

## Status and trend of Tern Species in Jhansi and Lalitpur, Northern India

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**Abstract:** Terns belonging to family Sternidae are lesser studied bird species in India. Data on the population trends of birds are mandatory for their management and conservation programme. So the study on status and occurrence of Terns in Jhansi and Lalitpur was undertaken from November 2016 to January 2017. Survey work were carried out for 4 hrs in the morning and 2 hrs in the evening (morning: 07:00-11:00 am, evening: 03:00-5:00 pm). Observations were made along line transects with the aid of 10x50 mm binoculars and Canon 7D SLR Camera. Two Tern species (River tern and Gull-billed Tern) were recorded. In Jhansi, the highest population of Terns were reported at Pahuj Reservoir in December (River Tern 23; Gull-billed Tern 35) followed by Sukhma Dukhma Reservoir (River Tern 29; Gull-billed Tern 11) and Saprar Dam (River Tern 23; Gull-billed Tern 12). In Lalitpur, the highest population of Terns were reported at Jamni Reservoir in December (River Tern 58; Gull-billed Tern 11) followed by Matatila reservoir (River Tern 43; Gull-billed Tern 13) and Rajghat Reservoir (River Tern 34; Gull-billed Tern 15). The findings reported here provide a baseline and improve current knowledge on these hitherto poorly-known species. Site specific awareness and conservation measures are required.

**Key words:** Terns, reservoirs, population, conservation

### 1. INTRODUCTION:

Water birds are the birds which populate wetlands for some or the other life thriving activities such as nesting, feeding and roosting are broadly defined as. Water birds include widely known and studied waterfowl, waders/shorebirds and seabirds. The most commonly studied water birds belong to family Anatidae with a total of 44 species currently reported from India [1]. Conversely scientific studies on Terns belonging to the family Sternidae are still diminutive. Terns are colonial water birds residing in locations of marine and freshwater all over the world, and are closely related to gulls and skimmers [2, 3]. Tern species are migratory as well residential to the Indian Sub-continent. One strategy to overcome the difficulties associated with the winter period is to migrate to southern regions to find mild weather [4]. The winter period, however, is often regarded as a 'black box' in the life cycle of many birds because demographic processes during this season are largely unknown, particularly for migratory species that are assumed to be distributed over large wintering areas [5]. Till date very few empirical studies have been carried out to validate these ecological hypotheses in migratory species, presence of suitable roosting and nursery sites [6]. This lack of knowledge is most reflected into conservation practices, which concentrate most of their efforts to protect populations during breeding. The water bodies declining and polluting of water quality is the great loss to aquatic floral and faunal diversity. There have been very few studies in India regarding Terns to reveal the population status and occurrence as well as habitat utilization. Knowledge of the arrival dates and breeding dates of bird is important for studying long term trends of changes in timing of breeding in the ongoing climate changes [7]. Since data on the population trends of birds are mandatory for their management and conservation programme, the present study was undertaken to focus on the ecological status, diversity and occurrence of these lesser known species (Gulls and Terns) in Jhansi and Lalitpur district of Uttar Pradesh, India. There are 44 species of Terns worldwide. Only 23 species of terns occur in India. Terns are seabirds in the family Sternidae that have a worldwide distribution and are normally found near the sea, rivers, or wetlands. Previously considered a subfamily of the gulls, Laridae, they are now usually given full family status and divided into eleven genera. They are slender, lightly built birds with long, forked tails, narrow wings, long bills, and relatively short legs [8].

