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Diversity and Seasonal Variations of Zooplanktons in Jawai Dam, Pali, Rajasthan

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ABSTRACT: Jawai Bandh is a dam built across the Jawai River, a tributary of Luni River, in Rajasthan.^[3] The dam is situated near Sumerpur town in Pali District of Rajasthan state in India. The dam was built by Maharaja Umaid Singh of Jodhpur.

The idea of building a dam over River Jawai was conceived in 1903 as its flooding waters caused heavy damage in Pali and Jalore district during monsoon. It was finally given shape in 1946. The project was to construct a dam across the river, creation of water reservoir, which could be used for water irrigation and hydel power generation.^[4] The work started on 12 May 1946. By 1951, when first 5-year plan was launched, nearly 124 Lakh Rupees were already spent on this project. The hydel project was suspended, since sufficient pressure was not likely to be available throughout the year, after meeting the irrigation demand. Revised estimated cost was revised to Rupees 300 Lakhs. Project completed in 1957.^[4]

KEYWORDS: Jawai Dam, Pali, Rajasthan, zooplanktons, seasonal variations

I. INTRODUCTION

This dam covers an area of 13 km². This is the biggest man made dam in western Rajasthan. The dam has the capacity of 7887.5 million cubic feet and covers an area of 102,315 acres (414.05 km²) of cultivable command area.^[5] Its height is about 61.25 feet (18.67 m). Sei Dam and Kalibor Dam are the feeder dams of the Jawai Dam. The catchment area of the dam site is 720 square kilometres, and the basin is in the shape of a fan.^[3]

It is the main water supply source for Pali district. If there is sufficient water in the dam, then some villages of Jalore district and Pali district get water for irrigation from the Jawai Dam, which was the main aim in making this dam.^[4]

The Jawai Dam water dispute in Rajasthan's Jalore district revolves around the release of water from the Jawai Dam, constructed on a tributary of the Luni River, and has been a contentious issue since the dam's inception in 1957. The dispute has culminated in a significant protest, popularly known as a 'mahapadav', staged by hundreds of farmers demanding a rightful share of the dam's water.

Background and Construction

The Jawai Dam, located on a tributary of the Luni River, was built to harness water resources for agricultural and irrigation purposes. However, its construction led to an ongoing dispute over the allocation of water, particularly for the farmers in Jalore district. This dispute has persisted for decades and has resulted in adverse consequences for the farming communities in the region.

The Mahapadav Protest

In an effort to draw attention to their plight and demand a fair share of water from the Jawai Dam, hundreds of farmers from 186 villages in Rajasthan's Jalore district initiated a 'mahapadav' or a prolonged sit-in protest. The protesters, primarily from villages situated along the Jawai River, have been living at the district headquarters in Jalore. Their core demand is for the release of one-third of the water stored in the dam to ensure a natural flow into the Jawai river. This natural flow is seen as crucial for replenishing groundwater levels and supporting crop irrigation.

Demands and Concerns

The protesting farmers are united in their demand for a share in the water resources of the Jawai Dam. They highlight that the dam's construction has led to a reduction in the natural flow of the Jawai River, negatively impacting their ability to draw water from wells and tubewells. As a result, many of these water sources have become unfit for use, affecting agricultural activities and livelihoods in the region.



Government Response and Way Forward

The state government's response to the farmers' demands has been a matter of contention. Despite the allocation of funds for the dam's recharge, there has been limited progress in addressing the concerns raised by the farmers. The protesters continue to assert that their struggle will persist until a comprehensive solution is reached.

Biodiversity

Jawai is known for its leopard sightings,^[6] bird watching,^[7] and a large crocodile population. Many migratory bird species are spotted here during the winter season.^[8] And as of 2020, there were 377 crocodiles in Jawai Dam.^[9]

