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A Review of Kabul River Uses and Its Impact on Fish and Fishermen

Mohammad Nafees, Tanzeel Ahmed & Maria Arshad

Department of Environmental Sciences, University of Peshawar, Pakistan

Abstract

In this paper a detailed account of Kabul River has been given to highlight the socio-economic importance related to fish decline in Kabul River. Kabul River is a major river of Khyber Pakhtunkhwa Province. Its water is widely used for irrigation in Peshawar, Nowshera and Charsadda Districts. At the same time it receives wastewater directly from various industries situated in the mentioned district. This induction of waste water has deteriorated water quality and adversely affected aquatic flora and fauna in which fish is of major economic importance. This study shows that Kabul River enormously contributes in economic prosperity but the deterioration of water quality hampers the growth of fish population. On the whole there are nine species of fish, which are of immense economic importance and whose population is sharply declined. Pollution and over fishing are the two main causes of this decline. The collective contribution of pollution and pesticides is above 60% while that of illegal fishing mainly through electric current and dynamite is 25% and only 15% is due to legal fishing. Pollution and illegal fishing are considered as the major threats to fish decline. Therefore, both preventive and curative measures are recommended.

Keywords: Pollution, Fishing, Illegal Fishing, Kabul River Fish Species, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD)

Introduction

Kabul River has diverse sources scattered over both Pakistan and Afghanistan. The various tributary rivers in Pakistan include Chitral River, Swat River, Bara River, and Jindi River (Nafees 2004). Afghanistan contributes in the form of Alingar River, the Kabul River branch and Kunar (Lashkaripour and Hussaini. 2007) which combine together at Jalalabad to make the main Kabul River. The Kabul River enters Pakistan at Sheen-Pakh, Mohmand Agency and Swat, Bara and Jindi rivers join the Kabul River at various points in the Khyber Pakhtunkhwa (KP) Province (Nafees, 2004). The Kabul River plays a great role in the economic uplift of the areas it runs through, and is widely used for agriculture, power generation and fishing (Anwar, 1991).

A Study was conducted in 1991 that mentions the presence of 156 fish species in the various rivers of Pakistan (Mirza, 2003). In which 54 were in Kabul River out of which 35 species were common in the entire stretch of the Kabul River (Fazal, et al. 1988 and Javed, 1989). The decline in fish species and population was observed in the 1990's. Among these, the famous species called Masheer, also called king of river fish was common specie of Kabul River. The population of Masheer is reported to have considerably declined. This decline is attributed to commercial scale fishing and pollution load in the river at Peshawar-Nowshera region, preventing up/down stream migration to spawning ground in the Swat River (Nafees, 2004). In this way pollution is considered as the main reason of fish decline.

Moreover, over fishing may also be the big reason of this decline. In this regard various studies have been conducted. No doubt, over fishing and illegal fishing has been studied with its impacts on fish population (IUCN-DEPM, 1994, Nafees, 2004, Zahid, 2010). But the big contributor has not been efficiently evaluated and demonstrated.

In this study an attempt has been made to give a detailed account of past and present status of pollution and fishing related economic activities, attached to the Kabul River, with the objective to know about the present status of fish and fishing profession.

Methodology

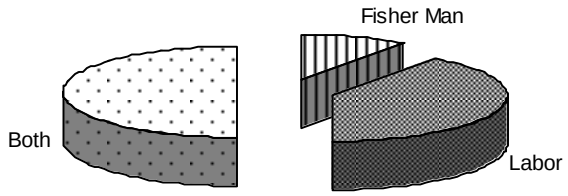
i. Literature from 1947 to 2010 was reviewed to collect information about pollution in Kabul River.

ii. Participatory Rural Appraisal (PRA) techniques were applied to determine trends in various fishing techniques. For this purpose a group of fishermen consists of five members were randomly selected and questions were asked from them about the various fishing methods. Time line PRA technique was used to get quantitative data.

iii. To evaluate the effect of various activities on fish decline a judgment from professional is required. For this purpose 20 experts belonging to fishery and fish related businesses were interviewed. Besides, a survey was conducted in various shops along Kabul River and fish market in Peshawar City. A total of 14 people were interviewed which helped. in the identification of the present status of fish in Kabul River and in its tributaries.

iv. To know about affected fisherman selective sampling techniques were applied. For this purpose old fishermen were identified and were interviewed. A total of ten fishermen, 40 laborers were interviewed (Fig 1). Besides, various huts/hotels offering fish were also interviewed. A total of 50 people including 32 from Sardayab, 10 Naguman and 8 Shalam River were interviewed.

