

Impact Assessment of the Traditional Fishing Festival (Maun Mela) of Jaunpuri Community, Uttarakhand (India): A Conservation Approach



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Abstract : The traditional fishing festival (Maun Mela) is an annual community tradition of Gharwal region of Uttarakhand, was started around a century back by the ruler of Tehri, Raja Sudarshan Shah, during the pre-Independence era. In Maun mela, thousands of villagers from Jaunpur (Tehri) and Jaunpur-Bhabar (Dehradun) area, participate and gathering at Aglar River valley where they celebrate the fishing festival. Peoples prepare “Maun powder” using the stem bark, leaves, and seed of the “Timru” plant (*Zanthoxylum armatum*) and pour into the river during the festival. The powder of this plant paralyses the fishes and has easy to its catching during the fishing. `

However, utilization of plant powder as fish poison an easy mean of catching fish but they are unaware of these facts: How this powder affects other aquatic fauna such as amphibians and snakes etc? How they destroy the whole ecosystem of Aglar River? Therefore, we decided to assess the impact of the fishing festival on Aglar river fauna.

The present study, conducted at Aglar River basin, where this traditional festival was organized. During the study, we observed, on the day of celebration there was a mass killing of fish diversity within a short time, among them few species were listed under IUCN red list data book. Moreover, this fishing festival, not only affect fish diversity, a large number of little bugs, insects, butterflies, grasshoppers, spiders, snakes, and amphibians were also affected. The number of dead tadpoles was larger than any other groups.

Therefore, to maintain the diversity of Aglar river valley, it is an urgent need to organize this folk festival sustainably without harming the sentiment of the community. The present study advocate to organize awareness and sensitization program among the peoples about the biodiversity conservation.

Keywords: Maun mela, Timur powder, Biodiversity, Fish killing, and Conservation

Introduction

Rivers are one of the extensively studied ecosystems and most threatened ecosystem worldwide (Li *et al.*, 2010; Saunders *et al.*, 2002). Rivers perform important ecological functions such as the development of ecosystem; enhance productivity, natural flood control and species diversity conservation (Naiman *et al.*, 1993; Kamp *et al.*, 2007). Natural disturbances like flood and fluvial process continually work together in riparian areas to create a unique ecosystem that is essential for biological habitat diversity (Subramanian, 2010; Mohite and Samant, 2013). According to Allen (2004) a healthy and intact riparian area not only protects stream structure but also stabilizes stream banks and riverine ecosystem. The anthropogenic alterations create ecological stresses on riparian ecosystems which are responsible for the change in the pattern of energy flow and also the movements of materials (Structure and

functioning of riparian areas, 2002).

Uttarakhand comes under the North-Western Himalayan region and consist of neighbouring states like Nepal on Eastside, Uttar Pradesh on South Side, Himachal Pradesh on North Side and Punjab, Haryana on West Side. It covers the area around 53,483 km². Altitudinal variation is the principal determinant for natural processes and human activities in Uttarakhand. Sharp changes in elevations over short distances in the mountains, lead to tremendous variations in climate and a profusion of geological, geographical, biological and cultural diversities. Uttarakhand is mainly known for its natural environments and rich biodiversity (flora and fauna); the variety of festivals, fairs and their unique cultural heritage. “Maun Mela” an annual fishing festival is also a unique cultural event held in Jaunpur region of Uttarakhand (Jayant *et al.*, 2016). It is a community event of Jaunpur area where the

entire villager's around 8-10 thousand peoples gathered at a particular location of the Aglar River to celebrate this festival. Thousands of villagers and some tourist attend this traditional fishing festival. Aglar River is a major tributary of the river Yamuna. River ascends as various small streams bolstered by underground water on the western slopes of the ridge isolating the drainage of the Yamuna and Bhagirathi towards the west of Tehri (<https://www.britannica.com/place/Yamuna-River>). From that point, the Aglar runs along an east-west direction to join the Yamuna River near a place called Yamuna Bridge. The small streams draining the northern slopes of the Mussoorie ridge contribute their water to this river. During the festival they use a traditional method for fishing which is to dissolve handmade powder of a specific plant Timur (*Zanthoxylum armatum*), results in the partial paralysis of fishes (Singh *et al.*, 2016). The preparations begin from one or two months before the fair, by making powder locally named as “Timru”