II.DISCUSSION

In the present work, seasonal variations of zooplankton and selected physico-chemical parameters were studied in Jawai Dam, a large man-made reservoir in Udaipur (Rajasthan). In the study period, 51 species of zooplankton - 17 species of Rotifera, 18 species of Cladocera, 5 species of Ostracoda and 4 species of Copepoda were observed. Among zooplankton, Rotifera was (727 No.1-1) observed as the dominant group throughout the study period and the highest count was recorded in the summer or pre-monsoon period while low incidence was observed in winter season. Zooplankton community is also correlated with certain physico-chemical parameters. The results of this study indicate that the distribution and density of zooplankton species were influenced by prevailing physical and chemical factors of the aquatic environment. The most characteristic criterion to assess the trophic structure of Jawai Dam remains to be primary productivity studies. The food chain in Jawai Dam is very simple comprising phytoplankton and aquatic vegetation as primary producers, zooplankton as primary consumers, small fishes as secondary consumers and large fishes as tertiary consumers. Plankton is the most sensitive floating community which is being the first target of water pollution, thus any undesirable change in aquatic ecosystem affects diversity as well as biomass of this community. The measurement of planktons productivity helps to understand conservation ratio at various trophic level and resources as an essential input for proper management of dam

Fishes occupy all three levels such as primary, secondary, tertiary consumer of food web in aquatic ecosystem. Man being the top carnivore in this food system as it is a very good source of protein. Fish protein is supposed to be cheapest. The production of million calories would take 15- 20 mandays by fishing and 56 mandays by beef farming (Rath, 2000). The investigations on the Indian fresh water fishes have mainly been restricted to taxonomy (Talwar and Jhingran 1991, Jayaram 1999). As Udaipur is blessed with good number of lakes and known as 'The city of lake'. Every year, lacs of tourist come from all over the globe to visit udaipur city and lake provide water to the city dweller. So study on Limnological characteristic of Jawai Dam has high importance, the study of their trophic status may help in optimum utilization and conservation. Therefore, the present investigation attempt to study of Limnological parameter and their relationship, phytoplankton, zooplankton status and diversity and fishes (species) in Jawai Dam Udaipur (Rajasthan) during the study period.

Table 2: Average physico- chemical parameters and primary productivity at four stations of Jawai dam

Sr No	Parameters	Station A	Station B	Station C	Station D	Mean	SD
1.	Air Temperature ($^{\circ}\text{C}$)	29.69	29.70	29.81	29.74	29.73	0.05
2.	Water Temperature ($^{\circ}\text{C}$)	23.16	23.25	23.27	23.17	23.22	0.05
3.	Depth of Visibility (cm)	113.90	112.60	106.20	114.90	111.90	3.91
4.	pH	8.06	8.16	8.07	8.06	8.09	0.05
5.	EC (mS/cm)	0.41	0.40	0.41	0.41	0.41	0.005
6.	TDS (mg l^{-1})	261.80	259.90	260.70	260.20	260.65	0.83
7.	Dissolved O_2 (mg l^{-1})	8.06	8.30	8.00	7.95	8.08	0.15
8.	Free CO_2 (mg l^{-1})	0.00	0.00	0.00	0.00	0.00	0
9.	Carbonate Alkalinity (mg l^{-1})	4.20	4.40	4.00	4.00	4.15	0.19
10.	Bicarbonate Alkalinity (mg l^{-1})	107.20	108.40	110.60	107.40	108.40	1.56
11.	Total Alkalinity (mg l^{-1})	111.40	112.80	114.60	111.40	112.62	1.52
12.	Total Hardness (mg l^{-1})	153.50	154.40	152.70	147.9	152.13	2.90
13.	Nitrate-N (mg l^{-1})	0.015	0.017	0.018	0.014	0.016	0.002
14.	Ortho-P (mg l^{-1})	0.024	0.025	0.025	0.021	0.024	0.002
15.	Gross Primary Productivity ($\text{gCm}^{-3}\text{h}^{-1}$)	0.110	0.113	0.111	0.110	0.111	0.001
16.	Net primary productivity ($\text{gCm}^{-3}\text{h}^{-1}$)	0.066	0.065	0.067	0.064	0.065	0.001
17.	Community Respiration ($\text{gCm}^{-3}\text{h}^{-1}$)	0.045	0.047	0.044	0.046	0.046	0.001