Fig 1: Sample Size and Profession-wise Distribution of Respondints



Results and Discussion

Pollution in Kabul River

Pakistan had a weak industrial base in the beginning. During 1947-1971 rapid industrial growth took place in various cities of Sind and Punjab provinces. Thus little attention was given to Khyber Pakhtoonkhwa (KP) Province in comparison to the other part of the country. In KP, industrial development started in 1938 with the establishment of Frontier Sugar Mills at Mardan followed by Adamjee Paper Mill and Sarhad Colony Textile Mill Aman-Grah, district Nowshera in 1951 (Nafees and Ghulam, 1993). After setting Pakistan Industrial Development Corporation and Sarhad Development Authority tremendous development has been made (Mumtaz and Nawaz, 2008). Currently there are fifteen industrial estates in KP (five major industrial estates, and 10 small industrial estates). Most of them throw their wastes to Kabul River (SDA, 1996). Amangrah, Hayatabad and Kohat Industrial Estates, contribute directly to Kabul River without prior treatment. Besides, there are so many industries along the entire stretch of Kabul River or its tributary scattered throughout Khyber Pakhtoonkhwa (KP) which directly affect Kabul River with their effluent discharge.. Such as Mardan city which throws its effluent wastes through Kalpani River, Malakand, Swat and Charsadda districts throw their wastes through Swat River (Nafees, 2004). On the whole there are 1848 industrial units in the province (The Daily Nation, 2003), the waste of which, directly or indirectly reaches Kabul River, affecting fish population adversely. A survey conducted during 1992 revealed that 15% (Peshawar 205, Charsada 10, Nowshera 41 and Mardan 45) industries were found in the watershed of Kabul River. Among these the major industries are: sugar, Ghee, textile, tanneries, paper, pharmaceutical and rubber. They are dumping their effluent wastes into Kabul River (IUCN & DEPM, 1994 and Nafees, 2004).

Larry conducted the first pollution related study in 1977. He observed that the industries of textile, paper and tannery were important from point of view of pollution. The pollution impacts identified at that time was termed as localized with minimum effect on fish life (Nafees, 2004). After five years, in 1982 another study was conducted on Kabul River in which impacts of industrial effluents were evaluated. It was reported that the industries' direct discharges affected the level of dissolved oxygen (DO) negatively, which is the basic requirement for aquatic fauna. This decrease was attributed to increase in Biological Oxygen Demand (BOD) which is caused by organic load. The various industries contributing to organic load, include paper, Ghee and textile industries (Ahmad and Saleem, 1982) In

1983 BOD was quantified again and was observed that the BOD increases from 0.4 mg/l at Azakhail to 0.56 mg/l at Attock (Ahmad and Khan 1983)

Kamin, et al. (1985) worked on sulphide contamination in addition to BOD and observed that the sulphide level of wastewater joining Kabul River was 0.75 to 3.31 mg/l. Sulfide is toxic to fish and also affecting DO level, which was considered a big threat to fish life. The main contributor of Sulfide is tannery industry but it was also found in municipal effluents. Beside industrial and municipal wastewater disposal, Kabul River is also used as dumping site for solid waste. The impact of which was evaluated in 1989 and it was observed that the suspended load and other material thrown in Kabul River accumulates on the river bed and affect the bottom feed. This has negative impacts on fish population (Sohail 1989). This study was further supported by Kahlid (1989) who studied BOD, DO relation and the area downstream of Noswshera was considered not fit for fish life.

Amangrah industrial estate which was established in 1952 was the main contributor in the increase of pollution level at Nowshera (Nafees and Ghulam 1993). Till 1992 Kabul River was studied in parts at different locations. In 1993 IUCN, Peshawar and Department of Environmental Planning and management, University of Peshawar carried out a detail survey of Kabul River, its tributaries and wastewater joining Kabul River. In which Shalamn River was found to be the most polluted one and considered unfit for drinking, bathing, washing and fishing. While the Naguman and Adizai were observed comparatively clean (IUCN-DEPM, 1994). Another study was conducted in the same line. A ten time increase was noted in BOD since 1982. It was also observed that pollution is not the only reason for decline in fish population. The use of illegal fishing such as electric current, dynamite and pesticides were equally responsible for decline in the fish population (Nafees *et al* 2002).

