Manchar Lake's hypothetical restoration and fishers' willingness to switch back to fishing

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CERTIFICATE

This is to certify that this thesis entitled: **"Manchar Lake's Hypothetical Restoration and Fishers' Willingness to Switch Back to Fishing".** submitted by Muhammad Azeem is accepted in its present form by the Department of Environmental Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in **Master of Philosophy in Environmental Economics**.

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DECLARATION

I, Muhammad Azeem, PIDE2016FMPHILENV07, hereby declare that I have produced the work presented in this thesis, during the scheduled period of study. I also declare that I have not taken any material from any source except referred to wherever due that amount of plagiarism is within acceptable range. If a violation of HEC rules on research has occurred in this thesis. I shall be liable to punishable action under the plagiarism rules of the HEC.

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Dedication

This work is dedicated to my beloved parents and my sister Sajida Zureshi

Abstract

There has been seen great impact of environmental and anthropogenic on lakes and fishers' livelihood due to migration and changing professions. This study address the current situation of Manchar Lake's fishers who changed the occupation and their willingness to switch back to fishing in Manchar Lake. A survey based questionnaire was developed and 300 respondent were selected through the Snow Ball sampling. Contingent Valuation Method (CVM) was used to analysis the fishers' Willingness to Switch Back to fishing in Manchar Lake. It analyses the fishers' livelihood changes because of migration and change in occupation, further this study examines the current living pattern as compare to past living patterns when they were fishing in Manchar Lake.

The major finding shows that complete transformation in the livelihoods of fishers has been taken place due to positive and negative changes in their access to assets. Despite their increase in access to physical capital such as school, hospital, roads and markets of fishers are largely vulnerable due to negative change in their income and ownership of house. Livelihood assets changes among fishers have different impact on fishers' satisfaction with livelihood outcomes and their willingness to switch back to fishing in Manchar Lake, and it is determined by their livelihood in the place of origin. Satisfaction with current livelihood outcomes is low and willingness to switch back to fishing in Manchar Lake is high, because of their sound economic status and social recognition and power they had when they were fishing in Manchar Lake. The current situation and preferences of fishers emphasize the need of appropriate initiatives needs to be taken by the government and concerned agencies in order to restore Manchar Lake.

CHAPTER 01
INTRODUCTION

1.1 Background:

Fishing is known to be one of the major economic activities engaging million of the people around the world. However, recent studies such as Omwega, Abila et al. (2006), Ochieng (2012) reported global fish catch are instable with an overall declining catch per unit of effort. This implies that the livelihood of those engaged in fishing industry are at stake. It is likely that climatic elements and non-climatic factors have an effect on this globally decaling trend of fish catch. The ecological condition and ecosystem services of ocean and inland water bodies depend to a great extent on the human population, land use land cover changes, climatic and technological advances in water and wastewater management (Baustian, Mavrommati et al. 2014).

Ecosystem services have been proposed as an appropriate concept to link human and natural systems and the main idea underlying this concept is that changes in natural systems affect human well-being and vice versa (Stevenson, 2011). A historical review of ecosystem services suggests that “since biological services identified the value by the society when the good and services lowers created by nature, a similar conveyance of administration may be esteemed diversely after some time" (Lautenbach et al. 2011). Providing a historical perspective, the Millennium Ecosystem Assessment (2005) reported a loss of more than 50% wetland area during the 20th century. It noted, however, that extrapolating this rate of loss to other regions or wetland types was “speculative only.” For example, wetlands loss in the world ranges from 30% to 90%, depending on the region under consideration (Junk et al. 2013). The earlier global review by Davidson (2014) suggests that the wetland loss could be as high as 87% of the 1700 CE lake inventory, while 20th century losses alone were between 64% and 71% since in 1900. By a wide margin the broadest

issue confronting lakes and reservoirs is overflow of residue and related supplements and pesticides, human, industrial and other types of waste. Lakes frequently don't wash down or restore themselves. They are sinks for external pollutants that reuse and keep up weakening their conditions.

Drinking water standard, for instance, cannot be met, without excessive difficulty and cost, except degraded lakes and reservoirs are enhanced and afterward protected from pollutant intakes. Lakes, both natural and artificial experience the urban, human, industrial, farming and different effects. Therefore, numerous ecosystem communities have turned out to be seriously debased and should be restored. Lakes are utilized by people for some business purposes including angling, transportation, water system, industrial water supplies, and getting waters for wastewater effluents. Beside their significance for human utility, lakes have characteristic natural and ecological values. They direct temperatures and influence the atmosphere of the surrounded areas. They store water in this manner directing stream; recharge aquifers; and moderate dry spells. They give living space to aquatic and semiaquatic plants and creatures which thus give nourishment to numerous earthbound creatures and they add to the diversity of the landscape.

Lakes normally show a general impression of relative calmness and stability concerning the general set of natural resources they harbor (Desta, Lemma et al. 2015). Freshwater ecosystem systems give an extensive variety of environmental services, yet changes in land use in populated regions have had huge negative impact on their natural health and functioning (Jeppesen, Søndergaard et al. 2017).

Restoration failures are less broadly publicized, obviously, yet a few cases have been depicted in which a project produced less improvements than expected in lake quality. Examination of these failures is essential since we can learn as much about the factors prompting effective rebuilding from such projects as we can from examples of overcoming adversity.

1.2 Problem Statement:

Concerning the rapid degradation and disappearance of lakes all around, there is a high degree of interest in their restoration. Over the last 50 years, numerous lakes have been restored and different techniques have been adopted and tested all around the world (Phillips, Bramwell et al. 1999). The optimism with lake restoration however is not substantiated with empirical evidences that the restored lakes conserve regional biodiversity and recreate efficient ecological systems with all associated social, economic and environmental benefits (Council 1992). There are just few evidence that created or restored wetlands can function and behave like natural ones (Adler, R.W et al. 1993). These evidences too are mainly concentrated towards the assessment of environmental and ecological aspects of restoration. In many cases, scientific knowledge is unavailable of to know if the lake restoration also restores local livelihood (National Research Council, 1992). So, after restoring the lake, no one is sure that previous activities of local livelihood can be reasonably restored.

What is often taken for granted is population depending on lakes and wetlands before their intolerable levels of degradation is hapless, sitting idle and waiting for the time when they can restart their livelihood activities once again. This may be true in some cases and to some extent but it is more likely that many of those may have changed the livelihood activities, adopted new set of skill and most probably shifted to other occupation either at same place or may have migrated to other places. Memon (2011) showed that loss of livelihood of erstwhile camel herder

turned them into fishers in the Indus Delta. It in fact make more sense as people cannot just sit idle and die silently, thus ,they must see what other options are available to them. Lake also degrade gradually not suddenly giving people time to shift their livelihoods. In that case, if even lake is fully restored with all associated socioeconomic benefits, those who may have changed their livelihood or shifted to other places may not be willing to return and revert their livelihood on past patterns. New entreats may also fell hesitant to get benefit from the expended livelihood opportunities offered by the restored lakes because of the lack of required skill set. Thus it is plausible to assume that even if ecologically restored, some lakes may not trigger similar scales of social activates and thereby continue to underperform and eventually die because humans are also important elements of ecosystem health. Japanese's Satoyama Initiative in fact build on the principle that human and ecosystem cannot function isolation from each other and have a complementary symbiosis that must be integrated in any ecosystem initiative.

Thus, before initiating any activity it is important to assess human factor if the objective is to have fully functioning ecosystem. There are very few studies which have addressed this issue. These too are focused on type of ecosystem and virtually none addressing lake restoration in developing or developed worlds. This research therefore will attempt to answer following questions.

1.3 Research Question:

1. Do fisher believe that ecological restoration of lake will also result in restoration of livelihood and socio-economic dimension?
2. If yes are they willing to switch back to the old traditional benefits and will they participate in lake restoration?
3. To what extent they feel themselves ready to get benefits from new form of economic activates such as tourism?

1.4 Organization of the thesis:

The first chapter is consist of background: Overview, basic principles, and history. Further, this chapter provides problem statement, research question and objectives. In the second chapter there is brief literature review and synthesis. While third chapter explain the various steps which make up the Contingent Valuation Method (CVM). Econometric model based on different variables and simulations which was run to analyze the data and. The fourth chapter consist of descriptive statistics and results and the fifth chapter consist of summary of the results, conclusion, and recommendations.

CHAPTER 02
THEMATIC REVIEW OF LITERATURE

2.1 Introduction:

This chapter describes the different research findings and covers wide variety of the literature in the area of fishing, livelihood and lake restoration. Literature is drawn from numerous areas, including socio-economic, inland fisheries, environmental and anthropogenic issues, governance, institutions, and management strategies. The literature on lake restoration and livelihood provide an overview of how lakes have been restored whether the livelihood restored or not by many literatures (from 1989 to 2016). In this review of literature, various arguments from different perception are taken into concern so as to understand problem.

2.2 Fishing and livelihood strategies:

Freshwater is a basic human need. It is an adequate source of life (Tejerina-Garro, Maldonado et al. 2005). While the most important source of freshwater is lake which supports the number of fish species (Tejerina-Garro, Maldonado et al. 2005). Freshwater fishing is one of the oldest livelihood activity practiced for thousands years (Pringle, 1997). Fishing become the main source of recreational activities, and it provides employment opportunities, nutrition in all around the world. Financial and social advantages make people to use fish stocks (Hutchings, Walters et al. 1997), while the commercial fisheries have gotten broad attention due the number of articles and papers regarding fish extinction and fish deterioration (Myers, Hutchings et al. 1997). Recreational fisheries have likewise received significant consideration; in any case, the potential impacts of fishing have not been scientifically analyzed to the level of that business fisheries have (Cooke and Cowx 2004).

Inland fisheries basically vary from their coastal counterparts in the varied and complex structures that inland angling can take inside the work of the fisher family units. Certainly the fishing is the only economic activity for the local livelihood which play main role in their livelihood strategy (Welcomme, Cowx et al. 2010)

The rural poor communities have been trying different income strategies to cope with poverty and income variability. Advancing wage choices has been recommended by many studies on country regions and destitution (Pittaluga, Braimah et al. 2003). Rustic family units attempt to discover different options wage sources and procure cash from different exercises on the grounds that their present salary sources getting diminish because of a few variables including ecological changes. In order to support or improve their livelihoods, the rural people diversify their source of income. They need to earn money from different occupations not only from agriculture but also from others such as fishing or vice versa (Ellis 1998). Inland fisheries give general work to a huge number of destitute individuals, and part-time or seasonal work for many more. Despite the fact that inland fisheries frequently give regular work to individuals uprooted from different parts. The decent variety of species and biological communities makes variety of livelihood places that different group can occupy and that are not economically suitable for bigger operators (DFID, 2002).

The socio-economic importance of inland fisheries and their part in provincial economies in underdeveloped countries are regularly underestimated. Inland fisheries have been seen as 'backward, informal and minor' financial exercises (Platteau 1989) and are ineffectively incorporated into national or local decision making procedure (Sneddon and Fox 2007). Privious research demonstrate that the genuine circumstance might be altogether different. It was evaluated that in excess of 56 million individuals were specifically associated with inland fisheries in the developing in 2009 (BNP 2009).

Inland fish is one of the major source of nutrients such as protein, essential fat for most of the people, particularly in rural area (Youn, Taylor et al. 2014). In excess of 60 million individuals in low income nations depend upon inland fisheries as a source of livelihood and women represent to over a large portion of the people in inland fisheries supply chains (FAO 2014b). While still an extensive number, this is generally acknowledged to be an underestimated given the challenges with reporting in the sector (Bartley, De Graaf et al. 2015).

Fish assume to be essential part in enhancing the nutrients of a huge number of individuals around the world. Not only the source of protein but also provide minerals, vitamins, unsaturated fats and different micronutrients which are essential for the healthy diet (Roos, Chamnan et al. 2007). Inland fisheries assume a basic part in the food security of fishers and their families, and it also provide to the other people. Inland fish is also sold in local markets and substantial part of the catch which is consumed by the urban (Welcomme, Cowx et al. 2010).

Angling in floodplains or along streams or lake can be worked lasting through the year and offers families the possibility to create incomes on a regular schedule. Angling assumes a basic part as a 'bank in the water' (Béné, Steel et al. 2009) for nearby populaces that largely depend on this action to get to cash rapidly (Welcomme, Cowx et al. 2010).

The limit of inland fisheries to create rent and foreign exchange profit (Valdimarsson 2003) is limited to very few fisheries, the best case being the Lake Victoria Nile roost fishery that produces more than US$250 million every year for the three riparian nations (Cowx 2005).

2.3 Drivers external to the fishery:

Total populace is relied upon to grow from the present 6.8 billion to around 9 billion by 2050 (UN-DESA 2009). The increasing requirement for nutritious and healthy diet will expand the demand

for fisheries items, whose production is exceptionally stressed by high fishing pressure, developing natural rising organic pollution, toxic pollution, degradation and environmental change (Garcia and Rosenberg 2010). These issues can be separated into ecological and anthropogenic related problems.

2.3.1 Environmental Problems:

The relation of fisheries with ecosystem is close and more important than that conventional agriculture (FAO, 2008b). Food and habitat which depends on production fishery which has tight relationship with health and ecosystem (MAB, 2009); the only thing human can do for the productivity of fishery is adjustment of fishing efforts (Brander 2007).

