



Affects Of Anthropogenic Activities On The Floras And Fishes Of Sutunga A Small River Of Mekhliganj, Cooch Behar.

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Abstract

Greater Bengal provides us a river based civilisation. Almost more than hundreds river are flowing through west Bengal. Sutunga is one of them, little larger than a stream, with crystal clear flowing water of Mekhliganj Sub-division of Cooch Behar district shows a great diversity of flora and faunas. This river originates from the river Jaldhaka at Moronga, Dhupguri takes a different route and after crossing about 60 km it meets again to Jaldhaka at Mathabhanga. Close observation to the river in different sessions throughout the year shows presence of ample aquatic weeds like Chara, Oscillatoria, Spirogyra, Marsilia, Azolla, Ceratophyllum, Eichhornia, Hydrilla, Lemna, Ottelia, Pistia, Potamogeton, Scirpus, Ludwigia, Spirodella, Vallisneria, Wolffia, etc. and the weeds usually varies greatly with the seasonal variation. Small areas which are embanked by the local fish hunters in the pre-winter become the haven of weeds growth. But the last ten years it witnessed that Anthropogenic activity like paddy (Boro) cultivation in the river, sand and stone lifting by JCB from the river bed, use of pesticides and herbicides in the nearby tea garden made a remarkable change in the habitat of the aquatic weeds of the river. Embankment on the mother river Jaldhaka gradually lowered down the river depth. Watering of tea garden by ground water by using motor pump or by river water lowered the aquifer zone of the river bed. And the river will be finally dried out losing its current, leaving some waterlogged areas on its way along with complete destruction of flora and fauna. As it has already been happened to the nearby two river Sheuli and Kachua of Mekhliganj Block respectively. Our study is to focus the weeds variety now prevails in the river Sutunga along with its seasonal variation. And the impact of human activities how makes the change of weeds habitat in the river water.

Keywords: Anthropogenic activities, Sand mining, Boro rice, floras & faunas

INTRODUCTION-

Bengal province at the time of Mughal emperor was famous for its river based agriculture. Bengali civilisation and culture were river based. Economics of Bengal were heavily dependant upon its water transport. But with the betterment of land transport, small rivers lose their importance in the countries transport system. People began to extort its capacity for other purpose without paying any heed to its natural health. Somewhere the river become a cultivated land just leaving small trace of its course. Nature is not a static concept. It will change naturally in course of time. But how or in which way it will change that is now started to be determined by the activities of human being. In this paper an illustration of same fate happening to all the small rivers in Jamal daha and surrounding locality along with its diverse flora is portrayed.

Probably a number of small rivers were originated from the river Jaldhaka in the long past, passes a long distances meeting with each other and then finally meet to their source Jaldhka again. Rivers were full of flora and fauna. Sutunga is one of them. Jadhaka hydel project (120 MW) at Bindu, Jhalong which was commissioned in 1981, upstream to the origin of the Sutunga causes a great cut of water-flow to the channel. In winter situation become worst, water level get so much lowered that local fisherman can embank the river here and there for hunting fishes, as the water become stagnant in these pockets, they become eden of aquatic weeds like algae, eg. Oscillatoria, Cladophora, Chara aquatic pteridophytes eg. Marsilia, Azolla, Salvinia sp. submerged and immersed weeds such as Hydrilla, Sagittaria, Eichornia etc. will flourish there. According to Lancar & Krake, India has the largest canal network in the world where the velocity of flowing water is reduced by about 30- 40 percent due to the presence of aquatic weeds. Both this effect lure the inhabitants of people near the river Sutunga to initiate Boro Rice cultivation within the river bed by obstructing its flow through the erection of sand banking. There are three rice growing seasons in different parts of India, depending upon temperature, rainfall, and other climatic conditions. These are- Kharif (Aus), Rabi (Aman or Aghani), and summer or spring (Boro) [Singh, C., Singh, P. and Singh, R. (2018)]. Boro rice growing season is the most productive of all three seasons. The reasons for the higher productivity of boro rice are- absorption of higher solar radiation, lower temperature at night during early crop growth stages, fewer incidences of insect pests and diseases, the favourable temperature during grain filling and ripening (Sourajit Dey, Somdatta Achar, Ahana Dey. 2021).. Cultivators uses fertilisers for the growth paddy and weedicides to stop weeds growths in those waterpockets. Rootsystem of the paddy plant somehow disturbs the flow of water as a result sediments deposition takes place, consequently riverbasin rises day by day. Ultimately river dries up form a cultivable land leaving behind a trace of its course, as it has already been happened to two of its fellow river Shiuli and Kachua at Dwarikamari and Kalirhat respectively.

