

STATUS OF GOLDEN MAHSEER IN KOSI RIVER, UTTARAKHAND

Report submitted to

Ramnagar Forest Division, Uttarakhand



Wildlife Institute of India, Dehradun

in collaboration with

The Corbett Foundation, Ramnagar

March 2020



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**भारतीय वन्यजीव संस्थान
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CONTENTS

S. No.	Title	Page No.
	<i>Summary</i>	
1.	Introduction	1
	1.1 Distribution record of Golden Mahseer in Uttarakhand	1
	1.2 River Kosi and fish community structure	2
	1.3 Status of Golden mahseer	2
2.	Objectives of the study	3
3.	Study Area	3
4.	Methods	4
	4.1. Inventory of golden mahseer habitat	4
	4.2. Measurements of micro-habitats	4
	4.3. Fish Population estimation	5
	4.4. Mahseer nursery grounds mapping	5
	4.5. Waterquality parameters	6
	4.6. Threats Analysis	6
5.	Findings	7
	5.1. Fish diversity	7
	5.2. Population status of Golden Mahseer	11
	5.3. Status of water quality	14
	5.4. Threat Analysis	16
6.	Recommendations	17
	Habitat Fact Sheets - 1 to 25	19-68
	<i>References</i>	69

SUMMARY

The river Kosi is one of the tributaries of Ramganga River basin, flows between the Corbett Tiger Reserve and Ramnagar Forests Division in Uttarakhand. It holds one of the important habitats for golden mahseer, *Tor putitora*. Despite their abundance at one time, the population of golden mahseers is declining very rapidly in recent times in its native ranges. In this background, a detailed survey was carried out to generate information on status of golden mahseer population in Kosi river. The specific objectives of the study are: 1). assess the population status and abundance of golden mahseer in Kosi river; 2). document diversity of fish species associated the golden mahseer; 3). identify critical habitats of golden mahseer's life history stages and 4). document macro and micro habitats use by mahseer in river Kosi. Field sampling was carried in Kosi river between Kunkhet and Kosi Barrage (32 km length) covering post-winter (March 2018) and post-monsoon (October 2018) seasons. Twenty species of fishes including big-sized barbs, *Bangana dero*, *Labeo calbasu.*, *Labeo pangushia*, *Labeo rohita*, *Chagunius chagunia* and *Tor putitora* were recorded from the Kosi River stretch between Kunkhet and Kosi Barrage. Total 25 deep pools with golden mahseer (*Tor putitora*) congregation were recorded in Kosi river. Based on the underwater observation and different surface photographic evidence, it is estimated that about 5000 adult mahseer were inhabited in pool habitats of Kosi River. In addition, important nursery grounds along the Kosi River were identified and mapped. It is observed that the waterquality parameters such as Dissolved Oxygen (8.10 - 9.78 mg/l), Total dissolved solids (147 – 300 ppm), Electrical conductivity (220 – 471 μ S) pH (8.1 – 9.4) and Temperature (21 – 28.8°C) recorded in all the habitats were within the normal limit. However, the high level of Total dissolved solids (TDS) was observed in the downstream of Kosi River at near Tarika Resorts (TDS-300 ppm) and Kosi Barrage (TDS-275 ppm). It indicates that the cumulative impacts of mass bathing and entry of other nutrient load in the river system. Further, it is observed that golden mahseer population in Kosi River facing immense threats due to illegal/ destructive fishing. In order to conserve this mighty species from the ongoing declining trend it is recommended that to i) organize stakeholders meeting in a year by involving Resort Managements and provide legal support to empower identified stakeholders to safe guard the mahseer pools located nearer to their place; ii) 'Fish Watch' programme may be introduced in Kosi River as part of Eco-tourisam package from Ramnagar Forests Division, which includes snorkeling and underwater observation; iii) the Forests Department shall deploy additional manpower at important vulnerable areas (mahseer pools) and response quickly to any untoward incident and iv) the important mahseer nursery ground identified in Kosi river should be kept under watch especially during post monsoon months (August to October).

Status of Golden Mahseer in Kosi River, Uttarakhand

1. Introduction

The Golden Mahseer, *Tor putitora* (Hamilton, 1822) also known as ‘Himalayan mahseer’ is one of the largest freshwater fishes of India. It inhabits mainly the foothills of the Himalayan rivers. It is promoted as a ‘flagship’ species and it acts an icon species representing the fresh water habitats (Everard and Kataria, 2011; Gupta *et al.*, 2016). It is an important game fish because of its large size, attractive golden color and sporting values (Gupta *et al.*, 2016). It is known to reach impressive length of 2.75 meters and weight of 54 kg (Hora, 1939; Talwar and Jhingran, 1991). Golden mahseer is an omnivore fish, adults feed on insects, mollusks, algae, macroinvertebrates, rotifers, small fishes etc. and during early life history stages they feed on plankton and (Badola and Singh 1980; Dasgupta, 1991). This mighty fish occurs in pools, lakes and large reservoirs. It prefers to thrive in fresh flowing habitats with high dissolved oxygen content. Being a migratory fish, it migrates upstream for spawning. It spawns from the month of July to September after breeding and flows through long rivers and reservoirs in the lower altitudes to replenish for the next breeding season (Johal *et al.*, 1994; Joshi, 1994).

1.1. Distribution record of Golden Mahseer in Uttarakhand

The Ganga River system is one of the largest sources of golden mahseer population in India. In the state of Uttarakhand; this species has its distribution from Yamuna river in the west to Mahakali river in the east. Almost all tributaries between these rivers inhabit one of the rich sources of golden mahseer and it has distribution range between 300 to 1500 m msl altitude. So, the Uttarakhand state holds the high population of golden mahseer in wild. Population of golden mahseer also thrive well in tributaries of River Ram Ganga such as Kosi, Khoh, Kohlu streams. However, being a state with large number of river systems, numerous small and big projects have come up in series for the development purpose in the last few years. The construction of dams and barrages in the upper segments of the river Ganga is considerably reducing the water flow and have shown detrimental effects on the physical attributes, such as alteration in feeding behavior, distribution patterns, and spawning grounds of golden mahseer (Sarkar *et al.*, 2012 and Raj Vanshi *et al.*, 2012).

1.2. River Kosi and fish community structure

The River Kosi, a perennial river originates in the middle Himalaya of Kumaon hills, arising out of Budha Peenath of Koshimool near Kausani in Almora district. It flows through the towns of Ramnagar in Uttarakhand and later it joins the Ramganga river in Uttarakhand. The complete stretch of river Kosi is about 250 km. The river flow is erratic in the foot hills of Himalaya and interacts with river bed having different substrata including big rocks, bed rock, sand, boulders, cobbles etc. The levels of river are unpredictable in nature and it often leads to exceed up the limits and cause destruction especially during the monsoon season. River Kosi has its role in replenishment of the farmlands of local people as well as serving as the source of drinking water for the wildlife around in the Corbett Tiger Reserve.

The structure of river Kosi is defined by different habitats types such as pool, riffles, runs with varying degree of water quality. Common fishes in Kosi river includes species of family Cyprinidae *Barilius bendelisis*, *Barilius vagra*, *Gara gotyla gotyla*, *Tor putitora*, *Schizothorax richardsonii*, *Labeo bata*;, *Labeo calbasu*, *Bangana dero* and other as *Botia almorhae*, *Mastacembelus armatus*, *Pethia conchornius* etc.

1.3. Status of Golden mahseer

Despite their abundance at one time, the population of golden mahseers is declining very rapidly in numbers. Due to the lack of exact numerical assessments of the availability and catches there is no proper comparison of its status in rivers. So, forth data is available and because of its considerable depletion the population trend and status of golden mahseer is considered as throughout 'declining'. Hence, it is enlisted in endangered categories in the IUCN Red list (2018).

Being migratory in nature, golden mahseer migrates upstream during the pre-monsoon (glacier fed rivers) and monsoon seasons from the large and higher order streams in the foothill regions of the Himalaya to lower order streams for breeding and spawning. In the recent past, its declining rates due to several reasons raised among the conservationists. One of the major reasons for population decline is destructive fishing. As a result, brooders distribution has drastically reduced from currently, they are localized to certain river systems of Uttarakhand. The main reasons for population decline in Kosi river is illegal/overfishing practices, pollution, man-made development pressure along the river banks (sand and rock mining) and habitat fragmentation (path diversions).

2. Objectives of the study

The primary goal of the present study was to generate information on status and abundance of golden mahseer and to study its habitat condition and quality of River Kosi for developing effective conservation strategies for golden mahseer conservation in Kosi river. Specific objectives of the study are:

1. Assess the population status and abundance of golden mahseer in Kosi river.
2. Document diversity of fish species associated the golden mahseer
3. Identify critical habitats of golden mahseer's life history stages.
4. Document macro and micro habitats use by mahseer in river Kosi.

3. Study Area

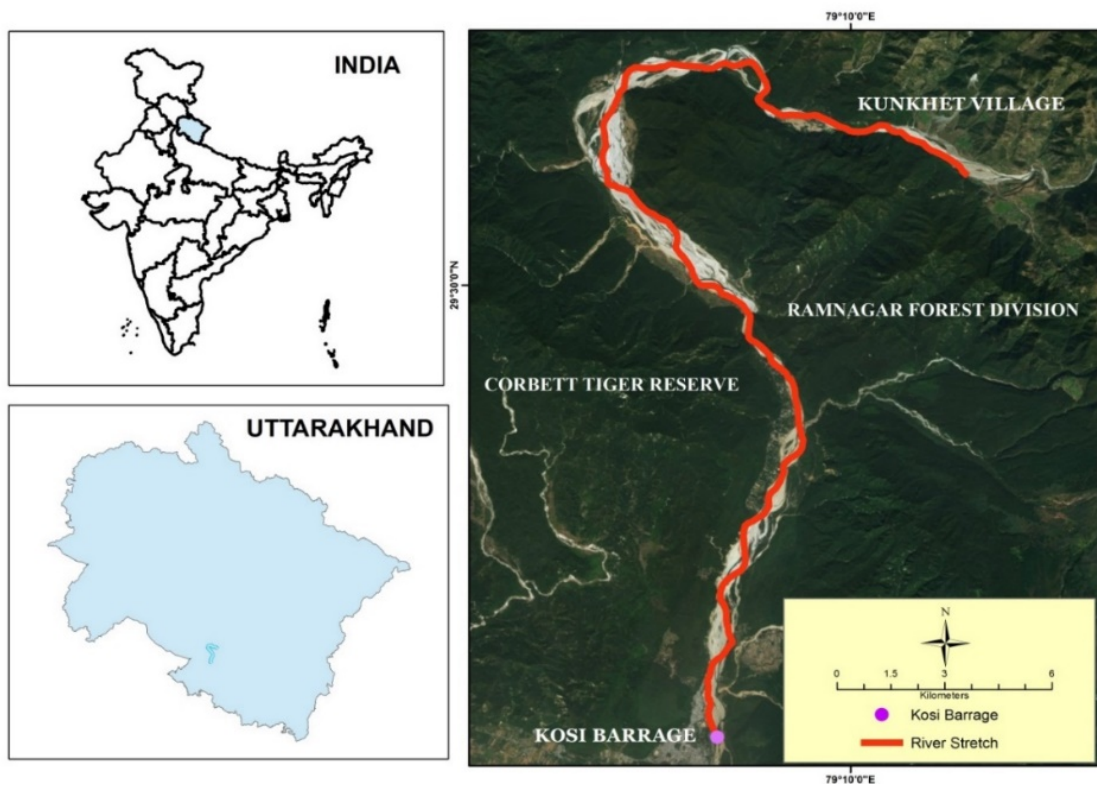


Figure 1: Map showing 32 km long stretch of River Kosi flowing through Ramnagar Forests Division, Uttarakhand.

Survey was carried out in 32 Km stretch of river Kosi (Figure 1), which enters into Ramnagar Forest Division at Kunkhet and forms boundary between Corbett Tiger Reserve and Ramnagar Forest Division. At the end of Ramnagar Forest Division, a barrage has been constructed across the Kosi river at Ramnagar town for channelizing water for meeting the irrigation and drinking water supply in the downstream area. On the right side of the bank is natural and no human settlement along the river bank, whereas on the left bank is highly modified due to many human settlements as well as tourism establishment.

4. Methods

4.1. Inventory of golden mahseer habitat

‘Habitat’ is the place where the individuals, populations can find the environmental and biological features needed for their survival. The formation of pools in natural riverine ecosystems could result due to large rocks and boulders in the bed materials which hold the flowing water providing a structure of a standing water body. Adult mahseers generally prefer deeper sections of the channel unit with no or less velocity, such habitats are called as ‘pools’. In the present inventory, number of pool habitats along the 32 Km length of Kosi was documented. At each pool habitat GPS location and altitude were recorded.

4.2. Measurements of micro-habitats

Fish habitats in the mountain streams comprise of different gradient and levels, different habitats have specific features which defines the particular habitat and its use. It includes depth, flow-rate, substrate etc. Information of these micro-habitats in relation to the availability and use by the fish species defines the habitat preference and survival of the fish. At each pool habitat the occurrence of golden mahseer and its different life history stages were recorded. This data give little insight into the habitat features that affect the presence of fish.

Followed by number of cross-sectional interval data at every 5m and for each cross-section at every 1-meter interval depth, velocity and substrate type were recorded. The methods for measuring micro-habitat and variables are illustrated in the Figure 2. Based on the habitat inventory length of pool, mean width of pool, habitat area, mean depth, habitat volume, velocity and dominant substrate types were generated. Information on velocity and depth distribution were generated using depth finder & measuring rod and hand-held digital Flow probe (3.7-6’ Model: FP111). Dominant substrate types (Bedrock/ boulder/ cobbles/ pebbles/ gravel/ sand/ silt/

leaf litter) recognized as outlined by Pusey *et al*; 1993. Composition at each substrate type was quantified on the basis of visual observation.

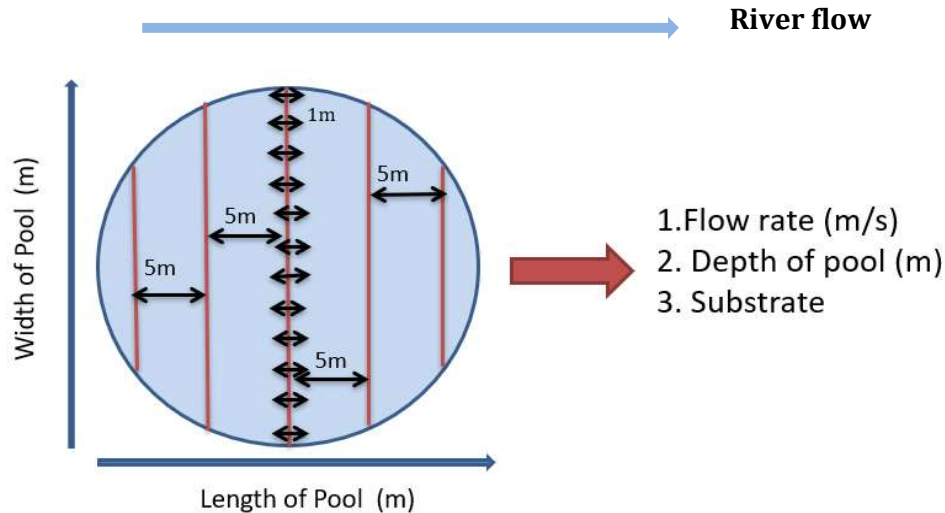


Figure 2: Diagrammatic representation of river cross-sectional data collection method across the pool habitats.

4.3. Fish Population estimation

Fish count was recorded in the field through visual underwater observations using snorkeling and masks during the day light. For each observation three to four people were involved in counting fishes by sitting along the pool sides as well as through under water observation. In addition, multiple aerial photographs were captured covering entire pool areas, later the number of visible fish in each pool habitats were counted. Further, systematic fish sampling was performed in each habitat using cast nets. For every field site, 10 efforts using the cast nets for the half an hour duration was performed. Fish species encountered along with mahseer were photographed and recorded. After recording fishes were released back to the river systems.

4.4. Mahseer nursery ground mapping

Nursery grounds are the ecologically important habitats that enhance the growth and survival of early life-history stages (fingerlings and juveniles) of fish species. Habitats of young golden mahseers were further classified into six types as **backwater pool, secondary channels, run habitat, associated streams, isolated pools and confluence point** on basis of depth, flow and connection with the main river channel (Moore and Gregory, 1988). During the survey, mahseer young one schools were encountered along the Kosi river system. Young ones were classified into

two categories based on the size class (fingerlings, 1.5-10 cm; juveniles (10-30cm) based on Kulkarni, (1980) and Desai, (1973). Location of each nursery ground was recorded. Later, they were plotted using ArcGIS map.

4.5. Waterquality parameters

In each sampling site, for both seasons information on various water quality parameters such as temperature (thermometer); pH (probe), dissolved oxygen (Winkler's method), electrical conductivity, EC (probe) and, total dissolved solids TDS (probe) were generated.

4.6. Threats Analysis

Though fishing in Kosi river is banned by Uttarakhand Forest Department, illegal fishing and other activities are happening along the Kosi river. Threats to the fish community in the Kosi river were observed and classified into five major categories depending upon how these threats adversely affects the golden mahseer population and other fish biodiversity in river Kosi:

(a) Illegal fishing (IF): Fish population decline due to illegal fishing, in selected pools due to the increased demand in the local market.

(b) Destructive fishing (DF): Use of destructive methods such as dynamites, poisoning, electric gears etc.

(c) Habitat Modification (HM): Largescale modification in the river beds, small scale water diversions by local residence and uncontrolled recreational activities in the river channel.

(d) Habitat fragmentation (HF): Due to the developmental activities along the rivers, the natural breeding grounds have been lost due to loss of substrata as rock and sand mining takes place for the construction purposes.

During the survey sings of different types of threats operating at each site was recorded and analyzed.

5. Findings

5.1. Fish diversity

The present study twenty species of fishes belonging to 5 order, 7 families and 16 genera were recorded from River Kosi flowing between Kunkhet and Kosi Barrage. List of fish species recorded from River Kosi is presented in Table 1. Among all species, the Golden Mahseer is an iconic fish from the Kosi river, which is distributed all across the river section (Figure 3). Along with the Golden mahseer other big-size native carps such as *Bangana dero*, *Labeo calbasu*, *Labeo pangushia*, *Labeo rohita* and *Chagunius chagunia*, co-exist in most of the pool habitat (Figure 4). In addition to the large cyprinids, small typical stream fishes like *Garra gotyla*, *Barilious bendalis*, *Barilius vagra* and *Schitura rupicola* are quite common and occupied in entire section of the river (Figure 5). Some species such as *Xenotodon cancila*, *Pethia chonconius*, *Channa gachua* and *Rasbora daniconius* are distributed only in the lower section and backwaters of the Kosi River. Out of 20 recorded species, *Tor putitora* species is listed as Endangered, *Naziritor chelynoides* is Vulnerable and *Labeo pangusia* is listed as near Threatened categories in IUCN Red list data.

Figure 3: Adult golden mahseer shoal in Kosi River, Uttarakhand



Table 1: List of fish species recorded from Kosi River, Uttarakhand

S. No.	Fish name	Status	Order	Family
1	<i>Bangana dero</i>	Least concern	Cypriniformes	Cyprinidae
2	<i>Barilius bendelisis</i>	Least concern	Cypriniformes	Cyprinidae
3	<i>Barilius vagra</i>	Least concern	Cypriniformes	Cyprinidae
4	<i>Chagunius chagunio</i>	Least concern	Cypriniformes	Cyprinidae
5	<i>Garra gotyla</i>	Least concern	Cypriniformes	Cyprinidae
6	<i>Labeo bata</i>	Least concern	Cypriniformes	Cyprinidae
7	<i>Labeo calbasu</i>	Least concern	Cypriniformes	Cyprinidae
8	<i>Labeo rohita</i>	Least concern	Cypriniformes	Cyprinidae
9	<i>Labeo pangusia</i>	Near Threatened	Cypriniformes	Cyprinidae
10	<i>Naziritor chylenoides</i>	Vulnerable	Cypriniformes	Cyprinidae
11	<i>Pethia chonconius</i>	Least concern	Cypriniformes	Cyprinidae
12	<i>Puntius sophore</i>	Least concern	Cypriniformes	Cyprinidae
13	<i>Rasbora daniconius</i>	Least concern	Cypriniformes	Cyprinidae
14	<i>Tor putitora</i>	Endangered	Cypriniformes	Cyprinidae
15	<i>Schistura rupecula</i>	Least concern	Cypriniformes	Nemachellidae
16	<i>Botia almorhae</i>	Least concern	Cypriniformes	Botiidae
17	<i>Channa gachua</i>	Least concern	Anabantiformes	Channidae
18	<i>Glyptothorax pectinopterus</i>	Least concern	Siluriformes	Sisoridae
19	<i>Mastacembalus armatus</i>	Least concern	Synbranchiformes	Mastacembelidae
20	<i>Xenotodon cancilia</i>	Least concern	Beloniformes	Belonidae

Figure 4: Large-sized cyprinid fishes recorded in Kosi River between Kunkhet and Kosi Barrage.



Labeo calbasu



Labeo rohita



Labeo bata



Labeo pangusia



Naziritor chylenoides



Tor putitora



Chagunius chagunio



Bangano dero

Figure 5: The common minnows, barbs and loaches recorded in Kosi River between Kunkhet and Kosi Barrage.



Garra gotyla



Rasbora daniconius



Barilius bendelisis



Barilius vagra



Pethia conchonius



Puntius sophore



Botia almorhae



Schistura rupecula

5.2. Population status of Golden Mahseer

Since adult golden mahseer generally prefers large-rocky pools habitat, number of large pool habitat available in the Kosi river between Kunkhet and Kosi Barrage were mapped. A total of 25 pool habitats (23 in post-winter; 25 in post-monsoon seasons) were recorded. Location of each pool habitats and their GPS co-ordinates are given in Table 2. Among all, the deep-water body at the Kosi barrage inhabits large congregation of adult golden mahseers (*Tor putitora*), next to that large sized pools are present in Kosi river at Garijya Temple, behind Tarika and Infinity Resorts. Detailed information on individual habitat description such as habitat area, volume, average flow, depth, composition of different class of substrate and status of golden mahseer are described in **Habitat Fact Sheets No 1 to 25**

Table 2: Locations of identified pool habitat in Kosi River between Kunkhet and Kosi Barrage.

S. No.	Site ID	Sites	Altitude (m)	Latitude	Longitude
1	A	Kosi Barrage (Pampori)	387	29°24'2.78"N	79° 07'54.41"E
2	B	Tarika Resort (A)	392	29°27'03.21"N	79° 08'40.17"E
3	B1	Tarika Resort*	393	29°27'01.17"N	79° 08'42.12"E
4	C	Infinity Resort	409	29°27'07.05"N	79°08'44.45"E
5	D	Infinity Resort	410	29°27'08.39"N	79°08'45.54"E
6	E	River side Resort	415	29°28'9.89"N	79°08'77.09"E
7	F	Tarangi Resort	388	29°27'56.03"N	79° 08'97.03"E
8	G	Garjiya Temple (A)	408	29°29'39.44"N	79° 08'22.64"E
9	H	Garjiya Temple (B)	410	29°29'03.53"N	79° 08'04.62"E
10	I	Garjiya Temple (C)	411	29°29'39.44"N	79° 08'22.64"E
11	I1	Garjiya Temple*	411	29°27'01.49"N	79°08'03.53"E
12	J	Sundarkhal (A)	441	29°30'08.42"N	79°07'02.53"E
13	K	Sundarkhal (B)	454	29°31'01.19"N	79°06'07.76"E
14	L	Sundarkhal (C)	446	29°31'01.43"N	79°06'07.14"E
15	M	Mohaana	478	29°32'53.69"N	79°06'42.29"E
16	N	Khalgari	485	29°32'59.09"N	79° 08'06.05"E
17	O	Khalgari	492	29°32'54.01"N	79°07'54.02"E
18	P	Kunkhet (A)	514	29°32'27.70"N	79°08'37.40"E
19	Q	Kunkhet (B)	521	29°32'29.91"N	79°08'36.74"E
20	R	Kunkhet (C) (Run)	539	29°54'05.62"N	79°14'05.04"E
21	S	Kunkhet (D)	527	29°54'04.63"N	79°14'05.85"E
22	T	Kunkhet (E)(Run)	538	29°54'02.63"N	79°14'39.05"E
23	U	Kunkhet (F)	541	29°44'02.67"N	79°13'09.94"E
24	V	Kunkhet (G)	541	29°48'02.62"N	79°12'08.43"E
25	W	Bangajala	408	29°28'32.35"N	79°10'08.63"E

. *Sites sampled only during the post-monsoon season

Based on the underwater observation and different surface photographic evidence, number of residence adult mahseer recorded in each pool was quantified. The summary of average population number and habitat specific density are given in Table 3. As an average 5000 adult mahseer were counted in pool habitats of Kosi River. More number of adult populations of Golden Mahseer recorded in Kosi barrage followed by pool habitat behind Infinity Pool.

Table 3: Average population number and specific habitat density of golden mahseer in different pool habitats of Kosi River.