Young fish and its nurseries are depending on the grass beds, coral reefs, bays and mangroves which important not only for young fish but also for the ecosystem services (Wells and Ravilious 2006), which are also unprotected and have negative effects of environmental change, destructive angling practices, effluence, sedimentation, and coastal development because of they are highly exposed. Fish have harmful effects due to different factors like as salinity, lower dissolved oxygen, acidity, rise in temperature and fish mostly live nearby the tolerance limit of variety of factors (Roessig, Woodley et al. 2004).

The internal temperature of fish and invertebrates varies with the environment because they are very sensitive regarding the changes in the temperature of the environment, so they move to those areas where the external temperature allow them to recover their internal temperature (Roessig, Woodley et al. 2004). As a result, they move to the cool areas where they can find cooler bodies of water due to thermoregulation behavior (FAO, 2008a). So the losses may be more in tropics especially for inland fisheries while there will be more benefits at the higher latitudes.

Number of different species may also migrate to the deeper cooler waters from semi-enclosed areas and shallow coastal waters where usually temperature rises fast (Cheung, Lam et al. 2009) According to the new estimations that the relocation of these may reduce the 40% of the potential fish catch in the tropics areas (Cheung, Lam et al. 2010), but these could be tradition predictions as the climate change impacts on the coral reef and oceanic acidification are ignored . As a result, climate change also effects the employment (Walther et al. 2002) while the stock is endangering due to over fishing where the fishing was previously sustainable (Easterling et al. 2007).

Inland fisheries are also undermined by changes in precipitation and water management. Subsequently, the recurrence and intensity of temperature or precipitation event is probably going to majorly affect future fisheries productivity in both inland and marine system (Brander, 2007). A study carried out by Barber (2010) on the impact of precipitation as a part of environmental change on estuarine fish productivity in Queensland, Australia demonstrated that numerous economically fish species utilize estuarine living spaces, for example, mangroves, tidal flats and sea grass beds as nurseries or reproducing grounds and have lifecycles connected to precipitation and temperature patterns.

Many studies, have shown that wind speed and direction among other factors can sharply alter the abundance, distribution and availability of fish population (Glantz, 2007). While the mellow winters with solid westerly breezes, above normal precipitation, and decreased frequency of inflows have overcame since the mid-1980s, likely as a result of environmental related changes in the atmospheric pressure fields, and have brought freshening of the Baltic Sea (Brander 2007). The eggs can't survive anoxic conditions in the deeper layers, thus discouraging fish production. There is likewise confirm from both the Pacific and Atlantic that nutrients supply to the upper productive layer of the Ocean is declining a direct result of diminished Meridional upsetting

dissemination, growing thermal stratification, and changes in wind borne supplements (U.S.G.C.R.P, 2013).

2.3.2 Anthropogenic Problems:

Exploitation is one of the key drivers influencing inland fisheries. In developed nations, inland fisheries are exploited basically by recreational fisheries. In developing nations, exploitation is to a great extent for nourishment (Welcomme 2000), however recreational angling is creating as a component of the tourism (Cooke and Cowx 2004).

The fisheries productivity is probably going to be influenced by the misfortune or decreased physical complexity of coral community, which results diminished fish species (Brander 2007). The strength of species and frameworks is being compromised by simultaneous pressure, including over fishing, loss of hereditary decent variety, habitat extinction, contamination, introduced and intrusive species, and additionally pathogens (Brander 2007) further established that rising levels of carbon dioxide are bringing down the pH with outcomes that are to a great extent unknown. The consequent cooling time frame speedup the decrease in Cod stock due to over fishing, which brought about another ecosystem switch and an expansion in the fishery for shrimps, by which revenue generating the Cod fishery is replaced (A. J Akoth, 2010).

2.4 Governance, Institutions, Management Systems and Strategies:

2.4.1 Governance and access regimes:

There is an extensive variety of access organizations and angling right system in inland fisheries. By and large they stay open assets yet obligations regarding administration are progressively being reverted to private people or local communities. The claim that inland fisheries in the developing countries are ‘open Access’ resources e.g.: (Panayotou 1982, Bailey and Jentoft 1990) does not

reflect reality. Not very few inland fisheries are true open access. Most are connected to some type of administration systems at the community/group level (Thomas 1996, Béné, Steel et al. 2009).

2.4.2 Current difficulties for the management of inland fisheries:

The assorted variety of inland fisheries is to be found in their nature and in addition the social and institutional settings under which they work. There is impressive vulnerability in the procedures that administer their elements. Since small scale fisheries are influenced predominantly by external process, policy environment and unpredictable institution are causes of consistent vulnerability and risk. Water allocation strategy and speculations, water streams, contamination and climatic inconstancy are predominant drivers of numerous inland fishery system. Looked with such difficulties, traditional fisheries administration has for the most part been unimportant as a reason for supportable improvement (Welcomme 2000).

2.4.3 Management strategies:

Inland fisheries have a tendency to develop along a cline from initial stress on food production, through recreation, nature preservation and aesthetic (Cowx, Arlinghaus et al. 2010). The situation of any fishery along this direction shifts most extraordinarily amongst developed and developing nations (Collares-Pereira, Cowx et al. 2002). Fisheries administration in industrialized nations focus solely around recreation and preservation, though under developed nations still concentrate on food security, in spite of the fact that the accentuations on recreational fisheries (Cowx 2002) and protection are expanding because of globalization (Cowx, Arlinghaus et al. 2010).

2.4.3.1 Lake Restoration:

During the last 50 years, various lake restoration strategies have been created and tried everywhere throughout the world (Phillips, Bramwell et al. 1999) The capability of utilizing lake restoration to set up clear-water conditions has as of late been encouraged by the alternative theory of stable states in shallow lakes. The theory, which proposes that a lake may exchange between a turbid and clear water state inside a given supplement level (Bachmann, Hoyer et al. 1999), has offered motivation to and incited a few management orientated lake restoration ventures with the reason for moving the lake from the turbid to the clear water state (Søndergaard, Jeppesen et al. 2000).

As a worldwide environmental issue, Lake Eutrophication has turned into a huge problem in the water resource security and water safety administration field (Smith 2003). Because of over-release of nutrients from farming runoff and untreated industrial and urban sewage, numerous lake are encountering eutrophication (Jin, 2003). Degradation of water quality can prompt a progression of reactions and result in loss of environmental capacities and degradation of aquatic ecological system (National Research Council, 2000). Eutrophication has a sever effect on numerous areas of the economy, with high social, natural and policy response costs (Pretty, Mason et al. 2003). Visit algal sprouts caused by eutrophication are inedible or even lethal to consumer species, resulting in food web alterations and conceivably negative impacts on biodiversity and fisheries (Qin 2009). An eco-friendly and powerful measure for water quality restoration is required critically in eutrophic shallow lakes.

2.4.3.2 Ecological restoration:

Ecological restoration is an essential practice attempted to effectively help and quicken the recovery of an ecological system that has been degraded, harmed, or decimated (Clewell, Aronson et al. 2004). Restoration ventures intend to accomplish biodiversity protection, guarantee

sustainability of important biological system works, and keep up ecological services (Harris and van Diggelen. 2006). Ecological restoration practice depends on the different discipline of restoration which applies biological hypothesis and thoughts to the recovery degraded ecological system (Bell, Fonseca et al. 1997). Restoration science incorporates a wide range of biological ideas and hypotheses, for example, progression, help, unsettling influence, and land scape ecosystem (Vallejo, Aronson et al. 2006). Restoration exercises are ordinarily focused towards the improvement of degraded ecological system, yet they are at last directed to satisfy society's more extensive (biological, financial, social and individual) values (Clewell 2000).

Restoration is generally attempted by community groups, local people or sometime individually and can incorporate exercises, for example, re-vegetation, reproduction of hydrology, pest management, weed control, and local species reintroductions (Clewell and Aronson 2013). The achievement of restoration plans can be connected to having a brief arrangement of activity with clear objectives, quantifiable goals, sensible administration activities and a versatile observing convention suited to the specific site necessities (Ehrenfeld 2000, Clewell and Aronson 2013). Restoration of contaminated ecological system is a tedious, expensive process that requires a long term responsibility by those groups involved.

2.5 Does Lake Restoration affect the local livelihood?

Among the major worldwide ecological changes has been seen so far and around the world in recent years lakes are dying (World Lakes Network 2004). Various studies have expressed that the reduction of lakes shapes the prosperity and security of lake inhabitants (NINDI 2007). With a few special cases, observational investigations rarely analyze the various scope of components through which lake fluctuations effected livelihood. Also, less is known about the scope of chances for

local livelihood can access under lake-level fluctuations—including where lake contamination fits in the suite of stressors influencing family unit occupations (UT Okpara et al. 2016).

This may forces a serious challenge to each endeavor of restoring the lake and accordingly profiting all users, particularly the poor people whose job is excessively reliant on the Lake, through enhanced transparency, forest partner support, and compelling nearby administration (Akele 2011), while restoration projects expected to enhance habitat conditions will impact fishing groups and fisheries at wide scale (Minns, Kelso et al. 1996). Effects to lake restoration fish groups have not been estimated. A key requirement for future lake-habitat restoration extends through which we can compare alternative restoration approaches and local livelihood with expected quantitative outcomes (Allen et al. 2002).

2.6 Synthesis:

A number of the studies are present in the field of lake restoration. A precarious review of available literature from different books, reports, research papers, and internet sources have been made to know the practices and theories related to the fishers' livelihood and lake restoration. In this study an effort is made to identify that whether livelihood of fishers will be restored with the ecological restoration of lake. Mainly the emphasis is given to the literature dealing with lake restoration and livelihood. Mostly, literature review has also been made to find the gaps in the review of literature regarding important problems in this field so that it can be analyzed in this study. Literature review gives overview of the complete image of different problems faced by fishers such as climatic and non-climatic through which lakes have been degraded and how government and institutions are tackling these issues. It contains how those degraded lakes have been restored and what were their outcomes.

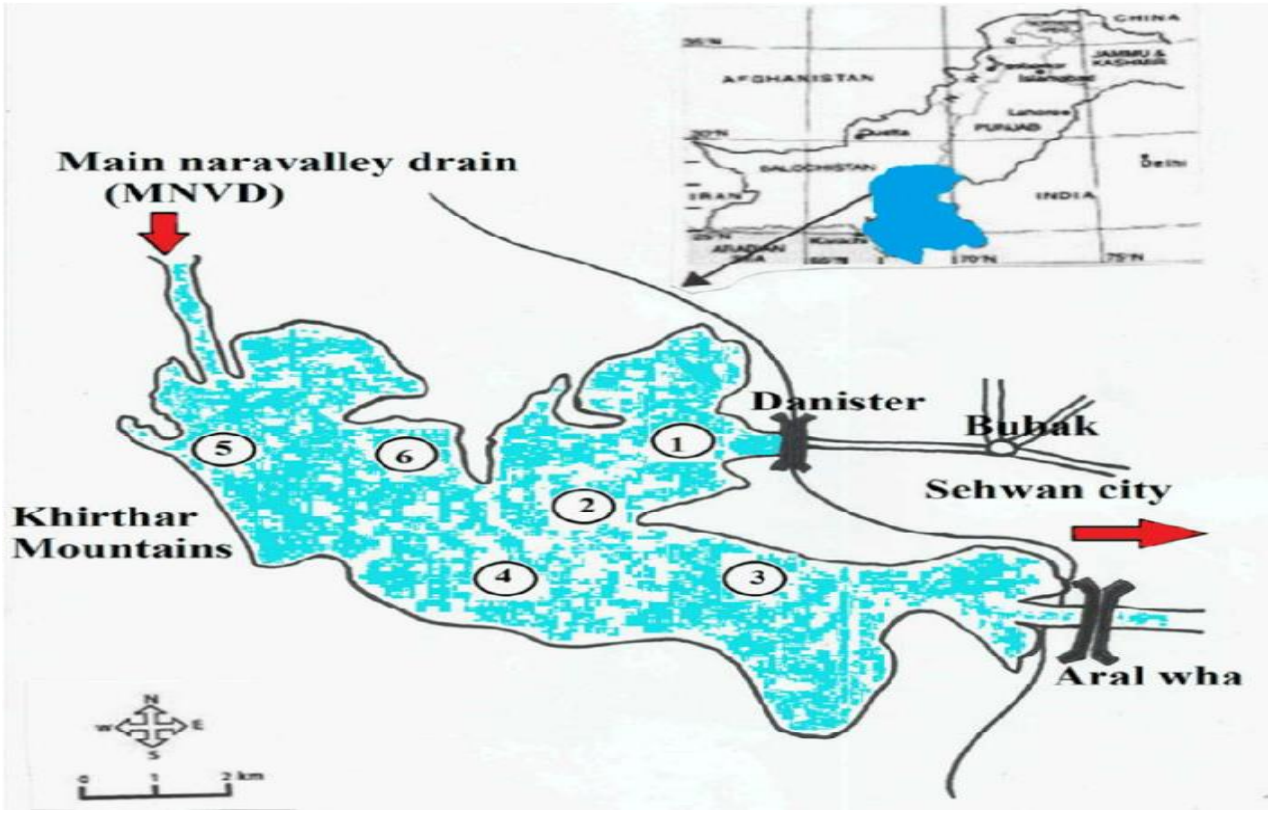
Now the problem is that fishers may have changed the livelihood activities, adopted new set of skill and most probably shifted to other occupation either at same place or may have migrated to other places. It in fact make more sense as people cannot just sit idle and die silently, thus ,they must see what other options are available to them. Lake also degrade gradually not suddenly giving people time to shift their livelihoods. In that case, if even lake is fully restored with all associated socioeconomic benefits, those who may have changed their livelihood or shifted to other places may not be willing to return and revert their livelihood on past patterns. New entreats may also fell hesitate to get benefit from the expended livelihood opportunities offered by the restored lakes because of the lack of required skill set.