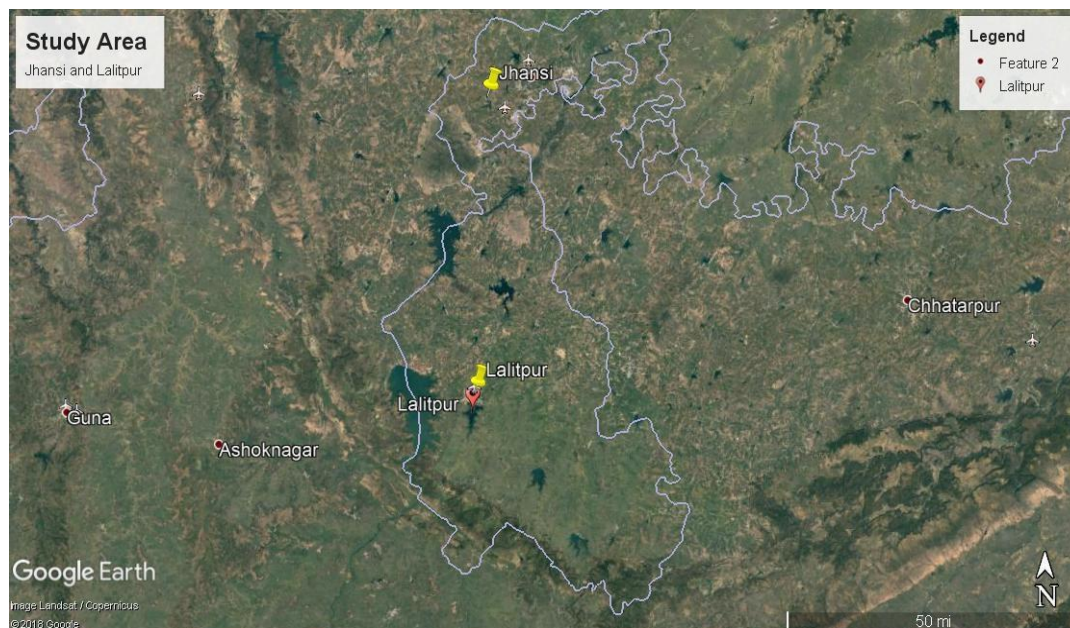
#### 1.1. STUDY AREA

The study was carried out in an area of two districts of Southern Uttar Pradesh in India i.e. Jhansi and Lalitpur (Table 1; Fig.1).

**Table 1: Details of Study area**

District	Area	GPS	Rivers
Jhansi	5,028 km <sup>2</sup>	25. 07°-25. 57° N and 78.10°- 79. 25° E	Betwa, Pahuj, Dhasan

<b>Lalitpur</b>	5,039 km <sup>2</sup>	24.11°-25.14° N and 78.10°- 79° E	Betwa, Jamni, Dhasan
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**Figure.1:** Map of study Area (Source: Google Earth)

Jhansi district is the southwestern part of Uttar Pradesh. Total Geographical area of the district is 5028 km<sup>2</sup>. The area is chiefly drained by the river Betwa and minor rivers like Dhasan and Pahuj. The Betwa and Pahuj rivers are tributaries of Yamuna and Dhasan is tributary of Betwa. The major tributaries of Dhasan are the Lakheri, Sukhnai, Kurera etc which are mainly ephemeral. All three main rivers are perennial [9]. The average annual rainfall is 850 mm. The climate is sub-humid and it is characterized by a hot dry summer and cold winter. About 91% of rainfall takes place from June to September. January is the coldest month of the year when the mean daily maximum temperature is 24.10 °C and the mean daily minimum temperature is 9.20 °C, May is the hottest month with mean daily maximum temperature 42.60°C and mean daily minimum temperature 28.80°C. The mean monthly maximum temperature is 32.60°C while mean minimum temperature is 19.20°C. In the district, number of tanks, ponds and reservoirs have been constructed for storing water for irrigational and domestic purposes [9]. In Jhansi district total 10 sites were surveyed for the presence of gulls and terns. These included rivers, lakes, and reservoirs on main rivers of the district such as Betwa, Dhasan, Pahuj. The sites selected covered the entire district. Lalitpur district is the southernmost district of Uttar Pradesh. The area with poor soil cover and uncertain rainfall has limited agricultural development [10, 11]. It comes in semi-arid climatic zone. The geographical area is 5039 km<sup>2</sup>. The undulating topography has an elevation ranging from 350 to 650 m above mean sea level [12]. The Average rainfall per year is 800-900 mm and dry months in a year may range between 3-7 mm. The highest temperature is 48 °C in summers. In winters, the temperature ranges between 1-17 °C. The northern and western boundaries of Lalitpur are formed by the Betwa river. The Jamni River, a tributary of the Betwa, forms the eastern boundary. The Dhasan River forms the district's southeastern boundary. In Lalitpur district total 10 sites were surveyed for the presence of gulls and terns.

