12000	144000
72.	Dertab	Gim Baara	Domestic		8000	96000
73.	Hassan Zada	Gim Baara	Domestic		12000	144000
74.	Sahreen	Gim Baara	Domestic		15000	180000
75.	Muhammad Sharif	Gim Baara	Domestic		8000	96000
76.	Sheen Khan	Abun	Domestic		10000	120000
77.	Muhammad Zaid	Abun	Domestic		15000	180000
78.	Minhag	Abun	Domestic		6000	72000
79.	Ameer Zada	Abun	Domestic		5000	60000
80.	Jaanat Gul	Abun	Domestic		15000	180000
81.	Abdul Aziz	Daut	Domestic	Commercial	20000	240000
82.	Salahudin	Daut	Domestic	Commercial	8000	96000
83.	Nabi Ur Rehman	Daut	Domestic	Commercial	10000	120000
84.	Muhammad Saleem	Daut	Domestic		20000	240000
85.	Amanullah	Daut	Domestic		15000	180000
86.	Abdul Razaq	Carkool	Domestic		6000	72000
87.	Sangeen	Carkool	Domestic		8000	96000
88.	Inam Ullah	Carkool	Domestic		8000	96000
89.	Fazle Hameed	Carkool	Domestic		12000	144000
90.	Hashim Ali Saeed	Carkool	Domestic		12000	144000
91.	Mujahedin	Thakot Colony	Domestic	Commercial	20000	240000
92.	Ferhan	Thakot Colony	Domestic	Commercial	6000	72000
93.	Hanif-Ur-Rehman	Thakot Colony	Domestic	commercial	12000	144000
94.	Fazal Muhammad	Thakot Colony	Domestic	commercial	10000	120000
95.	Zeralam Khan	Thakot Colony	Domestic	commercial	6000	72000
96.	Mustana Khan	Ghoriyar	Domestic		10000	120000
97.	Sakhiullah	Ghoriyar	Domestic		6500	78000
98.	Munawar Khan	Ghoriyar	Domestic		15000	180000
99.	Muhammad Arif	Ghoriyar	Domestic		8000	96000
100.	Shah Faisal	Ghoriyar	Domestic		7500	90000
101.	Rehman Zada	Sado Khan	Domestic		7000	84000
102.	Abdul Razaq	Sado Khan	Domestic		6000	72000
103.	Bakhi alam	Sado Khan	Domestic		6000	72000

104.	Khan Malik	Sado Khan	Domestic		7000	84000
105.	Saminullah	Sado Khan	Domestic		7000	84000
106.	Wajid Ali	Zozari Seeri	Domestic		7000	84000
107.	Noor Nabi Said	Zozari Seeri	Domestic		15000	180000
108.	Shabur Ahmad	Zozari Seeri	Domestic		10000	120000
109.	Said Nazeer	Zozari Seeri	Domestic		8000	96000
110.	Fazal Rabi	Zozari Seeri	Domestic		12000	144000
Total Average Income of the Household					Rs. 137,629	
Total Average Income of the 27 Commercial Fishermen Household					Rs. 146,667	
Total Average Income of the 83 Domestic Fishermen Hosehold					Rs. 134,689	