This study aim to analyze the fishers' preferences regarding willingness to switch back to fishing in Manchar Lake. The important gap after reviewing this literature is that ecological restoration of lake has been discussed in wide variety but not any study found regarding the restoration of livelihood. Therefore this research will contribute to literature and for the policy regarding lake restoration.

CHAPTER 03
BRIEF DESCRIPTION OF THE STUDY AREA

3.1 Introduction

Manchar Lake is situated west of the Indus River in the Sindh area and is Pakistan's biggest shallow freshwater lake and one of Asia's biggest lakes (Arain et al., 2008). At a separation of 18km from Sehwan, the lake is encompassed by the Laki Mountain in the south, the Kirthar Mountain in the west and the River Indus in the east. It is a shallow basin and the profundity and region of the lake differs relying upon the inflow of water. Its mean profundity ranges from 2.5 to 3.75m and it covers a region of 233km^2 (Zehra, 2010). It is additionally a characteristic water storeroom and a resource for the encompassing dry area. The lake is nourished by the Aral and Danister channels from the River Indus, mountains downpours and the Main Nara Valley Drain (MNVD) (Zehra, 2010). The



Manchar Lake territory gets a mean yearly precipitation of 4.43 inches while lake dissipation midpoints 96 inches (Zehra, 2010).

3.2 Local Community and their Cultural Traditions

Manchar Lake as ‘a marvelous gift of water for the arid piedmont and plains of western central Sindh. This immense wetland is rumored as having continued human home for no less than five centuries; the inhabitant fisher community is accepted to have establishes in pre-historic times and considered as descendants of those who stayed during the Indus Valley Civilization on a striking similarity between their boats and those found on Indus seals (Hewitt, 1977; Sehrai, 1997).

The Manchar Lake’s fisher community considered to be most prehistoric of fishing communities (Naeem A, 2015). They dwell on the boat houses and on the lakes banks. There are number of types of boats in which they live and those boat houses are distinguished by the different shapes and types which are used for specific function such as cargo-boat (*doondah* or *zohruk* or *hara*), (*dhoondhi* or *choplandi*), game/fishing-boat (*dundi* or *beddi*) and ferry-boat (*kauntal*) and (Hasan and Dawani, 1997; Sahrai, 1997). Boat houses are level bottomed and on each side, lodges are worked from stern to stem, that overhang around two feet and in each lodge is a kitchen and a place for absolution, which falls straight into the water. These lodges are contracted out to travelers and the holds, being made into a few lodges, are let out to tankers with the goal that everybody has a bolt all alone lodge and loft in the hold and has his merchandise constantly prepared to arrange on at what places he discovers his market (Naeem A, 2015).

The biggest fishers' focus lived on Manchar Lake, up till late occasions, when water pollution levels achieved hazardous state, consequently which forced the large number of the lake's fisher community to relinquish their familial domains and livelihood looking for other substitute to survive. Boat occupants generally flourished with angling as their main income source, regularly enjoying water-fowling (hunting) and moving water plant species eaten as a nourishment source or food (Bhi (lotus), Naro (reed), Loar and Kum) (Naeem A, 2015). A portion of the fishers, distinguishing themselves as "*Mirbahrs* meaning 'lord of seas'", innately exceeding expectations in conventional abilities of waterway route, embraced exercises of lake transportation. A group inside the Mohannas represents considerable authority in the specialty of building local flat boats, these skills are handed from generation to generation (Naeem A, 2015).

3.3 Push and Pull Factors

The broad evaporation because of high temperatures and low rain, the expansion in salts, overwhelming metals and different poisons has brought about disintegration of this eco-system. What's more, the contamination from the Main Nara Valley empty brings agrarian effluents out of the Right Bank Outfall Drain (RBOD) to the lake. This rising contamination and collapsing is

raising risk which is dangerous for health and creating life risks (S. Siddiq 2004). The once nurturing Manchar Lake now represents a serious hazard to the business, wellbeing and lives of the groups living in and around the zone (N Memon, Z Birwani, 2008). The yearly fish catch of 2300 tons has dwindled to 400 tons (Z. Siddiqui, S. Shah. 1999). Fish species in the Manchar Lake have diminished from 200 to 14 since 1930 (N. Memon, Z. Birwani, 2008). Pakistan Fisher folk Forum indicate the lake population as having dropped from 60,000 to less than 25,000 in recent years and continues to dwindle because they have left with no other choice but to abandon their ancestral way of life for the sake of survival (Naeem A, 2015). Most of the fishermen and their families have migrated to different areas and shifted to different professions (The News, 2016; Dawn News, 2017).

The Manchar Lake's culture and landscape and its boat dwellers is interesting and a significant portrayal of customs that developed over hundreds of years. Fishers delighted in standard rights on natural resources of the Manchar and tributaries as a methods for continued customary livelihood. This has, however, been exasperates by advancements that results ruin with lives and jobs of these indigenous individuals who in the search of survival made them displaced, looking for other methods for monetary sustenance. The outcome is fast vanishing of local tradition and culture that remained key to sustained use of natural resources (Y Muhammad 2008). The lake presents a true picture of complete destruction of natural environment, there is need to adopt the scientific measures for its rehabilitation towards natural restoration with the cooperation, interaction and discussion among scientific experts for preparing comprehensive work plan towards its natural restoration.

CHAPTER 04

METHODS AND TECHNIQUES

4.1 Introduction:

This chapter gives a framework of research strategies that were followed in the study. It gives information on the participants, that was, the criteria for consideration in the research, who the participants were and how they were examined. It depicts the design of research that is decided with the end goal of this investigation and the explanations behind this decision. The instrument that was used for information accumulation was likewise portrayed and the methodology that was taken to carry out this investigation is incorporated. It also discusses the methods used to analyze the data.

4.2 Data and Methodology:

To collect the data needed for this study a contingent valuation (CV) study was conducted in combination with a questionnaire. The semi-structured questionnaire contained both close and open-ended questions. Snow ball sampling was used to track and identify respondent.

4.3 Choice of Method:

To answer the research question, there was need to collect the information of fisher's preferences. Since the data required was not accessible, a direct contact with fishers to identify their preferences. For that I had chosen questionnaire based survey. The method allowed to gather data from a large numbers of fishers (Barribeau, Butler et al. 2005). Adopting the Holden and Shiferaw (2002) approach, WTA was modeled to ask the preferences. To answer the question a Contingent Valuation (CV) study was done.

CVM was used to show the "economic value" of ecological goods and services. The term 'economic value' very much characterized in the standard economics theory is the estimation of

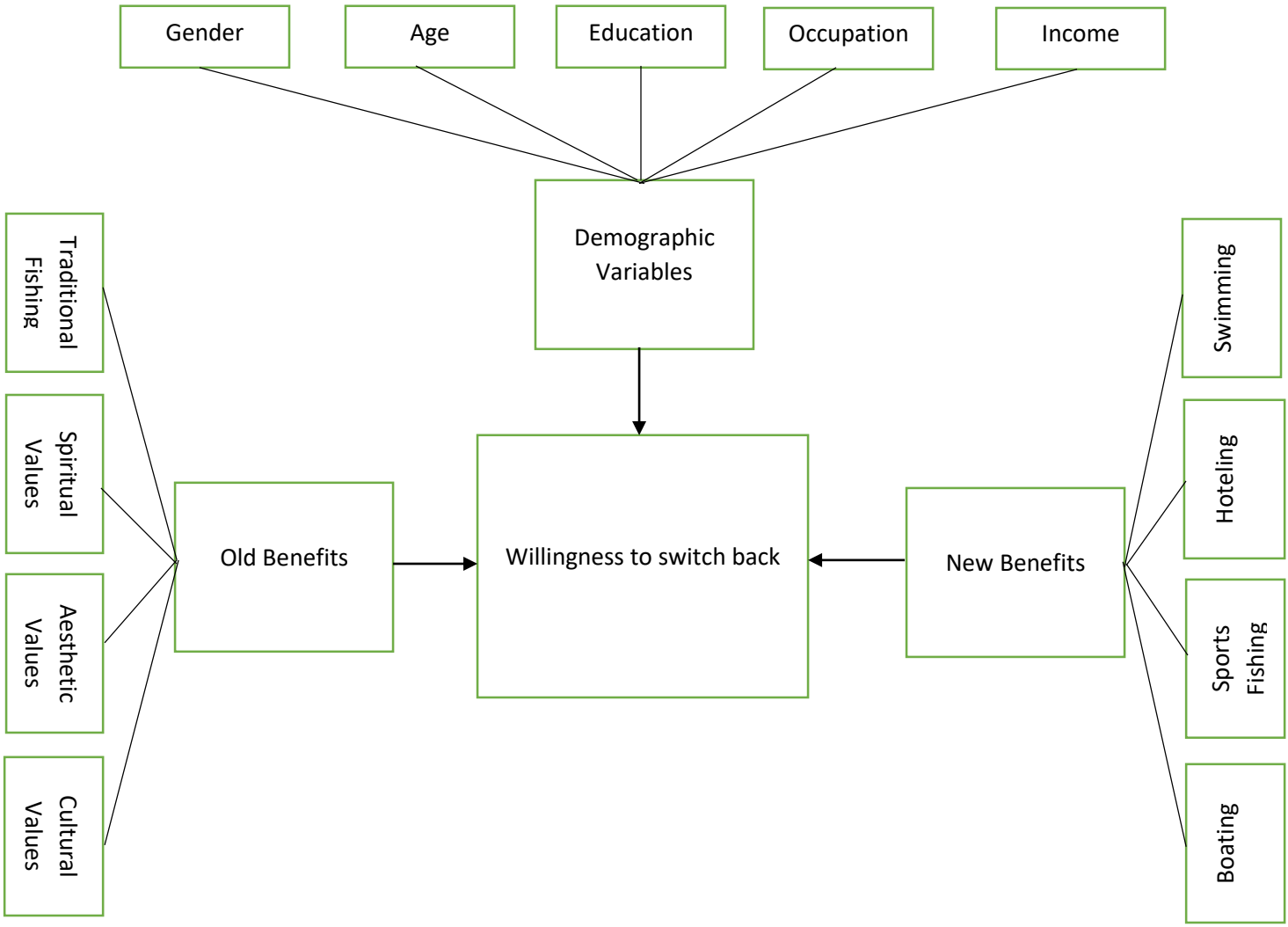
changes in well-being of people. For these goods and services this study made a theoretical situation of new and old benefits of lake through which, this study estimated the willingness to switch back (WTSB) of the fishers to move back to their old traditional profession or new benefits which will be provided by the Manchar Lake. The real elicitation procedures was adopted in this study was open ended (Dichotomous choice), double bound dichotomous choice method, and modified dichotomous choice method. First of all fisher's preferences was asked.

4.4 Conceptual Framework:

Previous research regarding the lake restoration has been largely focused on the restoring lake ecosystem which has been extensively examined in the literature. To get more knowledge about the restoring livelihood, we are designing an in-depth interview from fishers who had been migrated and shifted to other profession for the hypothetical restoration of Manchar Lake. This research based on grounded theory to identify and separate the main influencing factors and preferences on the basis of fishers willing to switch back to Manchar Lake. In Manchar lake fishers are faced with a variety of intertwined factors which influence their decision making in view of shifting back to Manchar Lake and to their old traditional profession.

In general fishers are likely to shift back if its net benefits are greater than what they are doing right now. Fishers have different personal characteristics which include fishers' education, age, household size, skills and income which greatly affects fishers' decision making. These factors are knotted since the influence one another and they have a great influence on the level of benefits. The fishers' characteristics, institutional factors, level of benefits together with the existing conditions of Manchar Lake influences the fishers' decision (willingness) to switch back. Thus subject to resource, technical, personal and skills constraints, fishers select from the alternative opportunities that fit their circumstances and accounting for both the net returns and risk.

The questions will be focus on respondents' preferences about the benefits provided by the lake restoration, their perceptions and their current condition about switching back, and which may be the important factors influencing the willingness to switch back to Manchar Lake. The analytical method of the grounded theory comprised of semi structured questionnaire. The extracted factors will be concised into three categories: household demographic, old benefits provide the lake, and new benefits provide the lake. Household demographic variables included gender, age, education background, occupation, and income. Old benefits variables include traditional fishing, spiritual value, aesthetics value, and cultural value. New benefits variables include boating, sports fishing, hoteling, and swimming. The conceptual framework for willingness to switch back is structured as shown in Figure bellow on the basis of hypothetical restoration of Manchar Lake.


Gender
Age
Education
Occupation
Income
Demographic Variables
Traditional Fishing
Spiritual Values
Aesthetic Values
Cultural Values
Old Benefits
Willingness to switch back
New Benefits
Swimming
Hoteling
Sports Fishing
Boating

4.5 Sample Size:

According to the most recent available statistics, there were 2137 fishers in Manchar Lake (Sindh bureau of Statistics, 2014). Reportedly, more than half of had been shifted to other profession and some of them migrated to Keenjhar Lake (The News, 2016; Dawn News 2017). A total sample size of (n) 300 fishers was selected areas with confidence level of 95% and a confidence interval of 5%. I had chosen the sample of those fishers who have changed their profession rather than fishing and whether they were living in lake or migrate to new area where they had switched to new occupation.