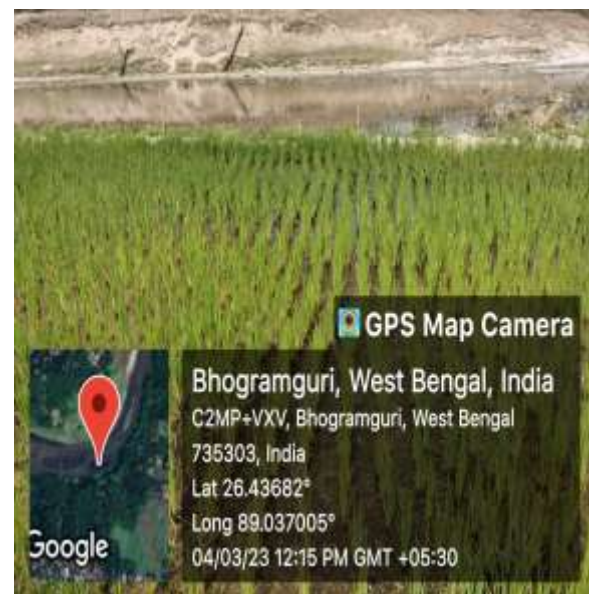


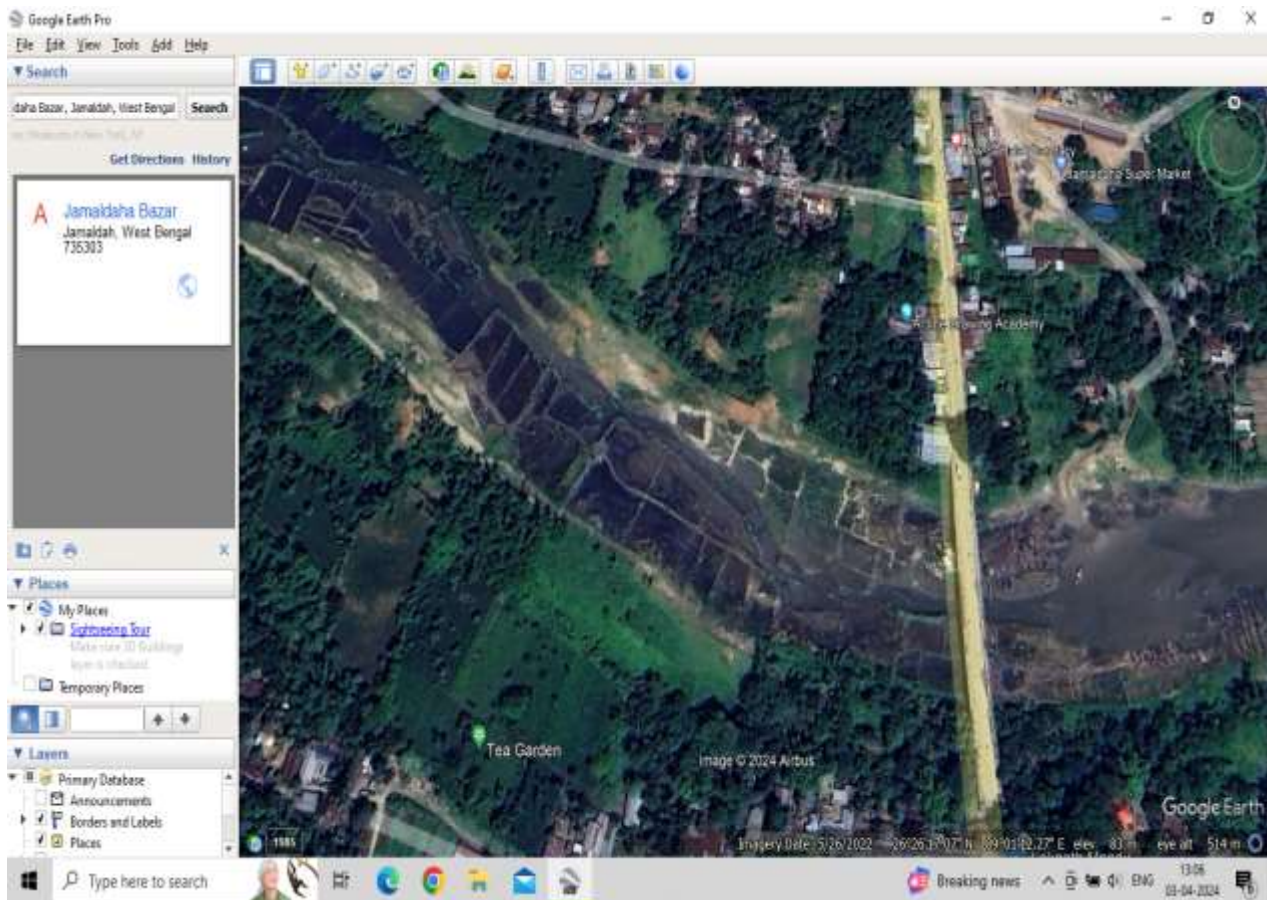
Figure 1 Boro cultivation by sand banking