S. No.	Site	Dry season (March, 2018)		Post-Monsoon season (October, 2018)	
		Av. no. fish individuals,	Habitat sp. density/ m ³	Av. No. fish individuals	Habitat sp. density/ m ³
1	Kosi Barrage (Pampori)	1200	1.78	1400	3.98
2	Tarika Resort (A)	40	0.08	70	1.56
3	Tarika Resort*	-	-	90	0.27
4	Infinity Resort	800	1.98	300	0.74
5	Infinity Resort	600	1.15	450	0.58
6	River side Resort	150	0.54	100	0.39
7	Tarangi Resort	0	0.00	80	0.22
8	Garjiya Temple (A)	500	1.13	60	0.20
9	Garjiya Temple (B)	300	0.28	40	0.06
10	Garjiya Temple (C)	200	0.61	70	0.11
11	Garjiya Temple*	-	-	120	0.20
12	Sundarkhal (A)	60	0.12	60	0.15
13	Sundarkhal (B)	300	1.19	50	0.17
14	Sundarkhal (C)	200	0.35	35	0.15
15	Mohaana	100	0.28	20	0.06
16	Khargari	80	0.23	100	0.46
17	Khargari	50	0.15	120	0.22
18	Kunkhet (A)	80	0.17	60	0.21
19	Kunkhet (B)	150	0.66	80	0.41
20	Kunkhet (C) (Run)	100	0.31	50	0.14
21	Kunkhet (D)	60	0.13	30	0.08
22	Kunkhet (E)(Run)	40	0.11	60	0.17
23	Kunkhet (F)	50	0.21	40	0.28
24	Kunkhet (G)	100	0.19	0	0.00
25	Bangajala				

*Sites sampled only during the post-monsoon season

Simultaneously, distribution and availability of young mahseer (fingerlings and juveniles) was done for the post-monsoon season. Distribution of young mahseer was recorded in backwater pools, secondary channels and run habitats along the Kosi river and the adjoining areas. It was observed that the juveniles (sub-adult mahseer) are occur in run habitat, whereas fingerlings and juveniles were distributed in back-water pools and secondary channels. Based on the post monsoon survey, important nursery grounds along the Kosi river were identified and mapped (Table 4 and Figure 6).

Table 4: Locations of different type of mahseer nursery ground recorded in Kosi river [backwater pool –BWP; secondary channels –SC; run habitat-RH; associated streams-AS; isolated pools -IP and Confluence point –CP].

S. No	Latitude	Longitude	Habitat	S. No	Latitude	Longitude	Habitat
1	29°24'2.78"N	79° 07'54.41"E	RH	26	29°32.803'N	79°06.590'E	RH
2	29°27'03.21"N	79° 08'40.17"E	AS	27	29°32.795'N	79°06.584'E	BWP
3	29°27'01.17"N	79° 08'42.12"E	CP	28	29°32.794'N	79°06.585'E	RH
4	29°27'07.05"N	79°08'44.45"E	BWP	29	29°32.790'N	79°06.583'E	RH
5	29°27'08.39"N	79°08'45.54"E	RH	30	29°32.786'N	79°06.580'E	RH
6	29°28'9.89"N	79°08'77.09"E	BWP	31	29°32.781'N	79°06.574'E	RH
7	29°27'56.03"N	79° 08'97.03"E	RH	32	29°32.775'N	79°06.568'E	BWP
8	29°29'39.44"N	79° 08'22.64"E	RH	33	29°32.769'N	79°06.579'E	BWP
9	29°29'03.53"N	79° 08'04.62"E	RH	34	29°32.761'N	79°06.570'E	BWP-RH
10	29°29'39.44"N	79° 08'22.64"E	RH	35	29°32.754'N	79°06.562'E	BWP-RH
11	29°27'01.49"N	79°08'03.53"E	BWP	36	29°32.747'N	79°06.556'E	RH
12	29°30'08.42"N	79°07'02.53"E	BWP	37	29°32.739'N	79°06.547'E	IP
13	29°31'01.19"N	79°06'07.76"E	RH	38	29°32.251'N	79°06.827'E	BWP-RH
14	29°31'01.43"N	79°06'07.14"E	RH	39	29°27.513'N	79°08.980'E	RH
15	29°32'53.69"N	79°06'42.29"E	RH	40	29°23.940'N	79°08.052'E	RH
16	29°32'59.09"N	79° 08'06.05"E	BWP	41	29°32.747'N	79°06.556'E	RH
17	29°32'54.01"N	79°07'54.02"E	BWP-RH	42	29°32.739'N	79°06.547'E	RH
18	29°32'27.70"N	79°08'37.40"E	BWP	43	29°24.480'N	79°08.050'E	SC
19	29°32'29.91"N	79°08'36.74"E	RH-IP	44	29°24.401'N	79°07.875'E	SC
20	29°54'05.62"N	79°14'05.04"E	RH	45	29°24.345'N	79°07.750'E	SC
21	29°54'04.63"N	79°14'05.85"E	RH	46	29°24.264'N	79°07.666'E	RH
22	29°54'02.63"N	79°14'39.05"E	RH-CP	47	29°24.244'N	79°07.611'E	RH
23	29°44'02.67"N	79°13'09.94"E	BWP	48	29°24.214'N	79°07.558'E	SC
24	29°48'02.62"N	79°12'08.43"E	BWP-RH	49	29°24.187'N	79°07.504'E	BWP
25	29°28'32.35"N	79°10'08.63"E	RH				

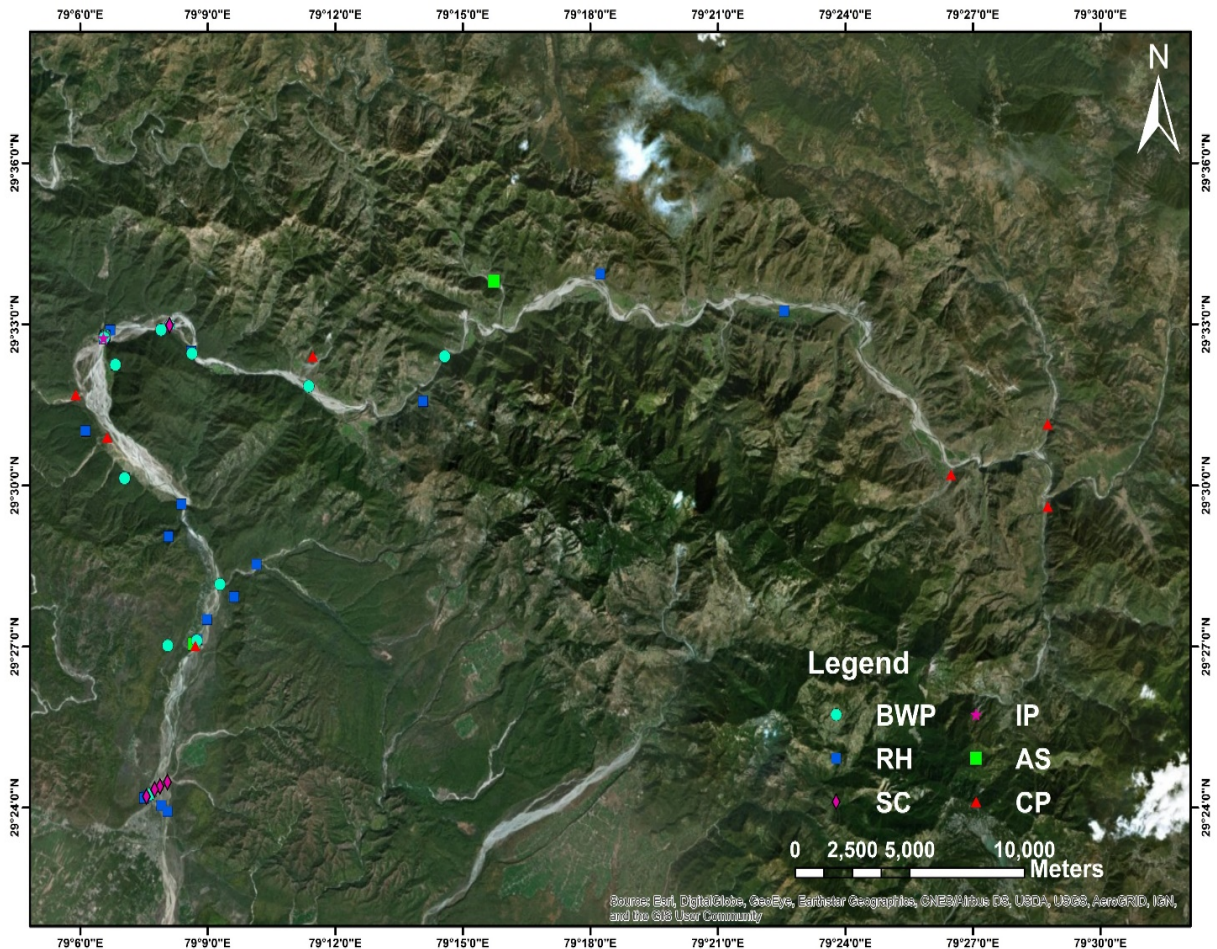


Figure 6: Map showing different types of golden mahseer nursery grounds in Kosi River [backwater pool –BWP; secondary channels –SC; run habitat-RH; associated streams-AS; isolated pools -IP and Confluence point –CP].

5.3 Status of waterquality

The water quality parameters were measured in all the pool habitats and combined analysis was performed. Dissolved oxygen content was ranged from 8.10 to 9.78 mg/l, which is ideal condition for mahseer habitat. Other major water quality parameters such as Total dissolved solids, Electrical conductivity, pH and Temperature are also within the ideal condition, there is no significant difference has been observed between sampling sites. However, the number of organic loads due to mass bathing at Garija Temple, other parts of Kosi River and city drainage form Ramnagar will have cumulative impacts on mahseer population residing at Kosi Barrage.

Table 5: Mean waterquality parameters recorded in different pool habitats of Kosi River.

Site	Post-Winter (Dry season) March, 2018					Post-Monsoon season, October, 2018				
	DO (mg/L)	pH	Temp. (°C)	TDS (ppm)	EC (µS)	DO (mg/L)	pH	Temp. (°C)	TDS (ppm)	EC (µS)
A	9.24	8.3	23	275	398	8.57	8.86	24.13	177.00	249.67
B	8.01	8.6	22	300	417	8.10	8.18	21.13	184.33	251.00
B1	-	-	-	-	-	8.10	8.18	21.13	184.33	251.00
C	9.74	9.3	26.7	148	220	8.80	8.68	21.80	169.00	240.00
D	9.53	9.3	26	159	300	8.90	8.66	21.87	171.33	240.67
E	9.34	8.6	25.9	164	234	9.00	8.78	21.87	175.00	247.33
F	8.4	9.4	25	150	241	8.33	8.75	22.73	174.33	245.67
G	8.25	8.8	23.4	174	251	8.10	8.70	24.17	168.67	237.33
H	9.23	9.2	23.4	153	287	8.10	8.73	24.13	162.67	234.33
I	9.41	9	23.2	159	290	8.10	8.77	24.00	161.67	231.00
II	-	-	-	-	-	8.83	8.70	23.73	165.00	231.00
J	9.81	8.7	22.2	167	276	8.17	8.83	22.47	163.00	231.33
K	9.24	8.7	24	167	276	9.07	8.88	24.37	167.67	237.33
L	9.74	8.9	28	175	289	8.83	8.85	24.30	163.33	233.67
M	9.43	9.2	22.7	190	309	9.03	8.80	21.63	159.67	223.33
N	9.23	9.1	22.7	147	279	8.27	8.72	22.00	157.33	222.67
O	9.53	8.9	22.5	186	256	8.33	8.65	22.03	158.33	224.00
P	9.78	9.1	24.7	174	279	9.11	8.76	21.90	157.67	221.67
Q	9.54	8.9	23.7	162	235	9.00	8.75	22.00	157.67	221.00
R	9.65	8.9	22.5	172	276	9.00	8.74	21.97	157.00	222.00
S	9.72	9.4	22	180	285	8.80	8.79	22.50	157.00	220.67
T	9.45	9.4	24.5	168	270	9.10	8.20	28.73	164.00	224.00
U	9.13	9.3	24.5	164	275	9.10	8.23	28.80	162.00	226.33
V	9.34	9.4	24	176	264	8.73	8.21	28.80	165.33	225.33
W	9.56	8.9	23.5	182	247	8.40	8.72	22.33	176.00	231.00

5.4 Threat Analysis

Since River Kosi is a type of open access for local community residing along the river, the golden mahseer population is facing sever threats. In the present study different types of activities which harm fish community structure were observed. The major threats observed are: Illegal fishing; Destructive fishing (using dynamites and bleaching powder); Habitat modification; Habitat destruction and Habitat fragmentation. Relative proportion of different types of threat categories recorded in sampling area is presented in Figure 5. Of the classified threats after performing the density-proportion analysis; Illegal fishing was found to be major threat observed along the Kosi River, this is mainly due to high consumer demand in the Ramnagar Fish market. Next to that destructive fishing method are quite common in the places many places, which yield quick and bulk catch of large size fish.

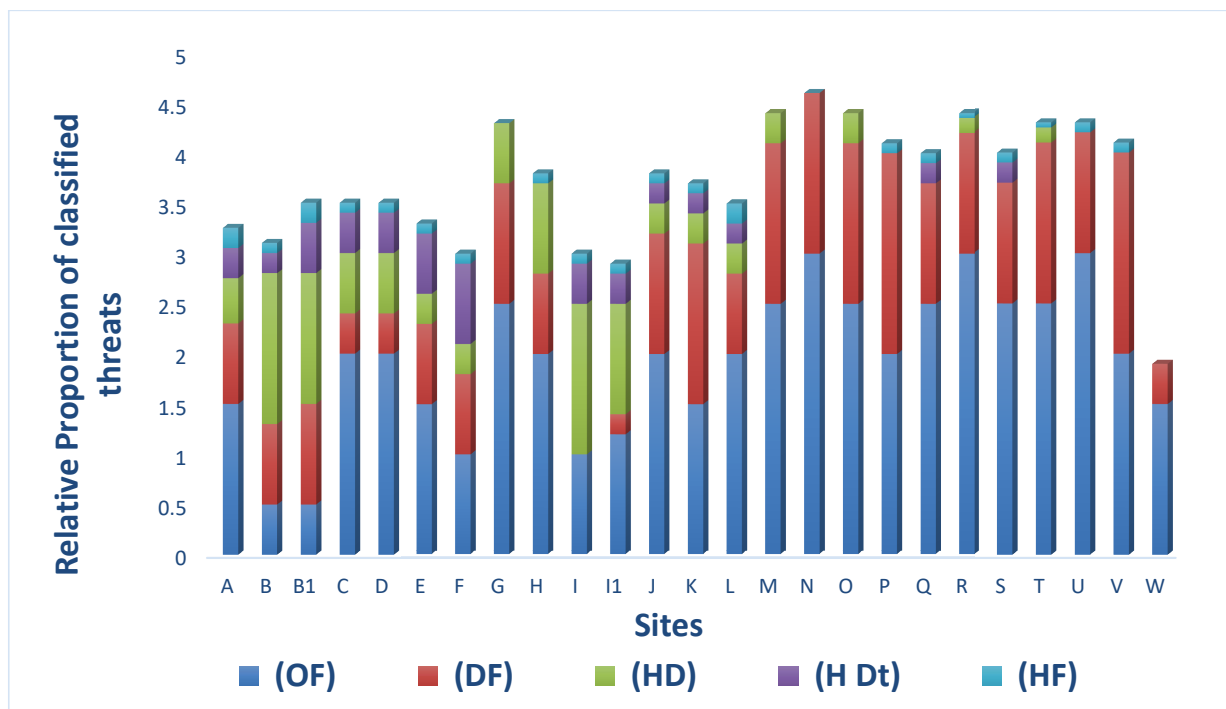


Figure 7: Graph depicting the relative threat proportions analyzed for the 25 sites in Kosi River.

6. Recommendations for Mahseer Conservation in Kosi River

The present estimate on status of golden mahseer population in Kosi River clearly indicates that golden mahseer occur in Kosi River facing immense threats and if the current trend continues, very soon Kosi River may lose its iconic species (golden mahseer). In order to conserve this mighty species from the ongoing declining trend, the following recommendations are anticipated:

1. During the present study it is observed that some of the pools located closed to private resorts are well protected by Respective Resort Management. Hence, it is recommended that Local Forest Department should organize at least one special stakeholders meeting in a year by involving such Resort Managements and other local stakeholders for sensitizing the important of mahseer conservation and provide legal support to empower identified Resort Managements to safe guard the mahseer pools located nearer to their resorts.
2. Similarly, periodically community awareness programme shall be organized for local community and fisherman community, those who are depending on Kosi River.
3. Since, Kosi river has clear water with good visibility in most of the period, 'Fish Watch' programme may be introduced in Kosi River. 'Fish watch' programme includes snorkeling and underwater visualization, this may be introduced as part of Eco-tourisam package from Ramnagar Forests Division. For this initiative, few pools with good congregation of mahseer can be selected and well-trained local youth team/ EDC members/ BMC members in collaboration with local resort management can be formed for this recreational activity. This fish watch programme provide opportunity to spread messages about importance of mahseer conservation in Himalayan rivers.
4. In order to prevent illegal/ destructive fishing along the Kosi River, local Forests Guides should be more vigilance while patrolling their area. In addition to that, Forests Department shall deploy additional manpower at important vulnerable areas (mahseer pools) and respons quickly to any call from any stakeholder i.e. a villager, fisherman, hotel staff, researcher regarding illegal/ destructive fishing.
5. In addition to that safeguarding mahseer spawning and nursery grounds is very vital for completing its life-history traits. In the present study important nursery ground along the Kosi River and other associated streams were mapped and locations were shared in this report. These areas are prone for small-scale habitat modifications such as water diversion, water extraction, boulders extractions etc. by local residence. Such activities will lead to

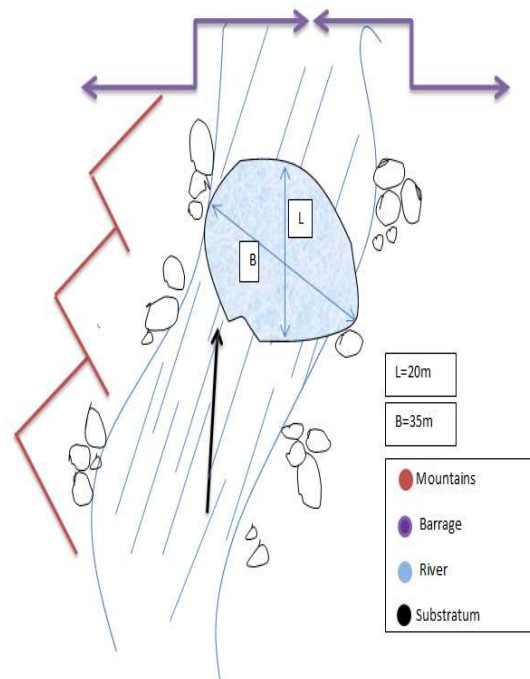
destruction of nursery ground that ultimately harm mahseer recruitments. Hence, the important mahseer nursery ground identified should be kept under watch especially during post monsoon months (August to October).

6. Department should encourage donors and promote initiatives towards providing alternate source of income to the fishing dependent community.
7. Other than anthropogenic pressure future of mahseer in Kosi River also depends on availability of water in Kosi River. Water remains to its lowest level in summer season and there is no river beyond Ramnagar Barrage. Considering the long term conservation of Mahseer and other aquatic fauna efforts should be made to rejuvenate Kosi river, though sometimes some efforts are being made by different organisations but there is a need to implement consistent efforts in this regard.
8. People cooperating in mahseer conservation should be duly acknowledged and rewarded by the forest department or some mechanism should be made to reward such people or organisations.
9. Anyone using illegal means such as electrocution, bleaching powder and dynamiting to catch mahseer or other fish species should be punished strictly.

Habitat Fact Sheet - 1

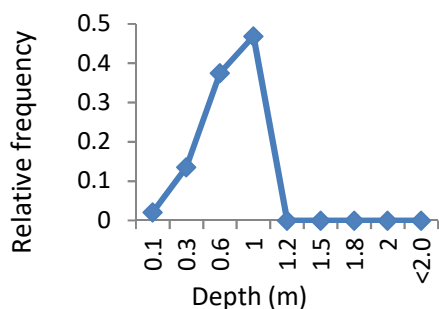
Pampampori (Ramnagar) Pool (A)

Site ID: Pool (A)	Post-winter	Post-monsoon
Date of survey	03.04.2018	25.10.2018
Time	03:52 P.M	2:30 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	20m	20
Av. pool width (m)	35m	24.75
Av. Pool depth (m)	0.96m	0.71
Area (m sq.)	700	495
Volume (m cu)	647.8	349.96
Flow rate (m/s)	0.16	0.52

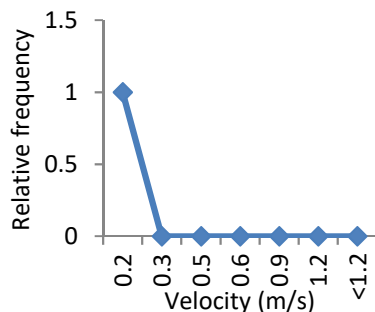


Habitat Inventory :

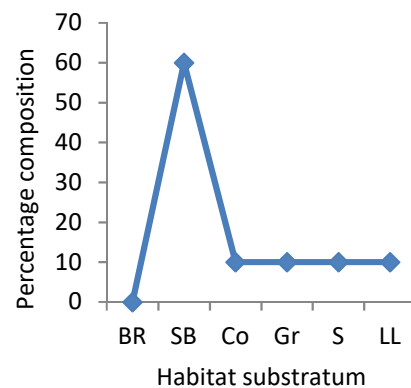
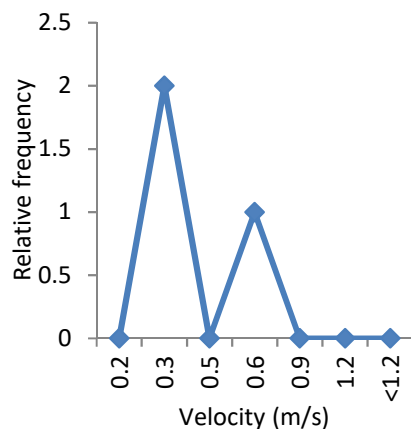
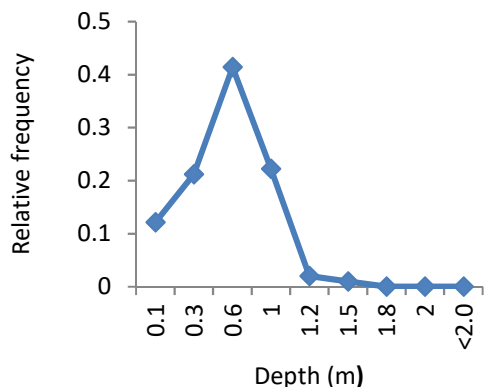
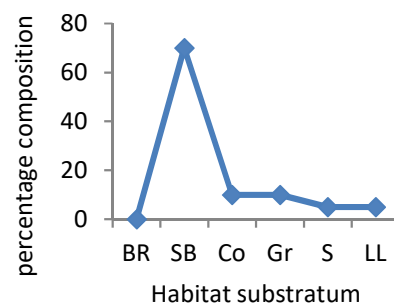
1. Depth



2. Velocity



3. Substrate



Site A: Barrage region near Pampampori (Ramnagar)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: The survey was started from the Ramnagar Kosi Barrage region where presence of large number of golden mahseer was observed. Near barrage area, people get homemade chapatti and kneaded balls of whole wheat flour to feed these huge number and different sizes of mahseer individuals along with other fish biodiversity. About 1 km away from the barrage area, first pool was surveyed. It was located near the Pampampori area of Ramnagar.

Nursery grounds : Nursery grounds for the young golden mahseer are available in form of Run-habitats and back water pools in this area.

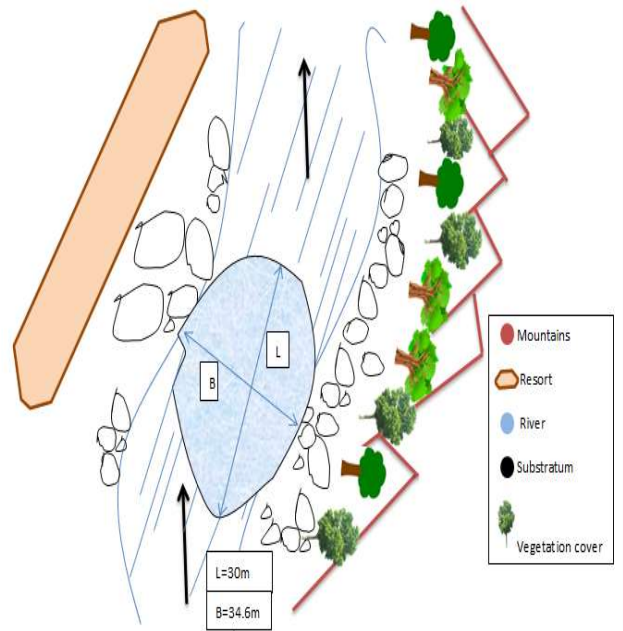
Associated fish species: The fish species recorded for both the seasons were *Barilius vagra*, *Garra gotyla* and *Barilius bendelisis*.

Key concern: Pampampori in Ramnagar town is a human settlement area and there has been seen effluents of waste directly into the Kosi. It has led to problem of large algal blooms and low dissolved DO content. Also, problem related to illegal fishing and sand mining is a big concern.