4.6 Sampling Method:

Snow ball sampling was applied in this study, in order to identify the respondents and track respondents. Fisher switched to different occupation in different areas to track them I used snowball sampling. The aim was to make the findings more illustrative, fishers from Manchar Lake shifted to other occupation or migrated to other area for new profession were selected. Through pilot survey it was identified most of the fishers are in district Jamshoro, Hyderabad and Dadu who originally belong to Manchar Lake.

4.7 Variable of the study:

In this study there are several variables including dummy, count, and index variables. While index variables were calculated by using formula developed by Miah (1993) for categorical variables and CBS (2003) for numerical variables both method are also used by (Sharma P. 2009).

Table: 4.1

Variables	Units	Description	Expected Sign
Income	Continuous	Monthly income now and before	+/-
Occupation	Categorical	Current occupation	+/-
Education	Continuous	Qualification	+/-
Household size	Continuous	Family members	+/-
Age	Continuous	Age of fisher in year	+
Total Cost	Continuous	From house to Job	+
Index Variables			
Job Quality	**Index Method**	**Composite Index**	**-**
1. Job Security: Satisfied with current job in terms of job security.	Very dissatisfied= - 2.0 Dissatisfied= -1.0 Neutral=0.0 Satisfied= 1.0 Very Satisfied= 2.0	$CI = \frac{\sum \mathbf{JsI + HsI + SpI + II + WhI}}{N}$ N= total number of variables CI= Composite index	
2. Health Security: Satisfied with current job in terms of health security.	Very dissatisfied= - 2.0 Dissatisfied= -1.0 Neutral=0.0 Satisfied= 1.0 Very Satisfied= 2.0		
3. Social Prestige: Well off by doing current job as compare to previous job	Very dissatisfied= - 2.0 Dissatisfied= -1.0 Neutral=0.0 Satisfied= 1.0 Very Satisfied= 2.0		
4. Income: Satisfaction with current income as compare to past	Very dissatisfied= - 2.0 Dissatisfied= -1.0 Neutral=0.0 Satisfied= 1.0 Very Satisfied= 2.0		
5. Efforts: Satisfaction with current job in terms of efforts as compare to Past.	Very dissatisfied= - 2.0 Dissatisfied= -1.0 Neutral=0.0 Satisfied= 1.0 Very Satisfied= 2.0		
Facilities	**Index Method**	**Composite Index**	**-**
1. Health Facility: Walking time from house to Hospital now and before.	#	$CI = \frac{\sum \mathbf{HfI + EfI + RI + MI}}{N}$	

2. Educational Facility: Walking time from house to School now and before.	#		
3. Road: Walking distance from house to service road now and before.	#		
4. Market: Walking distance from house to market now and before.	#		
5. Distance from house to job now and before	#		
Attachment to Place	**Index Method**	**Composite Index**	**+**
1. Cultural Heritage (Physical symbol of intergenerational prestige)	Very important= +2.0 Important = +1.0 Moderately important=0.0 Slightly important = -1.0 Not important= -2.0	$CI = \frac{\sum CH + HS + EB + HA + SC}{N}$	
2.Historical symbol (a memoir of past events importance foe us)	Very important= +2.0 Important = +1.0 Moderately important=0.0 Slightly important = -1.0 Not important= -2.0		
3. Existence of beautiful and attractive surroundings.	Very important= +2.0 Important = +1.0 Moderately important=0.0 Slightly important = -1.0 Not important= -2.0		
4. A source of clean and healthy air.	Very important= +2.0 Important = +1.0 Moderately important=0.0 Slightly important = -1.0 Not important= -2.0		
5. A place of social cohesion (point of community cooperation)	Very important= +2.0 Important = +1.0 Moderately important=0.0 Slightly important = -1.0 Not important= -2.0		

Distance	**Index Method**	**Composite Index**	**-**
1. Kilometer: Distance in terms of kilometer from house to job now and before	#	$CI = \frac{\sum KI + CI + TI}{N}$	
2. Cost: Distance in terms of cost, travel cost from house to job now and before	#		
3. Time: Distance in terms of time, how much time it takes from house to job now and before.	#		
Skill Level	Very High = +2.0 High = +1.0 About Same =0.0 Low = -1.0 None = - 2.0	$CI = \frac{\sum SL}{N}$	

4.7.1 Willingness to switch back (WTSB):

It is my dependent variable which is dummy variable 1 for Yes 0 for No it was regressed on different set of independent variables. In order to capture the relationship of WTSB with different variables, the model was controlled for dependent variable such as current occupation, current income, education, household size, age, distance, skills level.

4.7.2 Current income:

This study examined the current income to be calculated from self-reported monthly expenditure, and their savings and short term loans.

4.7.3 Current occupation:

Current occupation was asked which influenced the willingness of fishers to switch back.

4.7.4 Education:

Education is another variable on WTSB of the respondent depends. This study measured it using years of schooling. Respondent with more education were willing to switch back.

4.7.5 Household size:

House hold size may impact WTSB of a fisher to shift from other profession to Manchar Lake where there family was. It's was taken as number of family members who share kitchen. If the household size large the fisher men may easily be ready to switch back to meet the family members. If the family with them due expense they might back.

4.7.6 Age:

This is was taken as number of years. It is an important variable because higher age citizen cannot work in industrial sector as labor, as they can make some money in fishing sector. Moreover, aged fishers might be more willing to leave their current profession and shift back to fishery.

4.7.7 Level of Skill:

Those respondents who have switched to other occupation was asked what level they have skills of current occupation beside fishery. The fishers who will be able to adopt a new skill, trainings and say very low, low, average, high and very high. It is an important factor because skill adaptation might be the first need of these workers in new sector.

4.7.8 Job Quality:

It is main variables which consist of job security, health security, social prestige, income, and working hours. Job quality play important role to achieve their livelihood outcomes it is obvious if the job quality is better than previous job than fishers would not like to switch back.

4.7.9 Facilities:

Five variables: Distance from house to job, health facility, education facility, road, market are considered to identify the facilities. However due to facilities may be fishers might not want to switch to back to fishing in Manchar Lake.

4.7.10 Attachment to the place:

There are high chances of attachment of fisher with lake or culture, due to aesthetic, spiritual values and environment might be fisher would like to switch back.

4.7.11 Total Cost:

It is the cost that fishers are bearing while traveling from home to job. The total cost will was calculated as first we find opportunity cost which is (time x 2) x wage rate then for total cost we have sum the opportunity cost with travel cost through which we get total cost and it is an important variable because for most of the workers had to pay travel cost, if they are outstation.

4.7.12 Migration time:

It is the time since the fishers are migrated from Manchar Lake to nearby town. May be those fisher who migrated early may not be willing to switch back.

4.7.13 Partially Migrated:

It is the dummy variable of those fishers who are partially migrated to nearby town. 1 for partially migrated 0 for fully migrated. It is expected those fisher who are partially migrated are more willing to switch back.

4.8 Model Specification:

Following model was used in the study. This model was adopted from Ressurreigao et.al (2012).

$$\mathbf{WTSB = \beta_0 + \beta_1 (EDU) + \beta_2 (HHsize) + \beta_3 (AGE)\ \beta_4 (AGESq) + \beta_5 (SA) + \beta_6 (JQ) + \beta_7 (MT) + \beta_8 (PM) + \beta_9 (Fc) + \beta_{10} (AM) + \beta_{11} (TC) + \mu_i}$$

Where:

WTSB = willingness to switch Back

EDU = Education of the respondent

HHS = Household size

AGE = Age in years

AGESq = Age square

SA = Skill level

JQ = Job quality

MT = Migration Time

PM = Partially Migrated

Fc = Facilities

AM = Attachment to Manchar Lake

TC = Total Cost

CHAPTER 05

RESULTS AND DISCUSSION

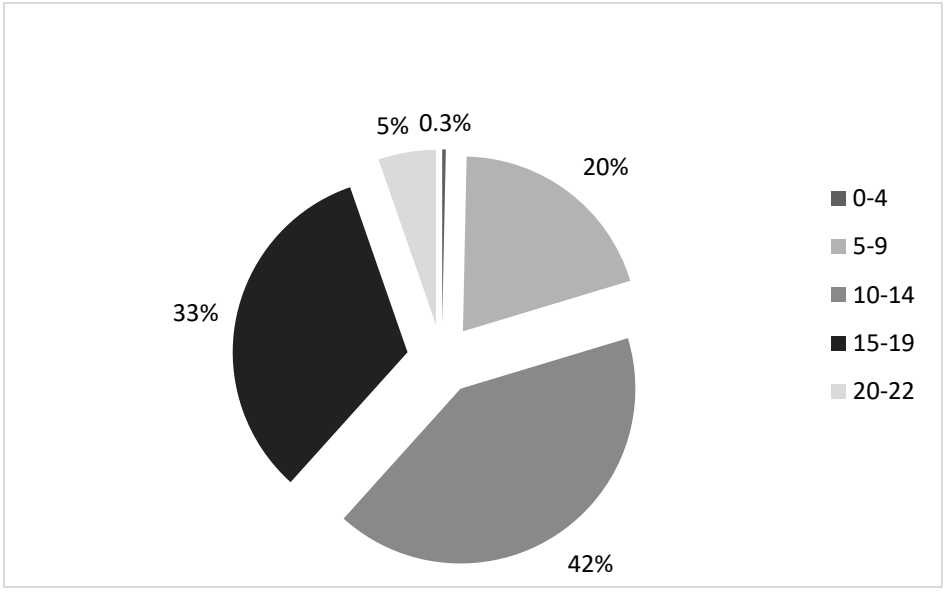
5.1 Introduction

This chapter describes the profile of respondents. It provides the results of the regression model used in this study for analysis to assess the fishers' willingness to switch back to fishing in Manchar Lake and descriptive statistics of variables. Under this study the socio-economic characteristics of fishers were dealt which include their family size, age, education and occupation. Changes in fishers' capital assets and costs include income of the respondents, skill level, facilities index, job quality and distance, while changes in natural assets and rural livelihood includes family integrity, contact with family and friends and attachment to Manchar Lake.

5.2 Profile

5.2.1 Socio-Economic Characters of Fishers

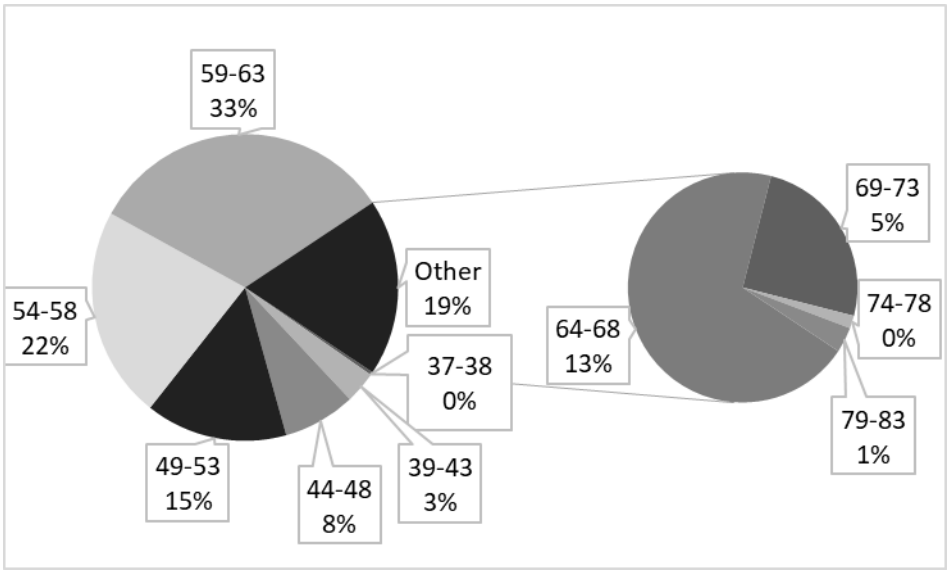
Figure 5.1 Family Size of respondents



The fishers have large household size, the reason behind is joint family system which is very common in rural areas of Sindh (Pakistan Bureau of Statistics 2008). Figure 5.1 shows the

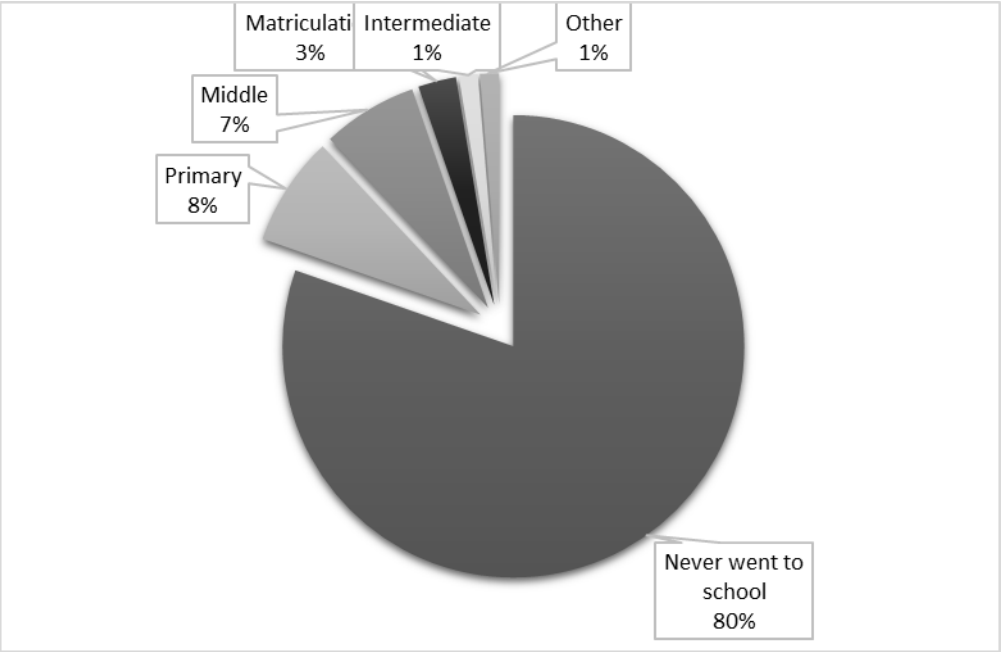
composition of the households. The fishers' households tend to be large, the average family size is consist of 13 members. Maybe religion is another reason behind the large household size, religious laws generally discourages the family planning. Traditional families in Sindh are extended, it may have many advantages such as physical support, coherence, psychological support, and stability, particularly in hard times.