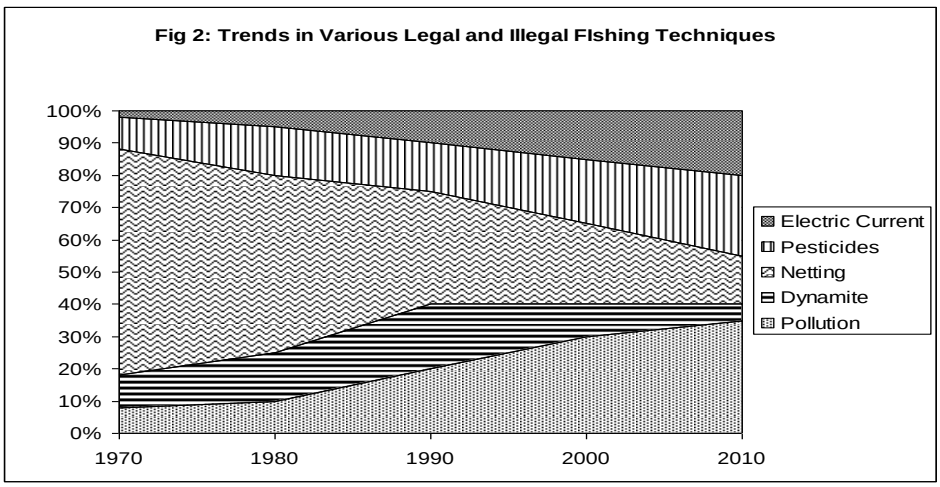
In 2009 a study was conducted and its results were compared with Pakistan National Environmental Quality Standards (Pak-NEQS). Among the studied parameters BOD, Sulphide and suspended solids were found well above the permissible limits set in Pak-NEQS. According to them the water is not fit for drinking, irrigation, fish and other aquatic life (Zahidullah *et al* 2010 and Ali *et al.* 2010).

It is also a common perception that Afghanistan may be major contributor in terms of pollution affecting fish population negatively. In historical prospective as compare to Afghanistan, Pakistan appeared to be the major effluent contributor. In

Afghanistan the first factory was built in Kabul in 1887 to produce coins and spare parts required for the military. Later on at the same site, the manufacturing of woollen goods, soap and a printing press were added. In 1974-75 a textile industry was introduced and it became the major industry of Afghanistan. During 1974-75 Kabul with the largest number of industries, was contributing waste directly to Kabul River (Amin and Schliz, 1976). After 1979 there was regular decline and in 1990 Afghanistan was left with no industry to contribute pollution load to Kabul River (Heintz et al., 1981). The contribution of other small scale industries, although were there, but negligible. In this way, at present it does not contribute but may contribute in future (Nafees and Rasul, 2010).

Settlements along the Kabul River's Banks and Fishing Related Activities

Total length of Kabul River is 1500 km (Kabul River and its tributaries). In Pakistan, throughout its length, about 1000 villages and 20 cities are directly or indirectly dependent on Kabul River. One of the activities is fishing. It is a general perception that fish is affected mainly by industrial pollution. According to this study there are two different factors affecting fish population negatively i.e. pollution and over fishing. The various sources contributing to pollution include industrial and municipal discharge and the use of pesticides. Among these pesticides are also used for fishing purposes which not only contributes to pollution but also causes the death of huge number of fish. one of the safest fishing techniques is netting, the use of which has declined from 70% to just 20% with the increase in unsafe fishing techniques like electric current, which is increased from 5% to 10%. Dynamite is another such technique but in its use various fluctuation has been observed. Initially, in 1970 its