For Plankton study, samples were collected from surface water, littoral region and bottom mud. For qualitative analysis, the plankton samples were collected by towing Hensen's standard plankton net with uniform speed. The net was made of no. 25 bolting silk. The plankton sample so collected was fixed in 70% ethyl alcohol. For quantitative



estimation of the zooplankton, 50 litres of surface water was filtered through a small plankton net made up of the bolting silk number 25. Subsamples of small quantities (10 ml) were taken and counting of zooplankton was done in counting chamber under a C.Z. Inverted microscope. Zooplankton numbers were expressed as individuals per liter. Identification of zooplankton was done after (George, 1961; Edmondson, 1992; and Perumal et al., 1998). Air temperature varied between 22° C in winter to 39.4° C in summer. Water temperature was observed to be highest during 2006-07 (33.9° C) and lowest during winter 2005-06 (18.2° C). The overall average value of air and water temperature was 31.28° C and 27.3° C respectively. A good synchronization between temperature and dissolved oxygen was seen. Temperature showed a significant inverse relationship with dissolved oxygen. Such an inverse relationship has also been observed (Ranu, 2001; Chisty, 2002; Sumitra et al., 2007; Sharma, 2007).

Jawai Dam harbour diverse taxonomic groups of zooplankton representing Protozoa, Rotifera, Cladocera, Copepoda and Ostracoda. During present investigation, 9 forms of protozoans belonging to 8 genera and 9 species were reported. Rotifers were represented by 20 genera and 40 species. Along with these, 29 species of Cladocerans belonging to 12 genera, and 10 genera and 11 species belonging to Copepoda are enlisted. Besides these, 5 species of Ostracoda were also recorded. After including occasional zooplankters like insects and their larvae, crustacean larvae, spiders and mites total 104 forms of zooplankters were recorded. According to the Menhinick's index of diversity, Rotifers indicated highest diversity throughout the study period followed by Cladocerans, Protozoans, Copepods, Ostracods, Insects and others. In the present investigation, 15 species of fishes belonging to 6 family and 13 genera were reported from Jawai dam namely *Notopterus notopterus*, *Catla catla*, *Cirrhinus cirrhinus*, *Ctenopharygodon idellus*, *Labeo gonius*, *Labeo rohita*, *Puntius sarana sarana*, *Puntius ticto*, *Chela cachius*, *Garra gotyla gotyla*, *Aorichthys seenghala*, *Mystus cavasius*, *Heteropneustes fossilis*, *Xenentodon cancila* and *Gambusia affinis*

III.RESULTS

“Jawai has everything that is needed for making a rejuvenated vacation” Quaint small village of Jawai is named after Jawai river which is now a prominent attraction for nature lovers. Mainly referred to as Jawai Dam, this village is located in Sumerpur Tehsil of the Pali district in Rajasthan. It is a uniquely mystifying place that stands as a testimony of harmony between humans, animals, and splendid nature. Engulfed by the mighty hills and granite rocks adds a unique charm to its beauty that surrounds the area stunningly in its own way. Being a home of many exotic fauna species like leopards, birds, and crocodiles, Jawai Wildlife Sanctuary is a great place to experience its rich wilderness beauty.

This serene place is a great attraction for everyone who loves to drown completely in the adorable natural beauty of Jawai. This place can be truly called a miracle of nature where the mingling of the leopard with the ordinary life of the village people is a point of attraction and is now the talk of the town. The memories of this amazing escape in the breathtaking surroundings get etched in the memories of our guests with a “fondness forevermark”. Jawai River is a tributary of Luni, the dam is an exquisite place to capture the panoramic views of Jawai. Constructed during 1946, Jawai dam took 11 years to get completely constructed. Being the biggest dam in Western Rajasthan, it covers acres of land which offers a perfect sight of sunrise or sunset.

Enjoying crocodile sightings and bird watching from the dam while experiencing the wilderness of Jawai has more than what one is seeking in this ambient place. It is one of the eminent places of attraction in Jawai from where you can see the entire village along with the scenic backdrops of hills. The panoramic views it offers will let you immerse in the magnitude of Jawai.