**B-6: Fishermen's Annual Income (Inhabitants of Different Villages)**

Sr. No.	Name	Village	Fish catch			Fishermen Income (PKR)		
			Average Catch (Kg/Day)	Days/ Month	Months/ Year	Total HHs Income /Year	HHs Income from Fishing/Year	Percentage of HHs' Income from Fishing
1.	Abdul Jabbar	Chuchang	8 to 9	20	5	120000	80000	66.67
2.	Izharul Haq	Chuchang	5 Kg	22	5	96000	55000	57.29
3.	Gulzar Ahmed	Chuchang	10 Kg	20	5	144000	100000	69.44
4.	Muhammad Zarean	Chuchang	8 Kg	18	5	120000	45000	37.50
5.	Amanullah	Chuchang	10 Kg	20	3	96000	30000	31.25
6.	Saib Haq	Jalkot	8 to 10 Kg	15 to 20	4	240000	56000	23.33
7.	Ibrahim	Jalkot	5 to 6	20 to 25	5	180000	56250	31.25
8.	Faiz Malik	Jalkot	6 to 7 Kg	10 to 15	4	180000	30000	16.67
9.	Malik Mian	Jalkot	4 to 5 Kg	15 to 20	5	144000	26250	18.23
10.	Sadam hussain	Jalkot	1.5 to 2 Kg	15 to 20	4	60000	10500	17.50
11.	Ibrahim	Patton	10 Kg	20 to 25	9	240000	202500	84.38
12.	Sher Muhammad	Patton	4 to 5 Kg	30	9	144000	135000	93.75
13.	Hayat ullah	Patton	6 Kg	30	9	180000	162000	90.00
14.	Bakht Amin	Patton	6 to 8 Kg	30	9	144000	135000	93.75
15.	Rahim ullah	Patton	7 to 10 Kg	15 to 20	9	120000	78750	65.63
16.	Khan Muhammad	Dubair Colony	9 to 10 Kg	30	5	132000	120000	90.91
17.	Muhammad Ayaz	Dubair Colony	4 to 5 Kg	20 to 25	2	180000	27000	15.00
18.	Abdul Bari	Dubair Colony	4 to 5 Kg	25 to 26	4	96000	40800	42.50
19.	Sher Muhammad	Dubair Colony	3 to 4 Kg	15 to 20	2	240000	8750	3.65
20.	Abdul Aziz	Daut	5-6 Kg	25	6	240000	45000	18.75
21.	Salahudin	Daut	2-3 Kg	20	2	96000	8000	8.33
22.	Nabi Ur Rehman	Daut	3-4 Kg	30	2	120000	18000	15.00

23.	Mujahedin	Thakot Colony	5 to 6 Kg	25	2	240000	30000	12.50
24.	Ferhan	Thakot Colony	4-5 Kg	25-30	3	72000	33000	45.83
25.	Hanif-Ur-Rehman	Thakot Colony	4-5 Kg	20	2	144000	18000	12.50
26.	Fazal Muhammad	Thakot Colony	5-6 Kg	25	2	120000	17500	14.58
27.	Zeralam Khan	Thakot Colony	3-4 Kg	25	2	72000	15000	20.83



**B-7: Education and Marital Status of Fishermen**

Sr. No.	Village	Name	Father Name	CNIC No.	Education	Age (years)	Marital Status
1.	Siglo	Ashraf Khan	Salamdar	13401-9144306	Primary	23	Married
2.	Siglo	Salamdar	Zubal	13401-9522375-5	-	60	Married
3.	Siglo	Faiz-ur-Rahman	Majap	13401-4203839-7	-	35	Married
4.	Siglo	Jamras	Bulia	13403-6077941-7	-	60	Married
5.	Siglo	Sher Khan	Salamdar	13401-9521730-1	Middle	29	Married
6.	Chuchang	Abdul Jabbar	Sahibul Haq	13401-0915484-3	Middle	21	Unmarried
7.	Chuchang	Izharul Haq	Wakeel shah	13401-5710556-9	Middle	23	Unmarried
8.	Chuchang	Gulzar Ahmed	Fameer	13401-8344459-5	Middle	19	Unmarried
9.	Chuchang	Muhammad Zarean Khan	Fameer	13401-4906240-9	Primary	25	Unmarried
10.	Chuchang	Amanullah	Bijal Khan	13401-6776972-9	Middle	28	Married
11.	Goshali	Sher Khan	Hijab Khan	13401-3871948-3	Matric	26	Married
12.	Goshali	Muhammad Gul	Israr din		-	40	Married
13.	Goshali	Fazal-ul-Rehman	Baju Khan	13401-6872798-1	-	21	Married
14.	Goshali	Shafiq-ur-rehman	Qaiser Khan	13401-5507032-9	Matric	23	Unmarried
15.	Goshali	Baju Khan	Raghala		-	50	Married
16.	Jalkot	Saib Haq	Jamroz Khan	13401-7350380-7	Primary	25	Married
17.	Jalkot	Ibrahim	Mumtaz khan	-	Middle	32	Married
18.	Jalkot	Faiz Malik	Noshawan	-	Matric	24	Married
19.	Jalkot	Malik Mian	Waliat Khan Noor	13401-1137256-1	Primary	51	Married
20.	Jalkot	Sadam hussain	Shukrat Khan	-	Primary	17	Unmarried
21.	Kuz Kereo	Khan Major	Gul Muhammad	13403-3246017-3	-	32	Married
22.	Kuz Kereo	Fazal Elahi	Haji Darlo	13403-4095527-1	Primary	34	Married
23.	Kuz Kereo	Raheem Dind	Idrees	13403-9508648-1	Matric	28	Married
24.	Kuz Kereo	Amanullah	Haji Jundin	13403-1318217-3	Primary	25	Married
25.	Kuz Kereo	Alam Zab Khan	Malik Jan	13403-4703562-9	Matric	24	Married
26.	Shilkanabad	Siraj ud din	Nasang	13402-1156820-7	-	68	Married
27.	Shilkanabad	Abdul Qayoom	Haji Qadam Khan	13402-1350098-5	-	59	Married
28.	Shilkanabad	Sarfraz	Awal Khan	13402-3957420-5	FA	26	Married
29.	Shilkanabad	Gul Badshah	Najum Khan	13402-1157020-1	Primary	45	Married
30.	Shilkanabad	Khalil ullah	Siraj din	13402-4440587-9	FA	22	Married
31.	Ghaziabad	Ijaz Ali	Subbdar Khan	13402-2218222-5	M.A	31	Married
32.	Ghaziabad	Riaz Ahmad	Qazi Malook	13402-2537314-2	B.A	30	Married
33.	Ghaziabad	Zain	Azal Khan	13402-5251309-7	F.Sc	18	Married
34.	Ghaziabad	Muhammad Imtiaz	Faiz Malook	13402-1153045-7	B.A	35	Married
35.	Ghaziabad	Muhammad Iqbal	Abdul Rauf	13402-1229824-2	B.A	41	Married
36.	Patton	Ibrahim	Muhammad Jaa	134039-575772-9	Matric	46	Married