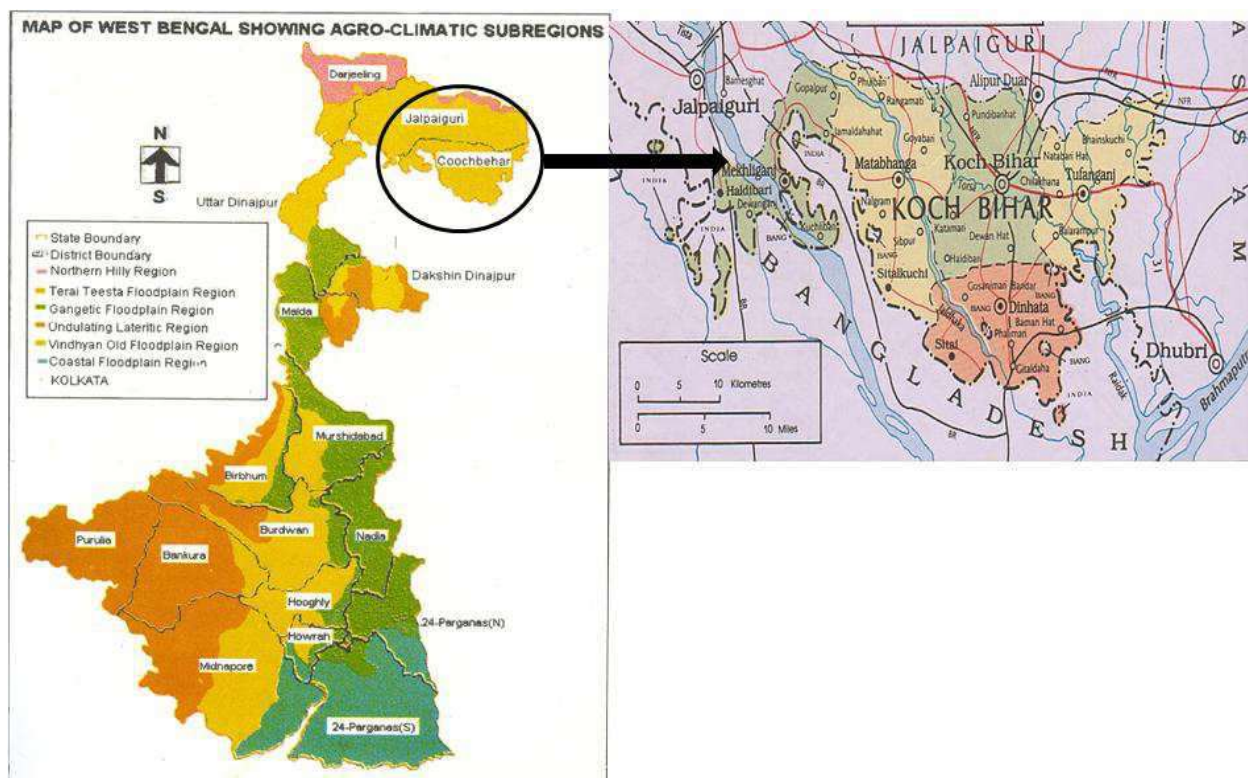
STUDY AREA WITH MAP-

The Shutunga-The Shutunga is a small stream which takes its rise in the Western Duars, and enters the district from the north at the north-west corner of taluk Kamat Changrabandha, where it is joined by the Chebas from the north. It forms for about three miles the western boundary of the taluk, until it turns east from the north of taluk Panishala, where the road from Changrabandha to the frontiers crosses it, and goes into the interior. Its course now lies through a tract of country rich in paddy, tobacco and jute, the western half of which belongs to Sub division Mathabhanga. Before leaving the borders of Mekliganj, it receives on its left bank in taluk Dhuliya Khalisa a small stream called the Jalshuya, which is a branch of the Jaldhaka flowing south from the north-west frontiers. The Jalshuya becomes almost dry during the hot weather months. The Shutunga then cuts the Patgram-Moranga Road below the Jalmaldah Bunder, which stands on its right bank. The river then continues eastward, and, after a course of about seven miles, marks the boundary line between Sub-divisions Mekliganj and Mathabhanga, for two miles and a half, along the east of taluk Chongarkhata Khagribari. The course of the river lies now south-east, and, after a flow of eight miles, crosses the Emigration Road below the Mathabhanga town. It then forms a curve by the west and south of the civil station, and flows on to fall into the Manshai in the north-east of taluk Manabari, In the beginning of the present century, when the Jaldhaka had not yet poured southward from Matiyarkuti, the Shutunga fell into the Dharla in the north of taluk Shibpur. After the change effected by the cutting of the new channel of the Jaldhaka, that river, which is locally called Manshai, intersected it below