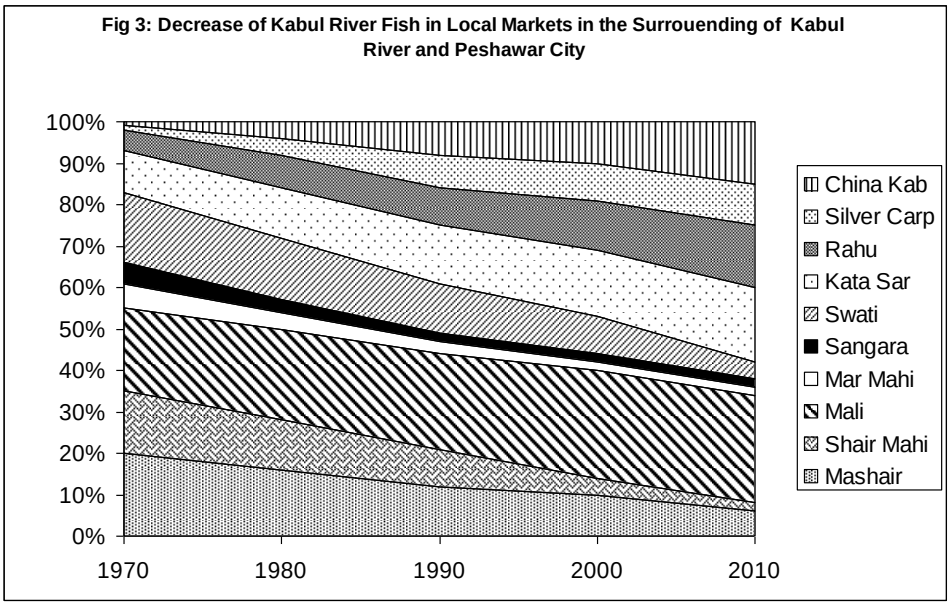


use was about 10% with a slight increase of up to 15% during 1990s. After which a regular decrease has been observed and by 2010 it come down to less than 5%. The use of pesticides is a popular fishing technique (Fig 2).

Effects on Fish Life

Fishing is a common practice along the entire stretch of Kabul River. In Pakistan 45 fish species are common out of which seven species are of economic importance (Mirza, 2003). Enquiry from the people living along the river revealed that several unauthorized and highly undesirable methods of fishing are detected including the use of electric current, explosive and insecticides, particularly Malathion, Thiodan, Cymag, Endo-Sulfan, Cypermethrin and Sanogas (Fig. 2). Field study also reveals that the fish population is on decline because of over fishing and industrial discharge. In Sardaryab area various huts are visible offering fish. The survey revealed a visible change in Kabul River indigenous species (Mashair, Shair Mahi Mali, Mar-Mahi, Sangara, Swati and Solay). Among these species Sangara, Mar-Mahi and Solay are not popular in the market. The species which is mostly available in the local markets are Rahu, Silver and China Kab which are usually coming from different ponds and dams in Punjab (Fig-3). In this way Local Markets are receiving 70% fish from various other sources, showing that Kabul River is no more offering fish on commercial scale while 10-15 years ago there were enough fish population to support commercial fishing (Fig-3). During the survey, five different factors affecting

Fig 3: Decrease of Kabul River Fish in Local Markets in the Surrouending of Kabul River and Peshawar City



fish population negatively are identified. These include municipal waste, industrial discharges, power generation, agriculture, and illegal fishing. At present only two species are found as abundant, Mali and Solay. Two species are considered as adequate and seven species are declared as rare (Table 1).

Table 1:

Different activities and their percent effect on common fish species

Fish Species	Municipal	Industrial	Hydro Power	Agriculture	Illegal Fishing	Status
Mashair *Tor putitora*	10	20	10	10	50	Adequate
Shair Mahi *Clupiosoma Naziri*	5	30	10	10	45	Rare
Mali *Wallago Attu*	5	25	15	15	40	Abundant
Sangara (Braytai) *Mystus seenghala*	5	30	35	5	25	Rare
Swati Fish *Schizothorax plagiostomus*	15	20	25	5	35	Adequate
Solay *Channa punctatus*	5	15	25	35	20	Abundant
Rohu *Labeo rohita*	10	25	20	15	30	Rare
Silver Carp *Hypophthalmichthys molitrix*	10	20	20	10	40	Rare
Mar Mahi *Mastacembelus armatus*	5	10	15	35	35	Rare
Torkay *Labeo dyocheilus*	15	30	15	5	35	Rare