37.	Patton	Sher Muhammad	Muhmmad Jan	13403-084755-7	Primary	27	Married
38.	Patton	Hayat ullah	Hakeem Khan	13403-9418653-1	Middle	28	Married
39.	Patton	Bakht Amin	Noor-ul-Huda	13403-5734723-3	Matric	36	Married
40.	Patton	Rahim ullah	Sabit shah	-	Matric	21	Married
41.	Dubair Colony	Abdullah	Guldat	-	Middle	38	Married
42.	Dubair Colony	Khan Muhammad	Shah Nawaz	13403-3332634-3	-	30	Married
43.	Dubair Colony	Muhammad Ayaz	Bajus	-	Middle	40	Married
44.	Dubair Colony	Abdul Bari	Bahida Khan	-	Middle	53	Married
45.	Dubair Colony	Sher Muhammad	Kiki	-	Primary	24	Married
46.	Sholgara	Muhammad Duraj	Sher Afzal	13403-1532773-3	Middle	25	Married
47.	Sholgara	Nabeel khan	shah ali	13402-1434321-2	-	32	Married
48.	Sholgara	Alam sher	Jamrus	13403-1532554-2	Primary	40	Married
49.	Sholgara	Rasool Khan	Mir Afzal	13403-0152324-1	Primary	31	Married
50.	Sholgara	Abdulrehman	Bashir ahmed	13405-1545132-1	-	38	Married
51.	Basham	Bakhtezar Shah	Gul Wazar	15502-3040118-3	Matric	39	Married
52.	Basham	Shah Khalid	Noor Hani Gul	15501-2274662-5	Middle	30	Unmarried
53.	Basham	Saed Ali Shah	Sir baz	15502-9901970-5	-	37	Married
54.	Basham	Waseem Shah	Mamtareen Shah	15502-7447951-9	-	26	Unmarried
55.	Basham	Sadam hussain	Mohsin shah	15502-5831788-5	F.Sc	20	Unmarried
56.	Seror Shang	Itibar Gul	Subat Khan	15502-2005166-7	-	54	Married
57.	Seror Shang	Hafeez ullah	Gul Nabi	15502-4087128-3	-	27	Married
58.	Seror Shang	Umer Tesar	Gelender Khan	15502-3716976-3	-	30	Married
59.	Seror Shang	Muhammad Khan	Mahmmad	15502-3716976-3	-	49	Married
60.	Seror Shang	Gul Nabi	Subat Khan	15502-2005770-3	-	48	Married
61.	Shaga Banda	Shaib Zada	Gul Sakeen	15502-4859351-3	-	35	Married
62.	Shaga Banda	Umer Zada	Abdul Hakeem	42201-2473162-7	-	39	Married
63.	Shaga Banda	Kositana	Abdul Hakeem	15501-3477557-9	-	40	Married
64.	Shaga Banda	Naseeb Khan	Shareef Khan	15502-9207999-7	-	37	Married
65.	Shaga Banda	Mujib Rahman	Badar Munir	15502-1540345-3	-	26	Married
66.	Sajbir	Saeed ur Rehman	Zarat Wali	13201-9644020-9	Middle	50	Married
67.	Sajbir	Zafer Khan	Ali Asghar	13201-3726857-9	Matric	42	Married
68.	Sajbir	Naitullah	Kabir Khan	13201-9216983-3	Primary	25	Married
69.	Sajbir	Mabat khan	Fakeer sher	13201-1834960-9	-	51	Married
70.	Sajbir	Ikram ullah	Khan Zada	13201-6563666-7	-	25	Married