## 2. METHODOLOGY:

From 01 November 2016 to 31 January 2017, all wetlands and water bodies of the Jhansi and Lalitpur district were surveyed for 3 hrs in the morning and evening (morning: 07:00-10:00 am, evening: 03:00-6:00 pm). Questionnaire and data sheets were prepared to collect secondary and primary data. Observations were made along line transects with the aid of 10x50 mm binoculars and Canon 7D SLR Camera. GPS was recorded with 20e-trex. Boat surveys were also carried out for more accurate data. Point count stations were made within the study plot either in a systematic manner or in a random manner. The distance between the two points was at least 200 metres. Photographs of birds and their habitat were taken in most cases. For all the Gull and Tern species documented, it was categorized as residents (R) or migrants (M) according to their presence (season-wise). The abundance code (Common, Fairly common, Uncommon) and the IUCN Status (Critically Endangered, Endangered, Threatened, Vulnerable and Least Concern) of the birds recorded were also noted. Statistical Analysis was done with Species richness index, Shannon Wiener's general diversity index and Index of dominance. Identification of birds was done with the help of key reference books by Grewal, Salim Ali and Grimmett [13].

## 3. RESULTS AND DISCUSSION:

The three month study reveals the Tern diversity in the selected districts. In the study area 2 tern species have been recorded (Table 2). River tern is resident species and Near Threatened while Gull-billed tern is migratory and Least Concern according to IUCN Status. In the study area, Gull-billed tern is uncommon while River Tern is common. The Gull-billed Tern is a very rare bird in Britain and Ireland, averaging about four records a year, mainly on the English south and east coasts [14].

**Table 2: Gulls and Terns in the study area**

S.No	Common Name	Zoological Name	Local name	Family	R/M	AC	IUCN Status
4	Gull-billed Tern	<i>Gelochelidon nilotica</i>	Ganga Cheel/kurpeti	Sternidae	M	UC	LC
5	River Tern	<i>Sterna aurantia</i>	Ganga Cheel/Kurpeti	Sternidae	R	C	NT

Source: The IUCN Red List of Threatened Species [15].

R-Residential; M-Migratory; AC-Abundance Code; C-Common; FC-Fairly Common; UC-Uncommon; LC-Least Concern; NT-Near Threatened.

1. **Gull-billed Tern** *Gelochelidon nilotica* (Gmelin, 1789)



**Figure .2.1 & 2.2: Gull-billed tern in Flight**

- **MORPHOLOGY:** The gull-billed tern is a stout, white, blunt billed tern measuring about 38 cm. It has gull-like large bill and so known as Gull-billed tern. The sexes are alike. During the adult non-breeding stage, the upperparts are pearly-grey. Head is white, a black patch around eyes and a black spot above the ear-coverts. The tail fork is shallow, but deeper than that of Whiskered Tern. It has black stout bill and longer black legs. The thickset body and broad wings are dissimilar to that of other terns (Fig.2). The adult breeding stage is like the non-breeding but has a black cap.
- **BEHAVIOUR:** The typical call of the gull-billed tern is a nasal "tee-hee-hee" or "kat-y-did" [16]. The habitat in the study areas were the Reservoirs. They were seen single or small flocks in association with River terns. Flights were over the mudflats or water close to the surface picking up food. They often rested on mudflats, in company of other terns and gulls. The gull-billed tern is an opportunist predator, taking a wide variety of prey from marine, freshwater and terrestrial habitats. Depending on what is available it will eat small crabs, fish, crayfish, grasshoppers and other large insects, lizards and amphibians. Warm-blooded prey includes mice and the eggs and chicks of other beach-breeding birds; least terns, little terns and members of its own species may be victims [17, 18]. It is a winter visitor and uncommon, not very numerous in the region. The population was highest in December in Pahuj Reservoir in Jhansi and Rajghat Reservoir in Lalitpur
- **DISTRIBUTION:** The gull-billed tern is a common winter migrant to all over India, Pakistan, Bangladesh, Sri Lanka, Nepal and Maldives. It's Breeds in North West India, Kashmir, Europe, W Asia, North West Africa to Middle East. Also winters in North East Africa, Middle East and South Asia [19].