Habitat Fact Sheet -2

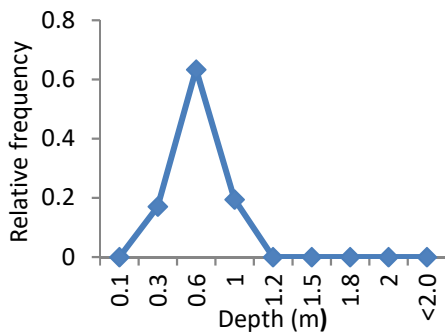
Site: Tarika Resort Pool (B)

Site ID: Pool (B)	Post- winter	Post- monsoon
Date of survey	03.03.2018	25.10.2018
Time	09:16 A.M	11:10 A.M.
Weather	Sunny	Sunny
Av. pool length (m)	30m	10
Av. pool width (m)	34.6m	8
Av. Pool depth (m)	0.46m	0.56
Area of pool (m sq.)	1,038	80
Volume of pool (m cu)	477.48	44.8
Flow rate (m/s)	0	0

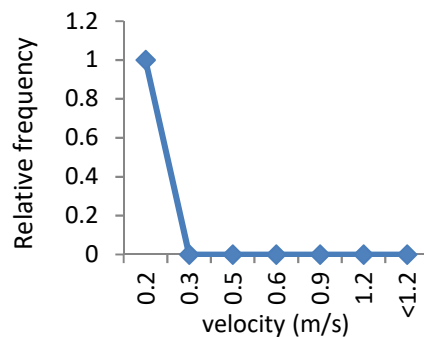


Habitat Inventory:

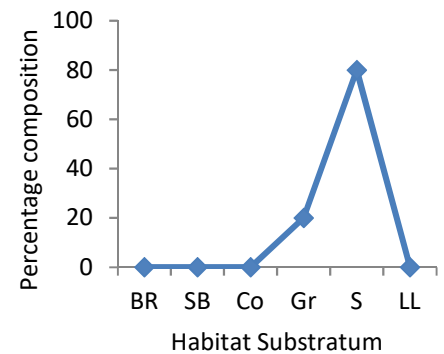
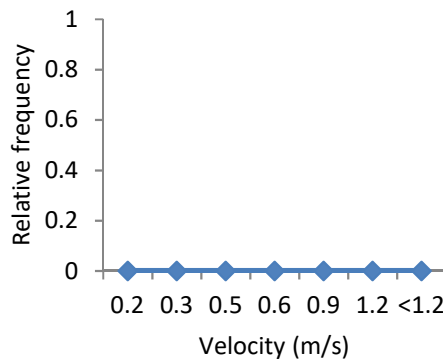
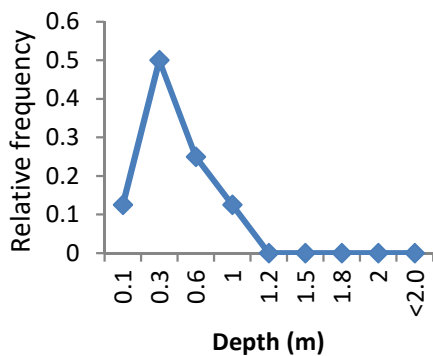
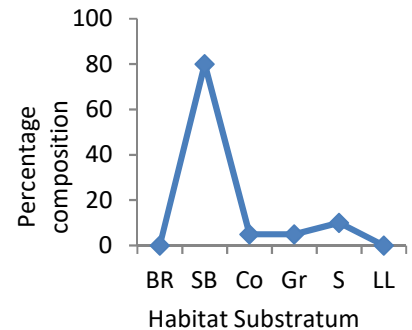
1. Depth



2. Velocity



3. Substrate



Site B: Tarika resort (backside)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: The second pool where the survey was conducted was located at the backside of the Tarika Resort. Resort was located on the left bank of the river and on the right bank there was presence of weathered beaten boulders and dense forest of the Ramnagar Forest Division. The pool was found bleached and green algal cover was seen grown on the bed rocks and small cobbles of the pool. Different size of golden mahseers have been observed and caught during the survey. Maximum depth of the pool was reported to be 86 cm.

Nursery grounds: Nursery grounds are present in the form of secondary channels (connecting channels).

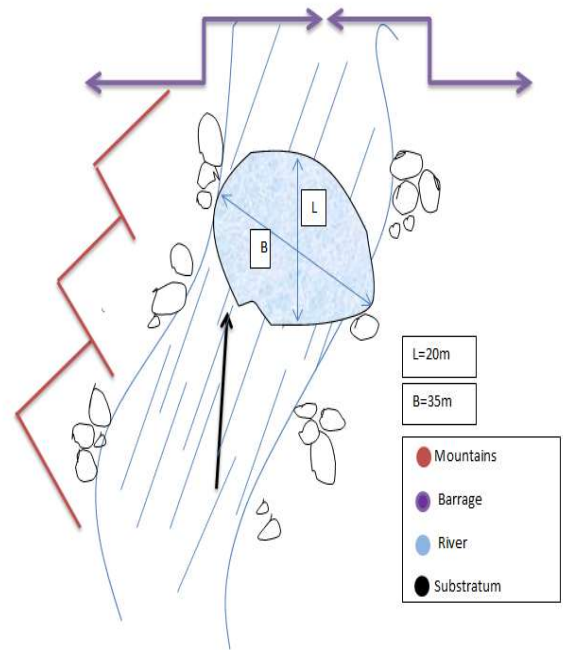
Associated fish species: Fish species diversity present was of *Garra gotyla*, *Barilius bendenlisis* and *Barilius vagra*. Also, fries of *Puntius spp.* and *Barilius* were present in the breeding pool.

Key concern: The main key concern is litter from the resort, rock and sand-mining and shrinking of the river bed.

Habitat Fact Sheet (3)

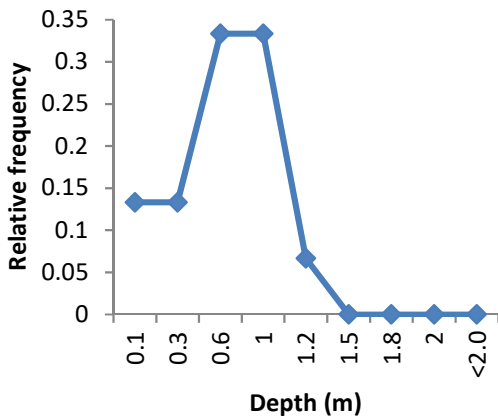
Site: Tarika Resort Pool (B1)

Site ID: Pool (B1)	Post-winter	Post-monsoon
Date of survey	-	25.10.2018
Time	-	11:20 A.M.
Weather	-	sunny
Av. pool length (m)	-	10
Av. pool width (m)	-	7.5
Av. Pool depth (m)	-	0.83
Area of pool (m sq.)	-	75
Volume of pool (m cu)	-	62.475
Flow rate (m/s)	-	0

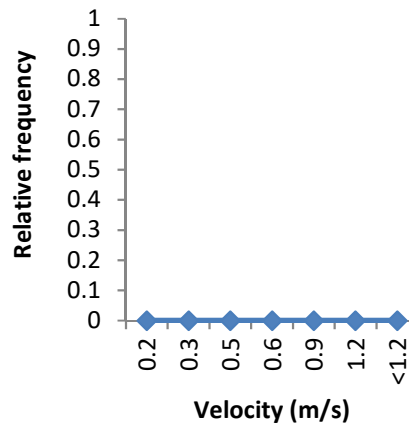


Habitat Inventory:

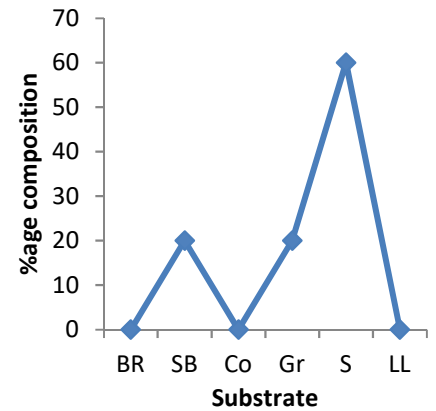
1. Depth



2. Velocity



3. Substrate



Site Description: Tarika Resort Pool (B1)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: The third pool where the survey was conducted was located at the backside of the Tarika Resort. Resort was located on the left bank of the river and on the right bank there was presence of weathered beaten boulders and dense forest of the Ramnagar Forest Division.

Nursery grounds: Nursery grounds are present in the form of back-water pool and isolated pools

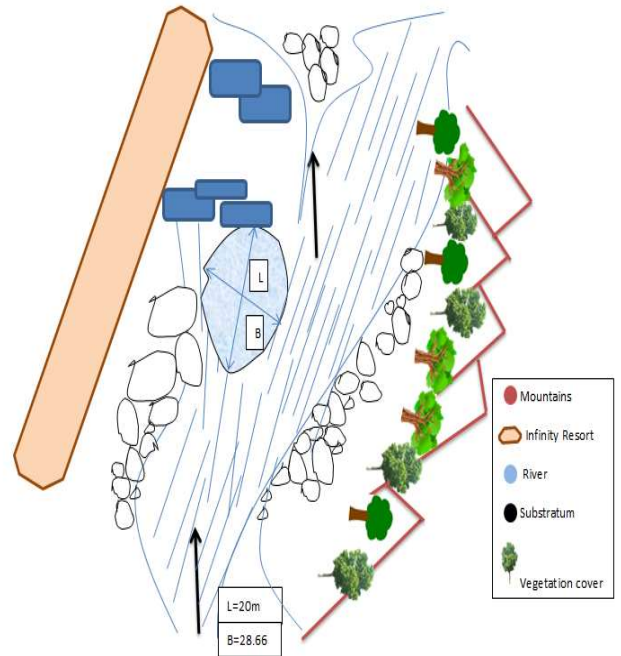
Associated fish species: Fish species diversity present was of *Garra gotyla*, *Barilius bendenlisis* and *Barilius vagra*. Also, fries of *Puntius spp.* and *Barilius* species were present in the breeding pool.

Key concern: The main key concern is litter from the resort, rock and sand-mining that is leading to habitat fragmentation.

Habitat Fact Sheet (4)

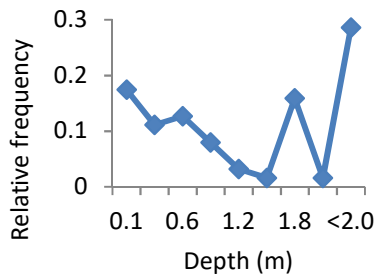
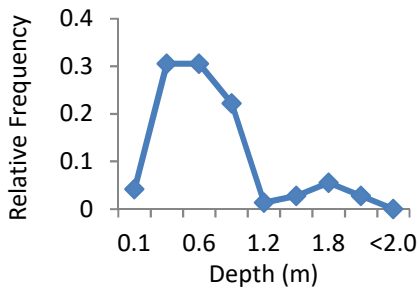
Site: Infinity Resort Pool (C)

Site ID: Pool (C)	Post- winter	Post- monsoon
Date of survey	28.03.2018	23.10.2018
Time	04:10 P.M	11:30 A.M.
Weather	Sunny	sunny
Av. pool length (m)	20m	20
Av. pool width (m)	28.66m	15.75
Av. Pool depth (m)	0.706m	1.29
Area of pool (m sq.)	573.2	315
Volume of pool (m cu)	404.6	406.35
Flow rate (m/s)	0.5	0.4

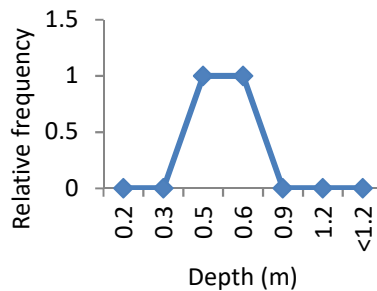
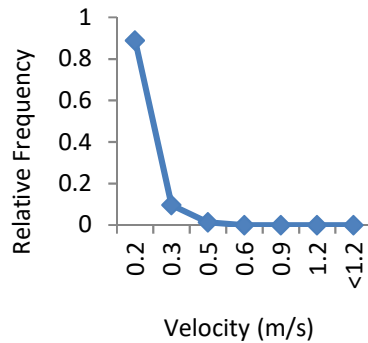


Habitat Inventory :

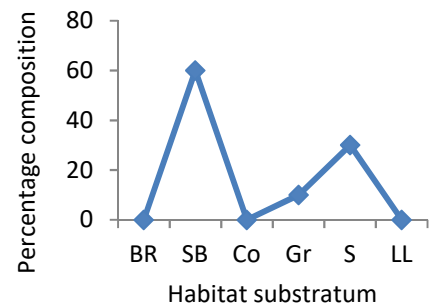
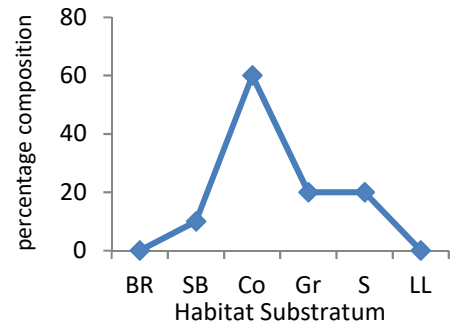
1. Depth



2. Velocity



3. Substrate



Site Description: Infinity Resort Pool (C)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Followed by the pool located at the back side of Tarika resort, the next survey was conducted in the pools located on the back side of the Infinity resort. At this particular site, 2 pools were studied.

Status of Golden mahseer: Highest fish abundance of Golden mahseer had been reported in Infinity size. About 500-600 individuals were present in the single pool. The largest size among the golden mahseer individuals was estimated to be more than 8-10 kg and about 50-60 cm in length. Other fish species were also reported from these pools.

Nursey grounds: Nursery grounds are present in the form of back-water pools and run-habitats.

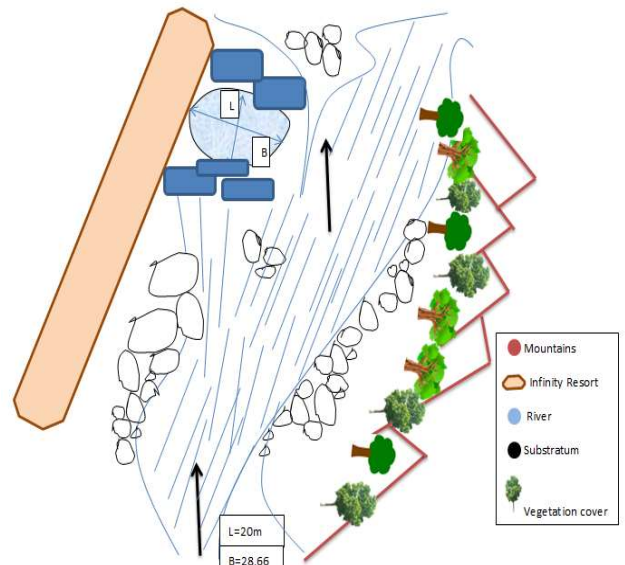
Associated fish species: In the fish species, maximum of the fish species were reported of *Labeo bangusia* , *Labeo dero*, *Labeo calabasu*, *Tor chelinooides* , *Tor putitora* and *Xenontodon cancila* .

Key concern : Infinity mahseer pool is one of the important habitat of Kosi mahseer. Here, problem of illegal fishing which is taking place in spite of guarding. Local people are catching big size mahseers during night time illegally and selling in the market.

Habitat Fact Sheet (5)

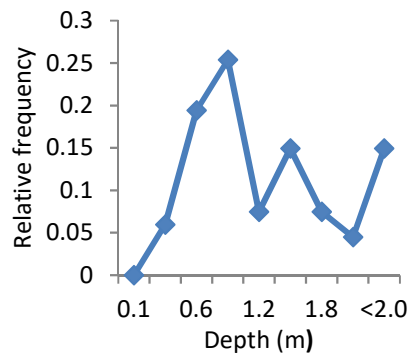
Site : Infinity Pool , Site D

Site ID: Pool (D)	Post-winter	Post-monsoon
Date of survey	23.03.2018	23.10.2018
Time	04:09 P.M	11:45 A.M.
Weather	Sunny	Sunny
Av. pool length (m)	20m	25
Av. pool width (m)	22.7m	17.4
Av. Pool depth (m)	1.15m	1.49
Area of pool (m sq.)	454	435
Volume of pool (m cu)	522.1	648.15
Flow rate (m/s)	0	0

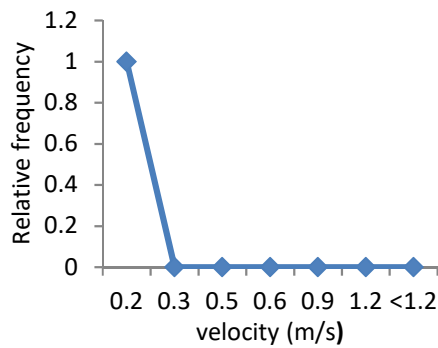


Habitat Inventory:

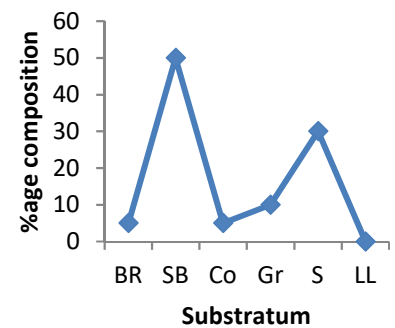
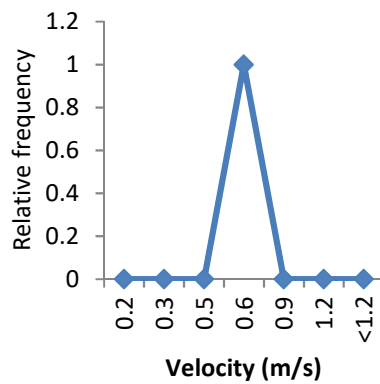
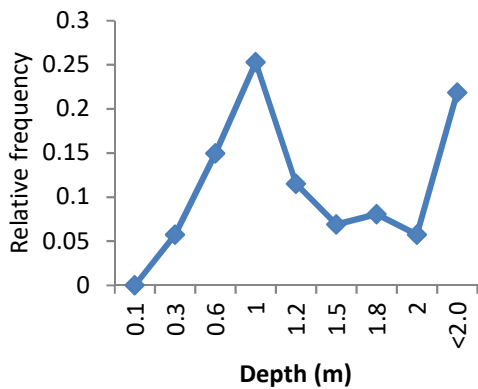
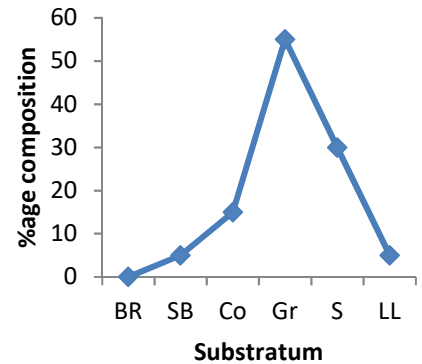
1. Depth



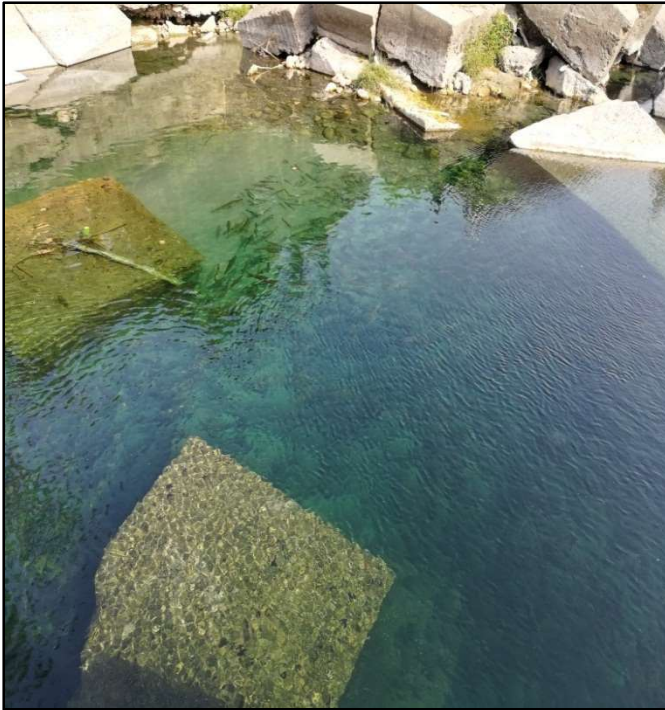
2. Velocity



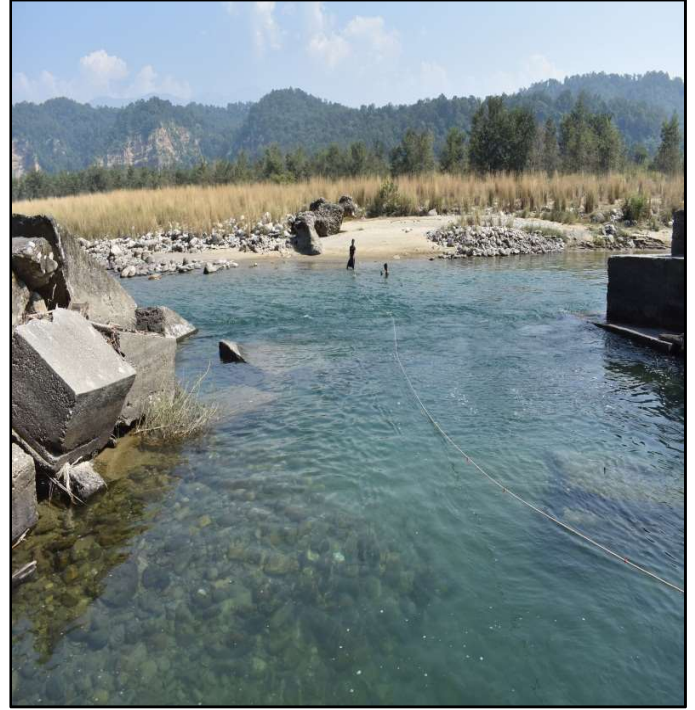
3. Substrate



Site D: Infinity Pool (II)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden mahseer: The 4th pool surveyed was the pool located on the back side of Infinity resort. On the left bank there was resort wall and on the right bank small boulders and weathered rocks with dense forest of the Ramnagar Forest Division was there. Large number of mahseer individuals have been observed in this area of varying sizes.

Nursey grounds: Nursery grounds are present in the form of back-water pools and run-habitats where juveniles and fries have been observed during both the seasons.

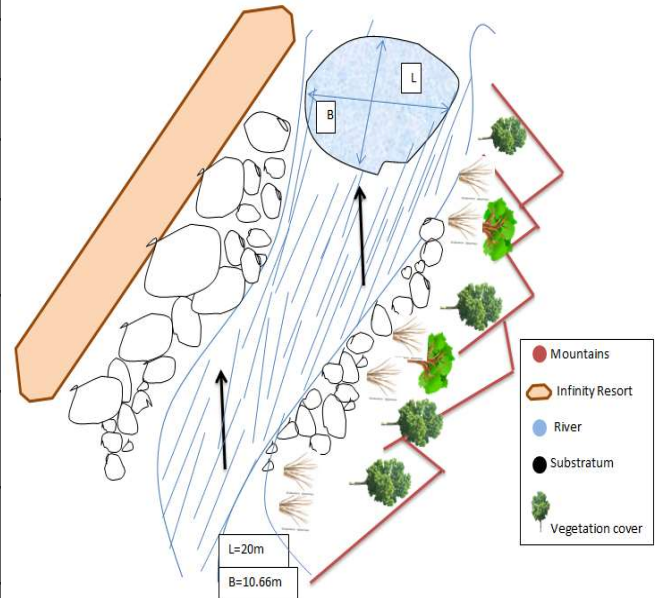
Associated fish species: In the fish species, maximum of the fish species were reported of *Labeo bangusia* , *Labeo dero*, *Labeo calabasu*, *Tor chelinoides* , *Tor putitora* and *Xenontodon cancila*.

Key concern : Infinity mahseer pool is one of the important habitat of Kosi mahseer. Here, the problem of illegal fishing is there in spite of guarding. Local people are catching big size mahseers during night time illegally to be sent in the market.