for catching the fishes. The powder made by grinding the bark, leaves, and fruit of the Timur plant (Fig. 1). Timur is a shrub belonging to the family Rutaceae locally named Tejphal (Hindi), Tejowati (Sanskrit), Mukthruhi (Manipur) and Timur (Nepal) (Singh and Singh, 2011). It is found in the warmer valleys of the Himalaya, ranging between 1000-2100 m above sea level and also grows in the lesser Himalayan range in the northeastern part of India. Timur is used in curing various common ailments such as a toothache, common cold, cough, and fever. Young shoots of Timur are used as toothbrushes and powder made from the dried fruit for cleaning teeth (Kala *et al.*, 2005). On occasion of festival tones of Timru powder by the host villagers is thrown into the Aglar River. After the powder thrown into the river, the fish get suffocated and come up near the surface water, so that they get trapped easily by the net and even catches by hands. Such kind of fishing practice showed a negative impact on river biodiversity.

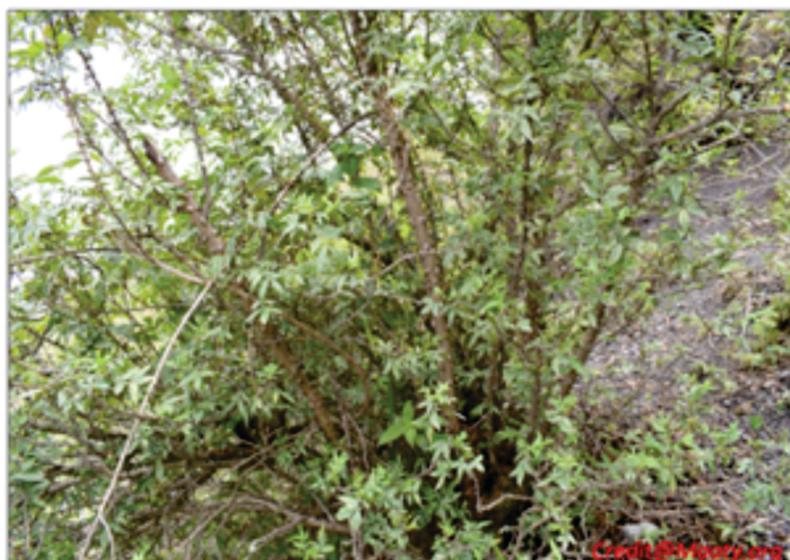


Fig. 1: Timur Plant (*Zanthoxylum armatum*)



Fig. 2: Mass gathering of local communities during the Fishing festival

In the present study, we covered the area alongside the Aglar River, which is a tributary to River Yamuna in Jaunpur area of Tehri District in Uttarakhand, where a yearly fishing festival (Maun Mela) is organised in which more than 5,000 people participate to catch fishes in the river (Fig. 2). Such a mass gathering of people causes sudden stress in an otherwise pristine and secluded area. This study is aimed at observing the impact of Maun Mela on faunal diversity of Aglar River as well as river basin.

Materials and Method

Duration of Study: The present study planned to find out impact of the fishing festival on the biodiversity of Aglar River ecosystem. Therefore, we planned this study in two phases 1st pre-study conducted (3 three days) to assess the faunal biodiversity of Aglar River basin and second phase of the study conducted for 2 days to evaluate the effects of anthropogenic pressure (in the form of Maun Mela) on the river, and faunal components.

Study area: The present study was conducted in a 4 km upstream stretch along with the Aglar River from the point

of its confluence with Yamuna River, in Jaunpur district of Uttarakhand (Fig.3). There is a specific location which is pre-decided and it acts as the starting point of the festival, it is believed that the king poured and dissolved the Timur powder first time ever from this place. There is a huge rock where they amass all the Timur powder bags.



Fig. 3: Aglar River valley, red solid line indicate the Fishing festival river stretch.