taluk Chakiyarchhara, the channels of the two lying almost parallel to each other for about three miles, with a narrow slip of land intervening between them. The western bank of the Manshai has of late been very largely diluviated, and the Shutunga is now cut through further up below Manabari. The section of its old bed between Manabart and Chakiyarchhara remains almost dry except during the rains, when a current of the Manshai flows through it, and feeds the main stream below Chakiyarchhara. The banks of the Shutunga are generally steep, mostly covered with low brushwood. The bed is sandy. It becomes fordable

in every part of its course from November to April, but deep and turbulent during the rains, when boats of 100 maunds burden can navigate it throughout, and very often come up to Mathabhanga.

- The study area lies in the south western part of Cooch Behar district, West Bengal covering area of (Map enclosed) 288.64 sq.km. and is enclosed within latitude $26^{\circ}21'N$ - longitude $88^{\circ}55'E$ in the survey of India topographical maps (73M/10,73M/11,73M/14,73M/15).
- Physically, the area is a flattened land nearly meters height from mean sea level. Typical subtropical climate and lateritic soil helps to origin large areas of forest patches in the said areas. Annual rainfall-2914 mm. Normal rainy days-107-115





METHODOLOGY:-

All the information collected all over the year from the local inhabitants living in close vicinity of the river Sutunga. People who are involved in the farming of boro cultivation in the river are interviewed. Managers of tea estates are also interviewed. All the information collected from the local informants is assessed with the recent updated scientific knowledge about river and aquatic weeds. Photographs are taken from the said river area in different sessions of the year.