Habitat Fact Sheet (6)

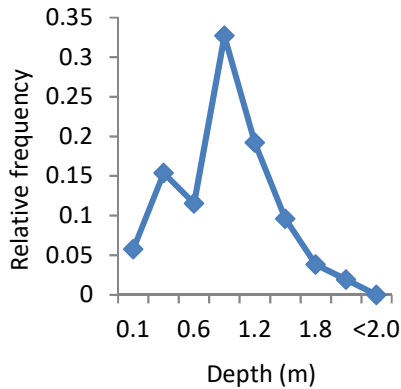
Site: River Side Resort, Pool E

Site ID Pool E	Post-winter	Post-monsoon
Date of survey	04.04.2018	26.10.2018
Time	02:37 P.M	11:05 AM.
Weather	Sunny	Sunny
Av. pool length (m)	25m	15
Av. pool width (m)	13.25m	19.7
Av. Pool depth (m)	0.838m	0.86
Area of pool (m sq.)	331.25	295.5
Volume of pool (m cu)	277.79	252.65
Flow rate (m/s)	0	0

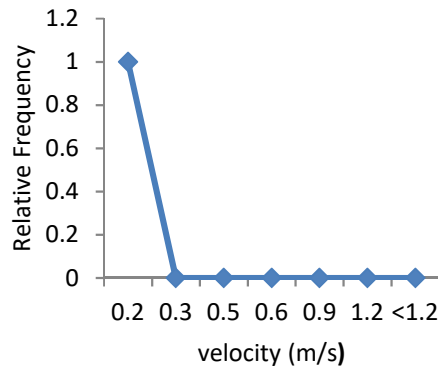


Habitat Inventory:

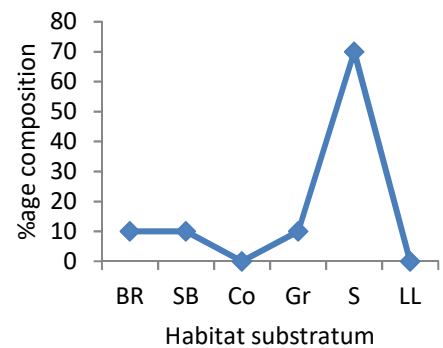
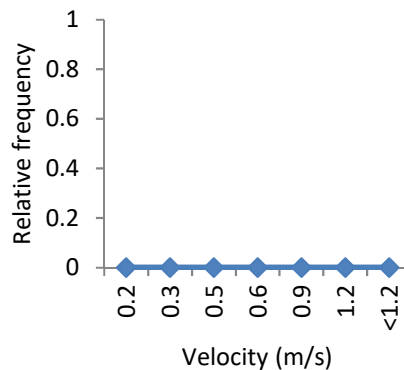
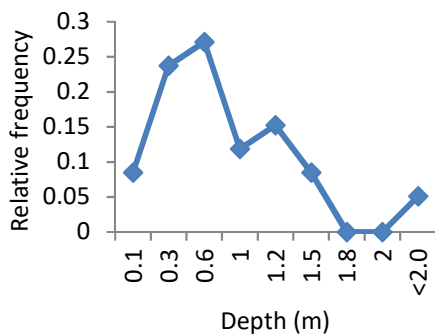
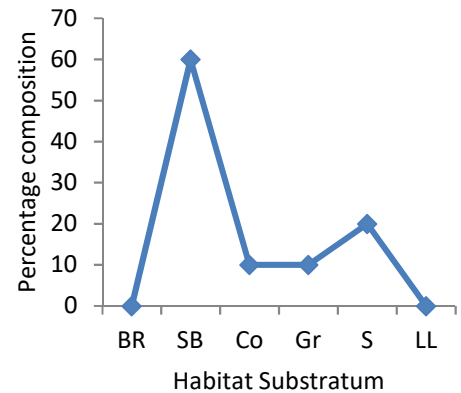
1. Depth



2. Velocity



3. Substrate



Site E: River Side Resort



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden mahseer: This site was located on the back side of the River side Resort. The study took place in the afternoon of 4th April having hot sunny weather. Resort wall is there on the left bank with dry river bed, weathered boulders and Ramnagar forest covers on right side towards upstream. Fish biodiversity have been observed more for this area.

Nursey grounds: Nursery grounds are present in the form of back-water pools, run-habitats and secondary channels where juveniles and fries have been observed during both the seasons.

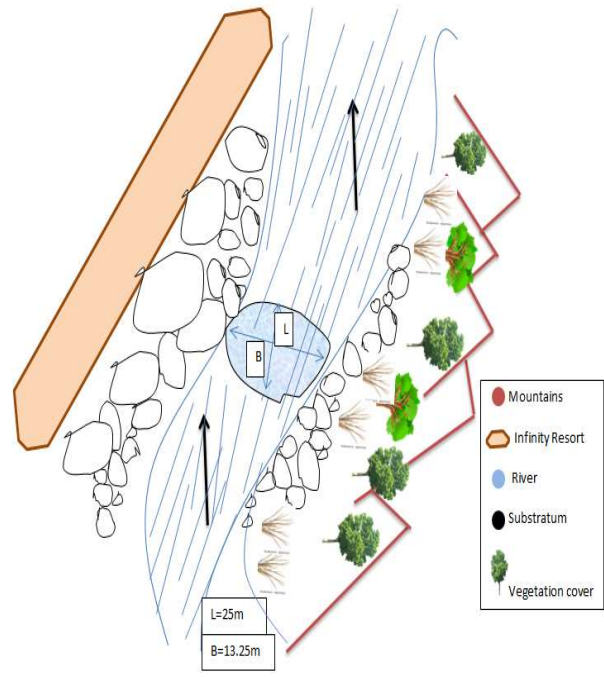
Associated fish species: In the fish species, maximum of the fish species were reported of *Labeo bangusia* , *Labeo dero*, *Labeo calabasu*, *Tor chelinoides*, *Tor putitora*, *Xenentodon cancila* and *Garra gotyla*.

Key concern : It is one of the important habitats of Kosi mahseer. Here, the problem of illegal fishing and use of destructive fishing methods by local have been reported during night hours.

Habitat Fact Sheet (7)

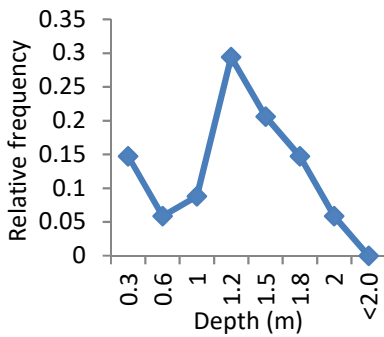
Site : River Side (Tarangi), pool F

Site ID: Pool (F)	Post-winter	Post-monsoon
Date of survey	31.03.2018	26.10.2018
Time	03:39 P.M	12:15 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	20m	20
Av. pool width (m)	10.66m	20.5
Av. Pool depth (m)	0.95m	0.90
Area of pool (m sq.)	213.2	410
Volume of pool (m cu)	202.54	370.64
Flow rate (m/s)	0	1.07

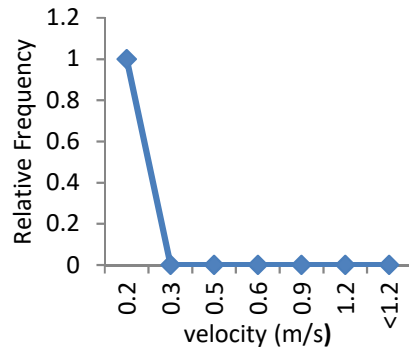


Habitat Inventory:

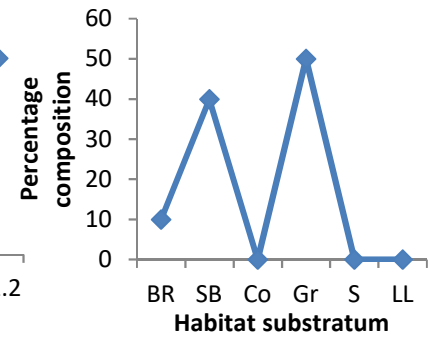
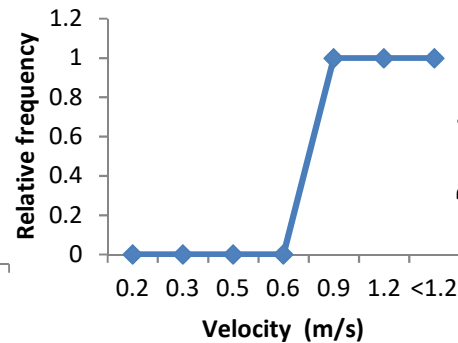
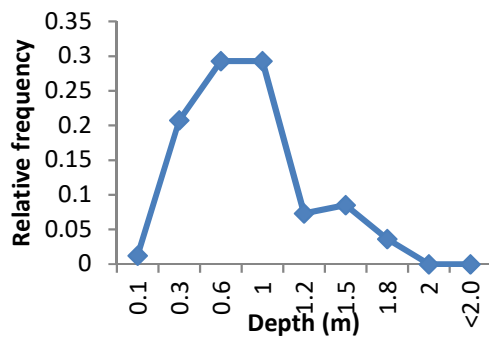
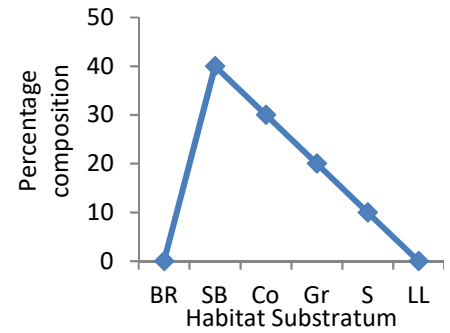
1. Depth



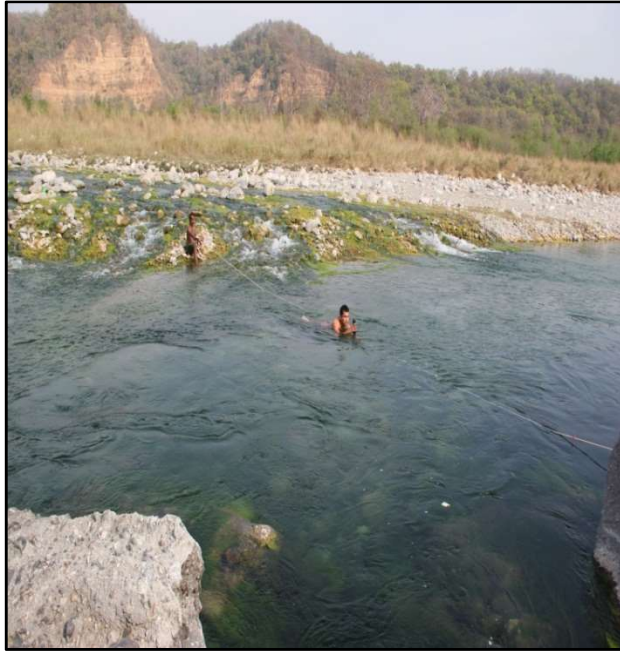
2. Velocity



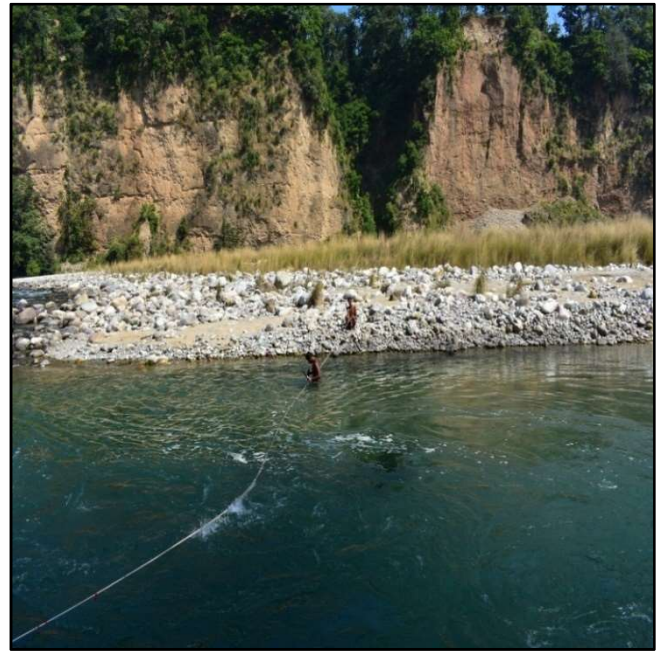
3. Substrate



Site Description: River Side (Tarangi), pool F



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden mahseer: It is located alongside road of Jim Corbett Tiger reserve on the left of the Kosi River. On the right bank of the river, there was dry river bed due to dry season followed by the dense forest cover of Ramnagar Division.

Nursey grounds: Nursery grounds are available in the form of run and back-water pool acting as nursing habitats for mahseer juveniles.

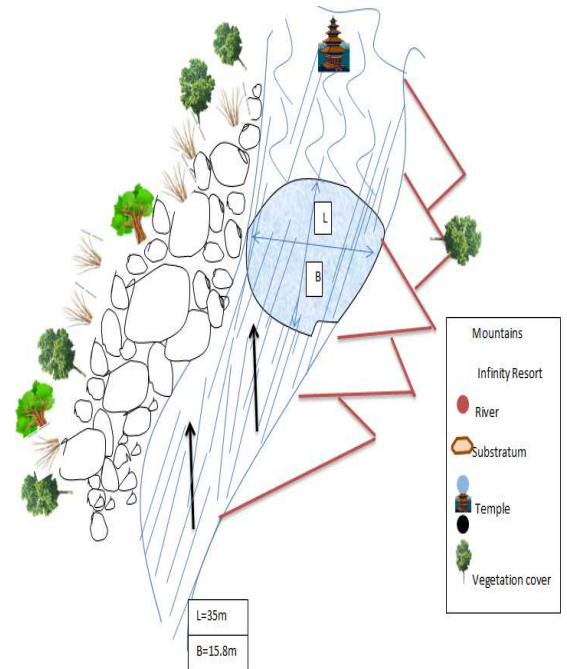
Associated fish species: Fish diversity reported for this pool includes *Labeo rohita*, *Labeo dyocheilus*, *Tor putitora*. Also, specimens of *Garra gotyla* were reported.

Key concern: Problem of sand and rock mining have been observed.

Habitat Fact Sheet (8)

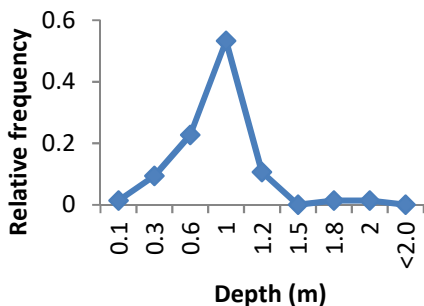
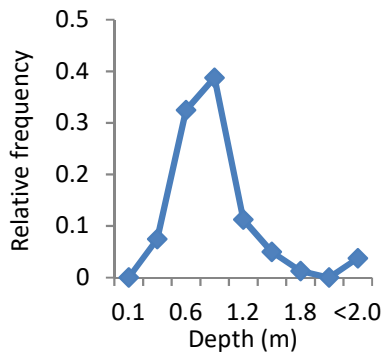
Site: Garjiya Temple Pool (G)

Site ID: Pool (G)	Post-winter	Post-monsoon
Date of survey	28.03.2018	23.10.2018
Time	10:30 A.M	02:25 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	35m	20
Av. pool width (m)	15.8m	18.75
Av. Pool depth (m)	0.797m	0.79
Area of pool (m sq.)	553	375
Volume of pool (m cu)	440.74	295.5
Flow rate (m/s)	0.164	0

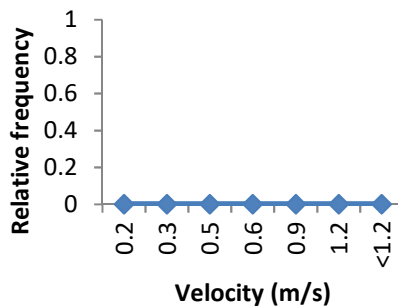
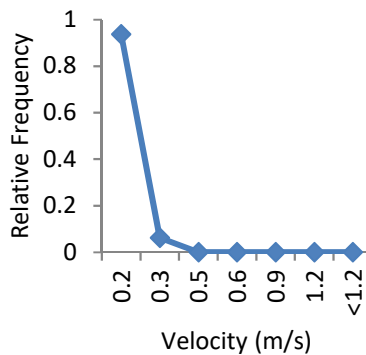


Habitat Inventory:

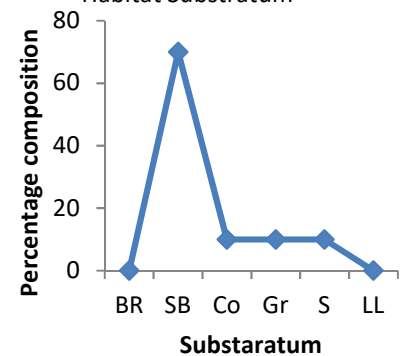
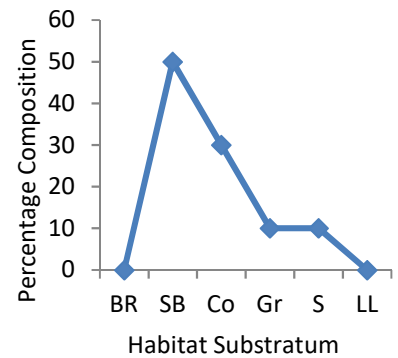
1. Depth



2. Velocity



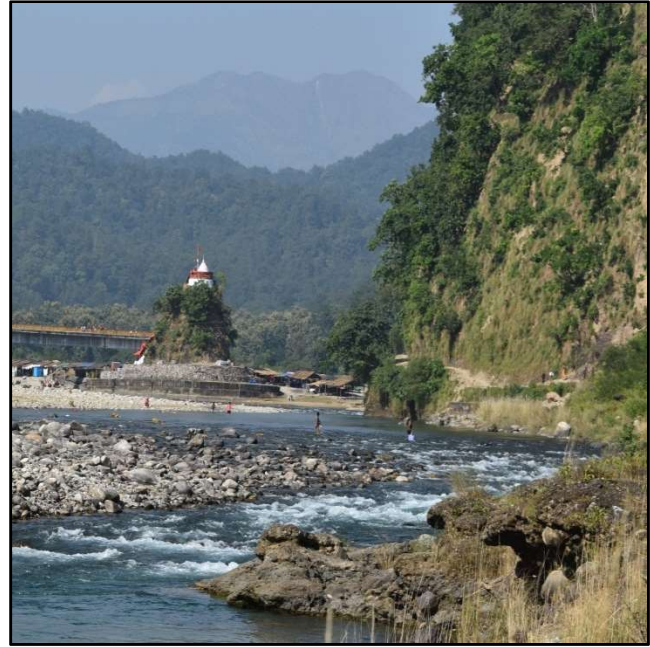
3. Substrate



Site G: Garjiya Temple (A)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden Mahseer: The next site for the study was near Garjiya temple. Location of this pool was on the right bank of the temple. Since, we had observed presence of good fish biodiversity there.

Nursery Grounds: Available in form of isolated pools and Run-habitats.

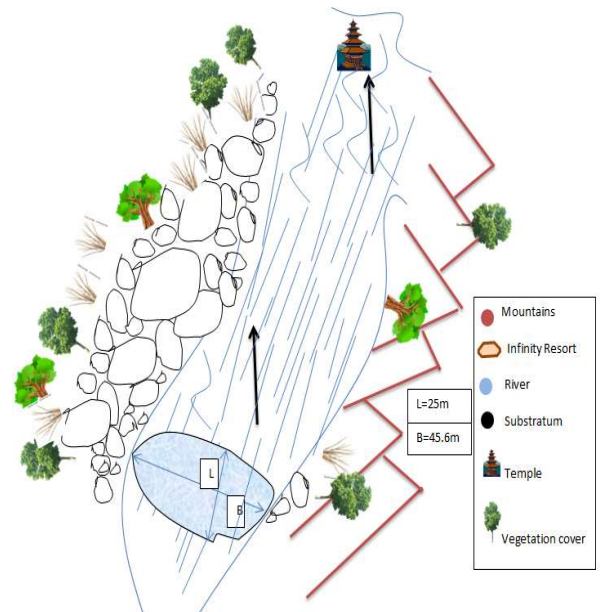
Associated fish diversity: Presence of fish species were observed only, species of *Tor putitora*, *Labeo dero*, *Garra gotyla* and *Xenonotodon spp.* were seen.

Key concern: . It was observed that the pool site was polluted. People were using water for bathing, performing rituals and thereby drowning worshipped idols, used packets, used garlands etc. and polluting the site

Habitat Fact Sheet (9)

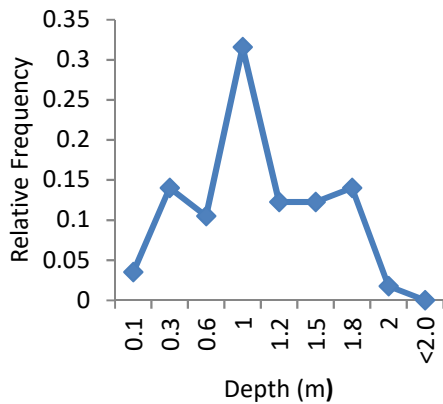
Site: Garjiya Temple B, Pool H

Site ID: Pool (H)	Post-winter	Post-monsoon
Date of survey	04.04.2018	23.10.2018
Time	01:30 P.M	03:30 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	25m	20
Av. pool width (m)	45.66m	23
Av. Pool depth (m)	0.927m	1.47
Area of pool (m sq.)	1141.5	460
Volume of pool (m cu)	1058.17	676.2
Flow rate (m/s)	0	0

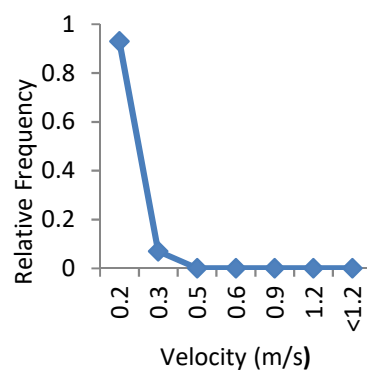


Habitat Inventory:

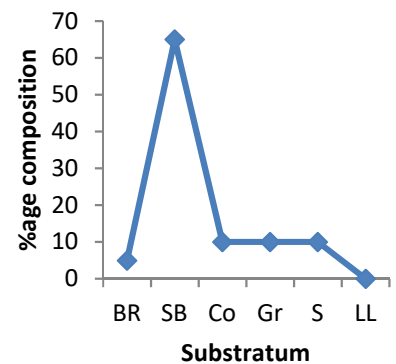
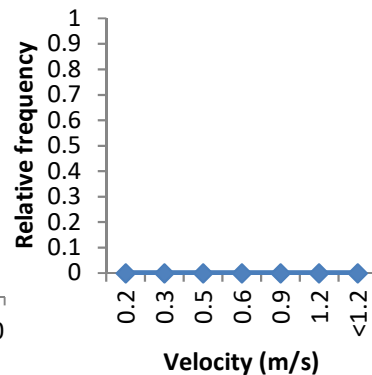
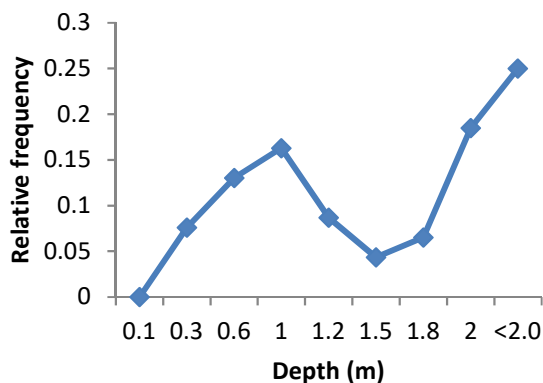
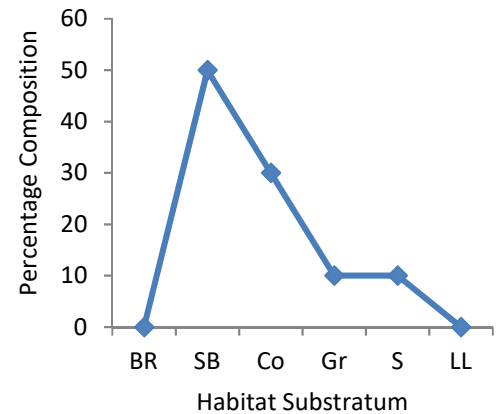
1. Depth



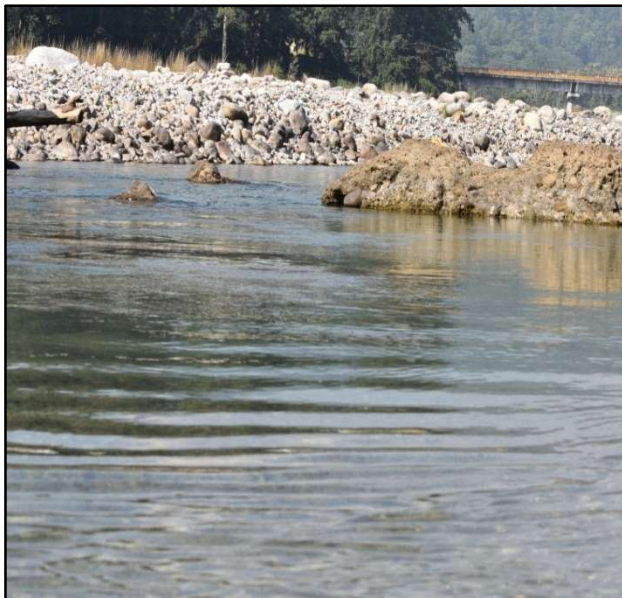
2. Velocity



3. Substrate



Site H: Garjiya (B)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden Mahseer: Another pool near the Garjiya temple is located about 600 meters downstream the temple. Golden mahseer individuals of different life history stages were abundant there. Associated fish species and species of turtles were also observed.

Nursery Grounds: Available in form of isolated pools, back-water pools and run-habitats.