**River Tern** *Sterna aurantia* (J.E.Gray, 1831)

- **MORPHOLOGY:** The size of River Tern is about 38-46 cm that is similar to Black-headed Gull. A graceful pale grey tern with deeply forked tail and yellow bill, frequenting fresh water habitat (Fig.3.1 & 3.2). Sexes are alike. During the adult breeding stage, upperparts are grayish white, under tail-coverts white. Head is white with black cap. Tail is grey and deeply forked. Bill is heavy and yellow. Legs are red to orange. Lack of crest and habitat separates it from crested terns. The adult non-breeding stage is similar to that of breeding stage, forehead and crown speckled black and white. Bill is duller yellow and tipped black.





Figure .3.1: River tern resting on mudflat



Figure .3.2: River tern flying

- **BEHAVIOUR:** The River tern gives out a variety of calls, all loud and shrill *kirivi-kirivi-kirivi*; *kwey-ye kwey-ye*; *kwey-kik*; *kirikik-kirikik* (Sashikumar *et al.* 2004). Since it is a residential species, it breeds from March to May. Being Colonial, they form shallow scrape on islets in reservoirs and large rivers, with pratincoles and other terns. Clutch; normally 3, rarely 4, egg colouration variable from buffy stone to greenish grey, spotted, blotched and streaked with brown and inky purple; size 42.0 X 31.4 mm. Both sexes share incubation and parental duties. Incubation period is 18 to 19 days. They are gregarious. Small parties in association with other terns fly over water at 6-10 m high, frequently plunging into water to catch fish, eating on the wings turning it round so as to swallow head first (Fig. 4 & 5). Stealing fishes from the fishing boats (Fig.6.1& 6.2). Flocks rest and roost on sandbanks, facing wind. They are resident and locally common species. The population was maximum in December in Sukhwa Dukhwa Reservoir in Jhansi and Jamni reservoir in Lalitpur
- **DISTRIBUTION:** The River Tern is a resident species in the plains all over India, Pakistan, Bangladesh, Sri Lanka and Maldives, South East Asia [20].