Figure 5.2 Age of respondents



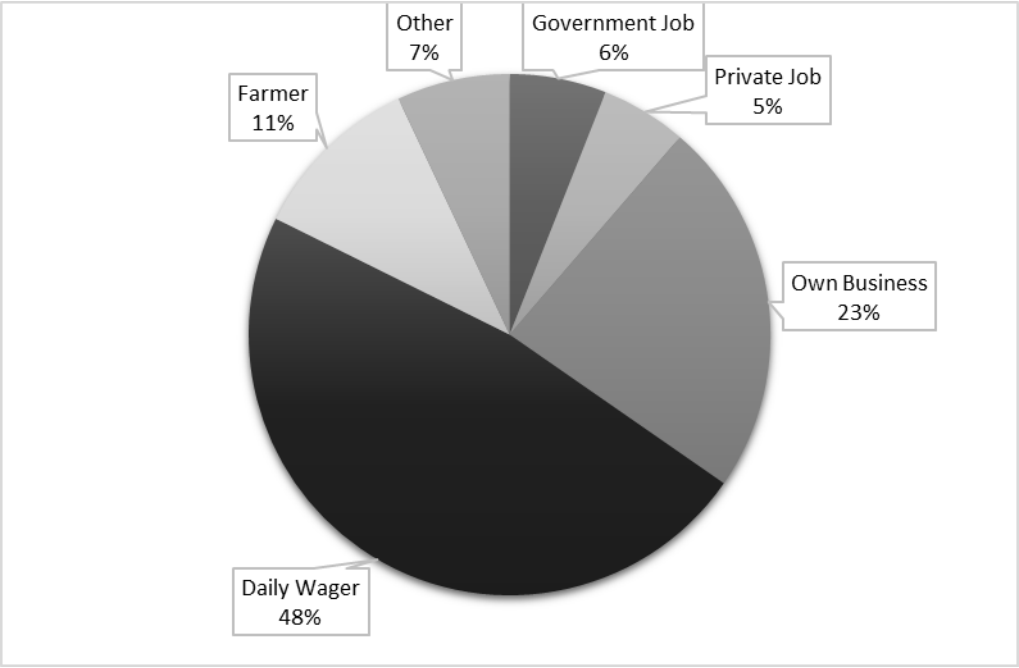
The (Figure 5.2) shows frequency distribution of age of the fishers. The large number of fishers were old and the mean age was almost 57. It was observed during survey that most of the fishers shifted to other profession after 1996 and this is also reason that mostly the respondents are the older ones.

Figure 5.3 Education of respondents



As formal education is not necessary to be a fisher. Figure 5.3 shows the majority of fishers never went to school. The reason of lack education could be is the lack of schools, Bubak is deprived of education there were insufficient educational institutes. According to the respondents there was only one school in Bubak which was far away from Manchar Lake.

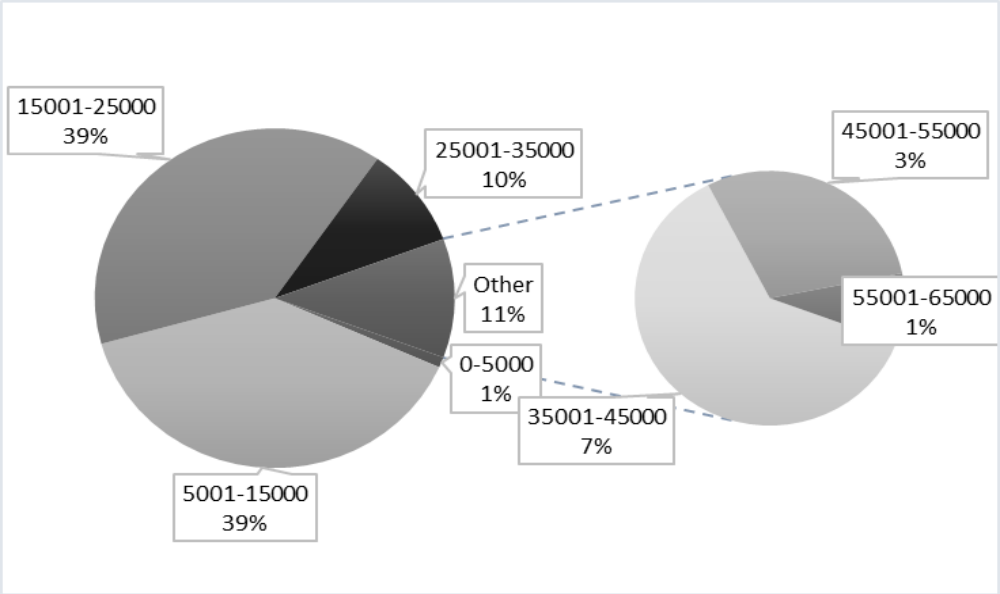
Figure 5.4 Occupation of respondents



Before switching to other jobs the main occupation was fishing. There are five main occupations in which fishers are currently engaged namely; government job, private job, own business, daily wager and farmer. However fishers are very less educated most of them never went to school so the higher proportion of fishers are engaged in daily wager, almost half of the fishers are daily wager. Those who have own business have their own shops or own small tea hotel/dhaba. In cities small business and daily wager opportunities are comparatively higher than other jobs.

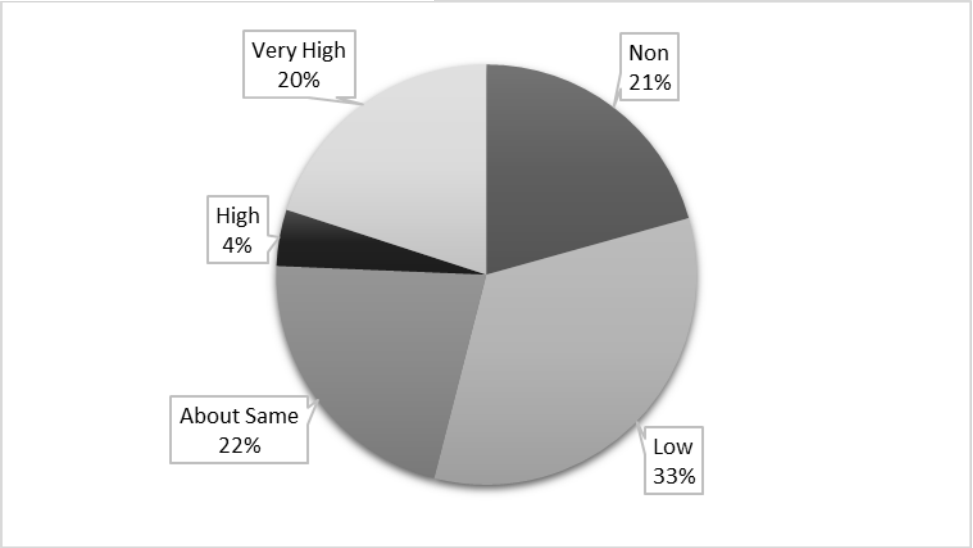
5.2.2 Changes in Fishers' Capital and Costs

Figure 5.5 Income of respondents



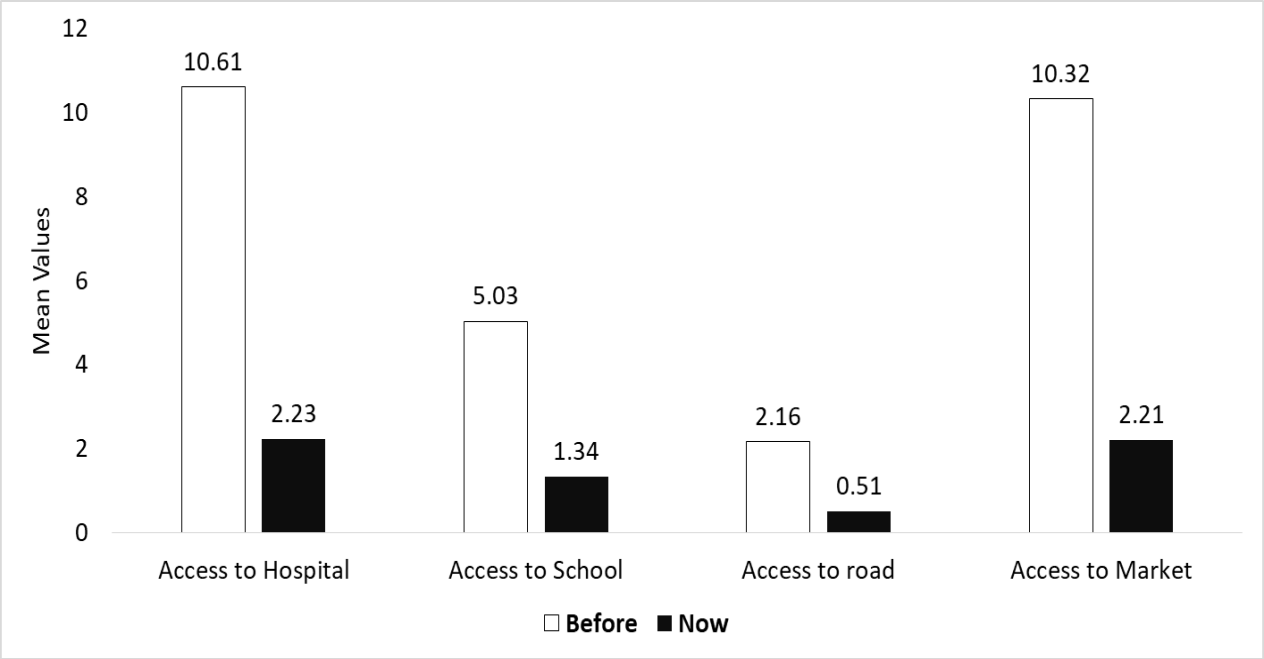
Ever since the nature of job and job availability prospects has been changed so the fishers have very poor access to jobs. However the neighbor cities provide many job opportunities such as small business, daily wage labor and private jobs and there is significant reduction in income. It was observed during the survey that the average income was less as compared to when fishers were fishing on the Manchar Lake in terms of money value.

Figure 5.6 Level of Skills of respondents



Since the fishers have switched to other professions besides fishing so they also need skill to get good job, they have very low level of skills as compared to the level of skills in fishing and many of them did not have any skill. Most of the old ones who do not have skills or those ones who recently shifted to new occupation. The income was also dependent on their level of skill, the less you have skill the less you get the income. Those who have very high skills in their current job compare to fishing they were less willing to switch back to fishing in Manchar Lake.

Figure 5.7 Facilities



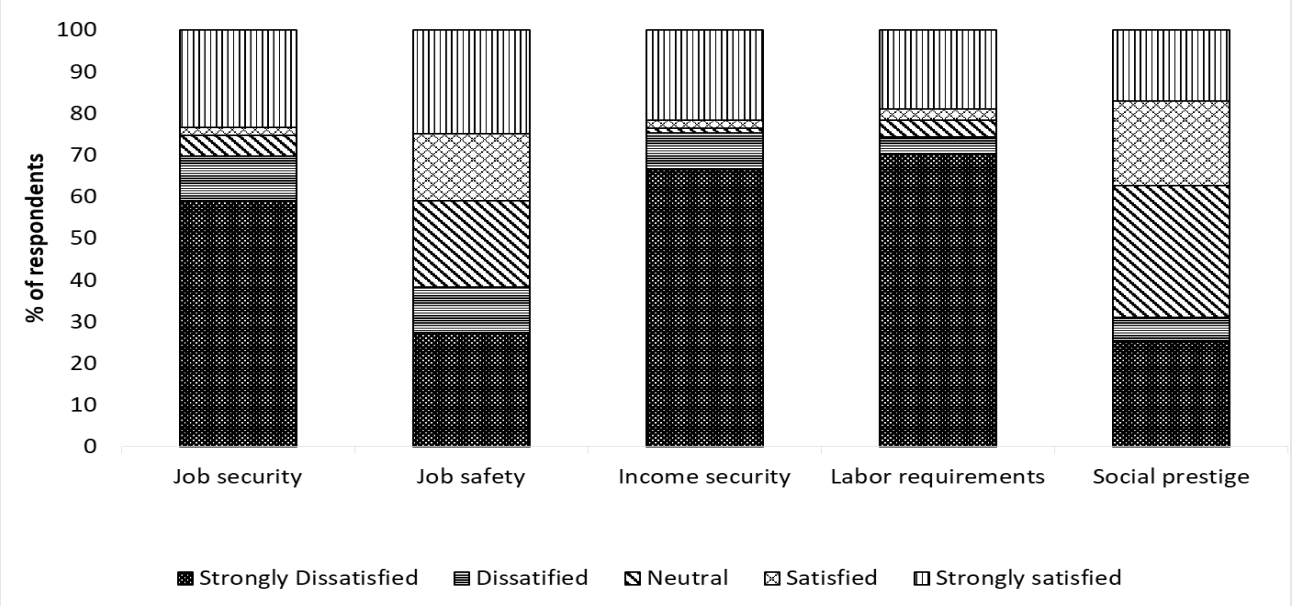
Remarks: ** t- test[1] is significant at the 0.05 level

In the start larger part of the fishers needed to travel for several hours in order to get the services, before the switching to new jobs and migrated to city the average distance to near service was about 7 kilometer. But after migrating to the city from Manchar Lake the mean distance is less than 2 kilometers in order to reach the services nearby them. Now they can easily access to the hospital or school and markets just because of in urban areas roads and markets are in better access as compare to the rural areas. Figure 5.7 shows that the fishers are getting the significant advantages of better access to market, roads and institutions. Through the easy access to the market the household can easily arrange the commodities and conduct the business are the main advantages fishers are getting. While the main advantage fishers are getting from roads are easy

[1] Paired t-test is applied on facility index to compare facilities before when the fishers were fishing in Manchar Lake and now the current place facilities. While t-test focuses on testing the significant of both facilities, however t- test is significant at the 0.05 level.

access to schools, hospitals and to do jobs. It was seen in the field that facilities are accessible are near in the city. Thus, they don't have to travel far.