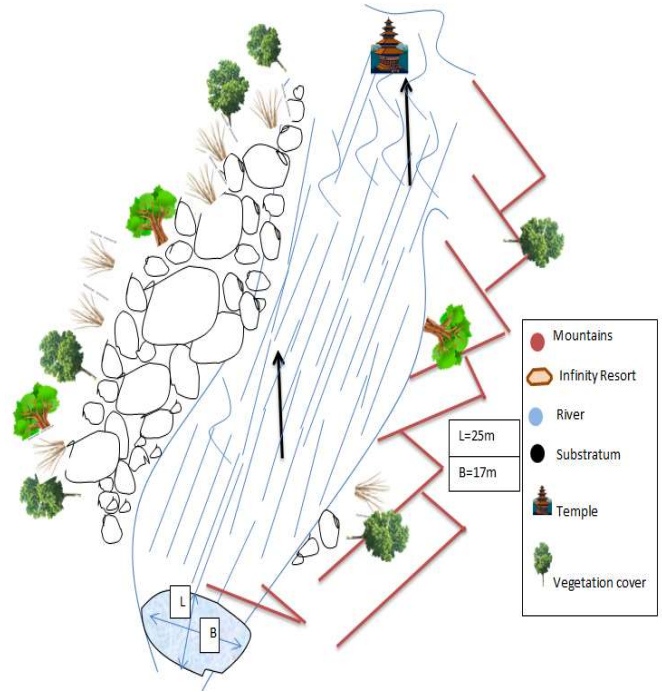
Associated fish diversity: Presence of fish species like *Tor putitora*, *Labeo dero*, *Garra gotyla* and *Xenonotodon cancila* were present.

Key Concern: Problem of pollution due to religious activities and drowning of the same in the river had been observed.

Habitat Fact Sheet (10)

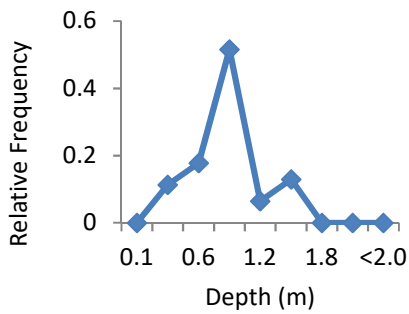
Site: Garjiya Temple, Pool (I)

Site ID: Pool (I)	Post-winter	Post- monsoon
Date of survey	04.04.2018	23.10.2018
Time	01:30 P.M	02:45 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	25m	20
Av. pool width (m)	17m	23.5
Av. Pool depth (m)	0.77	1.36
Area of pool (m sq.)	425	470
Volume of pool (m cu)	327.25	636.85
Flow rate (m/s)	0	0

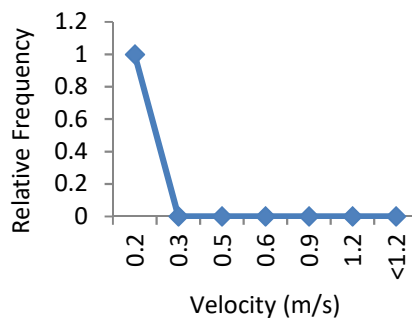


Habitat Inventory:

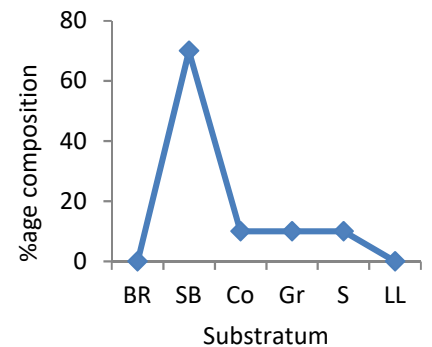
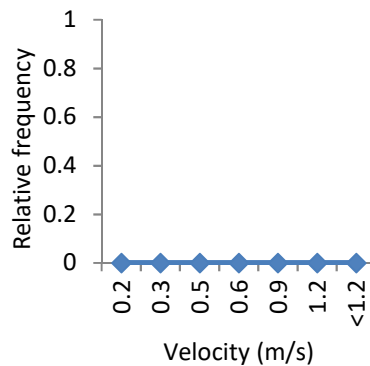
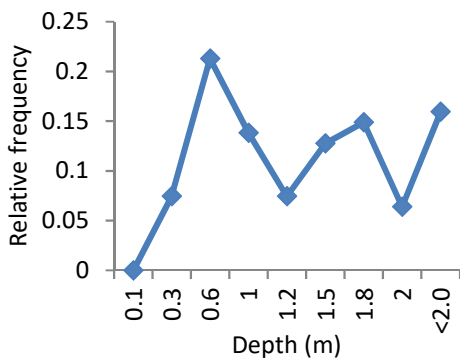
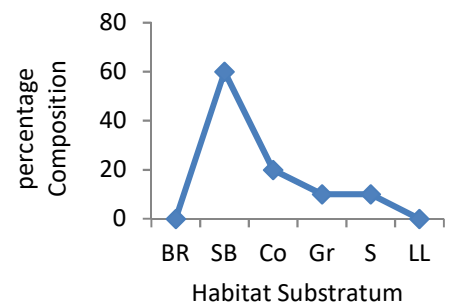
1. Depth



2. Velocity



3. Substrate



Site I: Garjiya Temple (C)



Post monsoon season (Oct-Nov, 2018)

Status of Golden Mahseer: Third pool near the Garjiya temple is located about 100 meters upstream the second pool. People enjoys to relax and bathe in pool. The survey for this pool was also done on 4th April during afternoon when the air temperature was around 28°C Golden mahseer individuals of different life history stages were abundant there. Associated fish species and species of turtles were also observed.

Nursery Grounds: Available in form of isolated pools, back-water pools and run-habitats.

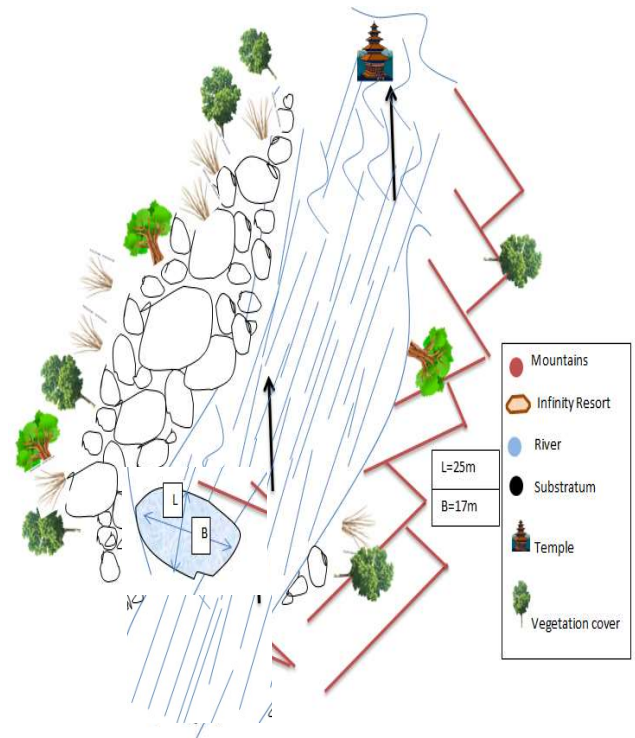
Associated fish diversity: Presence of fish species like *Tor putitora*, *Labeo dero*, *Garra gotyla* and *Xenonotodon cancila* was observed.

Key Concern: Problem of pollution due to religious activities and drowning of the same in the river had been observed.

Habitat Fact Sheet (11)

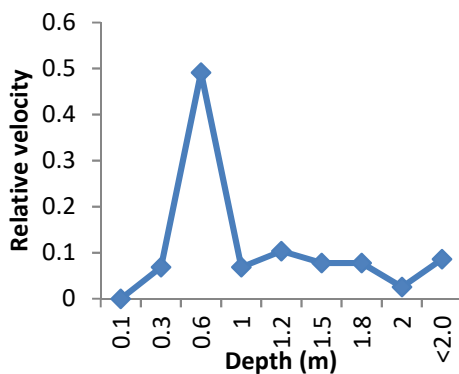
Site I1: Garjiya (I1)

Site ID: Pool (I)	Post-winter	Post-monsoon
Date of survey	-	23.10.2018
Time	-	03:10 P.M.
Weather	-	Sunny
Av. pool length (m)	-	25
Av. pool width (m)	-	23.2
Av. Pool depth (m)	-	1.14
Area of pool (m sq.)	-	580
Volume of pool (m cu)	-	661.2
Flow rate (m/s)	-	0

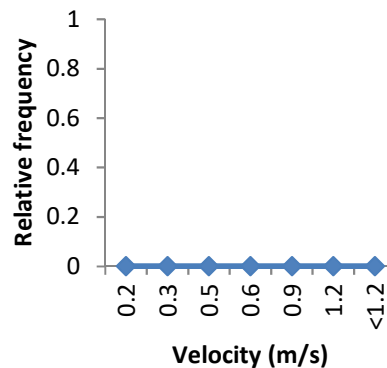


Habitat Inventory:

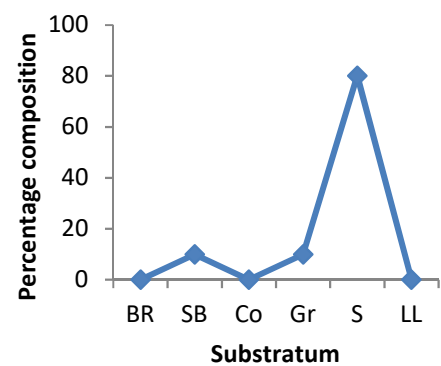
1. Depth



2. Velocity



3. Substrate



Site I: Garjiya (I1)



Post monsoon season (Oct-Nov, 2018)

Status of Golden Mahseer: A pool was located during the Post-monsoon season. The site was found little away from the temple and high diversity of aquatic biodiversity including golden mahseer had been observed. Abundance of adult individuals have been observed during this season in this pool.

Nursery Grounds: Available in form of isolated pools, back-water pools and run-habitats.

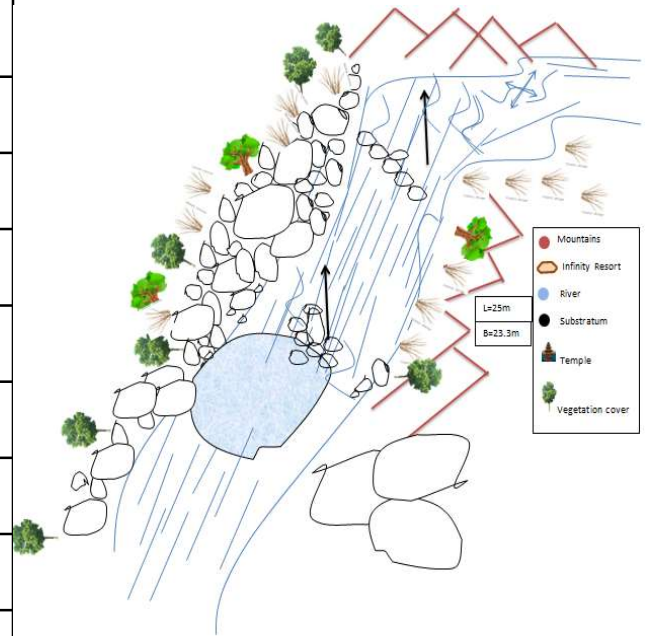
Associated fish diversity: Presence of fish species like *Tor putitora*, *Labeo dero*, *Garra gotyla* and *Xenonotodon cancila* was observed.

Key Concern: Problem of pollution due to religious activities are prevalent in this site.

Habitat Fact Sheet (12)

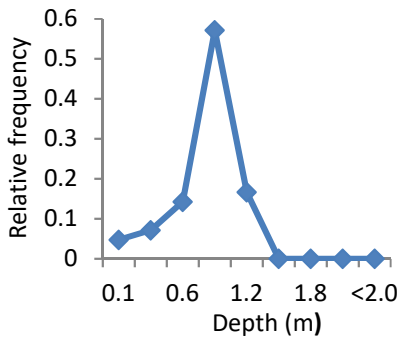
Site : Sundarkhal (A) Site ID: Pool (J)

Site ID: Pool (J)	Post-winter	Post-monsoon
Date of survey	04.04.2018	27.10.2018
Time	12:02 P.M	02:00 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	25m	20
Av. pool width (m)	23.33m	19.5
Av. Pool depth (m)	0.87m	1.05
Area of pool (m sq.)	583.25	390
Volume of pool (m cu)	507.43	409.5
Flow rate (m/s)	0	0.39

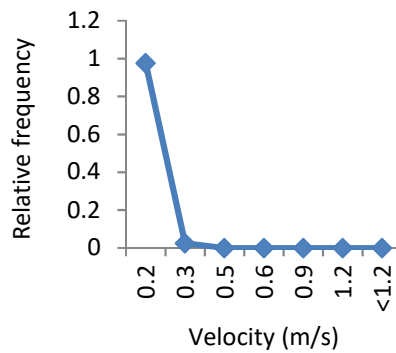


Habitat Inventory:

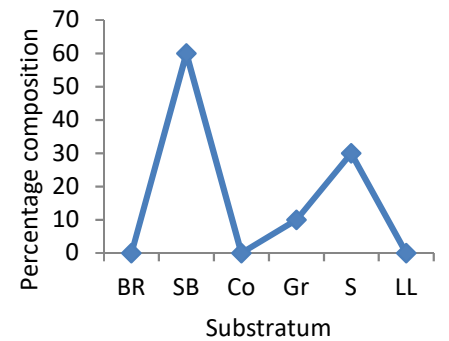
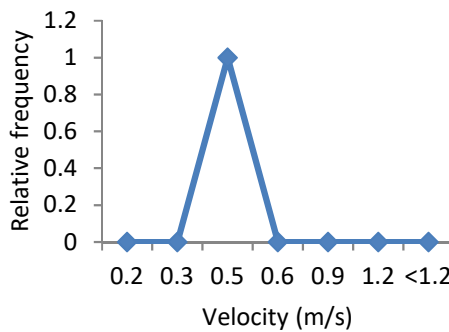
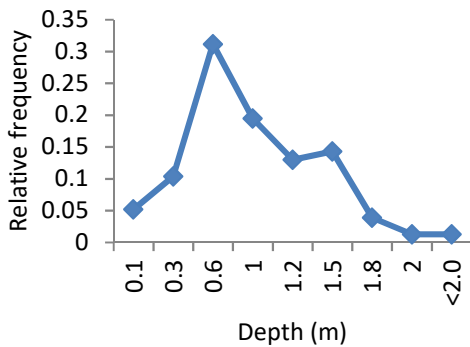
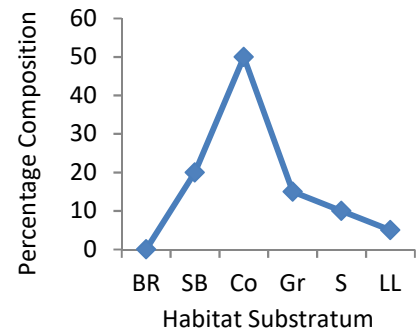
1. Depth



2. Velocity



3. Substrate



Site J: Sundarkhal



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden Mahseer: The next site surveyed was Sundarkhal. Study included the observation and fish catch, including the knowledge of existing fish biodiversity. Water quality was tested and parameters were measured to understand the hydrology of the pool. Golden mahseer individuals of different life history stages were abundant there along with associated fish species.

Nursery Grounds: Available in form of isolated pools, associated channels and run-habitats.

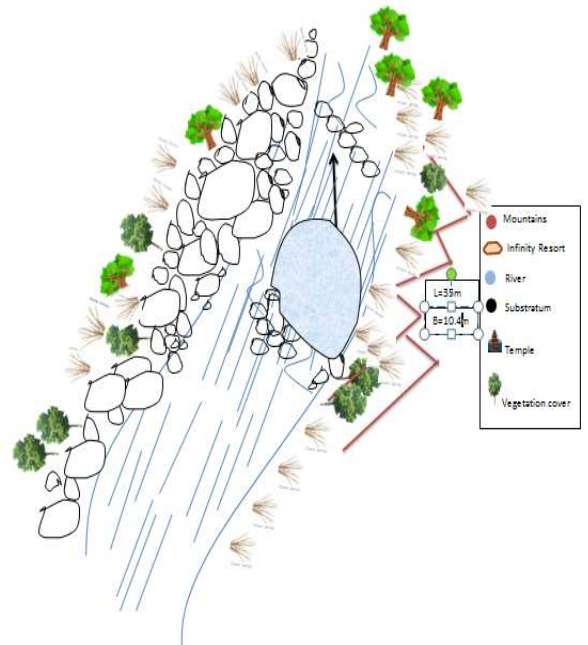
Associated fish diversity: Presence of fish species like *Tor putitora*, *Barilius bendelesis*, *Labeo dero*, *Garra gotyla* and *Xenonotodon cancila* was observed.

Key concern: Sand and rock mining, illegal fishing practices.

Habitat Fact Sheet (13)

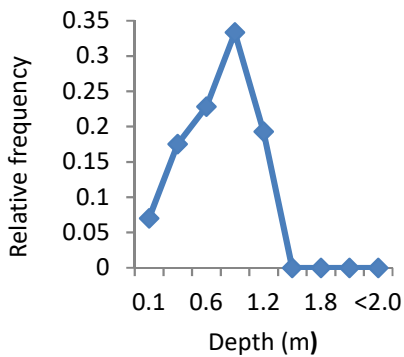
Site: Sundarkhal (B)

Site ID: Pool (K)	Post-winter	Post-monsoon
Date of survey	04.04.2018	27.10.2018
Time	11:30 P.M	02:30 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	35m	25
Av. pool width (m)	10.4m	20.3
Av. Pool depth (m)	0.69m	0.58
Area of pool (m sq.)	364	507.5
Volume of pool (m cu)	251.16	292.32
Flow rate (m/s)	0	0.84

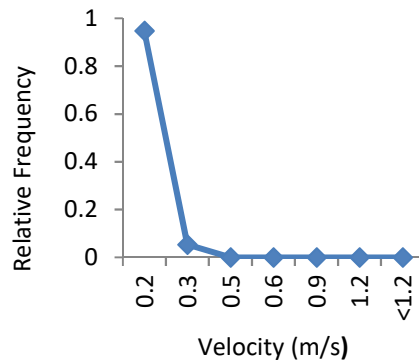


Habitat Inventory:

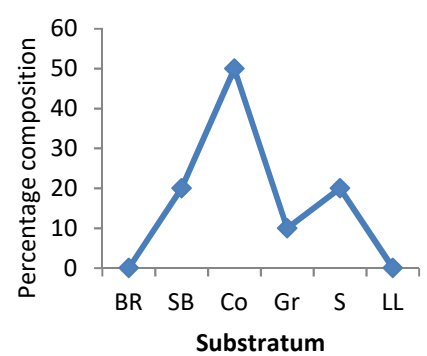
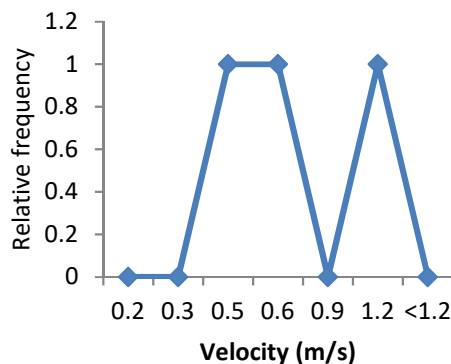
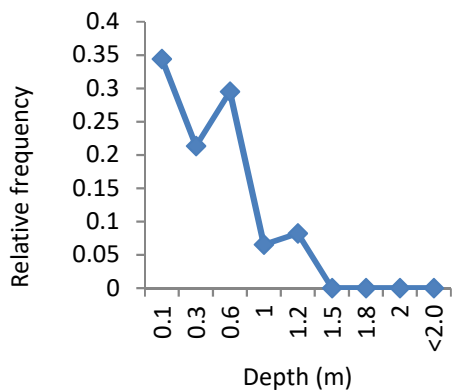
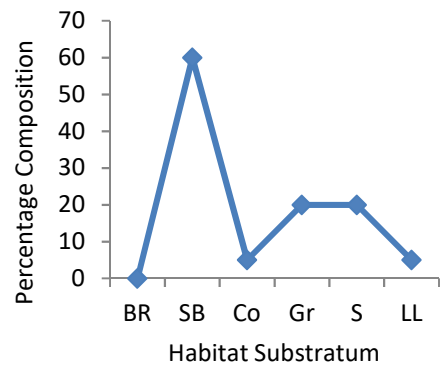
1. Depth



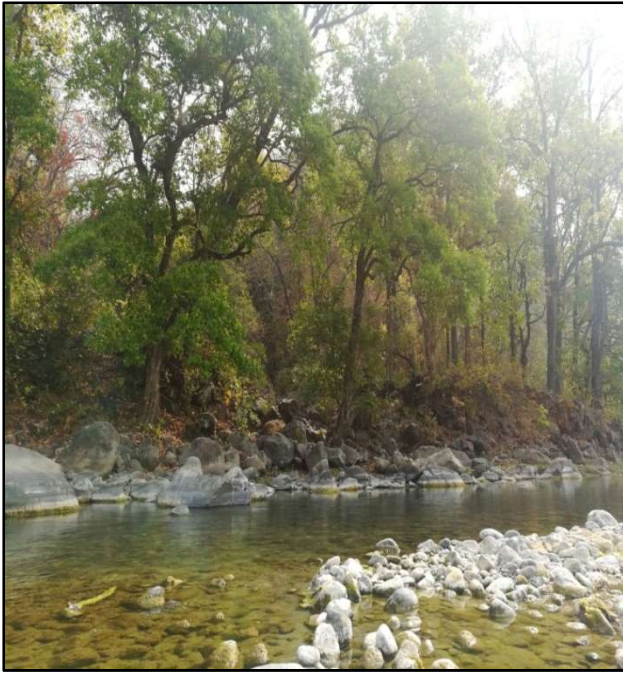
2. Velocity



3. Substrate



Site K:Sundarkhal



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden Mahseer: The next site surveyed was also in the Sundarkhal. This site is little away from the city and study included habitat inventory and fish catch, including the knowledge of existing fish biodiversity. Small size golden mahseer individuals were found abundant there.

Nursery Grounds: Available in form of isolated pools, associated channels and run-habitats.

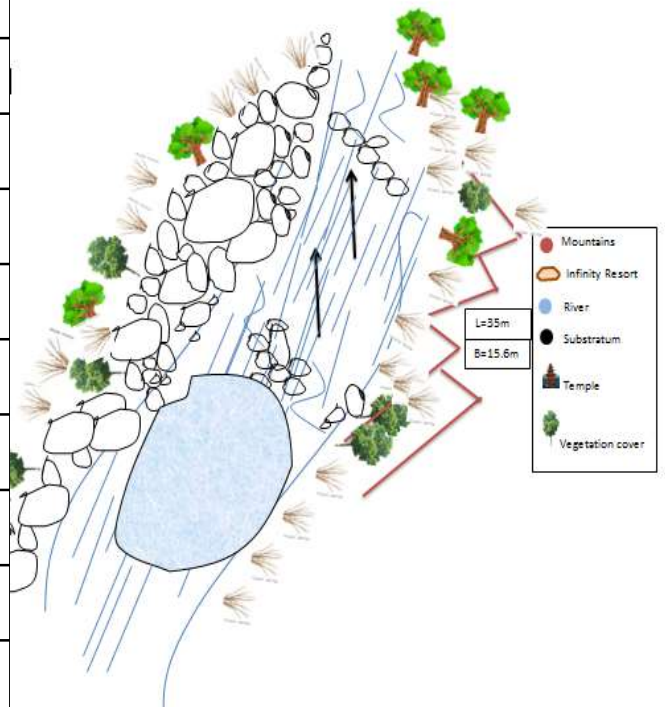
Associated fish diversity: Presence of fish species like *Tor putitora*, *Barilius bendelesis*, *Labeo dero*, *Garra gotyla* and *Xenonotodon cancila* was observed.

Key concern: Sand and rock mining, illegal fishing practices.

