

*Full Length Research Paper*

# Present distribution status and conservation threats of Indian Gharial in Assam, India

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**Preliminary survey of wild Gharial (*Gavialis gangeticus*) population was done in Assam from 2004 through 2007. The study revealed the presence of wild Gharial in Assam on certain ecological pockets in different locations of Brahmaputra river and its tributary of which few sites were previously not documented viz., Urpod beel in Goalpara district, Jinjiram River in Lakhimpur district and Beki river in Barpeta district etc. The existing Gharial population has faced tremendous conservation threats owing to extensive hunting pressure. In Urpod beel, three adult Gharials were seen, of which one was captured by the local people. Gharial was completely extirpated from most of the previously known sites of Assam. But, there is a conservation scope for this critically endangered species in some potential live sites and as well as relocate the species in some earlier potential sites. To unearth the detailed existing distribution localities, intensive field investigation is urgently required in Assam.**

**Key words:** Re-sightings, new sighting, threats, prospects habitat, wetland, tectonic lake.

## INTRODUCTION

Over the last 30 years there have been a drastic decline in the wild population of Indian Gharial-*Gavialis gangeticus* (Gmelin, 1789) in southern Asia (Maskey, 1999) and extinct from most of its earlier widespread areas. Gharial was uplisted from endangered to critically endangered in 2007 in IUCN Red Data Book, and is listed in Appendix I of CITES. Gharial faces many threats due to flooding and dam construction in rivers, habitat destruction and decline in food quality and quantity. Over

fishing, use of gill nets and river poisoning compounded the problem manifold. Gharial is the only surviving member of Gavialidae family. It mostly inhabits large bodied, deep, fast flowing rivers in the plain. Formerly, the species was distributed in Northern Indian Sub-continent including Bhutan, Bangladesh, Myanmar and Pakistan. Prior to 1950, the Indian Gharial was common in the Indus River in Pakistan (Francis, 1910; Rao 1933), Gandak River in Nepal (Kennion 1921), Jamuna River in Uttar Pradesh (Hornaday, 1885) and Kosi River in Bihar (Shortt, 1921). During 1950s, about 235 individuals of Gharials were counted along the Narayani River between Narayanghat and Tribeni (Maskey et al., 1995; Maskey, 1999). In 1976, estimated population of wild Gharial across the globe has declined from what is thought to have been 5,000 to 10,000 in the 1940s to less than 200 (Whitaker et al., 1974), indicating the declination of almost 96% of its population. Again, in 2006, the population of adult Gharial in India stands at a poor figure and it was less than 200 individuals (Andrews, 2006; Sharma and Basu, 2004). The species has almost extinct from Pakistan (Whitaker and Basu, 1983), Bangladesh (Whitaker, 1976; Khan, 1979; Faizuddin, 1985) and Bhutan (Singh, 1991) in recent years. There have been

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**Abbreviations:** **KC**, Kareng Chapori; **SG**, Ghagor and Subansiri River; **CB**, Chella and Subansiri River; **DK**, Dikhow; **GHC**, Guwahati City; **SD**, Chandubi Tectonic Lake; **KG**, Kulgachia (confluence zone of Manas and Brahmaputra Rivers); **UB**, Urpad beel; **JRB**, confluence zone of Jinjiram and Brahmaputra Rivers; **DSN**, Dibrusaikhowa National Park; **KNP**, Kaziranga National Park; **NNP**, Nameri National Park; **ONP**, Orange National Park; **MNP**, Manas National Park; **DR**, Dhaleswari River.

