

SOCIO-ECONOMIC WELL-BEING THROUGH FISHING IN KOTRI DOWNSTREAM: SHOULD THE RIVER BE KEPT ON FLOWING?

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Abstract

Fishery is one of the natural resources of Pakistan, and Indus River is ideal for fishing. Kotri barrage is the last barrage on the river and the downstream area is utilized for fishing and effluent. The most popular Ilish (*Palla* fish) is found in Kotri downstream. The production of fish is directly proportionate to the flow of water in the river. The downstream water is considered a waste and extravagant, but that downstream includes 34 landing sites for fishing and cater to 21550 of population on both sides in four districts. The paper aimed to explore the water discharge in Kotri downstream, number of license issued, fish production, and estimated income and correlation among them. It also sought to explore population of landing centers in downstream Kotri and the demand of fish and consumption pattern by survey. The downstream water is livelihood of fishermen, source of delicious and nutritious food which can be traded nationally and internationally and contribute to GDP. A wise management and conservation of water is required, otherwise Kotri downstream area will turn into desert whereas fishermen will turn to beggars.

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Introduction

Pakistan abounds natural resources and the 21st largest river Indus is a precious asset, which ascends from [Tibetan Plateau](#) and descends to [Arabian Sea](#). Fishery sector largely depends on water resources. Due to water shortage population of some of the fish species are at the verge of extinction. That has declined more than 50 percent and predicted to decline up to 80 percent in future (International Union for Conservation of Nature, 2011). Fisheries sector contributes 1% to the GDP (Raza, et al., 2012). Fisheries in rivers and reservoirs account for more than 80 percent of total inland fish production. Data on inland fisheries are poor and much of the catch and consumption locally is never reported. Fishery production peaked around the year 2000 and has decreased since then (United Nations, 2009).

Recommended optimum water discharge below downstream of Kotri barrage is 10 Million Acre Foot (MAF) (PILDAT, 2011), while the native literature recommends 30 MAF (Ercelawn, et al., n.d.). They attributed the water shortage and resulting economic, social and ecological problems to water projects that divert Indus water in the upper Indus basin (Magsi & Atif, 2012). Fishermen's income is badly affected due to less discharge of water, consequently most of them depend on NGOs and government income support programs. This study is a maiden attempt in determining water flow, population, license issued, fish production, income and demand of fish, which will also provide direction for future research.

World Wide Fund (WWF) has reported Indus River in the list of top 10 rivers of the world at risk. Over the past decades, freshwater flow in Indus River has been reduced to 1 Million Acre Feet (MAF) from 150 MAF in 1953 (Kazi, 2003). Water flow in its delta region declined to about one-fifth and the delta has shrunk to 250 square kilometers from 3,000 square kilometers in the early 1960s (Sheikh, 2012). Water accord signed in 1990 ensured at least 10 million acre feet (MAF) of water to be available for the delta each year, but could not be implemented (Wong, et al., 2007). The flow downstream Kotri remains constantly below 2 MAF all over the year except during the flood and monsoon season. Water supply

per person is much less than the minimum recommended by the United Nations and it is predicted to be more scarce by 2025 (Revenga, et al., 2000). The shortage has adversely affected fish fauna and mangroves have also been destroyed. Pakistan Fisherfolk Forum reported decline in the annual fisheries production from 5,000 metric tons in 1951 to just 295 by 2011 (Sheikh, 2012). The riverine life is in turmoil in downstream Kotri.

Approximately 193 fish species are found in freshwater in Pakistan. The commercially important fishes are of 31 in number, that are sources of high quality protein, nutrients and minerals which are often difficult to get from other food sources (Rafique & Khan, 2012). There are 147 fish species found in River Indus out of which 22 are found nowhere else in the world (Wong, et al., 2007).

Tourists have mentioned Sindh as the main trading point for fish, in the period of Mughal, Kalhora and Talpur empires. In British rule it was exported to Muscat, Gujrat and China. Oil was also produced from fish that was used as fuel at home (Allana, 2012). An English traveler Hamilton (1699) commended that he has never tasted a fish alike Ilish — which is locally called *Palla* (Sorley 1940, cited in Allana 1971, p.72). Tourist found it resembling Herring of Germany and Hilsa of Ganges (Aitken, 1907). Mubarak's 1872 [book](#) (cited in Allana 1971, p. 72) [lauded](#) *Palla*, Abul Fazl Ibn Mubarak was a vizier of Jallaluddin Akbar who termed *Palla* a matchless fish.