71.	Gim Baara	Umer Zada	Gens	13201-1837956-7	-	44	Married
72.	Gim Baara	Dertab	Glacier	13202-6030785-3	-	49	Married
73.	Gim Baara	Hassan Zada	Gul Zada	13201-1817459-7	-	32	Married
74.	Gim Baara	Sahreen	Afsar	13201-4202775-5	-	48	Married
75.	Gim Baara	Muhammad Sharif	Safdar	13201-0920624-3	-	45	Married
76.	Abun	Sheen Khan	Toor Khan	13201-9993388-9	-	45	Married
77.	Abun	Muhammad Zaid	Ahmed Jan	13202-0744548-7	-	42	Married
78.	Abun	Minhag	Abdul Rehman	13202-0744057-5	Primary	35	Married
79.	Abun	Ameer Zada	Sohbat	13201-1833729-1	-	72	Married
80.	Abun	Jaanat Gul	Gul Muhammad	13201-7338342-7	-	22	Married
81.	Daut	Abdul Aziz	Majeed	15503-1218539-1	-	45	Married
82.	Daut	Salahudin	Badar Gul	13202-0729917-5	-	27	Married
83.	Daut	Nabi Ur Rehman-Ur-Rehman	Muhammad Imran	15503-8228169-3	-	40	Married
84.	Daut	Muhammad Saleem	Baramand	15503-2427921-1	Primary	22	Married
85.	Daut	Amanullah	Himaash Khan	15503-2104117-9	-	38	Unmarried
86.	Carkool	Abdul Razaq	Syed Zareen	15503-6961600-3	Primary	36	Married
87.	Carkool	Sangeen	Mian Sardar	15503-4680276-3	-	26	Married
88.	Carkool	Inam Ullah	Abdul Jalil	15503-9573478-1	Middle	37	Married
89.	Carkool	Fazle Hameed	Saeed Hubab	15503-5704730-7	Primary	46	Married
90.	Carkool	Hashim Ali Saeed	Sahib Saeed	15503-7331136-1	Middle	29	Married
91.	Thakot Colony	Mujahedin	Qader Gul	13202-8291354	Middle	44	Married
92.	Thakot Colony	Ferhan	Hamaash Gul	13202-1068964-9	-	19	Married
93.	Thakot Colony	Hanif-Ur-Rehman	Samer Gul	13202-0781449-1	-	42	Unmarried
94.	Thakot Colony	Fazal Muhammad	Musharaf Gul	13202-6842559-7	Primary	23	Married
95.	Thakot Colony	Zeralam Khan	Eeser Gul	13202-0776020-3	-	58	Married
96.	Ghoriyar	Mustana Khan	Yousaf	42401-2457984-5	-	44	Married
97.	Ghoriyar	Sakhiullah	Zar Gul	13202-0874650-9	-	52	Married
98.	Ghoriyar	Munawar Khan	Zar Muhammad Khan	13202-0719191-5	-	61	Married
99.	Ghoriyar	Muhammad Arif	Zar Muhammad	13202-0735199-5	-	36	Married
100.	Ghoriyar	Shah Faisal	Nabeel Khan	13202-0735211-4	-	32	Married
101.	Sado Khan	Rehman Zada	Mobeen	13502-2516622-5	Middle	22	Married
102.	Sado Khan	Abdul Razaq	Jankase Khan	13502-3797623-1	-	21	Married
103.	Sado Khan	Bakhi alam	Jan Khatab	13504-6390723-3	-	20	Married
104.	Sado Khan	Khan Malik	Malik Waseem	13504-7490223-1	Middle	25	Married
105.	Sado Khan	Saminullah	Wajullah	13501-3552182-1	-	36	Married
106.	Zozari Seeri	Wajid Ali	Saif	13504-2244743-1	Primary	50	Married
107.	Zozari Seeri	Noor Nabi Said	Muhammad Akram	13601-0488503-5	FA	18	Married
108.	Zozari Seeri	Shabur Ahmad	Fazal Zamar	13504-9131659-3	F.Sc	18	Unmarried