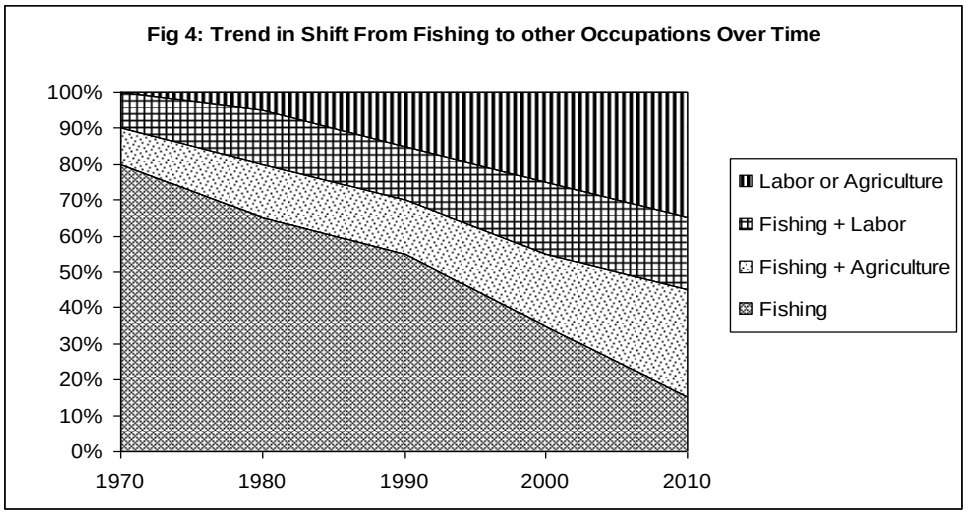
In area downstream of Warsak, fishing opportunities are there but the output is very low. Hydro power generation indirectly affects fish population by blocking its up and down movement: Warsak Dam appeared as hurdle affecting upstream fish movement; thus affecting both fish species diversity and population negatively. The various species affected negatively by hydro power generation include Sangara (35%), Swati Fish (25%), Solay (25), Rohu (20%) and Silver Carp also 20% (Table 1).

Municipal and industrial pollution has got negative effect on almost all fish species. The collective average effect on Shair-Mahi, Sangara was 35% each and Mali was 30%. The contribution of agriculture in the form of agrochemicals (pesticides) was comparatively low. On Mashair, Shair Mahi and Silver the effect is 10% each, on Sangara, Torkay and Swati the effect is 5% each while on Rahu the effect is 15%. Significant effect of Pesticides is reported on Solay and Marmahi (35% each) due to the effect of pesticides on the food chain. As Solay and Marmahi are carnivores and mainly dependent on earth worm and small fish which is affected by pesticides and decreasing its population.

In total only 2 species are found to be abundant (Mali and Solay) but toward decline. Two species are adequate i.e. Mashair and Swati while five species are identified as rare (Table 1).

Effects on the Fishing Community

According to our survey, there were thousands of fishermen living along the river bank. Majority of them (85%) have abandoned this business. Thirty percent have added agricultural activities, 20% have added other labor to fishing, while 35% have completely quitted the profession of fishing. Figure 4 shows the gradual change in the profession of these fishermen. Till 1970 fishing was their only entitlement to money, food and life. They used Net technique for fishing in the past. According to them there is a change (decrease) of 10-15 Kg in fish catch. This obvious change in the fishing community was also triggered by other factors such as pollution in Kabul



River, absence of good nets for fishing, huge inflation, and less attention by the fishery department of KP. Normally the net costs Rs. 3000 while license for fishing costs Rs. 5000. Due to unbearable price hike, the nets available in the market are very expensive. Due to enormous price hike and inflation the quality of nets is also degenerated. These nets are vulnerable to sharp things while fishing. Mostly nets are destroyed or torn out during fishing. The income generated per fisherman is Rs. 4000/month which is not sufficient in comparison with the cost. This forced the local fisherman to take loan from fish-shop owners in case of dearth of Money. During catching season they then work for that money in these hotels which halt them from fish catch. Fishing is a primary source of income of these fishermen, except a few who pursue other occupations. The households exclusively dependant on fishing have deficit family budgets than those who have subsidiary occupations other than fishing. Birth, death, marriage, illness, etc. are occasions which mostly disturb the family budgets of the fishermen.

Therefore, majority of fishermen have changed their profession in this way either to labor or work in the fish shops. Thus there is a growing change in profession. Our survey represented that almost every interviewed fisherman is in debt and he have to serve a hotel for a particular period to pay these debts. Therefore poor fishermen have been ousted from fishing business. The fish department management is also playing negligible role in saving this profession. They should provide nets to local fisherman for fish catch and reduction shall be done in license money. According to survey fishermen highlighted that use of electric shocks, medicines, illegal catching and crackers use in water is reducing the fish breeding spots and over the years the declining trend is high. If the current situation persists the River Kabul will lose its productivity.

Conclusion

Kabul River is the main water body of Khyber Pakhtunkhwa and has got socio-economic importance. A large number of people are directly or indirectly, the beneficiaries of Kabul River. Due to pollution and continuous use of illegal fishing techniques, the river is no longer fit for commercial fishing. Fish related businesses are on the decline. What needs to be done to save this profession is proper encouragement of fish-farming and provision of fish catching facilities to the poor fishermen.