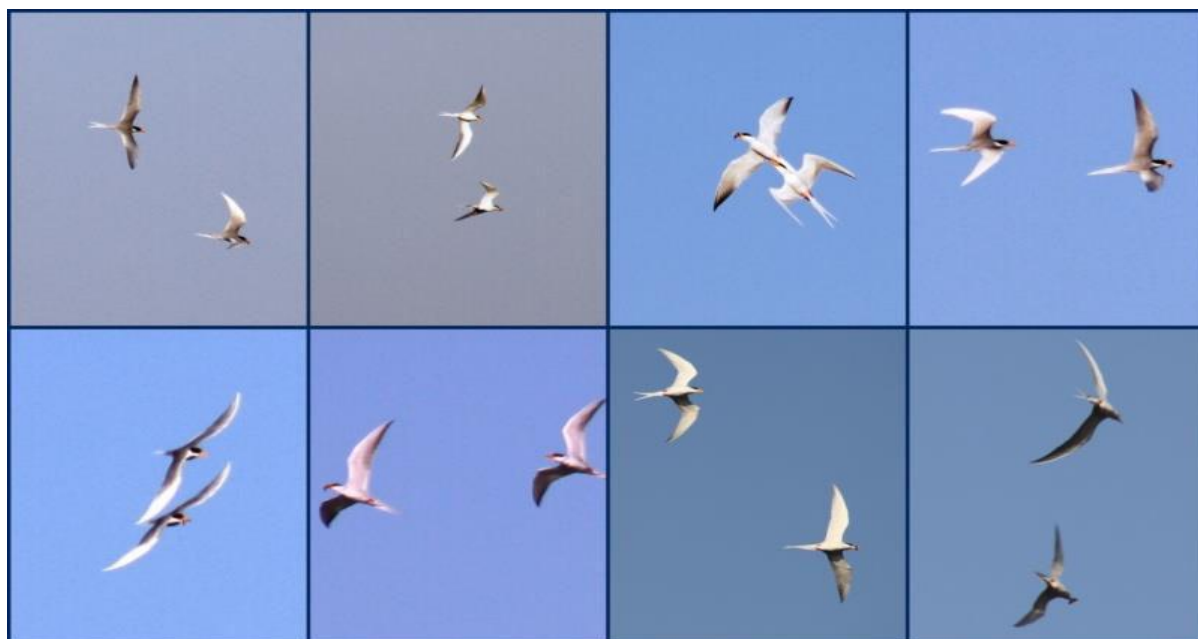


Figure.4: River terns often followed each other to snatch the food item



**Figure.5: River tern plunging into water to catch fish**



**Figure6.1 & 6.2: River tern flying around the fishing boat to steal the fishes**

Scientific information of the winter distribution of Terns in Jhansi and Lalitpur was poor before this study was undertaken. The data for Terns in Jhansi was recorded month wise in total 10 sites namely Pahuj Dam, Sukhma Dukhma Dam, Lachuraghat , Saprar Dam, Paricha Dam, Erich , Dongri Reservoir, Laxmi Taal, Ghadmau Jheel and Bhasneh jheel. Two Tern species (River tern and Gull-billed Tern) were recorded from the study sites. There were no Tern species in Laxmi Taal, Ghadmau Jheel and Bhasneeh Jheel. The Gull-billed Tern was uncommon in Jhansi and were also absent at Lahchuraghat, Paricha Reservoir, Erich and Dongri Reservoir. Out of total 10 sites it was reported only from 3 sites with a maximum population of 35 in December at Pahuj reservoir (Table 3 & 4). The population of migratory Gull-billed tern increased gradually from November (47) to December (60) and January (55). The total population of Gull-billed Tern for three months was 162 with a mean of 54. The Variance (Population Standard),  $\sigma^2$  was 54, with a standard deviation 7.34. The Gull-billed tern is uncommon in the region with no scientific studies and population management. This species has been reported for the first time in Jhansi district [21]. The Gull-billed Tern is listed as “Endangered” or “Threatened” in four states of North America, and requires attention for its management in five other states [22]. In spite of a reasonably low overall population size and substantial declines in the breeding sites, it has received little conservation and management concern. The Population studies show a strong and quantified, declining trend from the past to the currently active trends that exist; as such the study undertaken can be utilized to know the population trend of terns in future. Undeniably, for a species like Gull-billed tern, which dwell in extremely unsteady and changeable habitats, such synchronization of the information is crucial [23]. The River terns were common and residential. The River Terns were reported from 7 sites- Pahuj Dam, Sukhma Dukhma Dam, Lachuraghat, Saprar Dam, Paricha Dam, Erach and Dongri Reservoir. The total population of River tern for three months was 303 with a mean of 101. The Variance (Population Standard),  $\sigma^2$  was 28.66 with a standard deviation 5.35. The River Terns occurred occasionally in small groups of 2-4 individuals. They were more commonly seen singly or in pair. The highest population of Terns were reported at Pahuj Reservoir (Fig.7) in December (River Tern 23; Gull-billed Tern 35) followed by Sukhma Dukhma Reservoir (River Tern 29; Gull-billed Tern 11) and Saprar Dam (River Tern 23; Gull-billed Tern12) [Fig.8 and 9]. Terns were seen flying and resting on mudflats. This indicates

that these three reservoirs are good wintering grounds for the Terns. Paricha, Dongri and Erach had a low population of Terns ranging from 1-13 only.



**Figure.7: Gull-billed Tern at Pahuj Reservoir**



**Figure.8: River Tern at Sukhwa Dukhwaa Reservoir**



**Figure 9: River Tern at Saprar Reservoir**

SN	Sites	November		December		January	
		River tern	Gull billed tern	River tern	Gull billed tern	River tern	Gull billed tern
1	Pahuj Dam	21	32	23	35	22	34
2	Sukhma Dukhma Dam	27	08	29	11	28	10

3	Lachuraghat (Dhasan river)	09	00	11	00	10	00
4	Saprar Dam	21	07	23	12	22	11
5	Paricha Dam	04	00	06	01	05	00
6	Erich (Dhasan River)	03	00	05	01	04	00
7	Dongri Reservoir	07	00	13	00	10	00
8	Laxmi Taal	0	0	0	0	0	0
9	Ghadmau Jheel	0	0	0	0	0	0
10	Bhasneh jheel	0	0	0	0	0	0
	<b>TOTAL</b>	<b>92</b>	<b>47</b>	<b>110</b>	<b>60</b>	<b>101</b>	<b>55</b>