**APPENDIX-B [18/18]**

109.	Zozari Seeri	Said Nazeer	Aijaib Said	42401-7659346-7	-	24	Married
110.	Zozari Seeri	Fazal Rabi	Khetab	42101-1230871-5	Matric	33	Married

### Appendix C: List of Consulted Fishermen

Sr. No.	Village	Name	Father Name	CNIC No.
1.	Siglo	Ashraf Khan	Salamdar	13401-9144306-5
2.	Siglo	Salamdar	Zubal	13401-9522375-5
3.	Siglo	Faiz-ur-Rahman	Majap	13401-4203839-7
4.	Siglo	Jamras	Bulia	13403-6077941-7
5.	Siglo	Sher Khan	Salamdar	13401-9521730-1
6.	Chuchang	Abdul Jabbar	Sahibul Haq	13401-0915484-3
7.	Chuchang	Izharul Haq	Wakeel shah	13401-5710556-9
8.	Chuchang	Gulzar Ahmed	Fameer	13401-8344459-5
9.	Chuchang	Muhammad Zarean Khan	Fameer	13401-4906240-9
10.	Chuchang	Amanullah	Bijal Khan	13401-6776972-9
11.	Goshali	Sher Khan	Hijab Khan	13401-3871948-3
12.	Goshali	Muhammad Gul	Israr din	
13.	Goshali	Fazal-ul-Rehman	Baju Khan	13401-6872798-1
14.	Goshali	Shafiq-ur-rehman	Qaiser Khan	13401-5507032-9
15.	Goshali	Baju Khan	Raghala	
16.	Jalkot	Saib Haq	Jamroz Khan	13401-7350380-7
17.	Jalkot	Ibrahim	Mumtaz khan	-
18.	Jalkot	Faiz Malik	Noshawan	-
19.	Jalkot	Malik Mian	Waliat Khan Noor	13401-1137256-1
20.	Jalkot	Sadam hussain	Shukrat Khan	-
21.	Kuz Kereo	Khan Major	Gul Muhammad	13403-3246017-3
22.	Kuz Kereo	Fazal Elahi	Haji Darlo	13403-4095527-1
23.	Kuz Kereo	Raheem Dind	Idrees	13403-9508648-1
24.	Kuz Kereo	Amanullah	Haji Jundin	13403-1318217-3
25.	Kuz Kereo	Alam Zab Khan	Malik Jan	13403-4703562-9
26.	Shilkanabad	Siraj ud din	Nasang	13402-1156820-7
27.	Shilkanabad	Abdul Qayoom	Haji Qadam Khan	13402-1350098-5
28.	Shilkanabad	Sarfraz	Awal Khan	13402-3957420-5
29.	Shilkanabad	Gul Badshah	Najum Khan	13402-1157020-1
30.	Shilkanabad	Khalil ullah	Siraj din	13402-4440587-9
31.	Ghaziabad	Ijaz Ali	Subbdar Khan	13402-2218222-5
32.	Ghaziabad	Riaz Ahmad	Qazi Malook	13402-2537314-2
33.	Ghaziabad	Zain	Azal Khan	13402-5251309-7
34.	Ghaziabad	Muhammad Imtiaz	Faiz Malook	13402-1153045-7
35.	Ghaziabad	Muhammad Iqbal	Abdul Rauf	13402-1229824-2
36.	Patton	Ibrahim	Muhammad Jaa	134039-575772-9
37.	Patton	Sher Muhammad	Muhmmad Jan	13403-084755-7
38.	Patton	Hayat ullah	Hakeem Khan	13403-9418653-1
39.	Patton	Bakht Amin	Noor-ul-Huda	13403-5734723-3
40.	Patton	Rahim ullah	Sabit shah	-
41.	Dubair Colony	Abdullah	Guldat	-
42.	Dubair Colony	Khan Muhammad	Shah Nawaz	13403-3332634-3
43.	Dubair Colony	Muhammad Ayaz	Bajus	-
44.	Dubair Colony	Abdul Bari	Bahida Khan	-
45.	Dubair Colony	Sher Muhammad	Kiki	-
46.	Sholgara	Muhammad Duraj	Sher Afzal	13403-1532773-3
47.	Sholgara	Nabeel khan	shah ali	13402-1434321-2