FINDINGS:

- All the small rivers of this area are sandy and contain full of small stones.
- Illegal sand and stone lifting from river bed by JCB machine along with manual techniques are now common practice.
- Due to insufficiency of water from mother river and other small tributaries at winter water level decreases highly.
- Local fish hunters used to catch fish by creating small pocket in shallow area of the river.
- Boro rice cultivation in small-river bed has got a momentum of late by marginal farmers residing close to the river.
- Boro rice is known as Spring or summer rice, cultivators used to transplant the seedling in December in the river bed.
- Cultivation by artificial blocking of the water flow within the river leads to the deposition of sediments causing raising of riverbed day by day.

- Number of rivers have already been dried out in this area.
- Numbers of tea garden have been grow up in the close vicinity of the river. They are used to collect water from the river in the dry session. And all the hazourdous byproduct of the tea garden and tea factory are channelised to the river.
- Uses of fertilisers sometimes causes algal bloom along with eutrophication effects the natural flora and fauna of the river.
- To check abundance of aquatic weeds fermars often uses weedicides causes the destruction of aqutic biodiversity.
- Lot of aquatic weeds with medicinal importance go missing with death of the river.
- Number of local fish species are already become unknown to our new generation.
- Number of fish varieties and other aquatic organisms disappears completly from the local river.

RESULT AND DISCUSSION:

Sutunga-a small river brings water from Jaldhaka and other tributaries and after crossing almost 100 km. ended in to river Jaldhaka again near Mathabhanga. Once it was full of aquatic flora and fauna and the only way of transportation in this area. With the initiation of hydelpject and banking on its mother river i.e. Jaldhaka the flow of water gets lowered. People living to its close vicinity were used to cultivate water melon (*Citrullus lanatus* T.), bottle gourd (*Lagenaria siceraria*), cucumber (*Cucumis stivus* L.), etc on its sandy river banks mainly in winter from long past. Development of science and technology now introduced bus road and railroad as the way of transportation. Therefore, the river becomes the damping ground of the total villages. It changes its role to the villager from the transporter to the supplier of sand and stone to the construction of new building. Anthropogenic activities ultimately trying to convert the river bed into fertile agricultural land. People begin to cultivate boro rice since last ten years. Generally 600 kg paddy are yelded per Bigha (33 decimal) of area within the river bed in our study area. Boro rice cultivation takes place from Nov. to May in irrigated condition mainly in low land. As a marginal increase in the productivity of boro rice in Eastern India can significantly boost rice production in India, as sustainable agro-technology for boro rice is obligate [Singh, U.P] This type of rice has been cultivated traditionally in river basin deltas of Bangladesh and Eastern India including Eastern U.P., Odisha, Bihar, West Bengal and Assam (B. Lal*, Priyanka Gautam, B. B. Panda and R. Raja). It is photo-insensitive, transplanted rice cultivated in waterlogged, low-lying or medium lands with supplemental irrigation during November to May.

Recently some people is taking the advantages of low water current of the river, come down on its heart and started to cultivate by obstructing the water current by sand filled plastic bags or elevated sand banking. Lot of water pockets are developed all over the course of the river throughout the winter. They use fertiliser like (N.P.K-10.26.26.) and urea at the time of sowing seedling and often uses cow dung, spray dust at the time of growth, as they believe that dust and cow dung allow earthworm to be more active, thereby affect the naturally growing flora and fauna of the river. Besides a lot of tea garden have been developed near the riverbank and often collect water from the river for tea plants. In addition, river