References

Ahmad N. and F. Khan. 1983. Dissolved Oxygen and Biochemical Oxygen Demand of Kabul River and the Industrial wastes of the Nowshera Industrial Area. Journal of National Center of Excellence in Physical Chemistry, University of Peshawar. pp-87-95.

Ahmad N. and M. Saleem. 1982. Determination of Chemical Pollutants in River, Drinking and Industrial Wastewater of NWFP. Journal of National Center of Excellence in Physical Chemistry, University of Peshawar, Vol. 1(1): 28-38

Ali M. Y., A. K. Rehman and A.S. Rauf. 2010. Pollution of Large, Subtropical Rivers-River Kabul, Khyber-Pakhtun Khwa Province, Pakistan): Physico-Chemical Indicators. Pakistan J. Zool., vol. 42(6):795-808.

Amin H. and G.S Schilz. 1976. A Geography of Afghanistan" Center for Afghanistan Studies, pp-102-123.

Anwar H. 1991. Resource Use Efficiency and return to scale in Pakistan; A case study of Peshawar Valley. Department of Agriculture and Applied economics, Agriculture University Peshawar, Staff paper P91-29, pp-4-6.

Fazal H., F.M Sarim, and S. Akhtar. 1988. The Fresh Water Algea of Kabul River. Sarhad Journal of Agriculture 4(5): 22-32.

Heintz E, M. Brunet and B. Battait. 1981. A cercopithecid primate from the late miocene of Molayan, Afghanistan, with remarks on Mesopithecus,Internal Jourtanl of Primatology 2(3): 273-284

IUCN-DEPM. 1994. Pollution and the Kabul River. An analysis and action Planning, Environment and Development Department Civil Secretariat, Peshawar, pp-30-54.

Javed.A.B. 1989. A limnological study of Lotic water of NWFP Pakistan". Final technical Report. Pakistan Agriculture Research Council, pp-5-14.

Kamin K., M. Arif, M.A Khattak, and R.A Shah. 1985. Chemical Characteristics of The Drinking Water of NWFP Part 1. Pakistan Council Scientific and Industrial Research (PCSIR) Laboratories, Peshawar, pp-1-8.

Khalid K. 1989. Primary productivity, Oxygen and Biological Oxygen Demand in Kabul-Indus drainage System at Michni, Nowshera and Manori NWFP, Pakistan" MSc. Thesis, Department of Zoology University of Peshawar, pp-20-34.

Lashkaripour G. R. and S. A. Hussaini. 2007. Water resource management in Kabul river basin, eastern Afghanistan. The environmentalist, Springer Link publisher, 28 (3):253–260

Mirza, M.R. 2003 Checklist of freshwater fishes of Pakistan. Pakistan J. Zool. Suppl. Ser. (3): 1-30.

Mumtaz A.J and M. Nawaz. 2008. Growth and Efficiency of Small Scale Industry and its Impact on Economic Development of Sindh. Pakistan Journal of Commerce and Social Sciences 1:(1):56-82

Nafees M. 2004. Environmental Study of Kabul River and its Tributaries in NWFP, Pakistan. M.Phil Thesis, Department of Environmental Sciences, University of Peshawar, NWFP, Pakistan. pp-86-88.

Nafees M. and K. Ghulam. 1993. Environmental Impact Assessment (Monitoring) of AMangrah Industrial Estate, Nowshera. MSc Thesis, Department of Environmental Planning and Management, University of Peshawar. Pp-32-45.

Nafees M., K Ghulam and M. Sardar. 2002. Investigation of Chemical and Ecological evaluation of Adezai River" Peshawar University Teachers Association (PUTAJ) Vol. 9, pp 77-82.

Nafees. M and Rasul J. 2010. Role of Kabul River in Socio-economic activities and associated environmental Problems" Journal of Area Study Center, University of Peshawar, in press.

Sarhad Development Authority (SDA), 1996. Government of Pakistan Bureau of Statistics. Official web page of Sarhad Development Authority http://www.sda.org.pk/index.htm

Sohail A. 1989. Bottom Fauna and Organic matter in the Bottom Mud of Kabul-Indus Drainage System, NWFP, Pakistan. MSc thesis, Department of Zoology University of Peshawar. pp 14-34.

The Daily Nation. 2003. Econo-List, Directory of industrial establishment in NWFP. Islamabad, March 6.

Zahidullah, M. Nafees, S. Husna and K. Ghulam. 2010. Effect of Amangrah Industrial Estate on Water Quality of Kabul River, Khyber Pakhtoonkhwa. Peshawar University Teacher Association Journal, 17(1): 83-92.