Table 4: Month wise total population of Tern species in Jhansi District

S.N	Tern Species	November	December	January	Sum	Mean	Variance $\sigma^2$	Standard Deviation $\sigma$
1	River Tern	92	110	101	303	101	54	7.34
2	Gull Billed Tern	47	60	55	162	54	28.666	5.35
	<b>TOTAL</b>	<b>139</b>	<b>170</b>	<b>156</b>	<b>465</b>	<b>145</b>	<b>160.666</b>	<b>12.67</b>

Table 5: Terns population in various water bodies in Lalitpur district of Uttar Pradesh

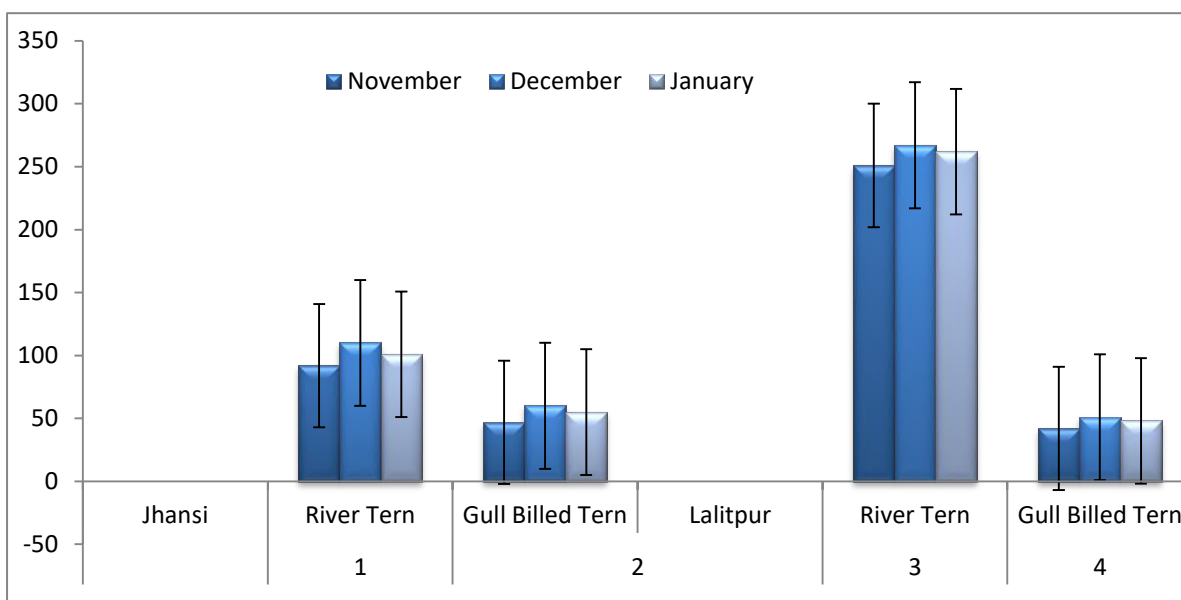
SN	Sites	November		December		January	
		River tern	Gull billed tern	River tern	Gull billed tern	River tern	Gull billed tern
1	Jharar Ghat	03	00	05	00	04	00
2	Matatila Dam	41	11	43	13	42	11
3	Shahzad Dam	21	06	23	07	23	07
4	Sajnam Dam	09	00	11	00	10	00
5	Jamni Dam	57	09	58	11	58	12
6	Rohini Dam	29	03	30	05	29	04
7	Govind Sagar Dam	26	00	27	00	27	00
8	Rajghat Dam	33	13	34	15	34	14
9	Deogarh	26	00	28	00	28	00
10	Saidpur pond	06	00	08	00	07	00
	<b>TOTAL</b>	<b>251</b>	<b>42</b>	<b>267</b>	<b>51</b>	<b>262</b>	<b>48</b>