Jawai Leopard Safari

Jawai Leopard is the heart and soul of this undisturbed place splendidly spread in acres of land with blistering beauty. Be it spending time watching this shy cat playing with its family or capturing its stunted prey style, Leopard of Jawai are distinguishably famous among wildlife enthusiasts. Undoubtedly, leopards are the major attraction of Jawai which attracts tourists and wildlife enthusiasts in a great way. The most interesting part of enjoying Jawai Leopard Safari is that these leopards are familiar with the locals, so you can easily find them wandering around the reserve area. Ages have been passed and leopards of Jawai are not only seen as an indispensable part of this place but also looked upon as a sacred duty of the locals to protect and respect their existence.

This may sound different but the reality check is just like what is enumerated here. This cohabitation with humans has continued for centuries and has now become the most attractive part of Leopard Tourism in Jawai. The main occupation in which Leopards of Jawai keep busy is to chill out in the breath-taking ambiance of the jungle of Jawai. Thus, Leopard Sighting in Jawai is full of fun and exciting because they can be easily located in their natural habitat.



People love to spend hours just watching the pack of this wild cat engaged in its daily chores, undisturbed by rustling of leaves and continuous sound of birds.

Jawai Crocodile Reserve

The elongated stretch of Jawai River makes it the best place to spot crocodiles in their natural habitat. The flowing Jawai Rivers makes itself an excellent place for breeding of Indian Mugger Crocodile making it a famous Crocodile Reserve of Jawai. These reptiles are often seen basking and hunting on the river banks making another engaging and major central attraction during tours of Jawai. The population of more than 250 crocodiles makes it a promising experience full of adventure especially when this lazy looking buddy makes a very unalarmed and spontaneous attack on its prey.

One can always find this colony of Indian Muggers of Jawai basking over the dam side. Summers are quite difficult but winters and monsoon makes the sighting quite an interesting experience here. The moment when they go back to water

to resume hunting, their hide can be noticeable when they rest at the shore.

Birding in Jawai

The unique biodiversity of this place attracts birds of a special class and variety that add gems to its insurmountable beauty. Jawai is a heavenly place for bird-watching which can be well-experienced during the months of October and March. During these months, many beautiful migratory birds shelter in the Jawai Dam. The classification of bird families can be majorly done as Migratory, Raptor Family and Local Birds of Jawai that together makes the birding experience a great idea for a vacation wrapped in the arms of nature.

Blessed with such a great variety of birds, Jawai is absolutely a beautiful paradise for bird-watchers. The major varieties of birds like Pelican, Painted Stork, Eurasian Roller and Ruddy Shelduck as migratory birds, among raptors black winged kite, white eyed buzzard, Egyptian Vulture, and Osprey tops the list and in local birds it is super lovely to spot Pallas Gull, Little Cormorant, Knob-Billed Duck White Tailed Lapwing and Purple Heron. This would be a great place to enjoy your mind-blowing escape in the natural ambiance of Jawai.

Tribal Tour in Jawai

The Rebaris- These tribal natives of Jawai are the tribe who rear cattle and engage in farming for their living. The place has been inhabited by this tribe for centuries as the guard of nature and wildlife care taker in Jawai. It is not that technology hasn't reached them or they are incapable of moving to some big town, in fact it is super amazing to interact with locals of Jawai in fluent English ! but keeping this classic rural beauty intact makes this place the most desired place for spending a peaceful vacation of its kind. Watch out the cooking style of the tribes who cook food in earthen hearts and have an amazing sense of Rajasthani hospitality.

We conduct a special walk through the villages to give you an insight into their rural lifestyle. It would be an excursion of a lifetime for you and an ethereal experience that you won't be able to forget. Stroll through the mud houses and allow everyone to witness their lives as you go through their chores. Spending time with Rebari or joining them during their cattle drive is a great experience in terms of learning about their lifestyle and understanding Jawai from their eyes.

Jawai Hills

Gigantic granite hills surrounding the village of Jawai were formed naturally decades before believed probably from lava outburst or some other geological activity and thus it became home of many wild animals. These hills offer a great trekking experience for adventure lovers. Though there are many beautiful things to do like visiting the temple, wandering around the rocks lets you feel the wilderness within the vibes.