Habitat Fact Sheet (14)

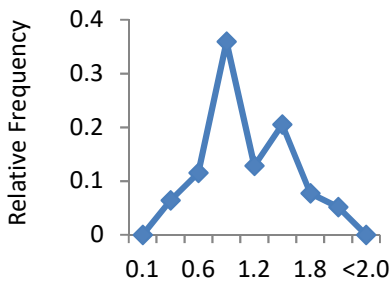
Site Description: Sundarkhal (C)

Site ID: Pool (L.)	Post- winter	Post- monsoon
Date of survey	04.04.2018	27.10.2018
Time	10:30 A.M	02:55 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	35m	25
Av. pool width (m)	15.6m	22.6
Av. Pool depth (m)	1.05m	0.42
Area of pool (m sq.)	564	565
Volume of pool (m cu)	573.3	237.35
Flow rate (m/s)	0	0.84

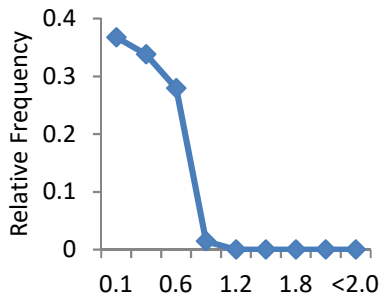


Habitat Inventory:

1. Depth

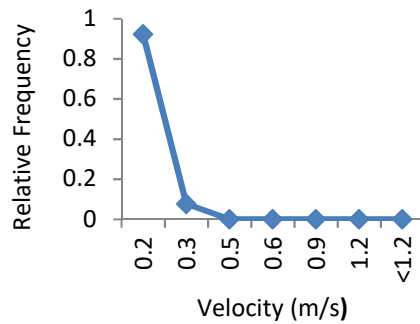


Depth (m)

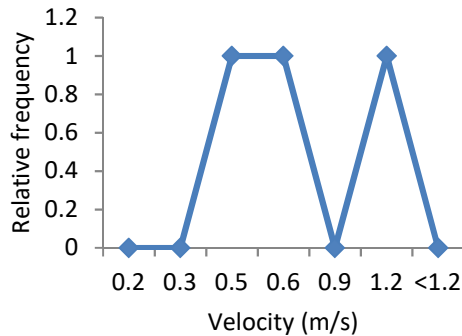


Depth (m)

2. Velocity

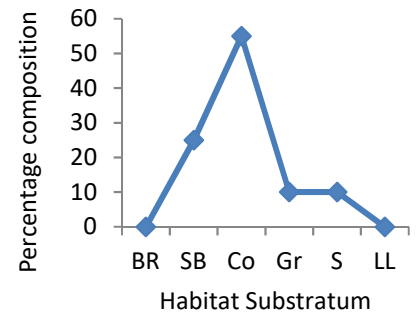


Velocity (m/s)

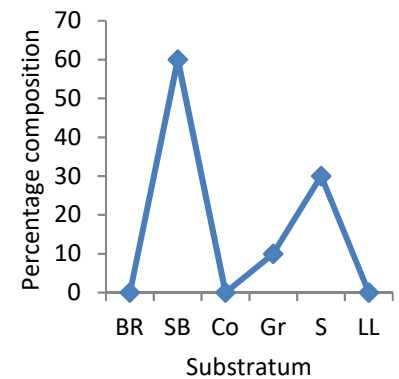


Velocity (m/s)

3. Substrate

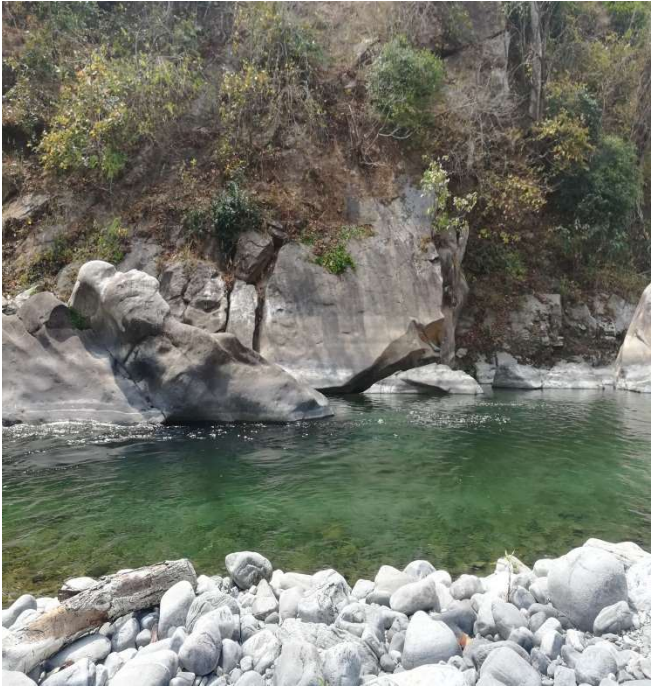


Habitat Substratum



Substratum

Site L: Sundakhal



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of Golden Mahseer: The other pool was located 200m downstream of the previous pool. Site was away from the noise of the city with dense forest on right side with vast area of dry river bed. Agricultural land on the left side. Small size golden mahseer individuals were found abundant there.

Nursery Grounds: Available in form of isolated pools, associated channels and run-habitats.

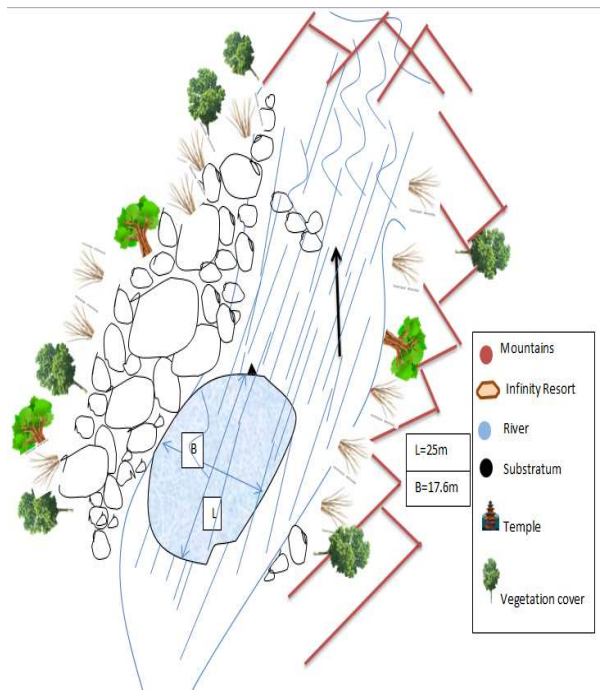
Associated fish diversity: Presence of fish species like *Tor putitora*, *Barilius bendelesis*, *Labeo dero*, *Garra gotyla* and *Xenonotodon cancila* was observed.

Key concern: Sand and rock mining, illegal fishing practices.

Habitat Fact Sheet (15)

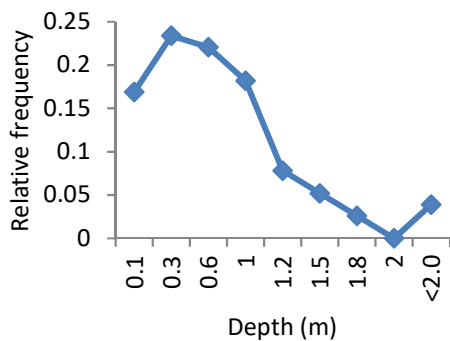
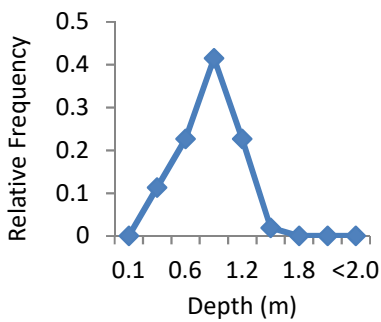
Site : Mohaan ,Site ID: Pool (M)

Site ID: Pool (M)	Post- winter	Post- monsoon
Date of survey	31.03.2018	27.10.2018
Time	11:10 A.M.	10: 40 A.M.
Weather	Sunny	Sunny
Av. pool length (m)	25m	20
Av. pool width (m)	17.66m	19.25
Av. Pool depth (m)	0.82m	0.83
Area of pool (m sq.)	441.5	385
Volume of pool (m cu)	362.03	319.55
Flow rate (m/s)	0.62	0.31

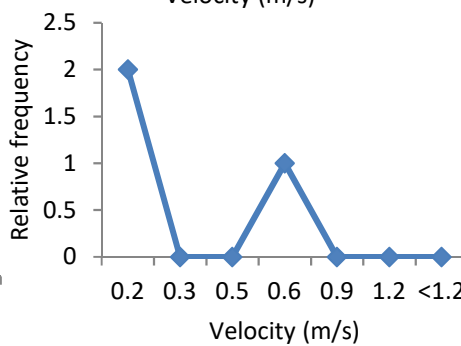
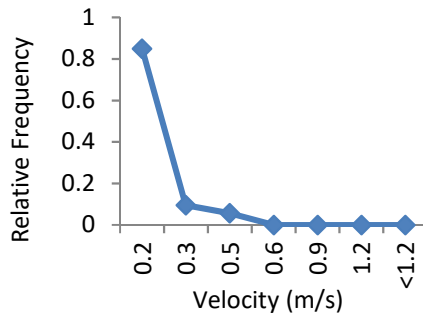


Habitat Inventory:

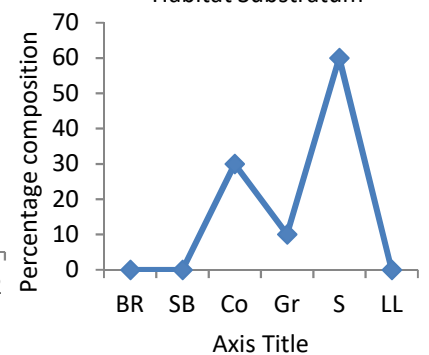
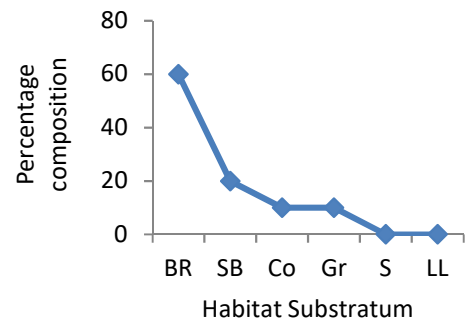
1. Depth



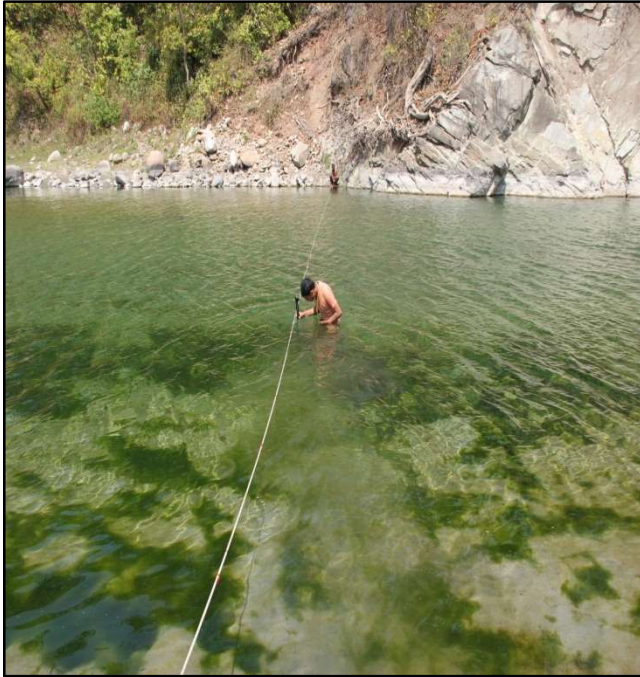
2. Velocity



3. Substrate



Site M: Mohaan



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: The next site of the survey was Mohaan. The site was surveyed for pool hydrology and golden mahseer population. The site is a wide river bed with compacted mountains of Ramnagar forest and Jim Corbett forest reserve on the left and right side of the river respectively. Small golden mahseer individuals of different life history stages have been recorded from this site.

Nursery grounds : This site was found to have large number of nursery grounds including run-habitats, associated channels and back-water pools. Also, shallow pools were located with fries and fingerlings of *Barilius* and *Puntius* spp.

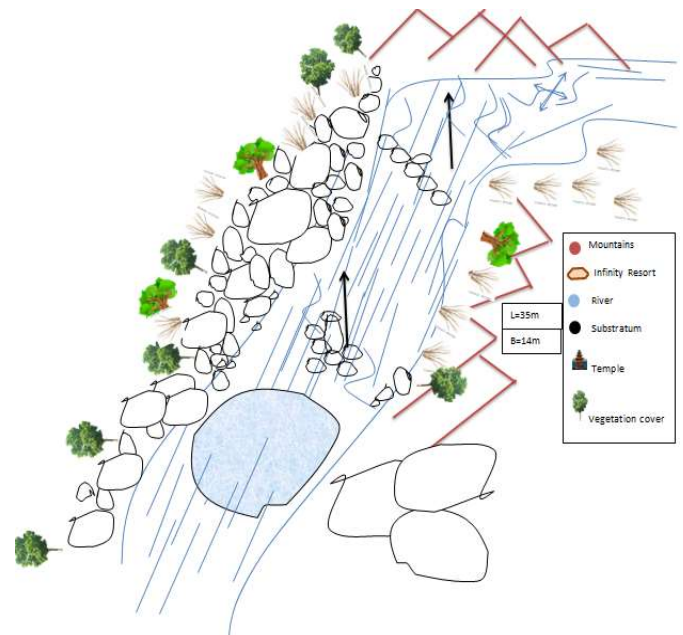
Associated fish diversity: Presence of fish species like *Tor putitora*, *Barilius benedesis*, *Barilius vagra*, *Labeo dero* and big size *Garra gotyla* were found.

Key concern: House-hold waste pollution, sand and rock mining and illegal fishing practices.

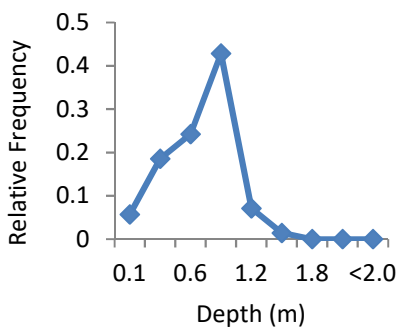
Habitat Fact Sheet (16)

Site: **Khalgari**

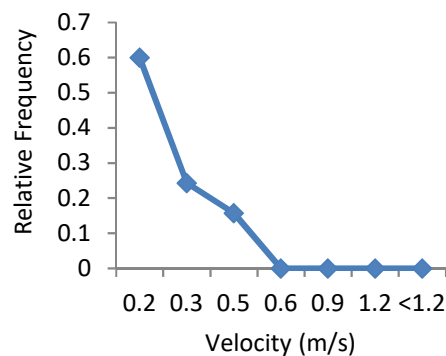
Site ID: Pool (N)	Post- winter	Post- monsoon
Date of survey	31.03.2018	27.10.2018
Time	09:28 P.M	12:05 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	35m	25
Av. pool width (m)	14m	11.66
Av. Pool depth (m)	0.708m	0.75
Area of pool (m sq.)	490	291.5
Volume of pool (m cu)	347.9	218.625
Flow rate (m/s)	0.33	0



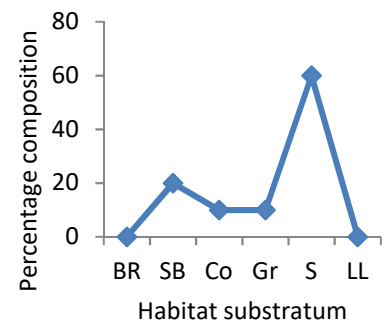
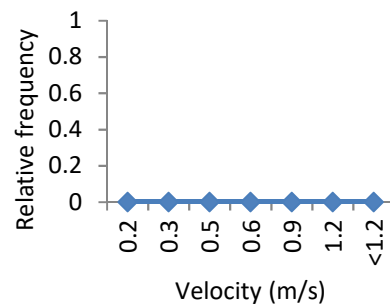
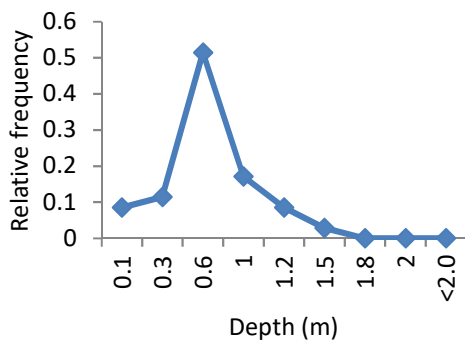
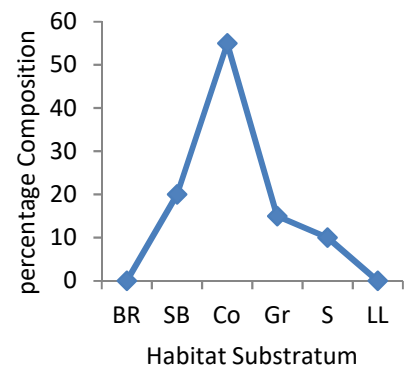
Habitat Inventory: 1. Depth



2. Velocity



3. Substrate



Site N: Khalgari



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Khalgari pool site is located between Kunkhet and Mohaan. The position of pool is in the buffer zone of Jim Corbett Tiger Reserve. The pools were present alongside of beaten Rocky Mountains of the Corbett forest. Large boulders were present on the right side of the pool. Juveniles and small-sized golden mahseer individuals of different life history stages have been recorded from this site.

Nursery grounds: This site was found to have large number of nursery grounds including run-habitats, associated channels and back-water pools. Also, shallow pools were located with fries and fingerlings of *Barilius* and *Puntius* spp.

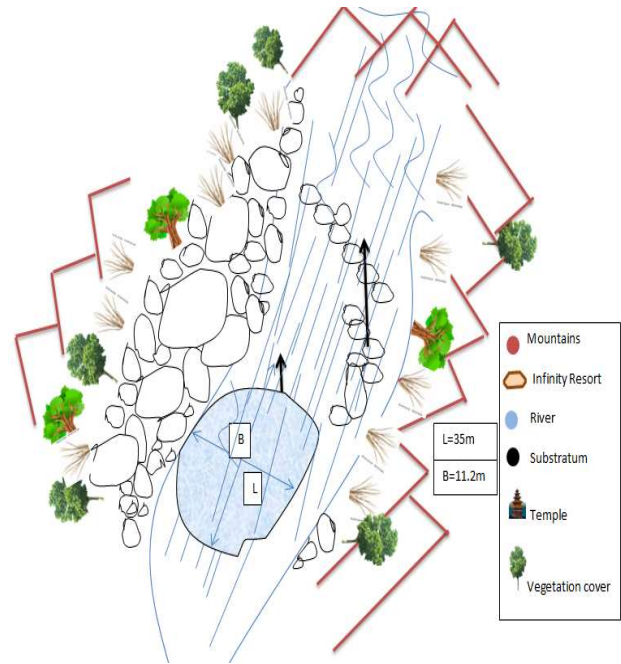
Associated fish diversity: Presence of fish species like *Tor putitora*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero* and big size *Garra gotyla* were found.

Key concern: House-hold waste pollution, sand and rock mining and illegal fishing practices.

Habitat Fact Sheet (17)

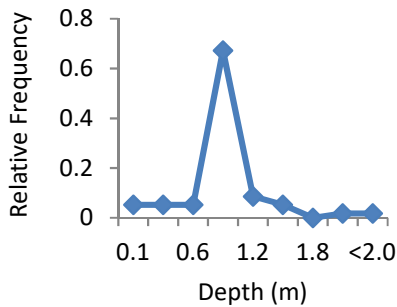
Site Description: Khalgari

Site ID: Pool (0)	Post- winter	Post- monsoon
Date of survey	03.04.2018	27.10.2018
Time	10:42 P.M	12:20 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	30m	25
Av. pool width (m)	11.6m	21
Av. Pool depth (m)	0.99m	1.02
Area of pool (m sq.)	384	525
Volume of pool (m cu)	344.5	535.5
Flow rate (m/s)	0	0.87

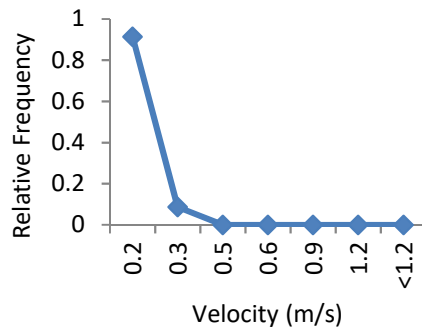


Habitat Inventory:

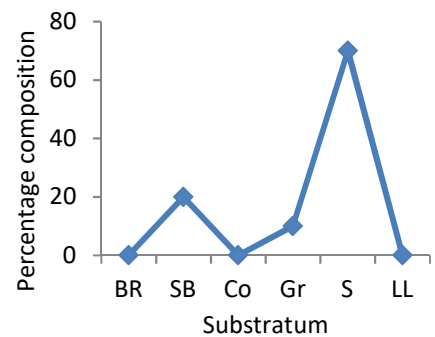
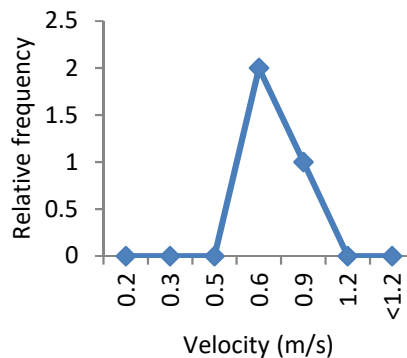
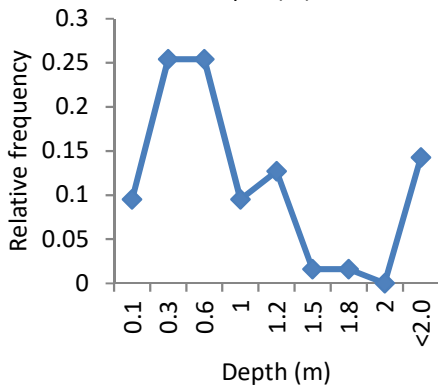
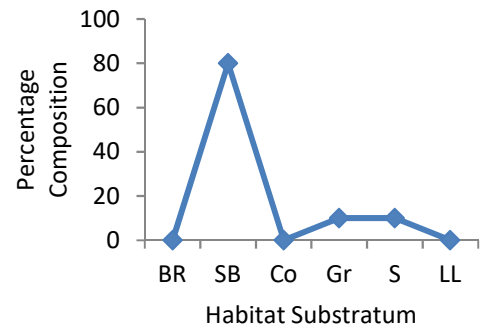
1. Depth



2. Velocity



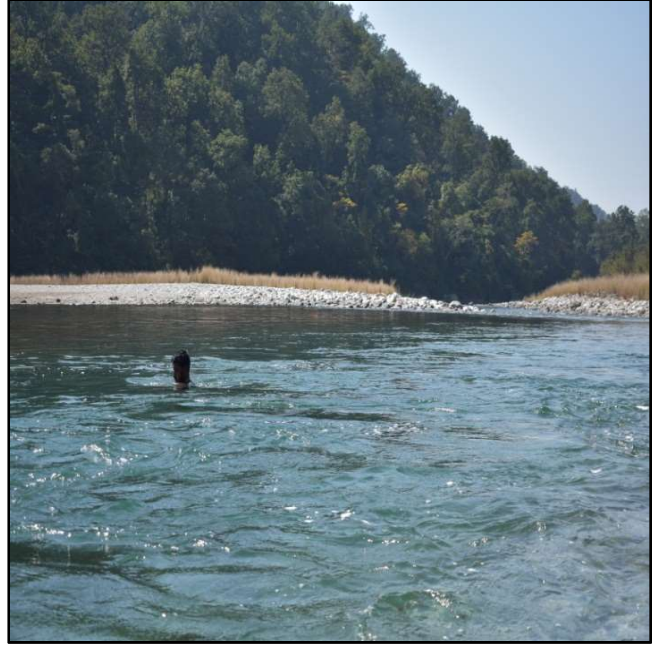
3. Substrate



Site O: Khalgari



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: The location of pool is in the buffer of Jim Corbett Tiger Reserve. The pools were covered with Large boulders were present on the right side of the pool. Juveniles and small-sized golden mahseer individuals of different life history stages have been recorded from this site.

Nursery grounds: This site was found to have potential nursery grounds including run-habitats, associated channels and back-water pools where large number of small fishes have been observed dwelling.

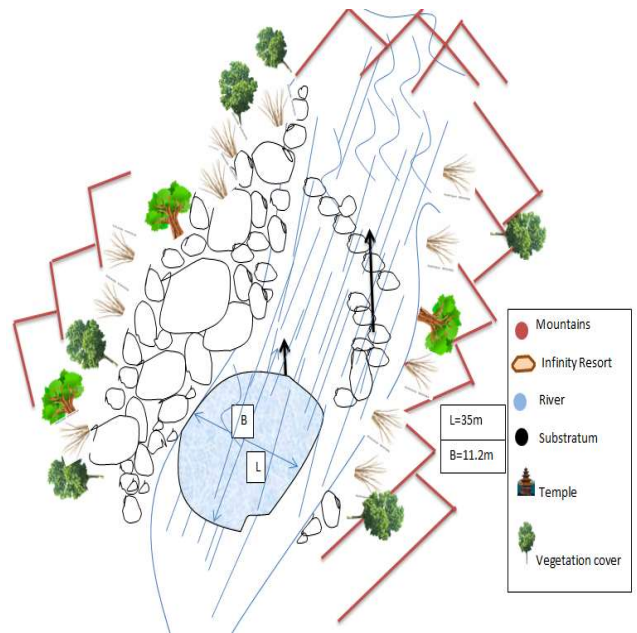
Associated fish diversity: Presence of fish species like *Tor putitora*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero* and big size *Garra gotyla* were found. Also, shallow pools were located having fries and fingerlings of *Barilius* and *Puntius* spp. and other adult fish species of *Labeo* and *Barilius vagra*, *Barilius bendenlisis*, *Tor Putitora* and *Garra gotyla* were reported.

Key concern: House-hold waste pollution, sand and rock mining and illegal fishing practices.