48.	Sholgara	Alam sher	Jamrus	13403-1532554-2
49.	Sholgara	Rasool Khan	Mir Afzal	13403-0152324-1
50.	Sholgara	Abdulrehman	Bashir ahmed	13405-1545132-1
51.	Basham	Bakhtezar Shah	Gul Wazar	15502-3040118-3
52.	Basham	Shah Khalid	Noor Hani Gul	15501-2274662-5
53.	Basham	Saed Ali Shah	Sir baz	15502-9901970-5
54.	Basham	Waseem Shah	Mamtareen Shah	15502-7447951-9
55.	Basham	Sadam hussain	Mohsin shah	15502-5831788-5
56.	Seror Shang	Itibar Gul	Subat Khan	15502-2005166-7
57.	Seror Shang	Hafeez ullah	Gul Nabi	15502-4087128-3
58.	Seror Shang	Umer Tesar	Gelender Khan	15502-3716976-3
59.	Seror Shang	Muhammad Khan	Mahmmad	15502-3716976-3
60.	Seror Shang	Gul Nabi	Subat Khan	15502-2005770-3
61.	Shaga Banda	Shaib Zada	Gul Sakeen	15502-4859351-3
62.	Shaga Banda	Umer Zada	Abdul Hakeem	42201-2473162-7
63.	Shaga Banda	Kositana	Abdul Hakeem	15501-3477557-9
64.	Shaga Banda	Naseeb Khan	Shareef Khan	15502-9207999-7
65.	Shaga Banda	Mujib Rahman	Badar Munir	15502-1540345-3
66.	Sajbir	Saeed ur Rehman	Zarat Wali	13201-9644020-9
67.	Sajbir	Zafer Khan	Ali Asghar	13201-3726857-9
68.	Sajbir	Naitullah	Kabir Khan	13201-9216983-3
69.	Sajbir	Mabat khan	Fakeer sher	13201-1834960-9
70.	Sajbir	Ikram ullah	Khan Zada	13201-6563666-7
71.	Gim Baara	Umer Zada	Gens	13201-1837956-7
72.	Gim Baara	Dertab	Glacier	13202-6030785-3
73.	Gim Baara	Hassan Zada	Gul Zada	13201-1817459-7
74.	Gim Baara	Sahreen	Afsar	13201-4202775-5
75.	Gim Baara	Muhammad Sharif	Safdar	13201-0920624-3
76.	Abun	Sheen Khan	Toor Khan	13201-9993388-9
77.	Abun	Muhammad Zaid	Ahmed Jan	13202-0744548-7
78.	Abun	Minhag	Abdul Rehman	13202-0744057-5
79.	Abun	Ameer Zada	Sohbat	13201-1833729-1
80.	Abun	Jaanat Gul	Gul Muhammad	13201-7338342-7
81.	Daut	Abdul Aziz	Majeed	15503-1218539-1
82.	Daut	Salahudin	Badar Gul	13202-0729917-5
83.	Daut	Nabi Ur Rehman	Muhammad Imran	15503-8228169-3
84.	Daut	Muhammad Saleem	Baramand	15503-2427921-1
85.	Daut	Amanullah	Himaash Khan	15503-2104117-9
86.	Carkool	Abdul Razaq	Syed Zareen	15503-6961600-3
87.	Carkool	Sangeen	Mian Sardar	15503-4680276-3
88.	Carkool	Inam Ullah	Abdul Jalil	15503-9573478-1
89.	Carkool	Fazle Hameed	Saeed Hubab	15503-5704730-7
90.	Carkool	Hashim Ali Saeed	Sahib Saeed	15503-7331136-1
91.	Thakot Colony	Mujahedin	Qader Gul	13202-8291354-1
92.	Thakot Colony	Ferhan	Hamaash Gul	13202-1068964-9
93.	Thakot Colony	Hanif-Ur-Rehman	Samer Gul	13202-0781449-1
94.	Thakot Colony	Fazal Muhammad	Musharaf Gul	13202-6842559-7
95.	Thakot Colony	Zeralam Khan	Eeser Gul	13202-0776020-3
96.	Ghoriyar	Mustana Khan	Yousaf	42401-2457984-5
97.	Ghoriyar	Sakhiullah	Zar Gul	13202-0874650-9