Not only are these natural caves inside the granite hills a loving living abode for leopards, but also python, cobra, bats and typical species from the reptile family can be spotted too. Jawai Hills are not abandoned till yet and are a home to several animals and human beings. Today these are a perfect spot for enjoying wildlife, birding for nature photography and viewing from the top of these hills. The rocky hills make anyone feel of solitude and also bring you closer to nature



with a profound charm. Spending time in the secluded but eventful ambiance of these hills makes it a great place for enjoying a peaceful time with self.

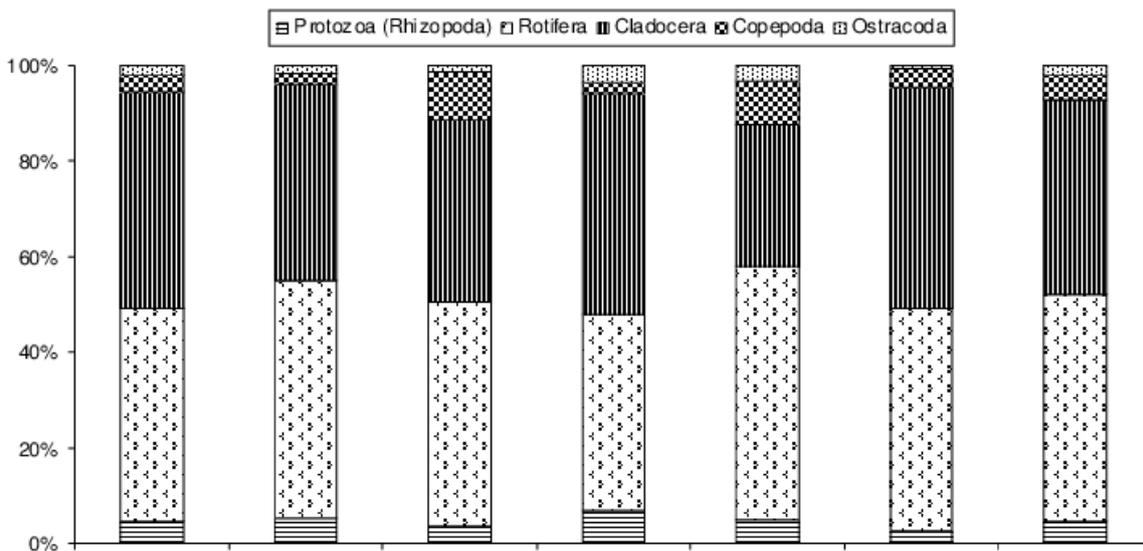
Ranakpur Kumbhalgarh Excursion

A drive for about 54.2 km from Jawai, lies Ranakpur famous for its stunning Jain Temples. Ranakpur showcases the sheer beauty of Jain architecture that amuses the visitors by its fascinating art of structure. Ranakpur is the most famous pilgrimage site and loved by guests for a detailed tour explaining the stunning architecture of the temples. The hall within the premises with 1100 pillars is the most surprising place as every single pillar bears a unique design making it an engineering and design marvel of bygone era. The major attraction of Ranakpur takes you to Shri Falna Swarna Jain Tirth (Golden Jain Temple), Ranakpur Dam, and Narayan Temple.

Driving a few more kilometers leads to the most beautiful destination of Kumbhalgarh. One of the must-see places in Rajasthan, Khumbhalgarh is famous for its majestic fortress, wildlife sanctuary, Parshuram Mahadev Temple, Hammeripal Lake, and many different places. The excursion to Jawai from Udaipur is best for making a weeked holiday plan full of exciting vacation activities.

IV. CONCLUSIONS

Table-1



Jawai Dam Rajasthan: Prominent landmark to indulge in Leopard Safari Enveloped with green forests and aravali hills, Jawai is a small village located near Sumerpur Town in Pali district of Rajasthan. Jawai Dam or Jawai Bandh are much more than just a dam structure and attract travelers from across the world. It has become an important habitat for a thriving population of leopards, birds, crocodiles, and other animal species. The dam lies on a river that goes by the same name and is also a tributary to the Luni River. In the past few years, the popularity of this river has been emerging for which it attracts travelers to witness its alluring beauty. The village is beautifully engulfed by many features and offers an enchanting experience of life, and in this article you will come across each one of these features. So, continue reading the article –

About Jawai –On 12th May 1946, the construction of Jawai Dam was begun on the behest of Maharaja Umaid Singh of Jodhpur. The dam took about 11 years to construct and it is the biggest dam in Western Rajasthan that provides a water supply to Jodhpur and some nearby areas in Pali District. The entire village is a home of the Rabari Tribe of Rajasthan who were originally the nomads.