Persistent drought-like situation in Sindh for the last decade before the flood of 2010 can be blamed for low production of *Palla* fish. A substantial water discharge will keep abundance of fish in the river which will ultimately be bread and butter for fishermen and provides public tasty and nutritious food.

Problem Statement

Kotri downstream water is considered a waste and extravagant. Despite an important sub-sector of economy, Fishery is dependent on it. Fishery sector is also contributed by coastal fishing and other subsector of inland fishery but traditionally most popular Ilish or *Palla* fish is found in Kotri downstream. Ironically *Palla* is being imported now a days (Khan, 2006), which signifies the disuse of available resources and outflow of foreign exchange. The river water is only considered important for agriculture but it is also livelihood of fishermen community that does not have any other option and don't know any other craft.

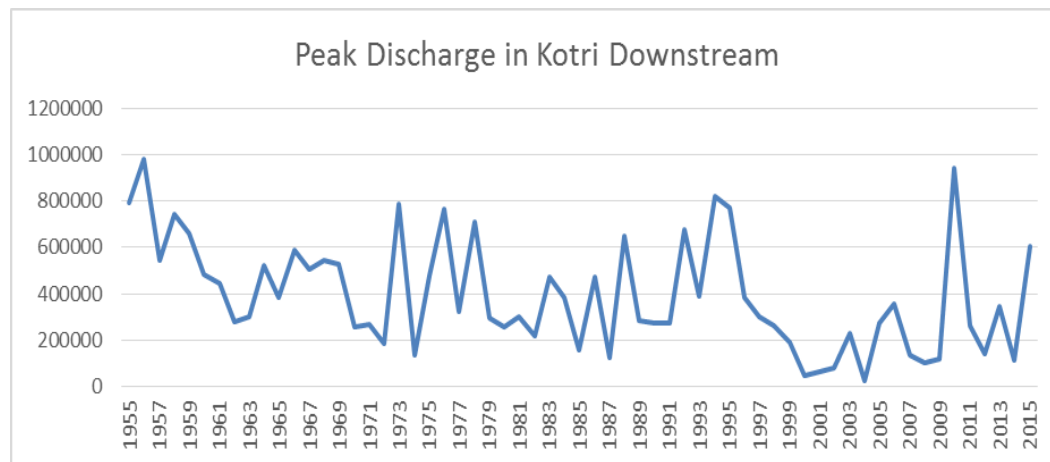
Research Methodology

This is an exploratory research, which is based on primary and secondary data. The water discharge figures were obtained from Weir Sub-Division Kotri barrage, Jamshoro. The number of license/cards issued, fish production of five years and population figures were obtained from Directorate of Fisheries (Inland) Hyderabad. The price list of fish was obtained from Market Committee.

Unstructured interviews were conducted from 12 local fishermen and the managers of three fish points situated near Kotri Barrage Jamshoro. Closed-ended questionnaires were also distributed among 704 people, randomly selected in three districts; Jamshoro, Hyderabad and Badin, out of which only 608 were received.

Findings And Discussion

The water flow in Kotri downstream has been sufficient for fish catch and that helped the region for being recognized the ideal place for catch of tastier fish. The graph below shows the trend in the last 60 years after the construction of Kotri Barrage.



(Source: Weir Sub division Kotri Barrage Jamshoro, 2015)

Population in Mians of Downstream Kotri

Kotri downstream includes 34 Mians (landing centers for fishing) and cater to 21550 of population on both sides in the lower Sindh course including banks of

four districts; Jamshoro, Hyderabad, Tando Muhammad Khan and Thatta. Table 1 presented the list of Mians and their population.