98.	Ghoriyar	Munawar Khan	Zar Muhammad	13202-0719191-5
99.	Ghoriyar	Muhammad Arif	Zar Muhammad	13202-0735199-5
100.	Ghoriyar	Shah Faisal	Nabeel Khan	13202-0735211-4
101.	Sado Khan	Rehman Zada	Mobeen	13502-2516622-5
102.	Sado Khan	Abdul Razaq	Jankase Khan	13502-3797623-1
103.	Sado Khan	Bakhi alam	Jan Khatab	13504-6390723-3
104.	Sado Khan	Khan Malik	Malik Waseem	13504-7490223-1
105.	Sado Khan	Saminullah	Wajullah	13501-3552182-1
106.	Zozari Seeri	Wajid Ali	Saif	13504-2244743-1
107.	Zozari Seeri	Noor Nabi Said	Muhammad Akram	13601-0488503-5
108.	Zozari Seeri	Shabur Ahmad	Fazal Zamar	13504-9131659-3
109.	Zozari Seeri	Said Nazeer	Aijaib Said	42401-7659346-7
110.	Zozari Seeri	Fazal Rabi	Khetab	42101-1230871-5





## Appendix D: List of Key Informants

### D-1: List of Identifying Persons

Sr. No.	Village	Name	Father Name	CNIC No.	Contact No.
1.	Siglo	Faiz-ur-Rahman	Majap	13401-4203839-7	0321-9824247
2.	Chuchang	Shabbir Khan	Molvi Mehran Khan	13401-1500583-3	0312-5905199
3.	Goshali	Abdul Qayyam	Hijab Khan	13401-1503026-5	0313-2266889
4.	Jalkot	Faiz-ul-Haq	Jamroz Khan	13401-1509046-1	0300-5645656
5.	Kuz Kereo	Alam Zab Khan	Malik Jan	13403-4703562-9	0301-5828515
6.	Shilkanabad	Haibat khan	Malik Kadam Khan	13402-7195922-7	0344-9174931
7.	Ghaziabad	Muhammad Imtiaz	Faiz Malook	13402-1153045-7	0342-8239984
8.	Patten	Sajjad Ahmad	Muhammad Iqbal	13302-0505636-5	0300-5088734
9.	Dubair colony	Abdullah	Guldat	-	0303-8637287
10.	Sholgara	Rasool Khan	Mir Afzal	13403-0152324-1	0307-6630159
11.	Besham	Habib ur rehman	Afzal wadood	15501-3928397-5	0346-8071569
12.	Seror Shang	Goher Ali	Gelender Khan	15502-7985946-1	0346-9626163
13.	Shaga Banda	Zer Muneer	Qazi Rehman	15502-0439895-7	0342-9114454
14.	Sajbir	Bakhat Zada	Ghulam Nabi	13201-1816810-5	0343-9516880
15.	Gim Baara	Gul Taj	Habib gul	13201-9369965-5	
16.	Abun	Faiz Muhammad	Hujaj	13201-2311258-5	0345-9585918
17.	Daut	Haleem ullah	Satullah	15503-3716042-9	0344-9546037
18.	Carkool	Hassan Syed	Gul Naseer	42101-1741659-3	0346-8940855
19.	Thakot colony	Nazam din	Bader Gul	13202-5370518-1	0346-9622928
20.	Garjar	Mukreem	Muhammad Rehman	13202-0753277-1	0345-9574097
21.	Sado Khan	Bakhi alam	Jan Khatab	13504-6390723-3	0346-3581346
22.	Zozari Seeri	Aziz ullah	Salam shah	13504-2244743-1	0342-2293250