Climate of Jawai Bandh Rajasthan - Weather in Rajasthan always remains moderate, but being a desert state of India it mostly experiences hot and humid climate. Like many other tourist destinations, Jawai enjoys pleasant climate due to some reasons. Being a place which is surrounded by Aravali hills and a river, therefore, the weather



remains pleasant wherein you will neither feel too hot or cold in any months. During the winter season, you can get a chance to bask in the sun because the climate remains clear.

Leopard Population in Jawai –The actual numbers are unknown, but as per the locals, there are at least 50 to 60 leopards in Jawai who reside in this region including the cubs. The best thing about Jawai is that it does not face any threat of poaching till yet and the number of leopards has been increasing day by day. The locals believe that the big cats are the guards of their local deity and they often worship the hill temple without causing any harm to the human beings. However, it has been traced that the leopards roam around the rocks to search for food.

Best time to spot leopards in Jawai -Leopard sighting in Jawai is very difficult and there are possibilities to spot them in the morning and evening. The online leopard safari booking service operator makes it easier for you to witness the wildlife in the night as well. So, you may also get a chance to enjoy a leopard sighting in the area. The chances of spotting wildlife in Jaipur is almost 99.99% which is better than any other wildlife reserves in India.

Fauna in Jawai -Along with leopards, there are many other fauna species who live in this region. These include Hyena, White FOX, Sloth Bear, Jungle Cat, nilgai, and Crocodiles and many other migratory birds. It is a great place to spend holidays as a wildlife enthusiast, nature lovers, and photographers, who can have a great experience in Jawai.

Bird watching in Jawai -Indeed a unique experience in Jawai, Bird watching activity offers a chance to see more than 100 species of migratory birds. Species of birds in Jawai includes Flamingoes, spotbill duck, common eastern crane, sarus cranes, bar-headed , and many others. With its diverse landscape, Jawai has become an ideal travel destination for bird watching. During the months of October and March, it absolutely becomes a paradise for every bird watcher in the world.

Jawai Jungle Safari –The jungle of Jawai is called “Medh” which is spread across the area of a few kilometers. At this place, you can make the most of your safari tour and take some breathtaking photos of all the fauna species here. It is a place where you can see the wildlife very closely and if you are to believe the visitors who have been in this area.

Temples of Jawai Bandh -There are many hill temples which can come across in this area but a few prominent shrines must not be missed by any visitors. Even if you are not a pilgrim or devotee, the location of this temple is tempting to every thrill seeker. Some of the most beautiful temples are -

- Dev Giri Temple - Situated in the middle of the hills and from this temple, you get the best view of the entire region. The shrine is dedicated to the local goddess Ashapura Mata ji, the local deity of the temples.
- Kambeshwar Mahadev Temple - Another temple located in the Sheoganj area of Sumerpur Tehsil, Kumbeshwar Mahadev becomes another attraction for travelers interested in adventures like trekking or hiking.

Jawai Village - In Jawai, the tribal community of the local rear their cattles to earn their livelihood. In these villages, you can experience the traditional lifestyle of locals. While strolling around the villages, you will come across to some of the mud houses, tubewells, clay stoves, and more. The locals greet you while showing their sense of hospitality of Rajasthani cultures.

Bera River - Wandering around this river will let you get a chance to meet the people living in hamlets. If you see their lifestyle and culture, you will get a chance to know how well you can manage things without getting updated with the trend and live a normal life like nomads do. Witnessing those people will let you get a chance to connect with the locals and enjoy your time freely.

Jawai is the most beautiful and offbeat place to visit Rajasthan which is lesser known by everyone and for such reasons it does not expect much crowd all around the year. If you are someone who is looking for a peaceful escape from the crowd, then plan your family or friends trip to Jawai Nature Stay and spend quality time with near and dear ones.

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