becomes the outlet of wash off materials such as insecticides and fertiliser of the tea gardens. Excess macronutrients such as nitrogen, phosphate creates algal bloom in the water. These are perennial rivers. these were very rich in containing a number of aquatic weeds such as Eichhornia crassipes, Myriophyllum aquaticum, Hydrilla verticillata, Potamogeton crispus, Ludwigia peploides, Enhydra fluctuans, Sagittaria sagittifolia, Glinus oppositifolius (common in sandy banks of the river Sutunga), Polygonum sp., Leucus sp., Pteridophytic plant sp. Such as Azolla filiculoides, Salvinia sp., Marsilia minuta, Selaginella sp. on river bank. Algal sp. such as Spirogyra sp. Chara sp. Certophyllum sp. Pithophora sp. etc. All this are aquatic macrophytes are primary producers, require light, water, and carbon dioxide to photosynthesize and oxygen to respire (Moss, 1988) and make an ecological balance among aquatic floras and faunas but with the drying up of the river this balance is breaking consequently in the field of fauna a number fish species of this area which were very common in fifteen years ago are missing now such as Veda (Nandus nandus), Kholisa (Trichogaster fasciata), Kakila (Xenentodon cancila), Chela (Aspidoparia morar), Tapa (Leidon cutcutia) etc. Boro cultivation in the river creates a situation that ultimately leads to eutrophication. It is the syndrome associated with an excess of macronutrients derived from anthropogenic sources, which leads in turn to excess plant growth and the exclusion of less competitive species.(Matthew T. O'Hare^{1*}, et al). Macrophytes are an important constituent of aquatic ecosystems as they directly influence the hydrology and sediment dynamics of river systems through their effects on water flow and play key functions in biogeochemical cycles (French and Chambers, 1996; Chambers et al., 1999).

Aquatic weeds are still present on river bed and surroundings.

Family	Name of the Plants	Habitat
Nymphaeaceae	Nymphoides indica (L.) O.Kuntze	Rooted floating
Convolvulaceae	Ipomoea aquatica Forsk	Rooted floating
Caesalpiniaceae	Cassia tora L.	Marginal
Asteraceae	Enhydra fluctuans Loureiro	Rooted Floating
	Mikania micrantha Kunth	Marginal
	Eclipta prostrata (L.) L.	Marginal
Marsileaceae	Marsilea quadrifoliata L.	Marginal
Lemnaceae	Lemna minor L.	Floating
Commelinaceae	Commelina benghalensis L.	Marginal
	Commelina diffusa Burman f.	Marginal
Onagraceae	Ludwigia octovalvis (Jacquin)	Raven
	Ludwigia adscendens (L.) Hara	Raven
Amaranthaceae	Alternanthera paronychioides St. Hill	Marginal
	Alternanthera sessilis (L.) DC.	Marginal
	Alternanthera pheloxeroides(Martius) Grisebach	Marginal
Nymphaeaceae	Nymphaea rubra Roxburgh ex Andrews	Rooted floating
Hypericaceae	Hypericum japonicum Murray	Marginal
Pontederiaceae	Monochoria vaginalis(Burmann f.) Kunth	Marginal

Apiaceae	Oenanthe benghalensis Bentham	Marginal
	Rumex dentatus L.	Marginal
	Persicaria orientalis (L.) Spach	Marginal
Polygonaceae	Persicaria hydropiper (L.) Spach	Marginal
	Polygonum sp.	Marginal
Poaceae	Panicum sp.	Marginal
Cyperaceae	Cyperus sp.	Marginal
Verbenaceae	Phyla nodiflora (L.) Greene	Marginal
Trapaceae	Trapa natans L.	Floating
Hydrocharitaceae	Valisnaria natans (Loureiro) Hara	Submerged
	Hydrilla verticillata (L.f.) Royle	Submerged
Azollaceae	Azolla pinnata R. Brown	Floating
Aponogetonaceae	Aponogeton undulates Roxbergh	Submerged
Alismataceae	Sagittaria sagittifolia	Marginal