Table 6: Month wise total population of Tern species in Lalitpur District

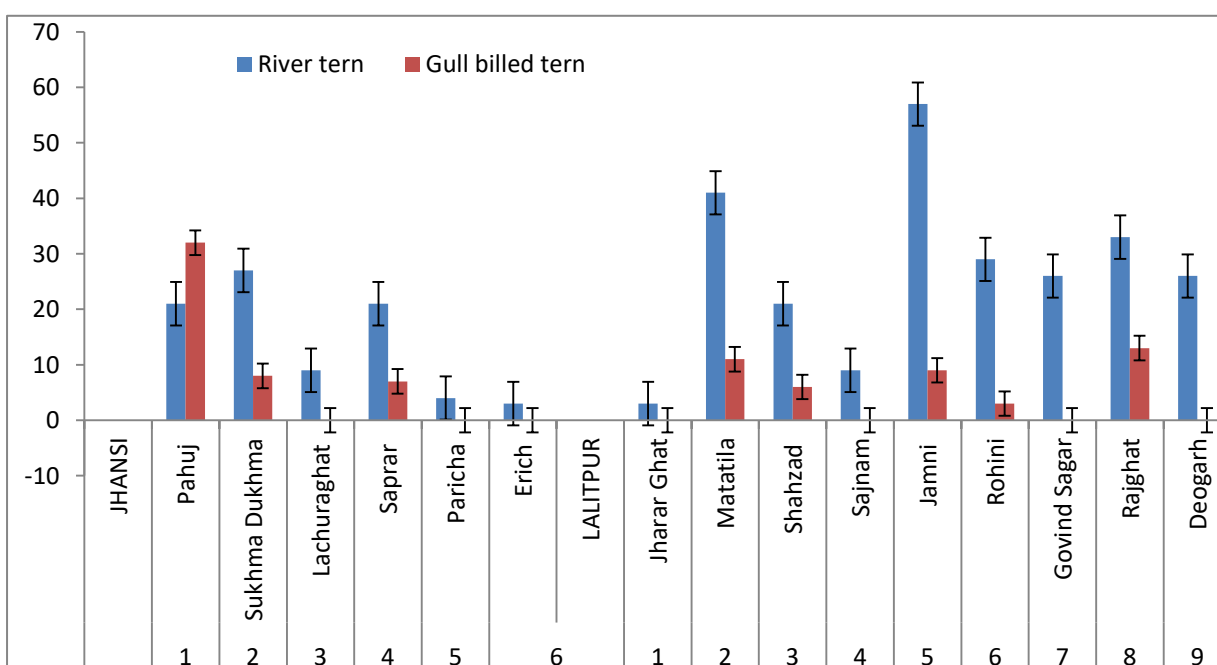
S.N	Tern Species	November	December	January	Sum	Mean	Variance $\sigma^2$	Standard Deviation $\sigma$
1	River Tern	251	267	262	780	260	44.66	6.68
2	Gull Billed Tern	42	51	48	141	47	14	3.74
	<b>TOTAL</b>	<b>293</b>	<b>318</b>	<b>310</b>	<b>921</b>	<b>307</b>	<b>108.66</b>	<b>10.42</b>

Graphs 1 and 2 shows the population of two tern species in the selected 10 sites of Jhansi and Lalitpur for three months. Maximum counts were in December.





Graph 1: Gull and Tern population in Jhansi and Lalitpur



Graph 2: Distribution of Gulls and Terns in selected sites of Jhansi and Lalitpur