Habitat Fact Sheet (18)

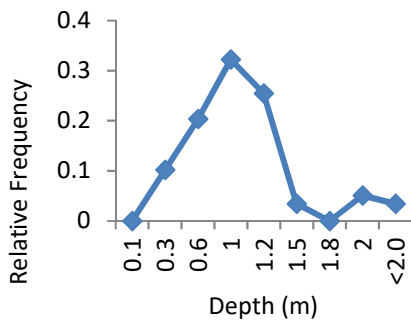
Site Description: Kunkhet (A)

Site ID: Pool (P)	Post- winter	Post- monsoon
Date of survey	29.03.2018	24.10.2018
Time	10:50 AM	12:15 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	35m	25
Av. pool width (m)	11.2m	14.66
Av. Pool depth (m)	1.116m	0.78
Area of pool (m sq.)	392	366.5
Volume of pool (m cu)	470.4	285.87
Flow rate (m/s)	1.52	0.66

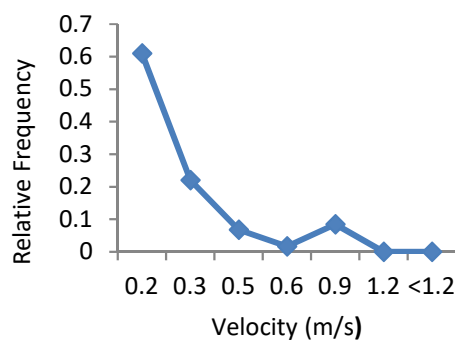


Habitat Inventory:

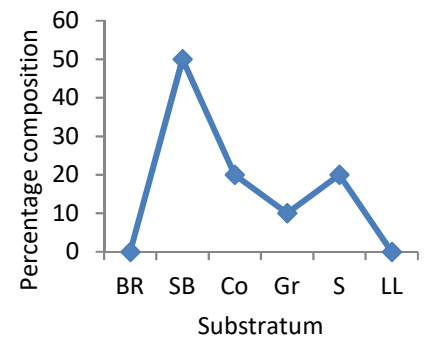
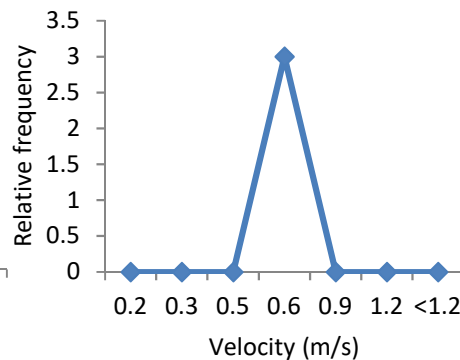
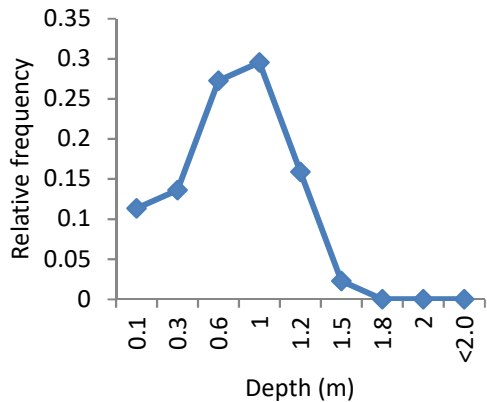
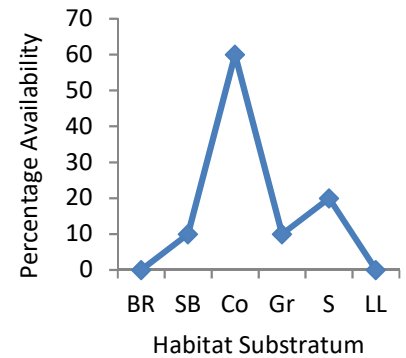
1. Depth



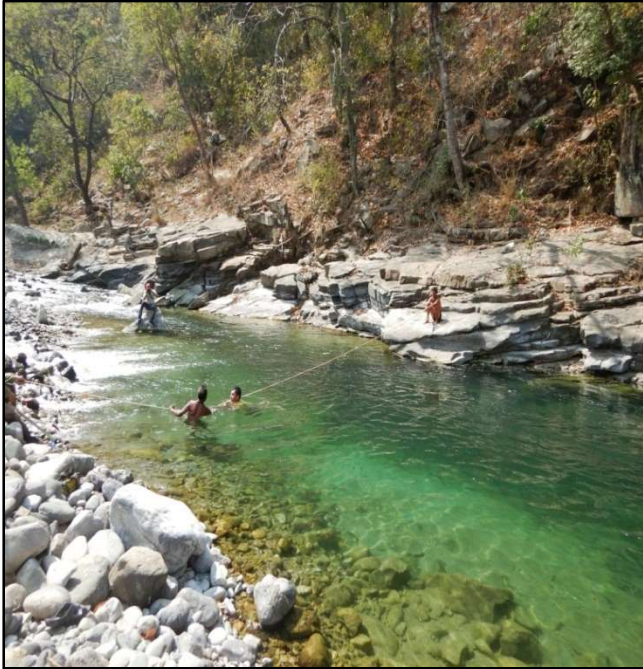
2. Velocity



3. Substrate



Site P: Kunkhet (A)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Kunkhet is the last point to which the survey was conducted. In Kunkhet region, 7 pools had been surveyed. The sites are located in the buffer areas of Jim Corbett Tiger Reserve. Pools inhabit good population of *Tor putitora* juveniles and small-sized individuals of different life history stages (fry and fingerlings) have been recorded from this site.

Nursery grounds: Kunkhet areas were found to be home of several potential nursery grounds of golden mahseer including run-habitats, associated, secondary channels and back-water pools. Also, shallow pools were found to have fries and fingerlings of *Tor putitora*, *Barilius bendelinsis* and *Labeo* spp.

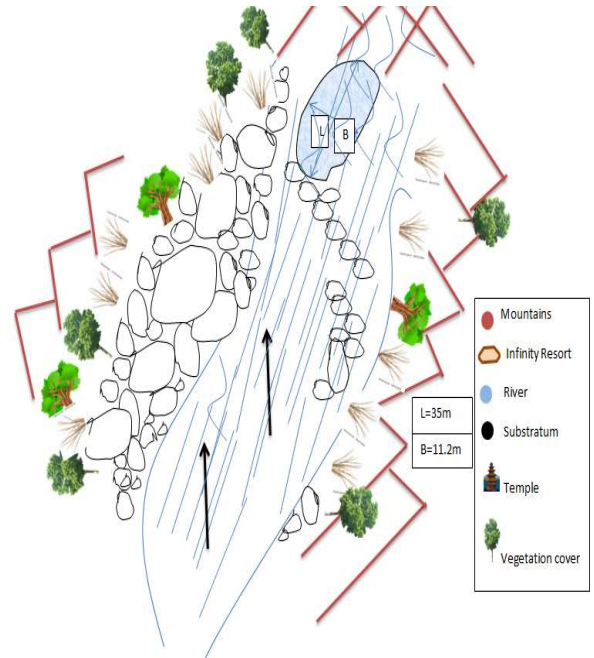
Associated fish diversity: Presence of fish species like *Tor putitora*, *Tor Chilinoidea*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero*, *Labeo rohita*, *Labeo dyecheilous* and big size *Garra gotyla* were found.

Key concern: Illegal and destructive fishing practices.

Habitat Fact Sheet (19)

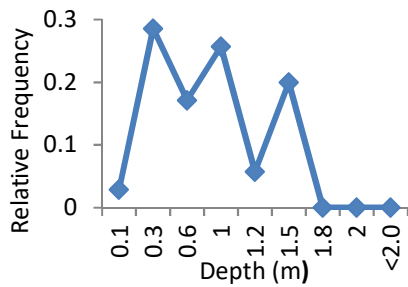
Site : Kunkhet (B)

Site ID: Pool (Q)	Post- winter	Post- monsoon
Date of survey	28.04.2018	24.10.2018
Time	12:00 P.M	12:35 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	25m	20
Av. pool width (m)	11.66m	13
Av. Pool depth (m)	0.78m	0.75
Area of pool (m sq.)	290	260
Volume of pool (m cu)	226.2	195
Flow rate (m/s)	1.23	0.61

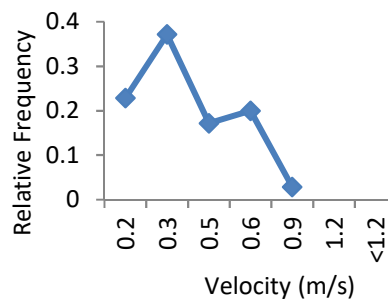


Habitat Inventory:

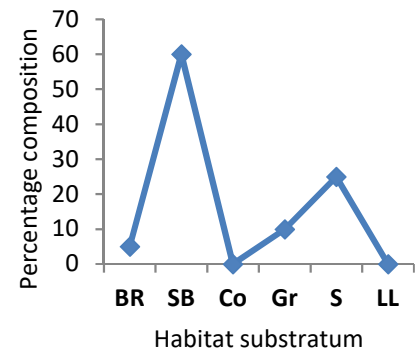
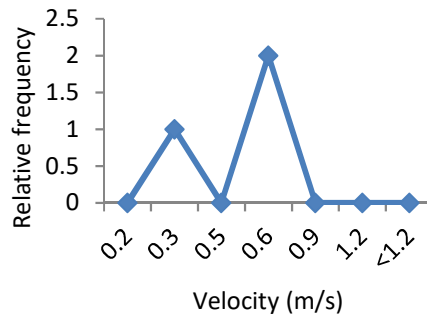
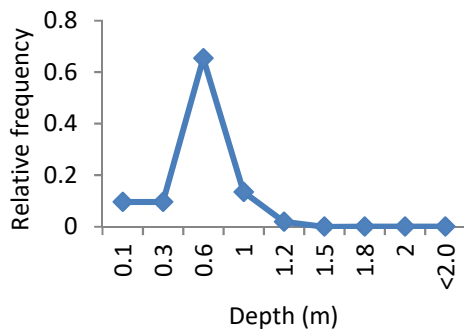
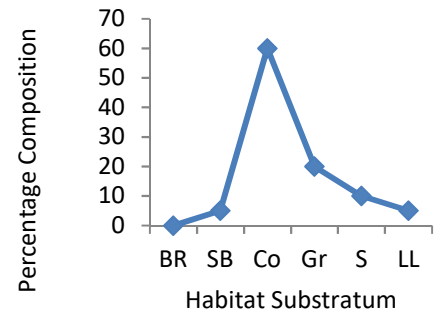
1. Depth



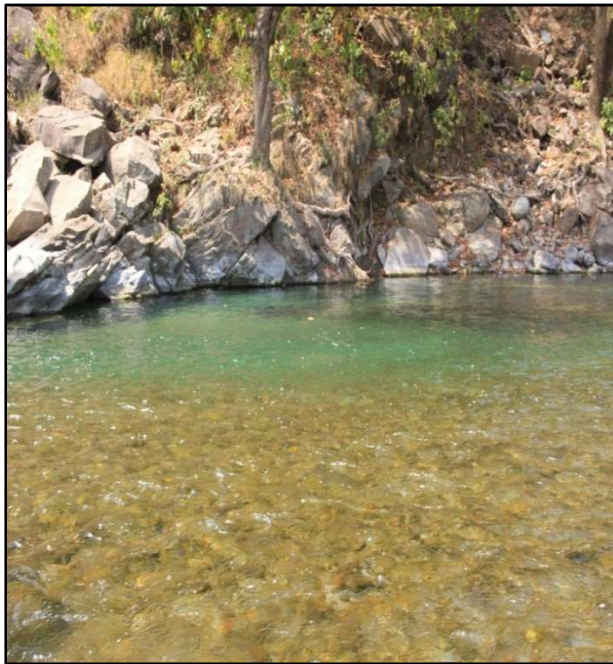
2. Velocity



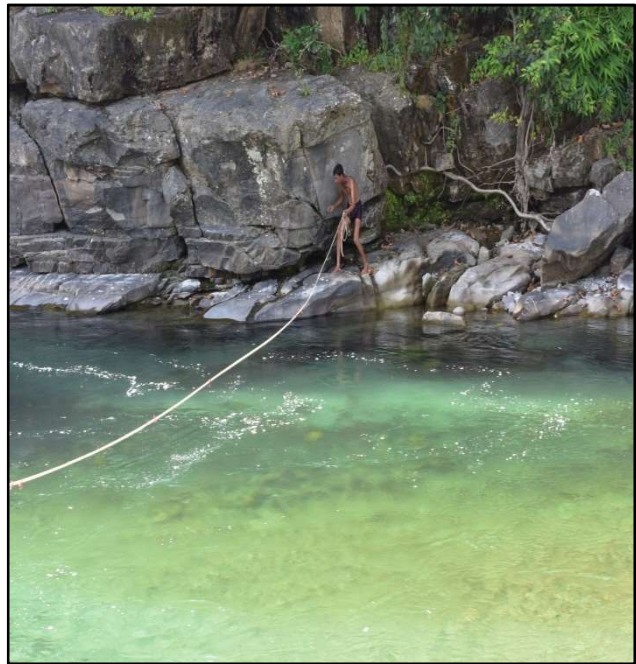
3. Substrate



Site Q: Kunkhet (B)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Kunkhet is the last point to which the survey was conducted. In Kunkhet region, 7 pools had been surveyed. The sites are located in the buffer areas of Jim Corbett Tiger Reserve. Pools inhabit good population of *Tor putitora* juveniles and small-sized individuals of different life history stages (fry and fingerlings) have been recorded from this site.

Nursery grounds: Kunkhet areas were found to be home of several potential nursery grounds of golden mahseer including run-habitats, associated, secondary channels and back-water pools. Also, shallow pools were found to have fries and fingerlings of *Tor putitora*, *Barilius bendelinsis* and *Labeo* spp.

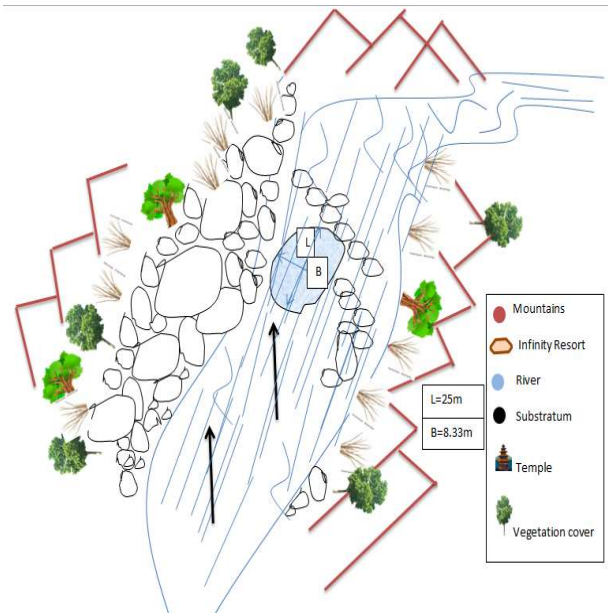
Associated fish diversity: Presence of fish species like *Tor putitora*, *Tor Chilinoidea*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero*, *Labeo rohita*, *Labeo dyecheilous* and big size *Garra gotyla* were found.

Key concern: Illegal and destructive fishing practices.

Habitat Fact Sheet (20)

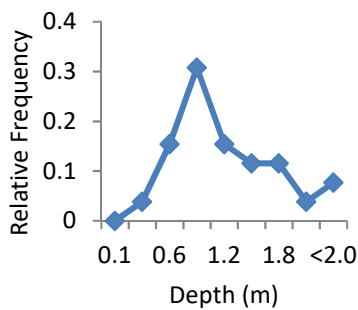
Site: Kunkhet, Site ID

Site ID: Pool (R)	Post- winter	Post- monsoon
Date of survey	02.04.2018	24.10.2018
Time	09:43 A.M.	12:50 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	250m	25
Av. pool width (m)	8.33m	19.8
Av. Pool depth (m)	1.54m	0.71
Area of pool (m sq.)	208.25	495
Volume of pool (m cu)	320.71	351.45
Flow rate (m/s)	0	1.01

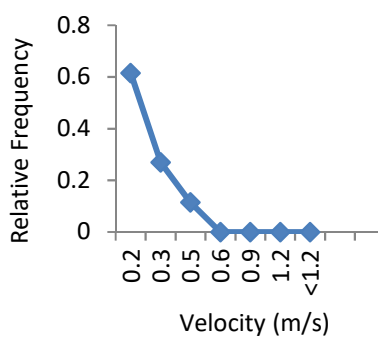


Habitat Inventory:

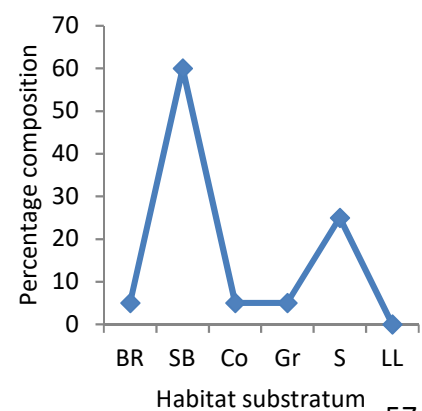
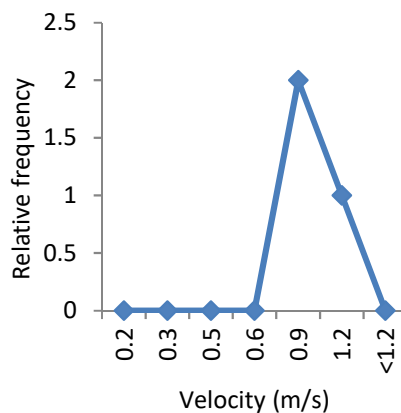
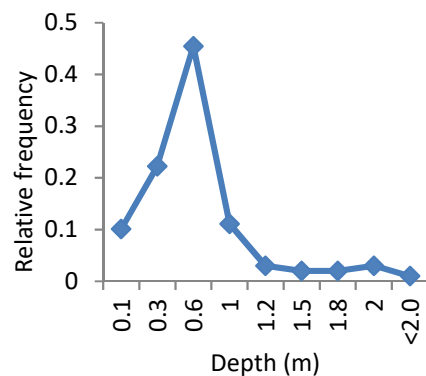
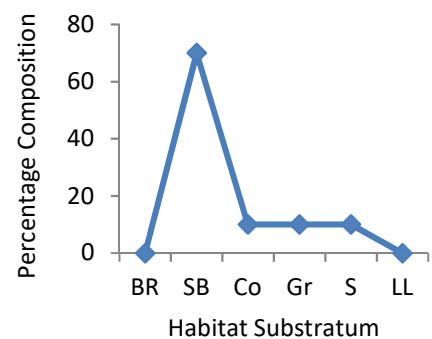
1. Depth



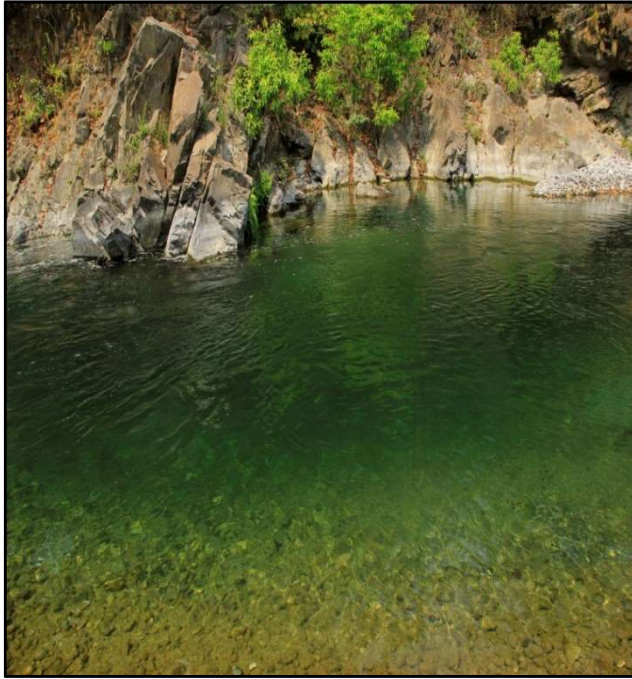
2. Velocity



3. Substrate



Site R: Kunkhet (C)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Kunkhet is the last point to which the survey was conducted. In Kunkhet region, 7 pools had been surveyed. The sites are located in the buffer areas of Jim Corbett Tiger Reserve. Pools inhabits good population of *Tor putitora* juveniles and small-sized individuals of different life history stages (fry and fingerlings) have been recorded from this site.

Nursery grounds: Kunkhet areas were found to home of several potential nursery grounds of golden mahseer including run-habitats, associated, secondary channels and back-water pools. Also, shallow pools were found to have fries and fingerlings of *Tor putitora*, *Barilius bendelinsis* and *Labeo* spp.

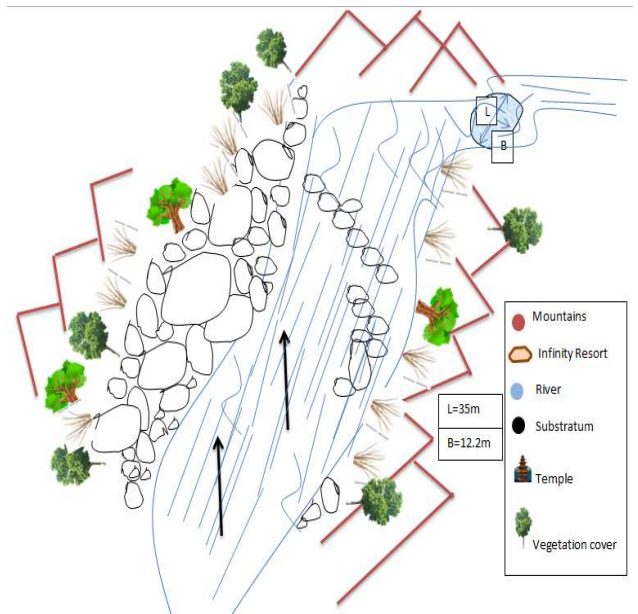
Associated fish diversity: Presence of fish species like *Tor putitora*, *Tor Chilinoidea*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero*, *Labeo rohita*, *labeo dyecheilous* and big size *Garra gotyla* were found.

Key concern: Illegal and destructive fishing practices.

Habitat Fact Sheet (21)

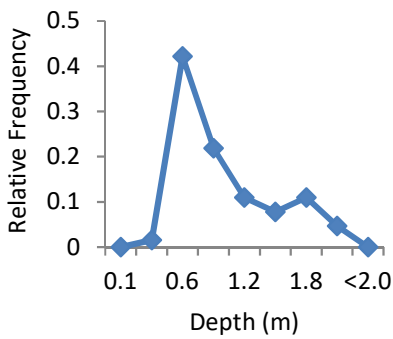
Site Description: Kunkhet (D)

Site ID: Pool (S)	Post- winter	Post- monsoon
Date of survey	02.04.2018	24.10.2018
Time	10:16 A.M	02:15 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	35m	20
Av. pool width (m)	12.2m	22.25
Av. Pool depth (m)	1.05m	0.82
Area of pool (m sq.)	427	445
Volume of pool (m cu)	448.35	364.9
Flow rate (m/s)	0	0.80

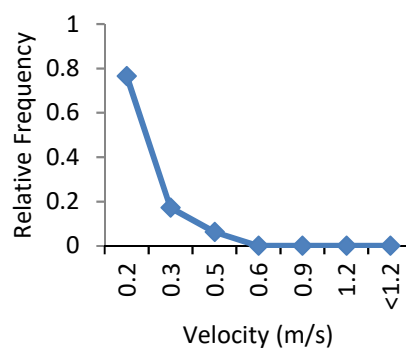


Habitat Inventory:

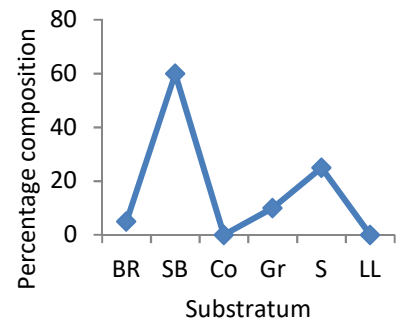
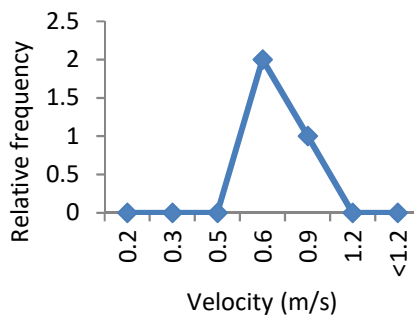
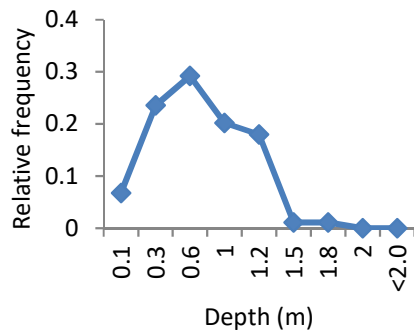
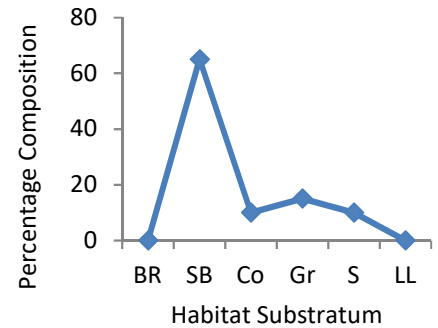
1. Depth



2. Velocity



3. Substrate



Site S: Kunkhet (D)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Kunkhet is the last point to which the survey was conducted. In Kunkhet region, 7 pools had been surveyed. The sites are located in the buffer areas of Jim Corbett Tiger Reserve. Pools inhabit good population of *Tor putitora* juveniles and small-sized individuals of different life history stages (fry and fingerlings) have been recorded from this site.

Nursery grounds: Kunkhet areas were found to be home of several potential nursery grounds of golden mahseer including run-habitats, associated, secondary channels and back-water pools. Also, shallow pools were found to have fries and fingerlings of *Tor putitora*, *Barilius bendelinsis* and *Labeo* spp.