Result & Discussion

During the study we noticed, ca. 5000-7000 peoples of Jaunpur community entered into the Aglar River together and within a short time, they destroyed the Aglar river aquafauna along with some riparian faunal diversity. We

witnessed a large number of dead small fishes, frog tadpoles, snakes and insects species were dispersed on the river basin. Apart from, avian species were also affected during the festival.

Table 1. Details of group, family and no. of species observed around the Aglar river valley during the present study.

S.NO.	GROUP	FAMILY	NO. PECIES	S.NO.	GROUP	FAMILY	NO. PECIES
1	Fish	Cyprinid	7	26		Emberizidae	1
2		Balitoridae	1	27		Paridae	1
3		Sisoridae	1	28		Cisticolidae	2
4	Butterflies	Nymphalidae	23	29		Hirundinidae	3
5		Papilionidae	6	30		Pycnonotidae	3
6		Pieridae	7	31		Phylloscopidae	2
7		Hesperiidae	1	32		Leiothrichidae	2
8		Lycaenidae	4	33		Sturnidae	4
9	Birds	Columbidae	6	34		Cinclidae	1
10		Cuculidae	4	35		Muscicapidae	8
11		Pelecanidae	2	36		Phasianidae	1
12		Charadriidae	1	37		Laniidae	1
13		Accipitridae	7	38		Zosteropidae	1
14		Strigidae	2	39	Snakes	Colubridae	3
15		Megalaimidae	3	40	Frog	Dicroglossidae	3
16		Alcedinidae	3			Bufonidae	2
17		Meropidae	2	41	Spider	Lycosidae	3
18		Psittaculidae	2	42	Grasshopper	Acrididae	14
19		Dicruridae	2	43	Beetles	Geotrupidae	2
20		Corvidae	6	44		Hybosoridae	3
21		Monarchidae	1	45		Scarabaeidae	2
22		Nectariniidae	1	46	Odonate	Libellulidae	5
23		Chloropseidae	1	47		Coenagrionidae	3
24		Estrildidae	1	48		Platycnemididae	1
25		Passeridae	3	49		Aeshnidae	1
				50		Libellulidae	5

Impact of Maun Mela (Fishing festival) on fish diversity

Field study during the festival has revealed a worrying picture, the large quantity of Timur results in the excessive mass killing of fish diversity. Timur powder not only paralyzed the bigger fish it also affects the smaller fishes like *Nemacheilus* sp and *Glyptothorax* sp which is not likely to eat by villagers but it is also killed. Most of the fish species caught were below their 1st sexual maturity. *Schizothorax* sp (locally known as Pahari Machi) found in the majority in number during the festival followed by *Tor* sp, *Barilius* sp, *Glyptothorax* sp, and *Nemacheilus* sp. Therefore, these species of fishes may be facing the greater risk of killing during the festival. In the post-examination of the festival different species of fishes were found dead near the river like *Barilius bendelisis*, *Bagarius bagarius*, *Tor putitora*, *Tor tor*, *Schizothorax richardsonii*, *Glyptothorax* sp, *Nemacheilus* sp, *Puntius ticto*, *Lepidocephalus guntea* etc. Numbers of small fishes were found during post-study because the villagers don't want to eat small fishes and they remain these fishes beside the river (Fig. 4).



Fig. 4: Image showing the impact of fishing festival on fish diversity.

The Aglar River supports breeding habitat for fish species such as the Endangered *Tor putitora*, Near Threatened *Bagarius bagarius*, and **Tor tor**, the **Vulnerable** *Schizothorax richardsonii* (Gupta *et al.*, 2016). However, Maun Mela has always celebrated in end of June month (28 or 29 June) and this time coincided with the arrival of the migratory fishes (i.e. *Tor putitora*, *Bagarius bagarius*, *Tor tor*, and *Schizothorax richardsonii*) to the Aglar from the Yamuna. During the onset of rainy season fishes (species which is found the majority in number during the Maun Mela) migrates towards the higher streams for breeding and spawning. Therefore, these types of practices of killing fishes are the major threat for the migratory fish species. Maun Mela has begun to take a toll on the aquatic population with the use of bleaching powder and electricity to kill and catch fish, which include migrating fish

travelling through this stretch to reach their higher breeding grounds. The number of fish arriving at the breeding grounds has begun to decrease in recent years. According to local villagers, the size and number of fish caught annually from the Aglar have declined over the past years. However, Fish is a good indicator of aquatic habitat health and possible environmental change, the status of any river system can be determined by the quality and quantity of fish species reported from it (Kumar *et al.*, 2013). There have been some studies related to the environmental changes in the riparian system and many authors have recorded supporting observation (Bhat, 2003; Sreekantha *et al.*, 2008 Bhatt *et al.*, 2016). Some previous studies revealed that even slight change in the watershed has an inevitable impact on the biodiversity in the riparian systems.