Table 1. Mians of River Indus Downstream Kotri

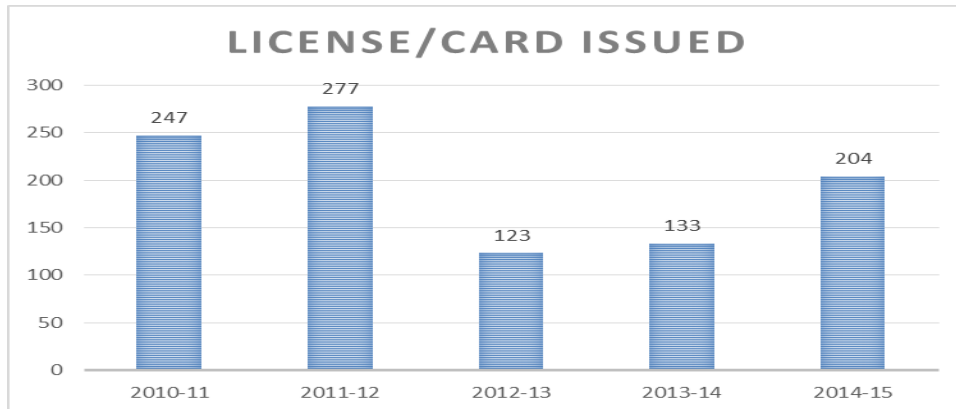
No.	Right side	Population	No.	Left side	Population
1.	Rialo Mian (Jamshoro)	2000	21.	Murad Shah Mian (Hyderabad)	2500
2.	Kanpur Mian (Kotri)	1500	22.	Hussainabad Mian (Hyderabad)	50
3.	Kotri Mian (Kotri)	500	23.	Naichani Mian (Latifabad)	2000
4.	Karo Khaho Mian (Kotri)	2000	24.	Hajipur Mian (Tando Muhammad Khan)	100
5.	Tando Hafiz Shah Mian (Thatta)	50	25.	Mulakatiyar Mian (TM Khan)	100
6.	Ahmed Rajo Mian (Thatta)	50	26.	Sang Mian (TM Khan)	50
7.	Jhark Mian (Thatta)	200	27.	Surjani Mian (Thatta)	400
8.	Matko Mian (Thatta)	300	28.	Kot Almo Mian (Thatta)	100
9.	Odero Lal Mian (Thatta)	250	29.	Qadir Dino Mian (Thatta)	400
10.	Daulatpur Mian (Thatta)	1500	30.	Moosa Mian (Thatta)	500
11.	Jangisar Mian (Thatta)	3000	31.	Ghulab Mian (Thatta)	50
12.	Sando Mian (Thatta)	50	32.	Babeho Mian	300

				(Thatta)	
13.	Ali Bahar Mian (Thatta)	200	33.	Charija Mian (Thatta)	50
14.	Bhano Mian (Thatta)	200	34.	Kharo Chan Mian (Thatta)	500
15.	Dhandhri Mian (Thatta)	150			
16.	Sanwalpur Mian (Thatta)	300			
17.	Ahmed Khan Mian (Thatta)	400			
18.	Ghora Bari Mian (Thatta)	300			
19.	Khalifa Mian (Thatta)	100			
20.	Sajan Wari Mian (Thatta)	1400			

(Source: Directorate of Fisheries Inland Hyderabad, 2015)

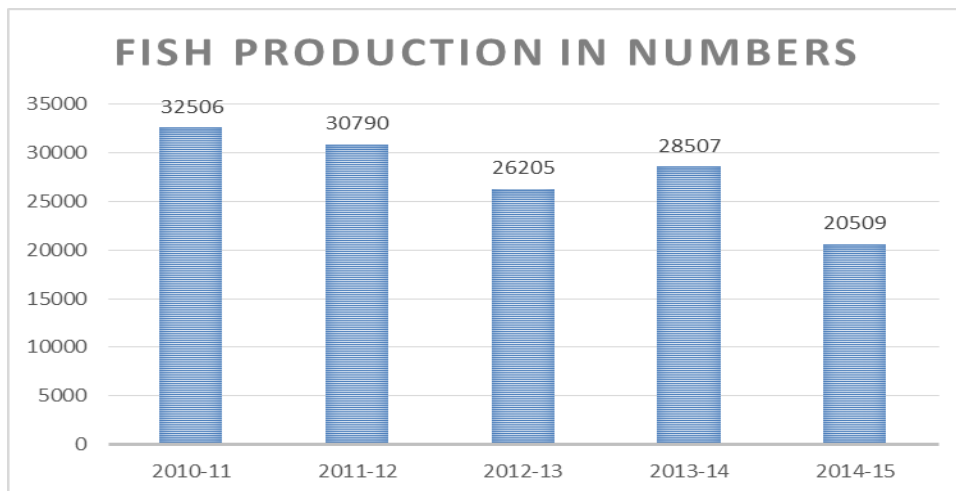
Fishing: Licenses, Production and Estimated Income 2010--2015