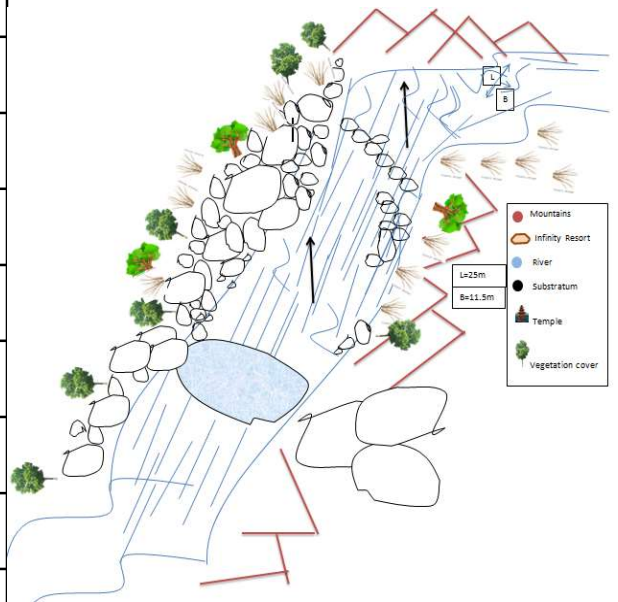
Associated fish diversity: Presence of fish species like *Tor putitora*, *Tor Chilinoidea*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero*, *Labeo rohita*, *Labeo dyecheilous* and big size *Garra gotyla* were found.

Key concern: Illegal and destructive fishing practices.

Habitat Fact Sheet (22)

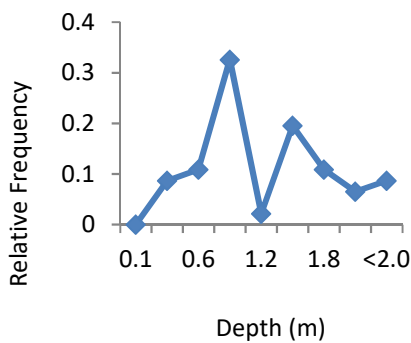
Site: Kunkhet (E)

Site ID: Pool (T)	Post- winter	Post- monsoon
Date of survey	02.04.2018	24.10.2018
Time	11:10 A.M.	02:25 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	25m	25
Av. pool width (m)	11.5m	12.66
Av. Pool depth (m)	1.3m	1.11
Area of pool (m sq.)	287.5	316.5
Volume of pool (m cu)	373.8	351.32
Flow rate (m/s)	0	0.90

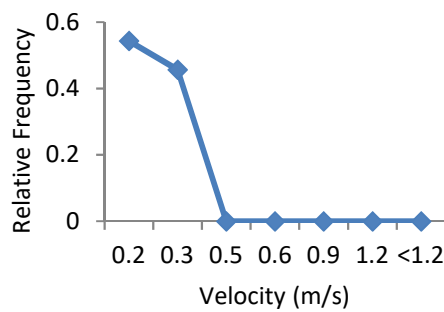


Habitat Inventory:

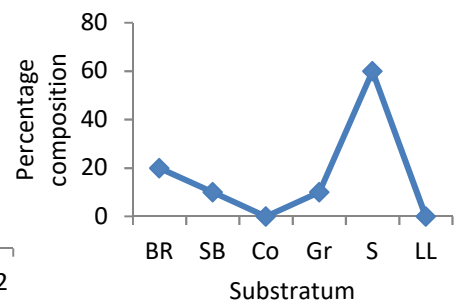
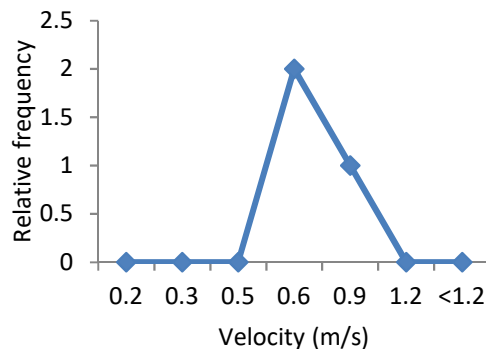
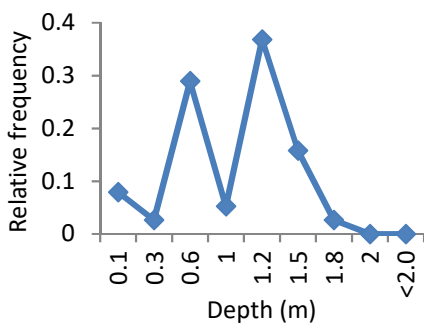
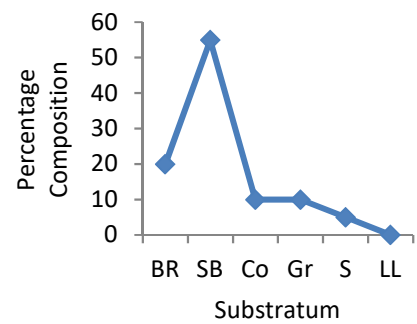
1. Depth



2. Velocity



3. Substrate



Site T: Kunkhet (E)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Kunkhet is the last point to which the survey was conducted. In Kunkhet region, 7 pools had been surveyed. The sites are located in the buffer areas of Jim Corbett Tiger Reserve. Pools inhabits good population of *Tor putitora* juveniles and small-sized individuals of different life history stages (fry and fingerlings) have been recorded from this site.

Nursery grounds: Kunkhet areas were found to home of several potential nursery grounds of golden mahseer including run-habitats, associated, secondary channels and back-water pools. Also, shallow pools were found to have fries and fingerlings of *Tor putitora*, *Barilius bendelinsis* and *Labeo* spp.

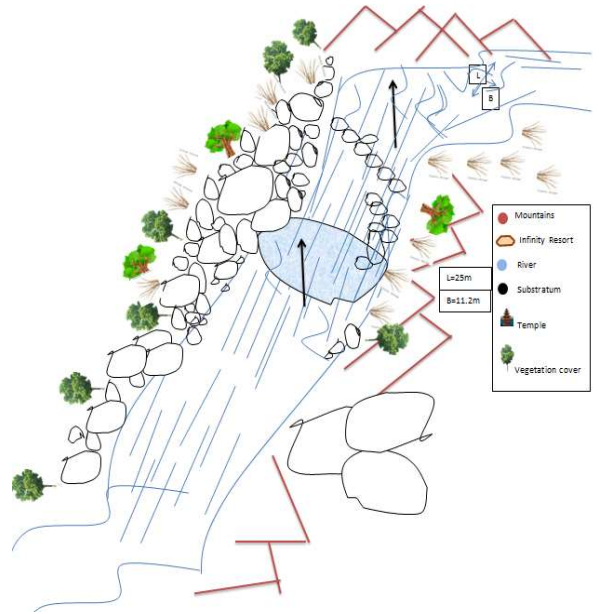
Associated fish diversity: Presence of fish species like *Tor putitora*, *Tor Chilinoidea*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero*, *Labeo rohita*, *labeo dyecheilous* and big size *Garra gotyla* were found.

Key concern: Illegal and destructive fishing practices.

Habitat Fact Sheet (23)

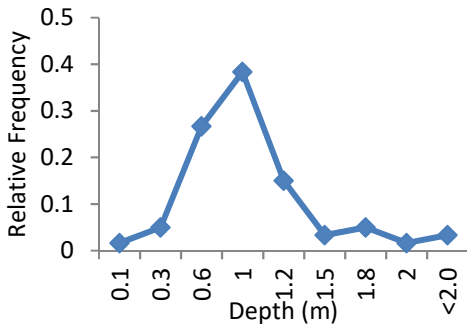
Site: Kunkhet (F)

Site ID: Pool (A)	Post- winter	Post- monsoon
Date of survey	02.04.2018	24.10.2018
Time	11:50A.M	02:45 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	25m	25
Av. pool width (m)	11.2m	6
Av. Pool depth (m)	0.86m	.94
Area of pool (m sq.)	280	150
Volume of pool (m cu)	240.8	141
Flow rate (m/s)	0	0

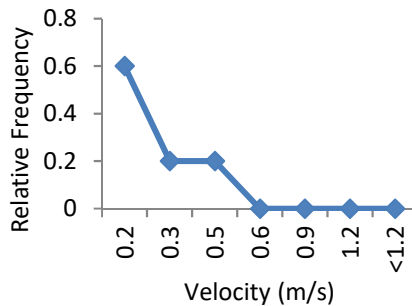


Habitat Inventory:

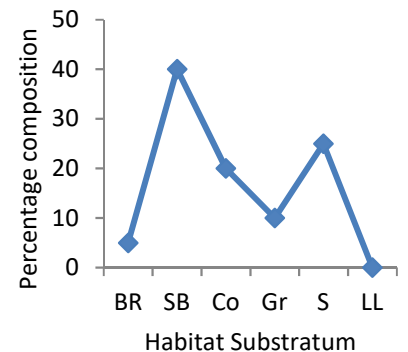
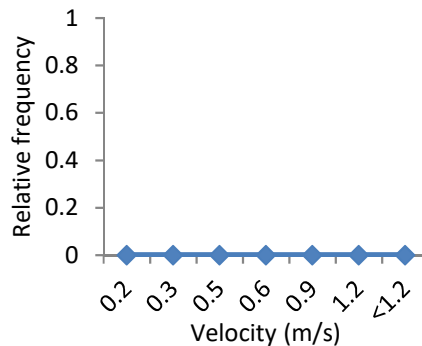
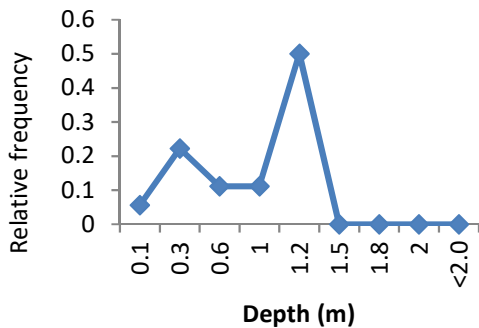
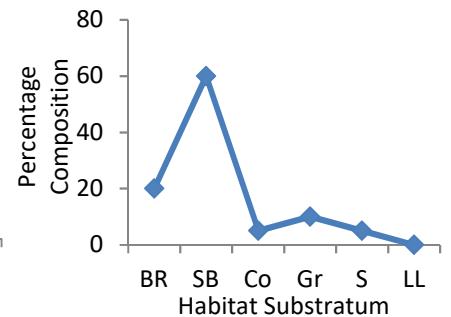
1. Depth



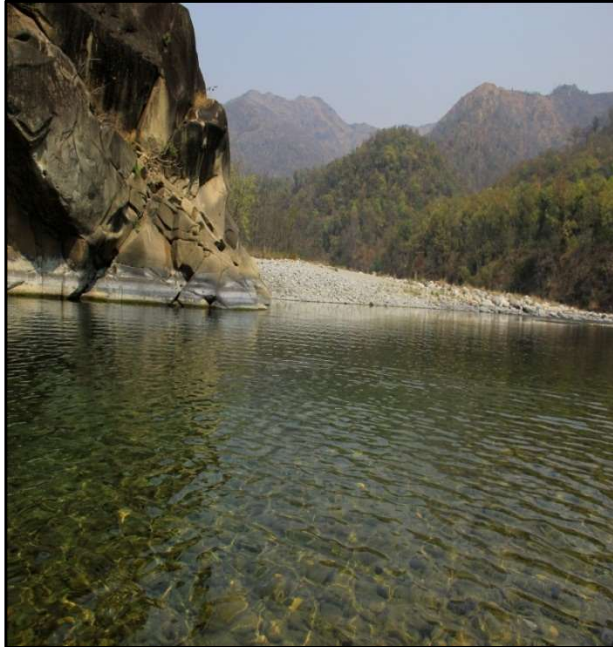
2. Velocity



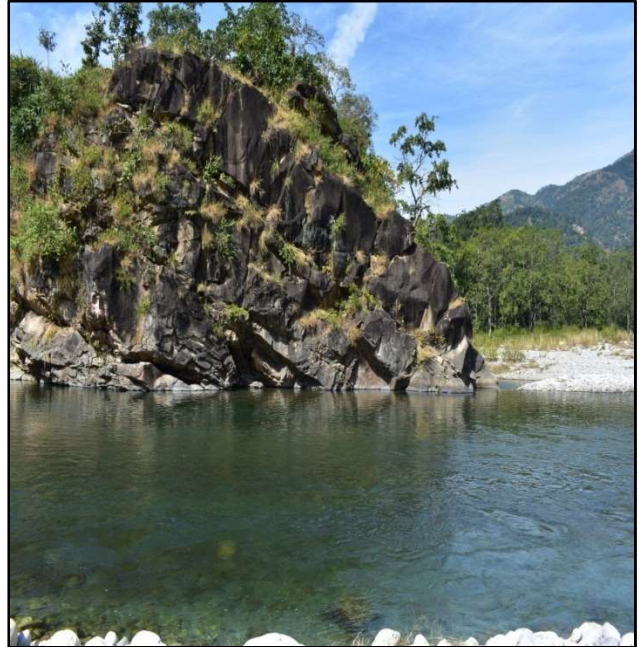
3. Substrate



Site U: Kunkhet (F)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Kunkhet is the last point to which the survey was conducted. In Kunkhet region, 7 pools had been surveyed. The sites are located in the buffer areas of Jim Corbett Tiger Reserve. Pools inhabit good population of *Tor putitora* juveniles and small-sized individuals of different life history stages (fry and fingerlings) have been recorded from this site.

Nursery grounds: Kunkhet areas were found to be home of several potential nursery grounds of golden mahseer including run-habitats, associated, secondary channels and back-water pools. Also, shallow pools were found to have fries and fingerlings of *Tor putitora*, *Barilius bendelinsis* and *Labeo* spp.

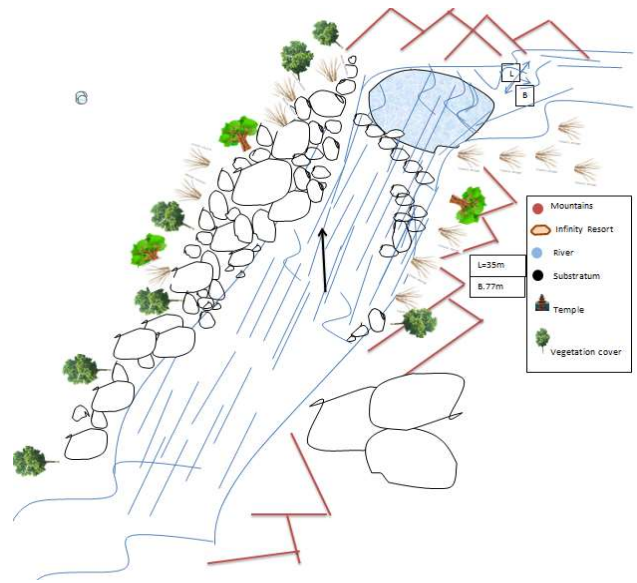
Associated fish diversity: Presence of fish species like *Tor putitora*, *Tor Chilinoidea*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero*, *Labeo rohita*, *Labeo dyecheilous* and big size *Garra gotyla* were found.

Key concern: Illegal and destructive fishing practices.

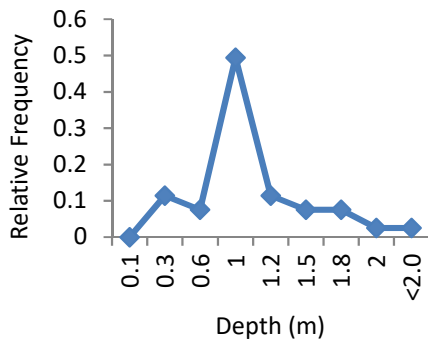
Habitat Fact Sheet (24)

Site Description: Kunkhet (G)

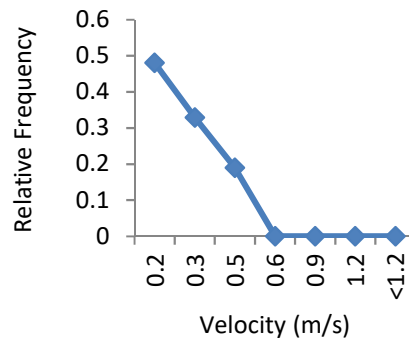
Site ID: Pool (V)	Post- winter	Post- monsoon
Date of survey	02.04.2018	24.10.2018
Time	12:16 P.M	03:05 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	35m	0
Av. pool width (m)	8.77m	0
Av. Pool depth (m)	1.062m	0
Area of pool (m sq.)	484	0
Volume of pool (m cu)	532.4	0
Flow rate (m/s)	0	0



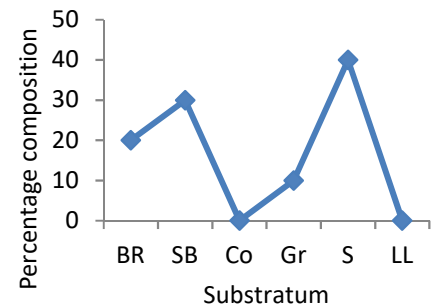
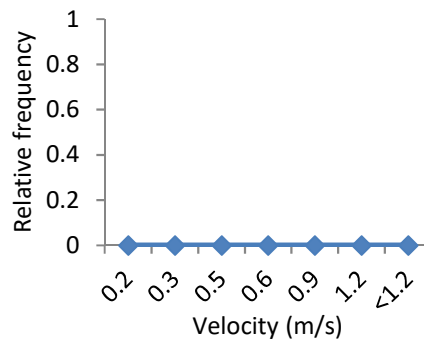
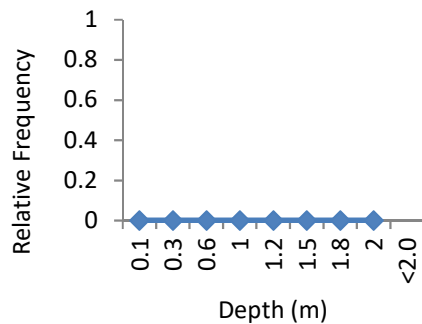
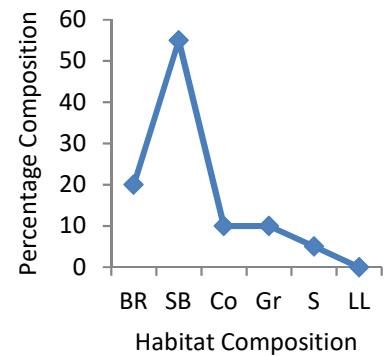
Habitat Inventory: 1. Depth



2. Velocity



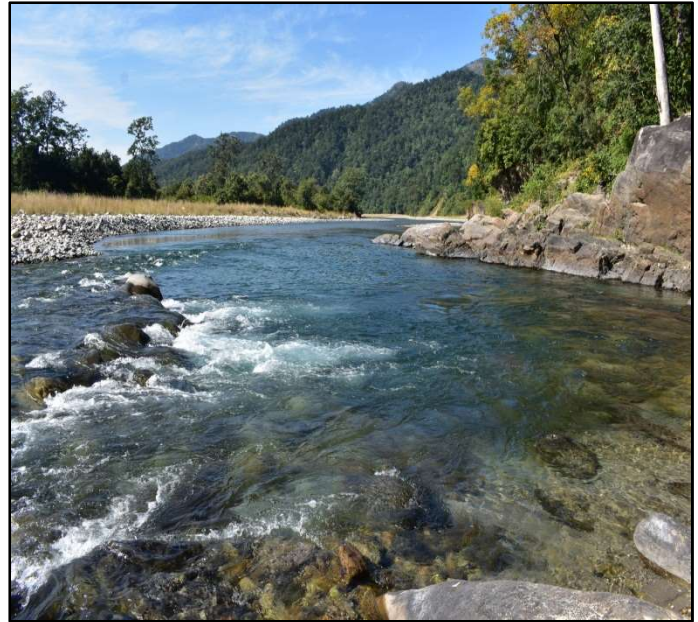
3. Substrate



Site V: Kunkhet (G)



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Status of golden mahseer: Kunkhet is the last point to which the survey was conducted. In Kunkhet region, 7 pools had been surveyed. The sites are located in the buffer areas of Jim Corbett Tiger Reserve. Pools inhabit good population of *Tor putitora* juveniles and small-sized individuals of different life history stages (fry and fingerlings) have been recorded from this site.

Nursery grounds: Kunkhet areas were found to be home of several potential nursery grounds of golden mahseer including run-habitats, associated, secondary channels and back-water pools. Also, shallow pools were found to have fries and fingerlings of *Tor putitora*, *Barilius bendelinsis* and *Labeo* spp.

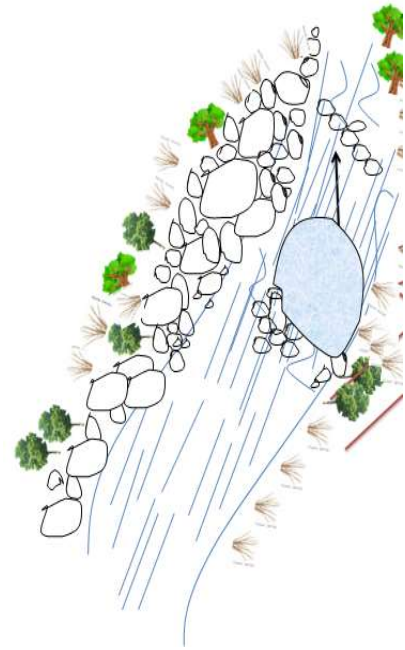
Associated fish diversity: Presence of fish species like *Tor putitora*, *Tor Chilinoidea*, *Barilius bendelesis*, *Barilius vagra*, *Labeo dero*, *Labeo rohita*, *labeo dyecheilous* and big size *Garra gotyla* were found.

Key concern: Illegal and destructive fishing practices.

Habitat Fact Sheet (25)

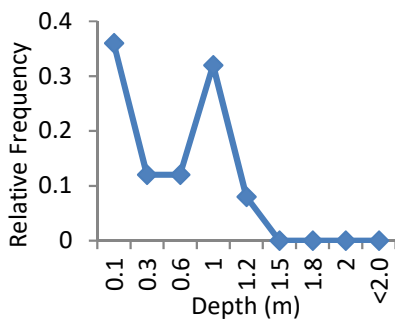
Site : **Bangajala**

Site ID: Pool (W)	Post- winter	Post- monsoon
Date of survey	30.03.2018	30.10.2018
Time	09:20 A.M	11:35 P.M.
Weather	Sunny	Sunny
Av. pool length (m)	30m	10
Av. pool width (m)	5.75m	6.5
Av. Pool depth (m)	0.5m	.55
Area of pool (m sq.)	172.5	65
Volume of pool (m cu)	86.25	35.75
Flow rate (m/s)	0.513	0

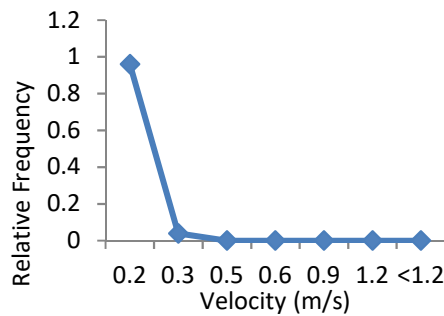


Habitat Inventory:

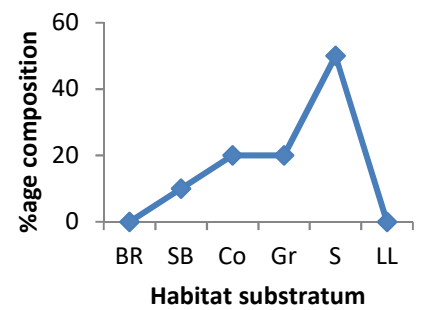
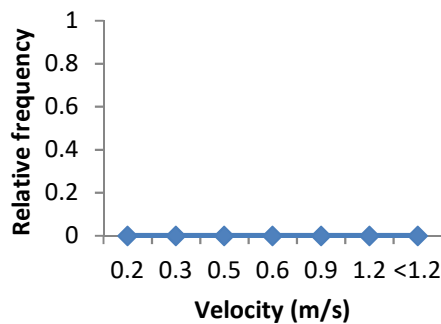
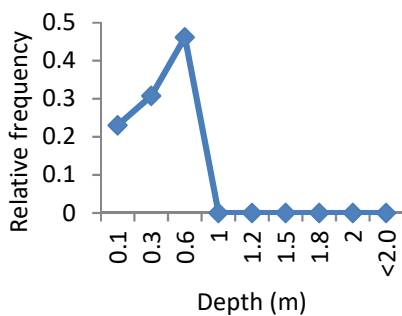
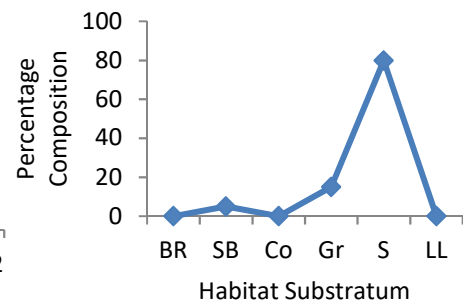
1. Depth



2. Velocity



3. Substrate



Site W: Bangajala



Post winter season (March-April, 2018)



Post monsoon season (Oct-Nov, 2018)

Following the stretch of 24 km of Kosi River, last site that was surveyed for golden mahseer abundance was Bangajala. It is located 4km away from the Kosi Barrage area.

Status of golden mahseer: It is tributary that joins the Kosi River near Ramnagar area. It flows through the Ramnagar forests area and Corbett forest and it is one of the potential sites of golden mahseer individuals away from the

Nursery grounds: This site was remarked as potential breeding grounds for *C. chagunia*, *Tor putitora*, *Barilius bendelisis* and *B. vagra*.

Associated Fish species: The fish species reported were *Barillus bendelisis*, *Barilius vagra*, *Chagunius chagunia*, *Tor putitora*, *Barilius bangana*, *Botia almora*, *Garra gotyla*, and *Channa gachua*.

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