Impact of Maun Mela (Fishing festival) on Avifauna diversity

Aglar River valley is extremely rich in avifaunal biodiversity and hosts a large number of species of birds. During the survey conducted before the Maun Mela, more than 72 Species of birds were recorded. Although, during the festival 5,000 to 7,000 people visited the area for celebrations which caused huge anthropological pressure that drove the birds away. Only 18 species of birds were recorded during the festival out of the total 72 species. The birds reported during the festival were mostly those species that have acclimatised themselves to live along with the human habitations like, Sparrows, Crows, Swallows etc. The presence of such large number of humans in the area posed the great threat to ground-nesting birds like Red Wattle Lapwing and those whose nesting preference is close to the surface, like Swallows, Swifts, and Scaly-breasted Munia etc.

Impact of Maun Mela (Fishing festival) on herpetofauna diversity

The Fishing festival not only affects the fish population, but also to herpetofauna in the valley that depends upon the river for feeding. During the study, we found 23 dead snakes including 3 species i.e. *Amphiesma stolatum*, *Xenochrophis piscator* and *Ptycus mucosa* and number of dead individual of frog species where five major species included i.e. *Fejervarya limnocharis*, *Euphlyctis cyanophlyctis*, *Duttaphrynus melanostictus* and *Duttaphrynus stomatictus*. Subsequently, so many undeveloped frogs (tadpoles) were found dead due to the disturbance in the river stream. Even we can say the tadpoles were the major targeted by this festival. Uncountable tadpoles were found beside the Aglar River during the post-study (Fig. 5).



Fig. 5. Image showing impact of fishing festival on herpetofauna and ambhiance diversity

However, Snakes play a vital role in the river and aquatic food chain as it controls the population of fishes, frogs and other smaller animals. There is a very common misconception about snakes is that all are venomous and harmful for humans but that is not correct, a very low percentage of all snake species are venomous. But people often fall for the misconception part and it reflected in the fishing festival because the villagers killed almost every snake they found and as a result, according to villagers in case of snakebite, the subject remains alive due to the majesty of the fishing festival.

Similarly, Amphibians like frogs are a good indicator of the pollution and toxicity level in the water stream. Their porous skin stores some toxic substances over the period and Timur powder which is dissolved in water may be harmful to the frog and its predator too. Previous study proved Amphibians and reptiles are important vertebrates to monitor when habitats are being altered and rehabilitated because they respond to structural changes in habitat

(Pianka 1967; Jones 1981), they can be used as indicators to understand the effects of modifying riparian habitats (Bateman *et al.*, 2008), and are good indicators of riparian ecosystem structure and function (Welsh and Hodgson 1997).

Impact of Maun Mela (Fishing festival) on Entomofaunal diversity

During the study, we reported number of butterflies (n=40 species), spiders (n=5 species.), beetles (n=7 species), grasshoppers (n=14 species) and odonate (n=15 species) (Table 1). The Timur powder affects fishes as it makes them inert and unconscious, if it is affecting fishes at this intensity then the smaller organisms and other invertebrates will face a larger threat and many other species of insects were found dead during this festival. Many insects like butterflies and moths have specific host plants for egg-laying. This fishing festival is making an awful impact on butterflies especially because it is held in the monsoon period of the year when it is their breeding and mating

season. In this situation, if their eggs get destroyed, a whole generation will be wiped out from a particular location.