Fishermen from other Mians come to Rialo Mian, Jamshoro and fishermen of Karo Khaho Mian to Kotri Mian for fishing in peak season. The breeding season of Ilish or *Palla* is from July to mid of September when it travels upwards the river and is caught, because of barrages it strikes with the closed gates and turns back. As long *Palla* travels in the river as much it is tastier therefore it is now a days less tasty. The accurate figure of fish production and income is difficult to obtain as fishermen avoid to get license from the Directorate of fisheries inland even the charges are Rs. 500 per boat and Rs. 100 per fisherman (A M Chachar 2015, personal communication, 28 July). Chart 1 exhibits number of license/card issued.

Chart 1

(Note: Data from The Directorate of Fisheries Inland Hyderabad, 2015)

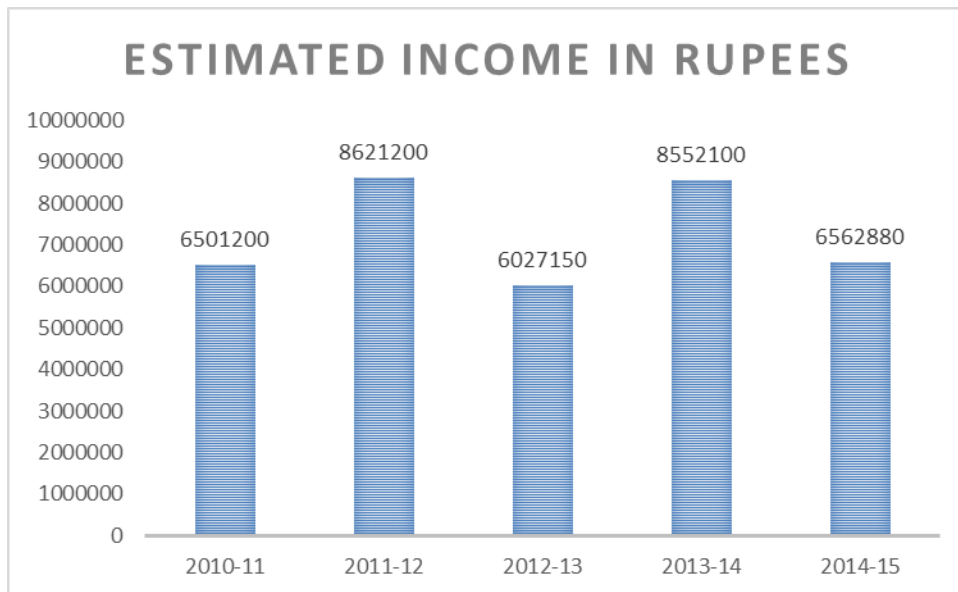
Fishery (Inland) Department has the production record of the license/card holders' catch while other unregistered fishermen do extract fish from the river in downstream. The production of fish in number was provided by fishery department is shown in chart 2.

Chart 2

(Note: Data from The Directorate of Fisheries Inland Hyderabad, 2015)

The price of fish varies day to day and is determined by demand and supply and mostly is affected by fishermen and buyers bargaining. Deputy Commissioner, Controller General of Prices & Supplies fixes prices of fish like other commodities (M A Baloach 2015. Personal communication, 4 September). The estimated income from fish sale is calculated using the list provided by Market Committee. Chart 3 exhibits the Estimated Income.

Chart 3



(Note: Data from the Directorate of Fisheries Inland Hyderabad, 2015 and Data from Price List of Market Committee, 2015)

Correlation among the Variables

Correlation among the four variables was calculated using SPSS 22.0. The result shows a strong positive relationship of Fish production with Peak flow Kotri downstream and Water discharge (MAF) that is $r=.728$ and $r=.701$ respectively, whereas a moderate positive relationship of License/Cards issued with Water flow that is $r=.399$ with Peak flow and $r=.429$ with Water (MAF). While a negligible relationship of Estimated Income with Peak flow $r= -.088$ and with Water (MAF) $r= -.095$ was found.