Figure 5.8 Job Quality of current job as compare to previous job

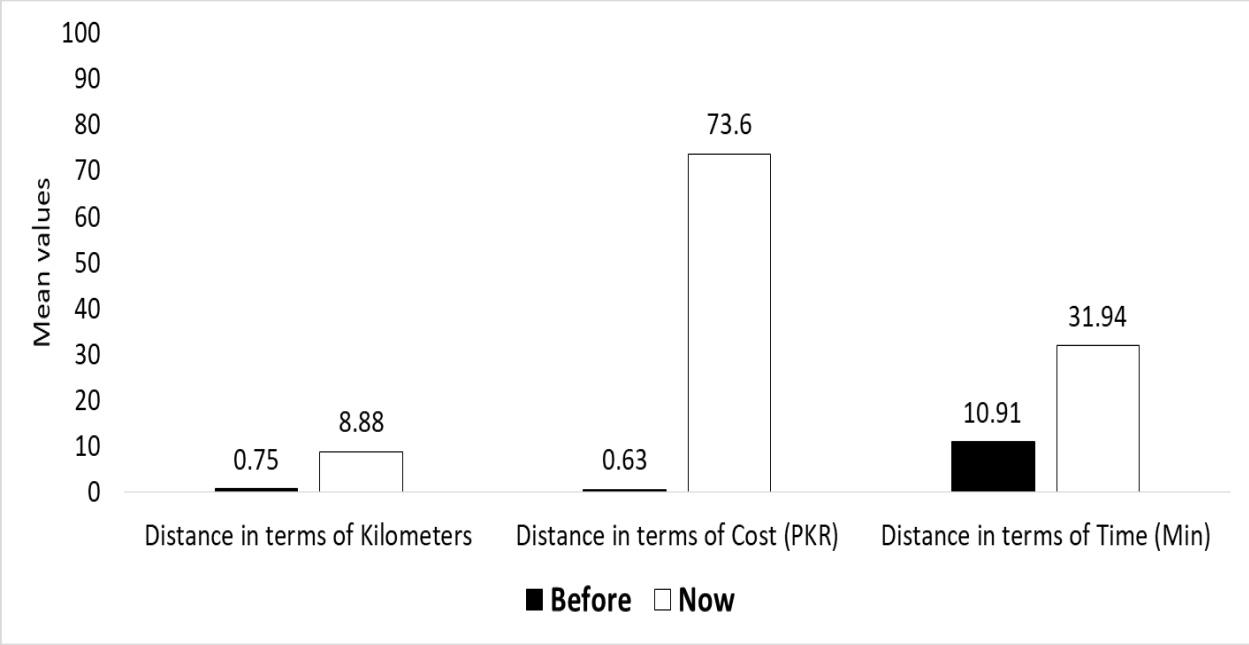


Remarks: ** t- test[2] is significant at the 0.05 level

On average every worker spend 8 hours at work in Pakistan and every worker give large share of their efforts and adult lives in work so work is significantly related with job quality of worker. Based on our study the job quality indicators are job security, job safety, income security, labor requirements and social prestige. These indicator can attempt to catch different aspects of job. Figure 5.8 shows that most of the fishers are strongly dissatisfied with their current job quality in terms of income security (reliable income) more than half of the fishers are strongly dissatisfied because larger number of fishers were daily wager, and they did not get reliable income. The fishers are somehow satisfied with parameter job safety (injuries and health hazards) because the current job they are doing they do not have any injury risk.

[2] One sample mean-comparison t-test is applied on job quality of current job as compared to previous job quality when the fishers' primary occupation was fishing on Manchar Lake. While t-test focuses on testing the significant of job quality, however t- test is significant at the 0.05 level.

Figure 5.9 Distance from house to job



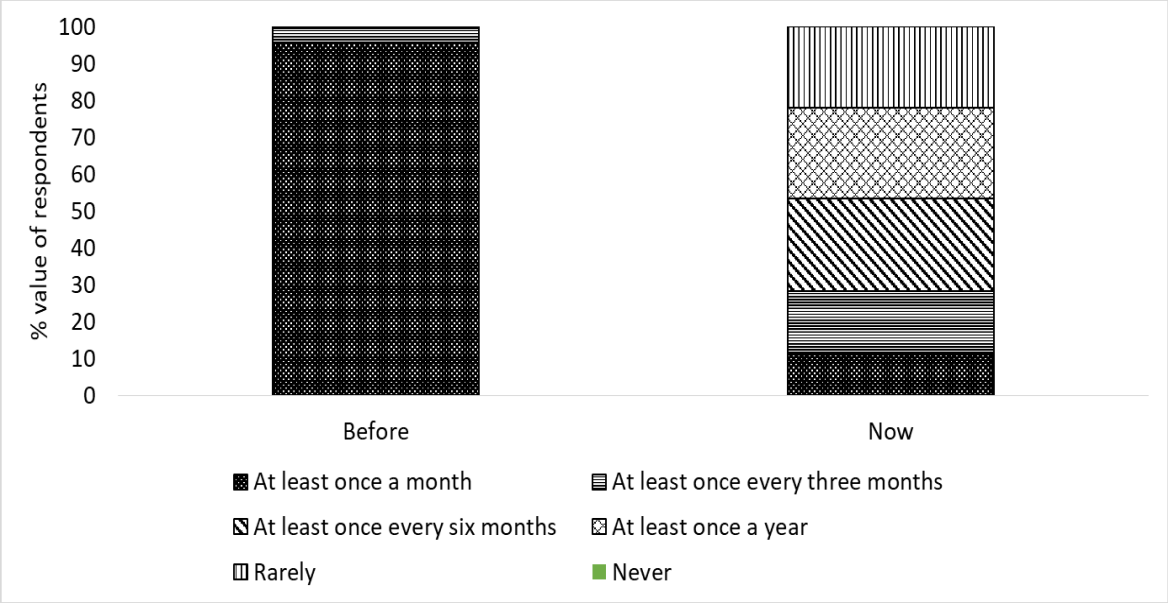
Remarks: ** t- test[3] is significant at the 0.05 level

Distance is generally seen as imposing cost and have significant effects on livelihood. The distance that workers cover from house to job have some opportunity cost so distance is always considered to be an important variable. In this study distance is measured in terms of kilometer, cost and time (Figure 5.9**Error! Reference source not found.**) shows that before when they were primarily fishers at Manchar Lake they were bearing less cost as compared to their current job. Because most of fishers were living on the boats or by the side of lake so they did not have to travel that far.

[3] Paired t-test is applied on distance index to compare distance from house to occupation before when the fishers were fishing in Manchar Lake and now the current distance from house to current occupation. While t-test focuses on testing the significant of both distance, however t- test is significant at the 0.05 level.

5.2.3 Changes in Natural Assets and Rural Livelihood

Figure 5.10 Contact with family and friends

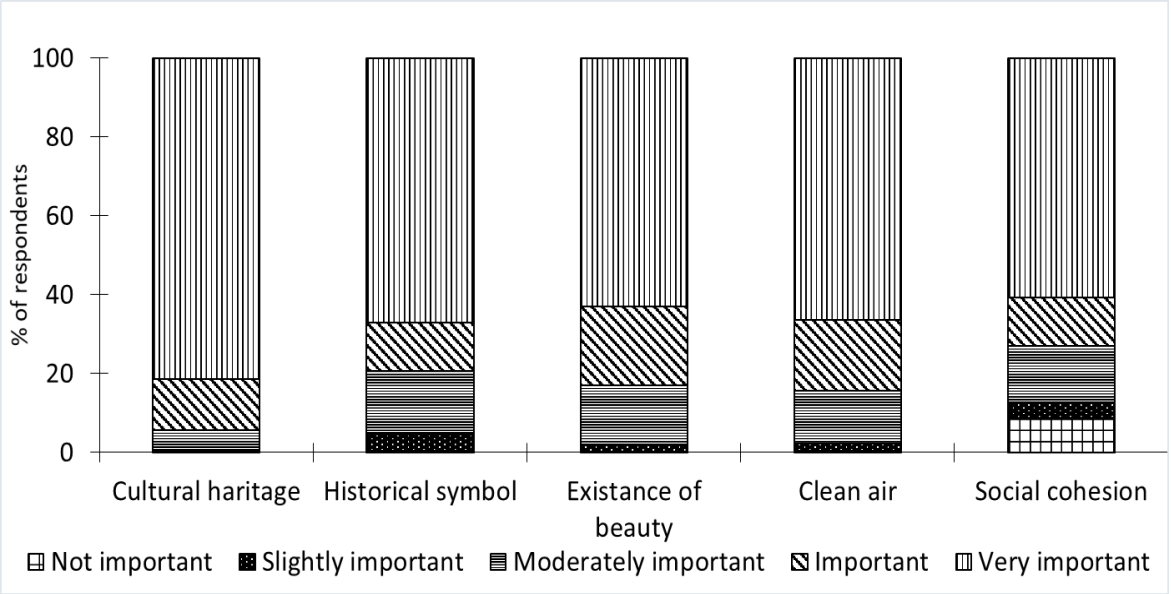


Remarks: ** t- test[4] is significant at the 0.05 level

Family integrity (living with family) remain same it was not challenged to those fishers who moved to the city they moved with family and living together while the contact with relatives, friends and neighbors significantly decrease as compared to past when the fishers were fishing in Manchar lake. Due to change in profession they are separated from each other, when they were fishing in Manchar Lake they used to fishing together live together so they frequently contact each other. Those fishers who have left the village are rarely connected and are not aware about their status. During the survey it was observed many of the fishers unaware that where the fishers were gone and who were gone. Figure 5.10 shows that now fishers comparatively contact very less as compared to the past when they were fishing in Manchar Lake.

[4] Paired t-test is applied on contact variable to compare how frequently fishers were contacting with relatives and friends before when the fishers were fishing in Manchar Lake and how frequently fishers are contacting with relative and friends now. While t-test focuses on testing the significant, however t- test is significant at the 0.05 level.

Figure 5.11 How important Manchar Lake is for the fishers in terms of cultural heritage, historical symbol, existence of beauty, clean air and social cohesion



Remarks: ** t- test[5] is significant at the 0.05 level

Rural livelihood considerably depend on the natural things such as water, Existence of beautiful and attractive surroundings, clean air and community cooperation. Therefore rural people have strong attachment with natural capital in contrast of urban life which is less connected with natural livelihood. Whether fishers are likely to switch back to fishing in Manchar Lake or not but their attachment with lake remain same.

[5] One sample mean-comparison t-test is applied on attachment to Manchar Lake. While t-test focuses on testing the significant of attachment to Manchar Lake, however t- test is significant at the 0.05 level.

5.3 Results Analysis

Table 5.1 Willingness to switch back with old benefits

Variable Name	Coefficient	Marginal Effect	Z Value	P>[z]
Household size	0.0861938	0.0130054	0.90	0.369
Age	0.1448432	0.0218548	0.46	0.646
Age Square	-0.000873	-0.0001317	-0.35	0.728
Skill level	-0.1936298	-0.029216	-0.52	0.600
Education in years	-0.3309119**	-0.0499299	-1.91	0.056
Job quality	-0.0687457	-0.0103727	-0.13	0.896
Migration Time	-0.429898***	-0.0648654	-4.71	0.000
Partially Migrated	4.758486***	0.6122412	3.55	0.000
Attachment to Manchar Lake	0.565693	0.085355	0.85	0.393
Difference of facilities	-0.2649354**	-0.0399749	-1.79	0.073
Total cost	1.996436***	0.3012336	4.52	0.000

Table 5.1 shows the results of regression of willingness to switch back to fishing in Manchar Lake if the old benefits (Traditional fishing, aesthetic value, spiritual values, and cultural values) are provided. However, education in years, migration time, partially migrated, difference of facilities, and total cost have statistically significant impact on willingness to switch back to fishing in Manchar Lake. While household size, age, age square, skill level, job quality, and attachment to Manchar Lake have statistically insignificant impact on willingness to switch back to fishing in Manchar Lake if the old benefits (Traditional fishing, aesthetic value, spiritual values, and cultural values) are provided. Further, results shows that fishers with high education are less willing to switch back to fishing in Manchar Lake. The (Table 5.1) shows that with increase in one year of education 4% probability of fishers less likely to switch back to fishing in Manchar Lake, if the old benefits (Traditional fishing, aesthetic value, spiritual values and cultural values) are provided. The (Table 5.1) indicates that migration time has negative relationship with willingness to switch back which means those fishers who migrated early to nearby town are less likely to switch back to fishing in Manchar Lake, if the old benefits (Traditional fishing, aesthetic value, spiritual values and cultural values) are provided. While partially migrated variable has positive relationship with

willingness to switch back so those fisher who are partially migrated are more willing to switch back to fishing in Manchar Lake, if the old benefits (Traditional fishing, aesthetic value, spiritual values and cultural values) are provided. Further, result shows total cost (sum of opportunity cost and travel cost) has positive relationship with willingness to switch back so by increasing in one thousand rupees in their total cost (sum of opportunity cost and travel cost) there is 30% probability of fishers likely to switch back to fishing in Manchar Lake, if the old benefits (Traditional fishing, aesthetic value, spiritual values and cultural values) are provided.