A very interesting observation about this fishing festival is that is the main centre point of this festival the Timur (*Zanthoxylum armatum*) plant is one of the host plants of a beautiful butterfly called Spangle (*Papilio protenor*). A host plant is an integral part of a butterfly's life cycle and without it a whole generation of butterflies get affected and that's why the cutting down of Timur plant for the extraction of Timur powder which is used as a fishing component is a horrid anthropogenic act and it is affecting directly a species of the ecosystem. The more interesting fact is that the butterflies are one of the largest contributors in pollination and if the population of Spangle butterfly goes down it will adversely affect the pollination of Timur plant which will

result in lesser productivity and there will be a significant decline in quantity and quality of Timur over the period.

In the life cycle of odonate which includes dragonflies and damselflies, they are fully dependent on water in the larval phase cannot survive without water and when their metamorphosis takes place they shed off their skin or outer covering to grow and step into the next stage of life. A possible impact of the fishing festival is it the disturbance in water forced these odonate larvae to shed their skin off earlier than regular time. During this early process can be fatal for these larvae because they will not be fully grown and developed to face the harsher microclimatic conditions out of the water. This disturbance in the stretch of river Aglar is impacting directly these numerous odonate larvae (Fig. 6).



Figure 6. Image showing impact of fishing festival on entomofaunal diversity

Threats to natural resources

Maun Mela not only affects the aquatic animals but also the natural environment. During the site visit, some wastes were found. Along with the Timru powder, several other items are immersed in the water such as plastic bags, fishing net, and slippers making the water dirty and impure. The larger plastic bags of Timru powder are also left behind in the river bank. The dumping fishing net in the river or outside the river may result in the entrapment and death of aquatic animals. The fishes of the river depend upon the physicochemical parameter and the disturbance on these parameters of the river also affects the fish diversity. During the Maun Mela increase level of one such parameter turbidity increase the risk of fish mortality.

Conclusion

Continuously increasing anthropogenic activities are the biggest reason of stressed freshwater ecosystems and species. As compared to the terrestrial ecosystem freshwater species are at higher risk of extinction. The Maun Mela is an important festival of the Jaunpuri community help in strengthening the unity among the different villagers. But apart from all this unity and cultural integrity, the fest also has some negative impact on biodiversity. Due to lack of knowledge and awareness towards the environment the people unintentionally causing harm to the aquatic and their surrounding biodiversity.

Maun Mela was a live example of human intervention playing a major role in disrupting the ecology of the region. Lots of species lost their physical space and food for their survival. This threat may be the beginning of species disappearance from a certain region due to change in their habitat. The species will face the major existential crisis if this continues. And this, in the long run, leads to species extinction. To save the ecology of the region, conservation steps should be taken to safeguard the lost biodiversity and normalize the disturbance in their habitat. To carry out conservation practices anywhere, the most necessary role is played by humans and therefore people must be educated, so that they learn about the importance of every organism in the ecosystem.

However, instead of causing threats to biodiversity by killing fish with toxic powder it should be celebrated in a sustainable way by creating awareness to explain the spirituality of their traditions and culture. It must also be celebrated with the spirit of ecological sustainment and protection. The religious, cultural and historical role of this fair is important in creating the ground for the development of eco-tourism and help to spread information and knowledge of their cultural heritage (folk songs, dance, food etc.).

Awareness programmes should be play a major role to

sensitize people about the issues of environmental degradation which occur during the fair, spread knowledge about the importance of fishes and other aquatic diversity and the impact of illegal fishing practices on fishes to conserve natural resources.

Dumping of waste is an important issue seen during the field visit. So well organized sanitation by putting garbage containers at the locations is the essential condition for making this fair sustainable and eco-friendly. Biodiversity of aquatic animals including cold water fisheries sector in open water bodies, is facing several threats and several species of fishes found in the Yamuna are on the verge of extinction and due to an increasing number of human interferences including, harmful fishing practices using plant extract adding the additional pressure on the fish's diversity which result in declining of fish population of Aglar River as well as Yamuna river.