Fishermen's Response

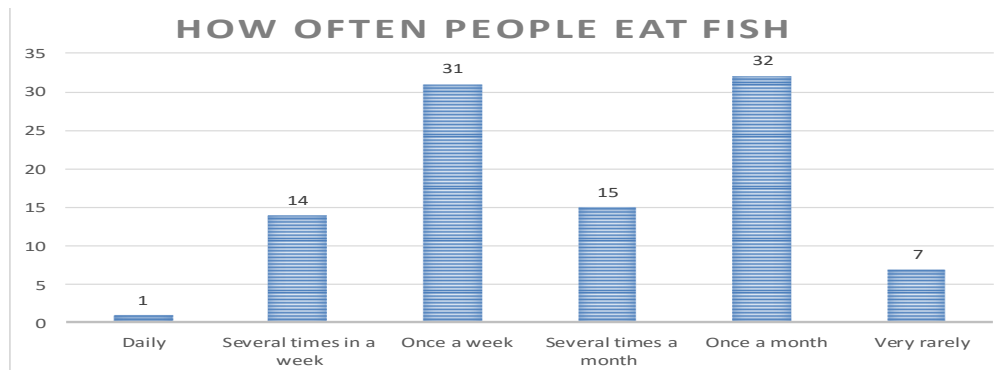
Fishermen stated that the production of fish is directly proportionate to the flow of water in the river except in the high flood situation that restrict the fishing. The fishing season is June to August otherwise they are free. In the peak season fishermen drag fishing-net after one hour and 70 to 80 fish are caught but in meagre water they have to keep it in river for 24 hour and get less than 50 fish. However real figure of production could not be obtained as fishermen are reluctant or do not have adequate record. From 1999 to 2009 was termed as the recession period by all of them when fish catch declined by 75 to 80 percent while cost of fishing was increased — nine out of twelve stated it. They told about few fishermen who have left fishing meanwhile. One of them has acquired a government job and stopped fishing while others are dependent on government income support programs and philanthropies. They were also concerned about the anticipated unavailability of water in future. They said *Palla* is currently available in River Sindh below Kotri due to sufficient water — they were interviewed in the month of August 2015.

Public Demand and Consumption

A survey was conducted using closed-ended questionnaire in three districts; Jamshoro, Hyderabad and Badin, in which 608 people participated. Data is compiled and results are presented in charts.

People were asked about how frequently they eat fish. Most of the people replied

Chart 4

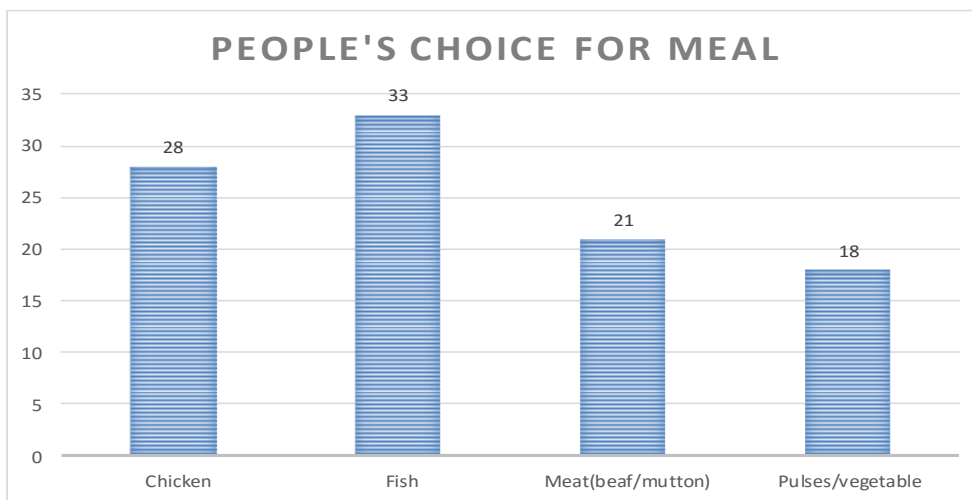


once a week and once a month with 31 percent and 32 percent respectively. Chart 4 shows the results.