Present status of occurrence of fishes in the river Sutunga

Sl.	Order	Family	Local name	Scientific name	Present status of occurrence
1.	Cypriniformes	Cyprinidae	Mola	Amblypharyngodon mola (Hamilton, 1822)	Rare
2.			Darika	Esomus danrica (Hamilton, 1822)	Abundant
3.			Desi puti	Puntius sophore (Hamilton, 1822)	Abundant
4.			Titla Puntia	Pethia ticto (Hamilton, 1822)	Abundant
5.			Lal Puntia	Pethia conchonioides (Hamilton, 1822)	Abundant
6.			Java Puntia	Barbonymus gonionotus (Hamilton, 1822)	Very rare
7.			Sar Puntia	Systemus sarana (Hamilton, 1822)	Rare
8.		Cobitidae	Gota	Lepidocephalichthys guntea (Hamilton, 1822)	Rare
9.	Perciformes	Channidae	Cheng	Channa gachua	Abundant
10.			Sati	Channa punctata (Bloch, 1973)	Abundant
11.			Shol	Channa marulius (Bloch, 1973)	Abundant
12.		Nandidae	Khorikata	Badis badis	Nil
13.			Veda	Nandus nandus	Endangered
14.		Gobiidae	Bele	Glossogobius giuris	Abundant
15.		Ambassidae	Lal Chanda	Parambassis lala	Endangered
16.			Chanda	Parambassis ranga	Very rare

17.			Chanda	Chanda mama	Very rare
18.		Belontiidae	Kholisa	Trichogaster fasciata	Endengender d
19.			Kholisa	Trichogaster lalius	Endengender d
20.		Mastacembelidae	Bam	Mastacembelus armatus	Abundant
21.			Gochi	Macrogathus aral	Abundant
22.		Anabantidae	Koi	Anabas testudineus	Abundant
23.		Belonidae	Bok machh	Xenentodon cancila	Nil
24.		Siluridae	Boyal	Wallago attu	Abundant
25.			Pabda	Ompak pabda	Very rare
26.		Clariidae	Magur	Clarius magur	Abundant
27.			Singi	Heteropneustes fossilis	Abundant
28.		Bagridae	Tengra Golsa	Mystus bleekeri	Endengender d
29.			Tengra	Mystus tengara (Hamilton,1822)	Abundant
30.			Tengra	Mystus vittatus	Abundant
31.		Notopteridae	Pholui	Notopterus notopterus	Very rare
32.		Tetraodontidae	Tapa	Leidon cutcutia (Hamilton,1822)	Nil
33.			Boroli	Barilius barila	Endengender d
34.			Khoksa	Barilius shacra	Abundant
35.			Chela	Aspidoparia morar	Endengender d
36.			Rita	Rita rita	Very rare
37.		Sisoridae	Baghar	Bagarius bagarius (hem.)	Nil
38.			Darangi	Barilius bola	Abundant
39.			Kakila	Xenentodon cancila	Nil
40.			Bacha	Eutropichthys vacha	Endengender d
41.			Khoira	Gudusia chapra	Very rare
42.			Khursa	Labeo dero	Endengender d
43.			Cuchia)	Amphipnous cuchia (Hamilton-Buchanan	Very rare
44.			Ghura	Clupisoma garua (Hamilton)	Very rare.

RECOMENDATION:

Our civilization is river based. We the Indian think every river is holy Ganga. None of our holy ritual is completed without inviting our river. We used to bring water in vassals from it believing it the water of the Ganga. Now in this age of technology the role of river has been changed, it has to flow not through its own course but to the man- made canals for the purpose of irrigation. Nature-made course of river get dried out. Proper measure must be taken to keep them alive. Excavating sand and stone from the river by JCB must be stopped as it makes deep pit unevenly in the river basin. Agriculture within river by making artificial pockets is to be stopped immediately as the root system of cultivated plant make sandy river

basin into muddy nature. Awareness programme from government and NGOs about the importance of river and its rich aquatic plant and animal diversity should be initiated.

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Figure 1 Holy bathing festival near river Figure2 Way for Vehicles for sand collection



Figure 3 pockets for cultivation



Figure 4 Chara sp.



Figure 5 Polygonum sp.



Figure 6 Algal bloom



Figure 7 Chara sp.





Figure 2 Ludwigia sp.



Figure 3 water pockets for fish hunting



Figure 4 Sagittaria sagittifolia



Figure 5 Fish hunting by local people



Figure 6 Myriophyllum sp.



Figure 7 Hydrilla sp.