Table 5.2 Willingness to switch back with new benefits (Tourism)

Variable Name	Coefficient	Marginal Effect	Z Value	P>[z]
Household size	.102333	.022629	1.48	0.139
Age	-.1427746	-.0315719	-0.46	0.643
Age Square	.0001066	.0000236	0.04	0.967
Skill level	-.2100368	-.0464456	-0.82	0.410
Education in years	-.1833309**	-.0405401	-1.73	0.084
Job quality	.3595298	.0795032	0.98	0.326
Migration Time	-.3167009***	-.0700324	-4.77	0.000
Partially Migrated	.5069313	.1101599	1.15	0.250
Attachment to Manchar Lake	.2361911	.0522292	0.77	0.442
Difference of facilities	-.117656	-.0260174	-1.07	0.287
Total cost	.6074629**	.1343288	2.10	0.035

Table 5.2 shows the results of regression of willingness to switch back to fishing in Manchar Lake if the new benefits (tourism) is provided. In (Table 5.2) education in years, migration time, and total cost have statistically significant impact on willingness to switch back to fishing in Manchar Lake. While household size, age, age square, skill level, job quality, partially migrated, attachment to Manchar Lake, and difference of facilities are statistically insignificant and does not have any impact on willingness to switch back to fishing in Manchar Lake if the new benefits (tourism) are provided. The (Table 5.2) shows that fishers with higher education are less likely willing to switch back to fishing in Manchar Lake. The result shows that with increase in one year of education 4%

probability of fishers less likely to switch back to fishing in Manchar Lake if the new benefits (tourism) is provided. Further, results shows that migration time has negative relationship which means those fishers who migrated early to nearby town are less likely to switch back to fishing in Manchar Lake, if the new benefits (tourism) is provided. Table 5.2 shows that total cost (sum of opportunity cost and travel cost) has positive relationship with willingness to switch back. The result shows that by increasing in one thousand rupees in their total cost (sum of opportunity cost and travel cost) there are 13% chances of fishers' willingness to switch back to fishing in Manchar Lake, if the new benefits (tourism) is provided.

Table 5.3 Willingness to switch back with both benefits

Variable Name	Coefficient	Marginal Effect	Z Value	P>[z]
Household size	-.2162755**	-.0181781	-1.93	0.054
Age	-.3384426	-.0284463	-0.79	0.427
Age Square	.0046073	.0003872	1.18	0.238
Skill level	.2843269	.0238978	0.60	0.552
Education in years	.1852678	.0155718	1.14	0.253
Job quality	-1.234518***	-.1037618	-2.93	0.003
Migration Time	-.3142526 ***	-.0264131	-2.64	0.008
Partially Migrated	-1.436976**	-.1373584	-2.02	0.043
Attachment to Manchar Lake	-.1722984	-.0144818	-0.48	0.633
Difference of facilities	-.128991	-.0108418	-0.67	0.501
Total cost	1.289913*	.1084178	1.65	0.100

Table 5.3 Indicate the results of regression of willingness to switch back to fishing in Manchar Lake if both benefits (old benefits and new benefits) are provided. In (Table 5.3) Household size has negative relationship with willingness to switch back to fishing in Manchar Lake and it has statistically significant impact on willingness to switch back which means by increasing 1 member of household size there is 1% chances fishers are less likely to willing to switch back to fishing in Manchar Lake if both benefits (old benefits and new benefits) are provided. It is unusual and our observations couldn't capture the cause behind this result. However age, age square, skill,

education in years, attachment to Manchar Lake, and difference of facilities are statistically in significant. Table 5.3 shows that migration time has negative relationship which means those fishers who migrated early to nearby town are are less willingness to switch back to fishing in Manchar Lake if both benefits (old benefits and new benefits) are provided. While partially migrated has negative relationship with willingness to switch back to fishing in Manchar Lake and it has statistically significant impact on willingness to switch back to fishing in Manchar Lake if both benefits (old benefits and new benefits) are provided so those fishers who are partially migrated are less willing to switch back to fishing. It is unusual and our observations couldn't capture the cause behind this result.

While total cost (sum of opportunity cost and travel cost) has statistically significant impact on willingness to switch back to fishing in Manchar Lake. Total cost (sum of opportunity cost and travel cost) has positive relationship with willingness to switch back. The result shows that by increasing in one thousand rupees in their total cost (sum of opportunity cost and travel cost) there is 10% chances of fishers' willingness to switch back to fishing in Manchar Lake, if both benefits (old benefits and new benefits) are provided.

CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter describes the major findings regarding research questions and based on current study's findings general conclusions are described. Furthermore, recommendations and general policies are presented.

6.2 Summary

Since the 1992 the contamination of Manchar Lake has caused the displacement of many fishers from their origin place Manchar Lake. The contamination of water has destroyed their unique culture and they became poor and exposed to the health issues which causes migration and shifting their occupation. In search of better livelihood opportunities and new jobs, fisher migrated to nearby cities and towns. This research focuses on those fishers who were shifted to other occupations besides fishing. While comparing the fishers' current livelihood and past livelihood when they were fishing on Manchar Lake, it was found that those fishers who were migrated to nearby cities or town have less income in terms of value and have low social profile as compared to when they were fishing on the Manchar Lake.

Fisher dislodged from rural to urban areas from their origin, they had their own type of living ways; mostly fishing based, highly attached to the Manchar Lake and natural resources, physical support, social coherence, psychological support. Due to changing in the profession and migration, their way of living has been significantly changed. Assets showed that there are both positive and negative changes. In case of physical assets, it is positively changed due to change the profession. As a result the increase in access to physical assets such as school, hospital, roads and markets. While some assets are negatively changed such as natural assets, rural livelihood, and capital assets

(income and cost). However, fishers are more negatively affected, it is observed that natural assets and capital assets are severely affected.

Overall, fishers are negatively influenced, especially in terms of capital assets (income and cost) but one of the major variable facilities has positive impact on fishers. Despite, there are other problems which fishers are currently facing but they are benefited with better access to hospitals, schools, markets and roads. From this study, it is identified that in spite of better access to facilities fishers are not getting full benefits because their affordability has been decreased with increase in their expenditure and decrease in current income.

The results also showed that there is highly significant impact of assets change has been seen on willingness to switch back to fishing in Manchar Lake. It also observed that willingness to switch back to fishing in Manchar Lake is extremely high, if the old benefits (Traditional fishing, aesthetic value, spiritual values, and cultural values) are provided as compared to the new benefits (boating, hoteling, sports fishing, and swimming). While fishers are also more willing to switch back to fishing in Manchar Lake if both benefits (old benefits and new benefits) are provided.

6.3 Conclusion

It had been seen human migration also affect the fishers' communities all over the world (Abobi, S.M. and Alhassan, E.H., 2015). Fishers' migration is considered to be a critical problem which influence the living settings of fishers' communities. The migrated fishers are always at risk, even though they settled over there for many years. Due to complete transformation, their living patterns has changed because of changes in their assets. The Nigerian migrated fishers were exposed to poverty, physical, and mental health (Fregene, B.T., 2007). However, the change in livelihood of Nigerian fishers and Manchar's is not same. Manchar Lake's fishers are somehow benefited by facilities.

The income of fishers is one of the major factor that influence the willingness to switch back, Fishers with high income are less vulnerable in current area. And are less willing to switch back to Manchar Lake. But large number of fishers' current income is less in terms of valueas compared to when fishers were fishing in Manchar Lake. There are different impacts on fishers' satisfaction due to change in livelihood assets with their willingness to switch back to fishing in Manchar Lake, which is linked with Manchar Lake and their previous living patterns. The fishers are totally dissatisfied with their current occupation, income, and environment, because when they lived around and fishing at Manchar Lake, there, they enjoyed a better environment, suitable occupation, income, and social cohesion.

Many times switch back is discussed and argued among the scholars and its impact on origin place. Cassarino's study showed that the people's willingness to return back depend on the circumstance in current and origin place and most of the time people give priority to origin place. While willingness to return back is common among shifted or migrated people after migration (Cassarino, J.P., 2004), because fishers have adopted new living patterns with current circumstances which do not suit them, they might be attach with rural livelihood and culture. This study revealed that fishers are willing to switch back to fishing on Manchar Lake rather than carrying out their current occupation. It is found that those fishers who find fishing on Manchar Lake is much better in terms of income, social respect and environment are more willing to switch back to fishing on Manchar Lake. Because it has been observed that fishers are more satisfied with their livelihood outcomes in Manchar Lake. However, Fishers are less willing to switch back to fishing in Manchar lake, if new benefits (boating, hoteling, sports fishing, and swimming) are provided, because fishers require new skills for new benefits. The government need to take appropriate initiatives regarding restoration of Manchar Lake in light of fishers' preferences and needs.

6.4 Recommendations

After the migration from Manchar Lake and changing the occupation fishers tried to adopt different strategies and activities offered by the cities or towns, but the majority of fishers' livelihood strategies were not supportable, they are surviving hardly, and large number of fishers are not able to live meaningful life. If the Manchar Lake is restored as a result of restoration fishers' livelihood and socio-economics dimension will also be restored.. However, fishers are ready to participate in the lake restoration of Manchar Lake, and willing to switch back to fishing on Manchar Lake if old benefits (Traditional fishing, aesthetic value, spiritual values, and cultural values) are provided.

If the Manchar Lake is restored with new benefits (boating, hoteling, sports fishing, and swimming) then fishers are less willing to switch back to fishing on Manchar Lake. They felt hesitant to get benefit from the expended livelihood opportunities offer by the restored lakes with new benefits (boating, hoteling, sports fishing, and swimming) because of the lack of required skill set.

6.4.1 General Policy

This study has revealed that currently fishers are in critical situation so government and concerned agencies such as NGOs need to take appropriate initiatives in order to restore the Manchar Lake with fishers' participation. However, fishers are more willing to switch back to fishing on Manchar Lake if the both benefits (old benefits and new benefits) will provide. If the government restore Manchar Lake with new benefits (boating, hoteling, sports fishing, and swimming) then government should open training center through which fishers and new entreats may get train regarding new benefits. New benefits will generate many opportunities through which government can generate revenue.

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APPENDIXES

Appendix A: Questionnaire

Manchar Lake's Hypothetical Restoration and Fishers' Willingness to Switch Back to Fishing.

Note for respondents:

I am undertaking a research study to write a thesis as a partial requirement for the aware of MPhil Environmental Economics from Pakistan Institute of Development Economics, Islamabad. The purpose of this questionnaire is to investigate the willingness to switch back to fishing in Manchar Lake if lake is restored and it will provide old traditional benefits new benefits to fishermen. Although your participation in this study is completely voluntary, you have a right to stop responding or withdraw your response anytime until this study is published. Even later on, it will be made sure that your identity will not be associated with any response and all data will be presented only in aggregates leaving behind no clue of what individual said or disclosed. Furthermore, I assure you that the information given by you will be kept strictly confidential and will be used for research purpose only. In case you want to know about your writes as a study participant, you can contact Dr. Junaid Alam Memon (Research Supervisor) Phone No: + 92 – 51 – 9248033 or increase you want to reach to me for any reasons, clarification or withdrawal of your response, you may contact me at: Muhammad Azeem (Principal Investigator) Phone No: +92 – 333 – 3624068. I am hopeful to receive your co-operation.

Questionnaire Code		← *To be given by research coordinator*
Name of Town		← *To be given by research coordinator*
Date		← *To be provided by Enumerator*
	DD MM YYYY	

1. GENERAL INFORMATION OF RESPONDENT:

Q1. Name _____ **Q2.** Age _____ *In years*

Q3. Gender _____ *1= Male, 2= Female, 3= Other*

Q4. Status in family _____ *1=Head, 2= Just member*

Q5. Your relationship with HH Head _____ *1 = Self, 2 =Wife, 3 = Brother, 4 = Sister, 5 = Son, 6 = Daughter, 7 = Father, 8 = Mother, 9 = Son spouse, 10= Daughter spouse, 11= Others*

Q6. Marital Status _____ *1 = Single, 2 = Married, 3 = Widow*

Q7. Do you still do fishing? _____ *1 = Yes, 2 = No*

Q8. Compared to other HH members, your education what is your educational level _____ *1= High, 2 = Equal, 3 = Low*

Q9. What is your educational qualification?