### D-2: List of District Fishery Officials

S.No.	District	.Name	Designation	Contact No.
1.	Kohistan	Taj Muhammad	Assistant Director Fisheries, Patton	0301-8191303
2.	Shangla	Shahid Mahmood	Assistant Director Fisheries, Alpuri	0347-9448368
3.	Battagram	Faheem Akhtar	Assistant Director Fisheries, Battagram	0345-9051165
4.	Torgher	Akbar Khan	Assistant Commissnor, Torgher	0997-239879
5.	Torgher	Khalid Khan	Assistant Director Fisheries, Torgher	0300-5688085
6.	Haripur/ Tarrbela	Muhammad Shafi Marwat	Deputy Director Fisheries, Khalabat	0346-7868651

**D-3: List of Fish Vendors**

Sr. No.	District	Name	M.arket Name	CNIC No.	Contact No.
1.	Kohistan	Muhammad Ayub	Kamaila Bazar	15501-0542596-3	0346-4344658
2.	Kohistan	Gul Zareen	Patton Bazar	13403-2083226-3	0345-9488494
3.	Shangla	Janzeb	Besham Bazar	15402-9690133-7	0343-9531514
4.	Shangla	Namat ullah	Besham Bazar	-	0346-9607369
5.	Battagram	Sher Muhammad	Battagram Bazar	13202-4889414-7	-

**Appendix E: Photo-log of the Downstream fishing communities, Baseline and Impacts Assessment Field Study**



**Fisherman catching fish at Siglo Nullah**



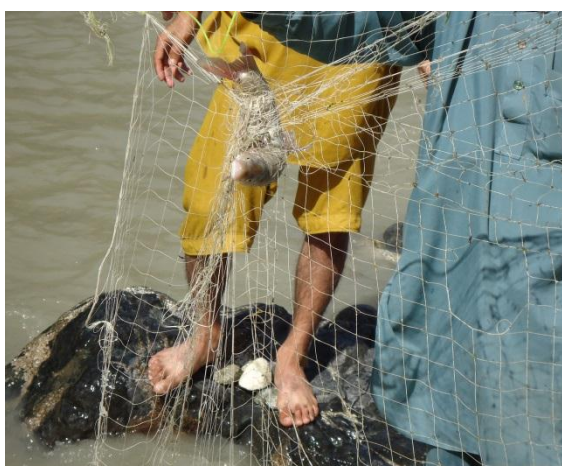
**Consultation with fishermen at Siglo Nullah**



**Fishermen catching fish from Indus at Choochang**



**Consultation with fishermen at Chuchang**



**Fish Catch from Indus River at Chuchang**



**Consultation with fish vendor at Komila**





Consultation at Dubair



Meeting with AD Fisheries at pattan



Consultation at Pattan



Fish Seller at Besham

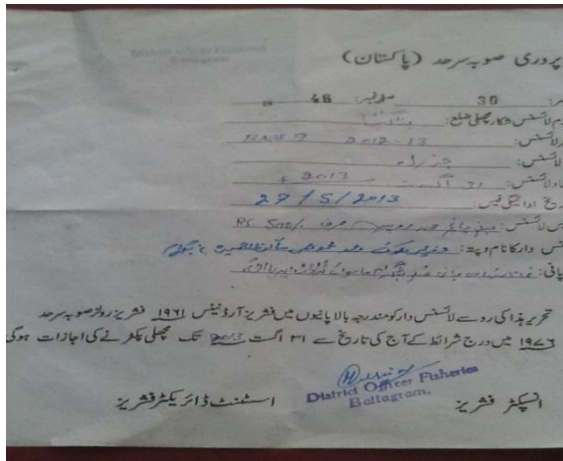


Fish at Seller's Shop in Besham



Fish Selling at Batagram





Fishery License of Fishermen at Batagram



Consultation at Abun



Consultation at Sharkool Khas



Consultation at Dawoot



Fish Catch at Dochi Bandah



Consultation at Ghazi Abad





**Consultation at Ghorhiyal**



**Poison Used for Fish Catch**



**Consultation at Kuz Kereo**



**Wood Log caught from Indus at Sajbir**



**Fish Catch from Indus River at Seror Shang**



**Net Used for Fish Catch at Shanga Banda**





Consultation at Shilkan Abad



Consultation at Shollingrah



Office of the D.D (Fisheries), Mansehra



Meeting with AC, Torgher



Consultation at Thakot Colony



Fish Nets in the Indus River at Thakot



**Fisherman Catching Fish at Alpuri**



**Trout Hatchery at Alpuri**



**Consultation with Fishermen at Tarbella Reservoir Area**



**Meeting with AD Fisheries, Tarbella**