(The Author, 2015)

People were asked about their choice for meal if they are given options of Chicken, Fish, Meat and Pulses/Vegetables. Majority with 33 percent select fish

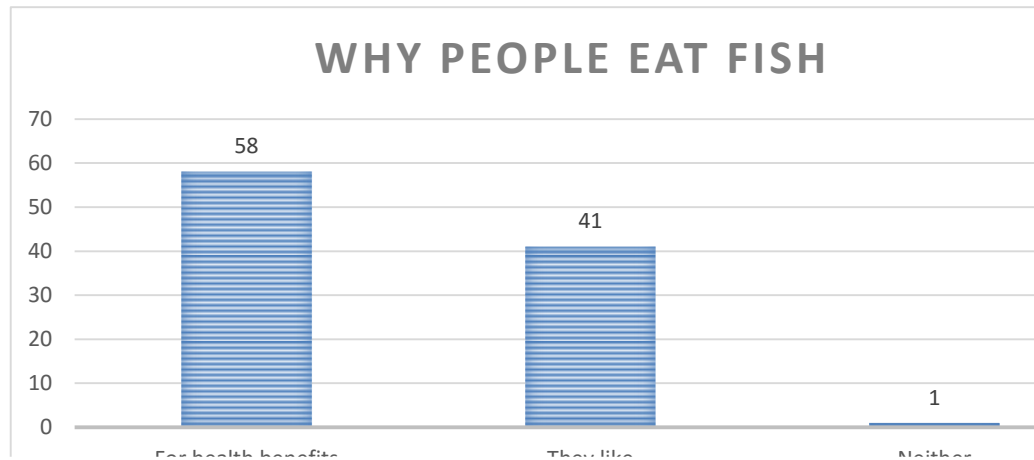
Chart 5



from them followed by Chicken with 28 percentage. Chart 5 shows the results.

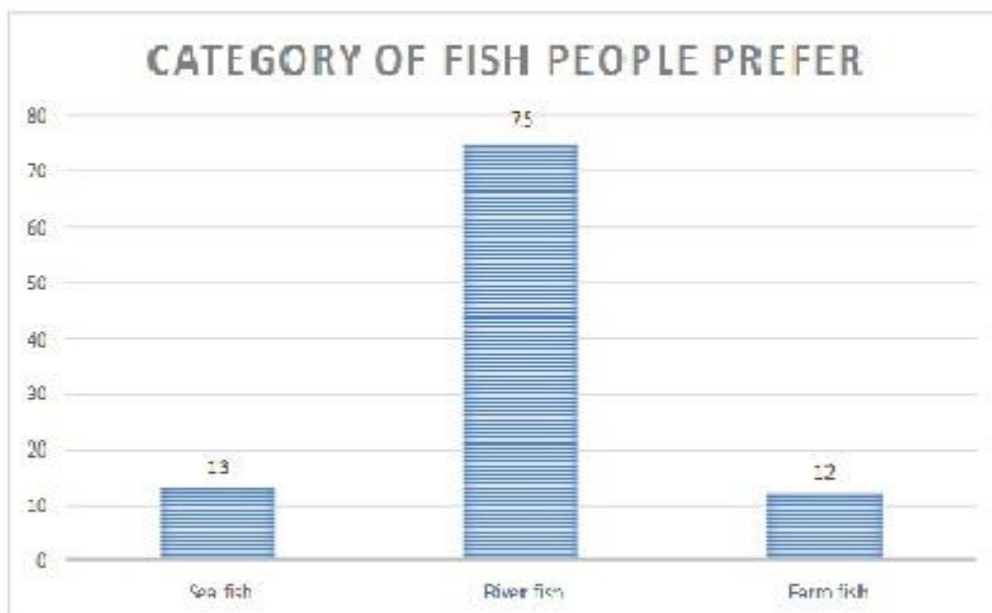
(The Author, 2015)

The majority eat fish 'for health benefits' as 58 percent replied this. While a big number that is 41 percent eats it because they like it. Result is shown by Chart 6.