1 = Never went to school, 2 = Primary, 3 = Middle, 4= Matriculation, 5 = Intermediate, 6 = Undergraduate, 7 = other (Specify_____)

Q10. What is your current occupation? _____ *1 = Government Job, 2 = Private Job, 3 = Own business, 4 = Daily wager, 5 = Farmer, 6 = Other_____*

Q11. What is your current monthly income? _____ *In PKR*

It's about respondent's individual income not his/her family income

GENERAL INFORMATION OF FAMILY

Q12. Household size_____ *No of persons*

Q13. Give details of economic activeness of your family numbers? (No of persons):

Earner (s)	Economically dependent (Adults)	Economically dependent (Children)	Economically dependent (Old age members)

Q14. What is Gender composition of your family? (No of persons):

Boys (14 years or below)	Girls (14 years or below)	Male (above 14 years)	Female (above 14 years)

Q15. What is your family's total yearly income from all sources: *In PKR*

a. At the present: _____

b. when you were a fisher at Manchar lake: _____

It's about entire family's income so add income of all members and report

Q16. Approximately, what percentage of your family's total **yearly** income used to come through following sources when you were fishing on Manchar and Now?

Sources of income	Before	Nowadays
Fishing	%	%
Livestock Rearing	%	%
Crop farming	%	%
Daily wage labor	%	%
Government job	%	%
Private Job	%	%
Own business/shop/vender activity	%	%
Remittances	%	%
Other sources (Specify)_____	%	%
Total Income	100%	100%

3. OCCUPATION INFORMATION OF RESPONDENT:

Q17. Are you able to recall your livelihoods when you were primarily a fisher at Manchar Lake? [ ]

1= Yes, Very clearly
2 = Yes, but to a limited extent
3 = No, I have completely forgot

Q18. What is level of skills in current occupation as compared to when you were fishing on the Manchar Lake? *(Tick one)*

Skills Level					
Very High	High	About same	Low	None	I cannot compare it

JOB QUALITY:

Q19. Compared with your previous job, how satisfied or dissatisfied are you with following dimensions of your present job: *(emphasize on comparative aspect)*

Parameter of job quality	Satisfaction Level					I cannot compare it
	Strongly satisfied	Satisfied	Neutral	Dis-satisfied	Strongly Dis-satisfied	
Job Security (long term employment)						
Job Safety (injuries and health hazards)						
Income security (reliable income)						

Labor requirements (effort level)						
Social prestige (How other see it)						

Q20. Do you still live in same location where you lived while your primary occupation was fishing on Machar? ☐ *1= Yes 2 = No.*

If Yes, Continue or skip to ……

Q18. In which year, did you move from Manchar Lake to current city? _____

(such as 1995, 2005 or 2018)

Q19. Did you move with family from Manchar Lake to current city?

a) Yes b) No

Facilities:

Q20. Access to house:

	House Ownership			
	Own	Rented	Relative's/ Friends'	*Own = 1 Rented = 2 Relative's/ Friends'=3*
Now				
Before (When you were fishing at Manchar Lake)				

Q21. Are you satisfied/dissatisfied with your present house as compare to previous house?

	Satisfaction Level					I cannot compare it
	Strongly satisfied	Satisfied	Neutral	Dissatisfied	Strongly Dis satisfied	
In terms of its construction						
In terms of its location						
In terms of spaciousness						

Q22. Access to Health Institutions

Type of Health Institutions	Travel Time (hour)		Travel distance from residence (km)		Travel Cost (PKR)	
	Now	Before	Now	Before	Now	Before
Dispensary						
Government Hospital						
Private hospital						
Other						

Q23. Access to Educational Institutions

Type of Educational Institution	Travel Time (hour)		Travel distance from residence (Km)		Travel Cost (PKR)	
	Now	Before	Now	Before	Now	Before
Primary School						
Secondary School						
College						
University						

Q24. Access to Roads

Type of roads	Travel distance from residence (km)	
	Now	Before
Foot trail		
Gravel		
Asphalt		

Q25. Access to Market

Types of Market	Travel distance from residence (km/m)	
	Now	Before
Local market		
City market		

Q26. Access to Sanitation (toilet)

Access	Now	Before
Yes		

ATTACHMENT TO THE MANCHAR LAKE

Q27. In terms of what do you think Manchar Lake is Important to you?

	Importance Level				
	Very Important	Important	Moderately Important	Slightly Important	Not Important
Cultural Heritage (Physical symbol of intergenerational prestige)					
Historical symbol (a memoir of past events importance foe us)					
Existence of beautiful and attractive surroundings.					
A source of clean and healthy air.					
A place of social cohesion (point of community cooperation)					

Q28. Family Integrity (Living with family):

Family Integrity	Now	Before
Still living with family		

Q29. How frequently do you contact with friends/relatives/neighbors back Manchar Lake?

Now		*1= At least once a month* *2= At least once every three months* *3= At least once every six months* *4= At least once a year* *5= Rarely* *6= Never*
Before		

DISTANCE FROM HOUSE TO OCCUPATION:

Q30. Distance in terms of kilometer

Distance	Now	Before
Distance from house to occupation. (Km)		

Q31. Distance in terms of cost

Cost	Now	Before
How much cost do you bear while traveling from house to occupation? (Round Trip)		

Q32. Distance in terms of time

Time	Now	Before
How much time it takes from house to occupation?		

Instruction for Surveyor: *Read following information to respondent before starting this section*

The following questions are based on just hypothetical situations and should not be interpreted as expectations of future conditions or policy. Please answer the questions assuming what you anticipate doing if the following situation occurs.

WILLINGNESS TO SWITCH BACK:

Q33. If lake is restored with only **old benefits** (Traditional fishing, aesthetic value, spiritual values and cultural values) would you be willing to switch back to fishing in Manchar Lake?

a) Yes b) No

Q34. If no than if lake is restored with only **new benefits** (Boating, Hoteling, sports fishing, and swimming) would you be willing to switch back to fishing in Manchar Lake?

a) Yes b) No

Q35. If no than if lake is restored with **both benefits** (old and new benefits) would you be willing to switch back to fishing in Manchar Lake?

a) Yes b) No

Appendix B: Regression Results

```
Logistic regression                             Number of obs     =        300
                                                Wald chi2(11)     =      66.75
                                                Prob > chi2       =     0.0000
Log pseudolikelihood = -42.167227               Pseudo R2         =     0.7720

------------------------------------------------------------------------------
                   |               Robust
         WTSB_OLD |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------+------------------------------------------------------------------
              HHS |   .0861938   .0960184     0.90   0.369    -.1019988    .2743865
              AGE |   .1448432   .3150954     0.46   0.646    -.4727323    .7624188
          age_squ |   -.000873   .0025104    -0.35   0.728    -.0057932    .0040472
               SL |  -.1936298   .3692558    -0.52   0.600    -.9173578    .5300981
        edu_years |  -.3309119   .1735033    -1.91   0.056    -.6709722    .0091484
              J_Q |  -.0687457   .5253825    -0.13   0.896    -1.098476     .960985
    migrationtime |   -.429898   .0912209    -4.71   0.000    -.6086877   -.2511083
dummyformigration |   4.758486    1.34087     3.55   0.000     2.130429    7.386543
       Atch_Manch |    .565693   .6621292     0.85   0.393    -.7320564    1.863442
         dif_fclt |  -.2649354   .1476031    -1.79   0.073    -.5542321    .0243614
               tc |   1.996436   .4419043     4.52   0.000      1.13032    2.862552
            _cons |  -5.818029   9.153493    -0.64   0.525    -23.75855    12.12249
------------------------------------------------------------------------------
```

Marginal effects after logit

y = Pr(WTSB_OLD) (predict)

= .81482428

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
HHS	.0130054	.01448	0.90	0.369	-.015365	.041376	13.2667
AGE	.0218548	.04608	0.47	0.635	-.068451	.112161	57.8033
age_squ	-.0001317	.00037	-0.36	0.721	-.000855	.000591	3393.87
SL	-.029216	.05234	-0.56	0.577	-.131792	.07336	-.223333
edu_ye~s	-.0499299	.02869	-1.74	0.082	-.106156	.006297	1.66667
J_Q	-.0103727	.07946	-0.13	0.896	-.166107	.145361	-.563333
migrat~e	-.0648654	.01806	-3.59	0.000	-.100266	-.029465	9.21333
dummyf~n*	.6122412	.10983	5.57	0.000	.396969	.827514	.42
Atch_M~h	.085355	.1034	0.83	0.409	-.117313	.288023	1.386
dif_fclt	-.0399749	.02337	-1.71	0.087	-.085788	.005839	-2.61591
tc	.3012336	.09114	3.30	0.001	.122593	.479874	.852184

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Logistic regression — Number of obs = 300

Wald chi2(11) = 112.94

Prob > chi2 = 0.0000

Log pseudolikelihood = -95.922228 — Pseudo R2 = 0.5062

WTSB_NEW	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
HHS	.102333	.0691781	1.48	0.139	-.0332535	.2379195
AGE	-.1427746	.3083795	-0.46	0.643	-.7471872	.461638
age_squ	.0001066	.0025457	0.04	0.967	-.0048828	.005096
SL	-.2100368	.2550894	-0.82	0.410	-.7100028	.2899293
edu_years	-.1833309	.1060154	-1.73	0.084	-.3911173	.0244555
J_Q	.3595298	.3661035	0.98	0.326	-.3580198	1.077079
migrationtime	-.3167009	.066356	-4.77	0.000	-.4467562	-.1866456
dummyformigration	.5069313	.4406887	1.15	0.250	-.3568026	1.370665
Atch_Manch	.2361911	.3075207	0.77	0.442	-.3665383	.8389206
dif_fclt	-.117656	.1104487	-1.07	0.287	-.3341314	.0988193
tc	.6074629	.2886069	2.10	0.035	.0418038	1.173122
_cons	9.254549	9.231414	1.00	0.316	-8.838689	27.34779

Marginal effects after logit

y = Pr(WTSB_NEW) (predict)

= .66990889

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
HHS	.022629	.01556	1.45	0.146	-.007876	.053134	13.2667
AGE	-.0315719	.06826	-0.46	0.644	-.165353	.102209	57.8033
age_squ	.0000236	.00056	0.04	0.967	-.00108	.001127	3393.87
SL	-.0464456	.05615	-0.83	0.408	-.156493	.063601	-.223333
edu_ye~s	-.0405401	.02335	-1.74	0.083	-.086313	.005232	1.66667
J_Q	.0795032	.08074	0.98	0.325	-.078737	.237743	-.563333
migrat~e	-.0700324	.01559	-4.49	0.000	-.100598	-.039467	9.21333
dummyf~n*	.1101599	.09357	1.18	0.239	-.073238	.293557	.42
Atch_M~h	.0522292	.0675	0.77	0.439	-.080066	.184524	1.386
dif_fclt	-.0260174	.02416	-1.08	0.281	-.073363	.021329	-2.61591
tc	.1343288	.0633	2.12	0.034	.010272	.258386	.852184

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Logistic regression — Number of obs = 300

Wald chi2(11) = 71.23

Prob > chi2 = 0.0000

Log pseudolikelihood = -39.785521 — Pseudo R2 = 0.7713

WTSB_BOTH	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
HHS	-.2162755	.1121382	-1.93	0.054	-.4360623	.0035113
AGE	-.3384426	.4258214	-0.79	0.427	-1.173037	.4961519
age_squ	.0046073	.0039026	1.18	0.238	-.0030416	.0122562
SL	.2843269	.4777413	0.60	0.552	-.6520288	1.220683
edu_years	.1852678	.1620653	1.14	0.253	-.1323744	.5029101
J_Q	-1.234518	.4219197	-2.93	0.003	-2.061465	-.4075708
migrationtime	-.3142526	.1191831	-2.64	0.008	-.5478471	-.080658
dummyformigration	-1.436976	.7101257	-2.02	0.043	-2.828796	-.045155
Atch_Manch	-.1722984	.360983	-0.48	0.633	-.8798121	.5352153
dif_fclt	-.128991	.1918989	-0.67	0.501	-.505106	.2471239
tc	1.289913	.7841008	1.65	0.100	-.2468964	2.826722
_cons	10.43806	11.79667	0.88	0.376	-12.68298	33.5591

Marginal effects after logit

y = Pr(WTSB_BOTH) (predict)

= .90736902

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
HHS	-.0181781	.0073	-2.49	0.013	-.032476	-.00388	13.2667
AGE	-.0284463	.03683	-0.77	0.440	-.100625	.043733	57.8033
age_squ	.0003872	.00034	1.14	0.255	-.00028	.001055	3393.87
SL	.0238978	.0402	0.59	0.552	-.054887	.102683	-.223333
edu_ye~s	.0155718	.01293	1.20	0.228	-.009765	.040909	1.66667
J_Q	-.1037618	.04106	-2.53	0.012	-.184242	-.023281	-.563333
migrat~e	-.0264131	.01028	-2.57	0.010	-.046554	-.006272	9.21333
dummyf~n*	-.1373584	.08077	-1.70	0.089	-.295659	.020942	.42
Atch_M~h	-.0144818	.03072	-0.47	0.637	-.074695	.045732	1.386
dif_fclt	-.0108418	.016	-0.68	0.498	-.042198	.020515	-2.61591
tc	.1084178	.06118	1.77	0.076	-.011501	.228336	.852184

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Current situation of Manchar Lake

Deserted houses of those fishers who are migrated

Fishers' houses who are currently living by side of Manchar Lake

Interview of the respondent who switched the other occupation besides fishing

Interview of the respondent who switched the other occupation besides fishing

Interview of the respondent who switched the other occupation besides fishing

Interview of the respondent who switched the other occupation besides fishing