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References

- Allan J.D. (2004): Landscapes and Riverscapes: The Influence of Land Use on Stream Ecosystems. Annual Review of Ecology, Evolution, and Systematics, 35:257-284.
- Bateman H.L. Chung-MacCoubrey A. and Snell H.L. (2008): Impact of non-native plant removal on lizards in riparian habitats in the southwestern United States. Restoration Ecology 16:180-190.
- Bhat A. (2003): Diversity and composition of freshwater fishes in river system of Central Western Ghats, India, Environmental Biology of Fishes, 68: 25-38.
- Bhatt J.B. Awaz F. Nissa K. (2016): Study of fish ,species diversity and relative abundance of fishes in river Yamuna of western doon uttrakhand.international journal of fisheries and aquatic studies, 4 (4):347-350.

- Jones K.B. (1981): Effects of grazing on lizard abundance and diversity in Western Arizona. *The Southwestern Naturalist* 26:107-115.
- Kumar Naik A.S. Benakappa S. Somashekara S.R. Anjaneyappa H.N. Jitendra Kumar. Mahesh V. Srinivas H. Hulkoti and Rajanna K.B. (2013): Studies on Ichthyofaunal Diversity of Karanja Reservoir, Karnataka, India, *International Research Journal of Environmental Sciences*, 2 (2): 38-43.
- Kamp U. Binder W. And Holzl K. (2007): River habitat monitoring and assessment in Germany, *Environ Monit Assess*, 127: 209–226.
- Kala C.P. Nehal A. Farooque and Dhar U. (2005): Traditional Uses and Conservation of Timur (*Zanthoxylum armatum* DC.) through Social Institutions in Uttaranchal Himalaya, India, *Conservation and Society*, 3 (1): 224-230.
- Li Li. Binghui Z. and Lusan (2010): Biomonitoring and Bioindicators Used for River Ecosystems: Definitions, Approaches and Trends, *Procedia Environmental Sciences*, 2: 1510-1524.
- Mohite S.A. and Samant J.S. (2013): Impact of Environmental Change on Fish and Fisheries in Warna River Basin, Western Ghats, India. *International Research Journal of Environmental Sciences* 2 (6): 61-70.
- Naiman R, De'camps H. and Pollock M. (1993): The role of riparian corridors in maintaining regional biodiversity, *Ecological application*, 3: 209–212.
- Pianka E.R. (1967): On lizard species diversity: North American flatland deserts. *Ecology*, 48:332-351.
- Singh J.P. Kumar A. Patiyal R.S. Pal A. Bisht A. Chandra S. And Abidi R. (2016): Traditional Community Fishing Festival (Maund Mela) of Garhwal Himalaya, Uttarakhand Using *Zanthoxylum armatum* (Timur). *World Journal of Fish and Marine Sciences* 8 (2): 123-128.
- Sharma K. Gupta N. Johnson J.A. and Sivakumar K. (2016): 'Fish festivals' in the Garhwal Himalaya: conservation options amidst age-old practices. *Current Science*, 110 (7): 1155-1156.
- Sreekantha K.V. Gururaja and Ramachandra T.V. (2008): Nestedness pattern in freshwater fishes of the Western Ghats: an indication of stream islands along riverscapes, *Current Science*, 95 (12): 25.
- Saunders D. L. Meeuwig J. J. Vincent A. C. J. (2002): Freshwater protected areas: Strategies for Conservation, *Conservation Biology*, 16 (1): 3041.
- Subramanian K. A. (2010): Biodiversity and Status of Riverine Ecosystems of the Western Ghats, Centre for Ecological Sciences, Submitted to Western Ghats Ecological Expert Panel (Unpublished).
- Singh T. P. and Singh O. M (2011): Phytochemical and pharmacological profile of *Zanthoxylum armatum* DC.-An overview. *Indian Journal of Natural Products and Resources*, 2(3): 275-285.
- Structure and functioning of riparian areas. National Research Council. (2002): *Riparian areas: functions and strategies for management*. Washington, DC: the national academies press. Doi: 10.17226/10327
- Y a m u n a R i v e r : R i v e r , I n d i a . <https://www.britannica.com/place/Yamuna-River>. Retrieved from 7 August 2019.
- Welsh H.H. and Hodgson G.R. (1997): A hierarchical strategy for sampling herpetofaunal assemblages along small streams in the western U.S., with an example from Northern California. *Transactions of the Western Section of the Wildlife Society*, 33:56-66.