The data for Terns in Lalitpur was recorded month wise in total 10 sites Jharar Ghat, Matatila Dam, Shahzad Dam, Sajnam Dam, Jamni Dam, Rohini Dam, Govind Sagar Dam, Rajghat Dam, Deogarh and Saidpur pond. Two Tern species were recorded-River tern and Gull-billed Tern. Like Jhansi, the Gull-billed Tern was uncommon in Lalitpur too and were absent at Jharar Ghat, Sajnam Dam, Govind Sagar Dam, Deogarh and Saidpur pond. Out of total 10 sites it was reported from 5 sites with a maximum population of 15 in December at Rajghat reservoir followed by Matatila, Jamni, Shahzad and Rohini Reservoir (Table 5 & 6). The population of migratory Gull-billed tern increased gradually from November (42) to December (51) and January (48). The total population of Gull-billed Tern for three months was 141 with a mean of 47. The Variance (Population Standard),  $\sigma^2$  was 14, with a standard deviation 3.74. The River terns were common and residential. The River Terns were reported from all 10 sites-. Jharar Ghat, Matatila Dam, Shahzad Dam, Sajnam Dam, Jamni Dam, Rohini Dam, Govind Sagar Dam, Rajghat Dam, Deogarh and Saidpur pond (Fig.10). The total population of River tern for three months was 780 with a mean of 260. The Variance (Population Standard),  $\sigma^2$  was 44.66 with a standard deviation 6.68. The River Terns occurred occasionally in small groups of 2-4 individuals. They were more commonly seen singly or in pair (Fig.11). The River terns are residential however the study was not conducted during the breeding period i.e. March-May [24]. Though Neelakantan (1988) and Saxena (1992) stated that the River Tern breeds infrequently throughout India, not many nests have been reported in these colonies [25, 26]. Colonies with hundreds of nest were recorded by Baker (1929) [27]. Larger River Tern



colonies were recorded near Pune (E. Bharucha *verbally*) and in Pong Dam (D. S. Dhadwal *verbally*; S. Balachandran *field observation*) [28]. A large nesting colony of River Tern was also reported by Sathiyaselvam, and Balachandran, in 2007 in Chilika Lake of Orissa. Information on the status, distribution and breeding biology of this Near Threatened species are very limited [29]. The highest total population of Terns were reported at Jamni Reservoir in December (River Tern 58; Gull-billed Tern 11) followed by Matatila reservoir (River Tern 43; Gull-billed Tern 13) and Rajghat Reservoir (River Tern 34; Gull-billed Tern 15) [Fig.12]. Lowest populations were reported from Jharar Ghat and Sajnam Reservoir. Excessive fishing of small fishes such as sand eels can be a reason for sharp turn down in the colonies that depend on these prey items. Further in general, the thrashing or interruption to tern colonies due to various human activities has resulted in turn down of many species [2]. Habitat loss, directly through demolition of marshland and nesting sites, and indirectly through anthropogenic activities that result in habitat changes that are intolerable, has probably been the main problem in the past for gull-billed terns and other waterbirds [30]. Anthropogenic activities may include a wide variety of actions ranging from walking near nesting colonies to more ruthless forms of disturbance, such as vehicular traffic and killing of waterbirds [31]. Over grazing by cattle and draining the wetlands for agricultural purposes are also disturbing the habitats.



**Figure.10: River tern at Saidpur pond**



**Figure.11: River Terns at Jamni Reservoir**



**Figure.12: Gull-billed Tern at Rajghat Reservoir**

#### **4. CONCLUSION:**

The Tern species and their status are poorly studied in Northern India. The River Tern is Near Threatened species of terns and need conservation action. The large body of work on tern conservation and behavior is lacking and there is much more to be learned. The study revealed the biodiversity of Terns in selected districts of Northern India for the first time. Previous to this study, no information with similar objectives was available; therefore detailed monitoring of wetlands regarding species diversity and species composition were studied. This indispensable study will prove to be very significant in terms of describing current status, and threats to Terns and their habitat that have been overlooked so far. This will benefit wild population and have a significant conservation value. Key research needs take account of more regular and advanced population monitoring, a better understanding of demographics, and aspects limiting populations as well as alterations of species' breeding distributions and wintering ranges. The view 'from the winter quarters' can bring important and complementary information to the study birds during the breeding period for a full understanding of species' ecology during the whole annual cycle. Practically all aspects of the life cycle and biology of terns need further research, but exacting consideration should be given to foraging behavior and migratory patterns. In addition to the breeding grounds, guarding of wetlands where they forage is likewise significant. At present, not enough is known about the foraging requirements of terns to recommend the management so foraging distances and habitats must be evaluated. The baseline information is a prerequisite to plan and monitor management of Terns and their habitats. Now with scientifically robust time series information on population status and distribution, success or failure of active conservation can be assessed. Monitoring of terns distributions and populations during the migration cycle is no more in its infancy; thus, their population sizes and trends are known in Northern India now. The findings reported here provide a baseline and improve current knowledge on these hitherto poorly-known species.

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