Chart 6

(The Author, 2015)

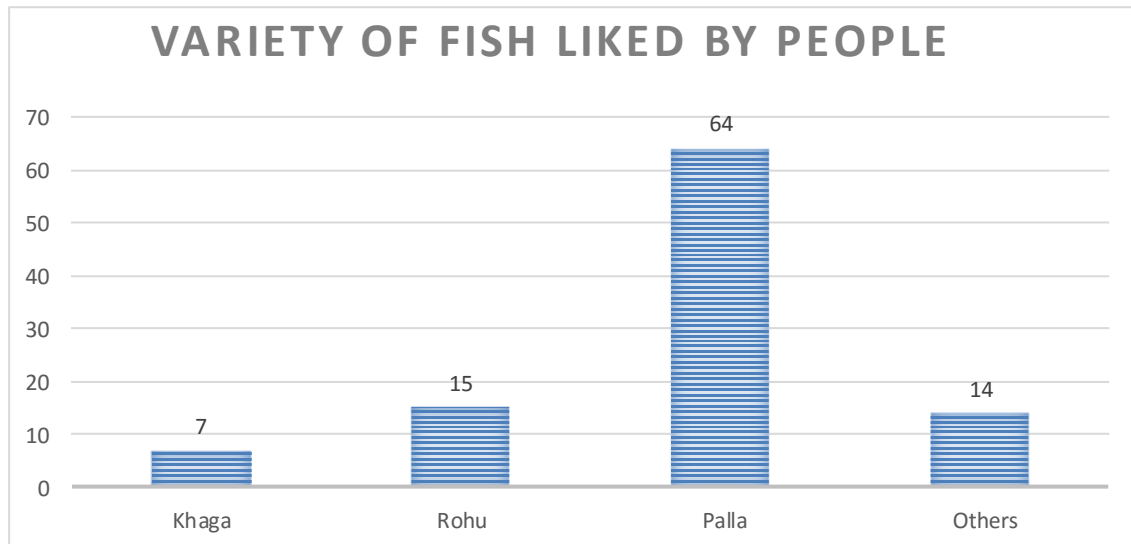
Fish is extracted from river, sea or farms. People's preference was enquired, and majority with 75 percent replied 'river fish' as their preference. Chart 7 shows the results.

Chart 7

(The Author, 2015)

There is a variety of fish found and caught in Indus river, but a big majority of them that is 64 percent people select the famous and specialty of Kotri downstream Ilish or '*Palla*' as their choice. Chart 8 exhibits the results.

Chart 8



(The Author, 2015)

Fish Points near Kotri Barrage

The management of three fish points near Kotri barrage reported a huge difference between the Net Income before 15 years and what they generate now; because of drought like situation there is dearth of visitors on the barrage. They offer fish price about Rs.1300 to Rs.1700 whereas price of *Palla* ranges from Rs. 2200 to Rs. 2500. They avoid to tell their income, due to inadequate record. One of them—established last year—was much satisfied with the income because they catch fish themselves, while other two buy from fishermen therefore they grumble about high cost. The visitors commented that they come on barrage when water flow is high in the river. A crowd was virtually witnessed in fish points during the visits in month of July and August, that denotes a high demand of fish there conditioned by the flow of water in the river for visitors' entertainment.

The Downstream Water for Coastal Fishing

The water shortage in downstream Kotri is adversely affecting the delta fishing as well. Most of the residents of coastal areas depend on fishing for their livelihood. Indus delta fishing contributes 70 percent of total coastal fishing (Nasir & Akbar, 2012). About 80 percent of the fish caught in coastal area spends much of life in the mangroves. Shrimps are the major export of mangroves, which accounts for 68 percent of the \$100 million of the foreign exchange the country earns from fisheries exports (Arain, 2014). Mangrove forests of Indus delta are the largest arid climate mangroves in the world that also depend upon freshwater discharges from the River.

Conclusions

Seeing the high demand of fish — especially Ilish or *Palla* fish — and its health and commercial importance it is imperative to draw attention towards this dwindling sector that has been neglected. The study also found inadequate record keeping in Government departments that obstructed the research to come on a meaningful correlation among the variables. Results shows that variation in water flow in Kotri downstream do not encourage the fishermen to obtain license that signify their pessimism about certainty of income, or non-compliance to regulations. Though the nominal record also proved a positive relationship between water discharges and fish production in downstream Kotri. A rise in price of fish with erratic water flow and production could not make a positive relationship between Income and water flow. A big number of population depends on fishing in Kotri downstream. Being agrarian economy water is demanded for agriculture, notwithstanding fishing is impossible without sustainable water in rivers. Fishermen in downstream Kotri are severely affected by water shortage or erratic water flows. They are frightened by the forecasted unavailability of water in Kotri downstream due to climate change or dam projects on upper Indus basin, which might be a nightmare or a fatal reality in future.

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