only two authentic sighting records of Gharial occurrence from Myanmar in 1927. Again, in Brahmaputra Valley of Assam, the species was extirpated from most of its earlier potential habitats viz., Chandubi Tectonic Lake (a large potential lake of Kamrup District), Dikhow River (not sighted, since 1971; Pers. Comm., Hazarika, B. C. 12/07/2007) of Sivasagar district and as well as from river Brahmaputra. The species was thought to be completely extinct from Assam, however, little unsubstantiated reports were found from the information of local people. The population of this majestic lizard species has been seriously fragmented and declined in recent times and thus categorized as an endangered species. The species was also included in the IUCN Red Data Book as a critically endangered species. The species has largely been declined for its extensive hunting pressure in past for meat, its body fats and skins all over its ranged areas and consequently included in the Appendix I of CITES. Recent estimation of wild Gharial population has suggested that, the total global population is less than about 200 individuals. So, it is imperative to find out the total accessible wild population of Indian Gharial in its former and present distribution areas of Southeast Asia. The population of Gharial in Assam is threatened by illegal killing, hunting for meat and medicine, habitat destruction, erosion of nesting areas of Gharial, destruction of habitat areas by the frequent course change of River Brahmaputra in the eastern Assam area etc. Again, there have been no such serious survey reports of the existence and distribution of the eastern population of wild Gharial in its habitats at Brahmaputra and Barak valley of Northeastern region of India. The present work is a modest initiative to rendering the vital information on the present distribution status of this critically endangered lizard species in Brahmaputra and Barak Valleys for future conservation perspectives.

### Study area

The study area is located in the Brahmaputra and Barak Valley (coordinates, 24°09'-27°58' N and 89°42'-96°01' E) of Assam in the Northeastern corner of India. The river Brahmaputra flowing through Assam finds its origin in the Chema Yundung glacier of Tibet and flows through India and Bangladesh. The slope of the river decreases suddenly in front of the Himalayas and results in the deposition of sediment and a braided channel pattern. It flows through the valley comprising its own recent alluvium (Sarma, 2005). In Brahmaputra Valley, the basin receives 300 cm mean annual rainfall, of which, 66 to 85% occurs in the monsoon period from June through September.

### METHODS

We surveyed from 14 November, 2004 through 26 September,

2007, to gather the direct and indirect sighting data of Indian Gharial-*G. gangeticus* in Brahmaputra and Barak valley of Assam.

### Direct sighting record

Gharial presence and distribution were enumerated by spotting them with binoculars in water/sand banks during their sun basking. The location of Gharial sighting was recorded with the help of Global Positioning System (GPS).

### Indirect sighting record

Imprints in mud while basking, trail of movements in the mud and sandbars, nest hole in the river banks, remains of Jaw, toe, tail, skin found in the household of areas near to the study area locations were considered as the indirect sign of occurrence. Informal interviews were conducted with the thatch collector, fisherman, local boatman in the Brahmaputra River and its tributaries to collect secondary data on the occurrence of Gharial.

To find out the recent distribution status of *G. gangeticus* in the Brahmaputra and Barak valley, the field surveys have conducted to covers all Sand-bars (Chars and Chapories) of rivers and its tributaries, natural wetlands and as well as river beds from Sadiya to Dhubri. The known locations of former distribution areas of the Indian Gharials have been appropriately surveyed and the local inhabitants and fishermen were interrogated to find out its existence and as well as its sites of encounter. In Barak Valley, seven days have spent from September 19 to 26, 2007 in present survey and covered the area of Dholeswary River near Lala Bazaar of Cachar District.

The data of Gharials were collected using Visual Encounter Survey (VES) method (Crump, 1971; Scott, 1976) to gathered data on direct sightings of the species and as well as to obtained information from local people (n=826) viz., villagers, local fisherman, local thatch collectors and hunters and the data were noted down. The habitat data were not aptly collected and analyzed, as the goal of the present study has been framed to assemble the recent authentic distribution records of this critically endangered aquatic lizard species. The relevant information of anthropogenic threats of Gharial's survival in various past and present distribution localities were gathered and documented. The potential areas of Gharial conservation in Brahmaputra valley were determined, based on present habitat situation where it occurs and the conservation perspectives of the local people towards Gharial. However, the surveys were not been performed as extensively as we proposed owing to financial limitation.

### RESULTS

Historically, the Gharial-*G. gangeticus* was widely distributed in the Brahmaputra and Barak rivers systems of Assam and the species has harbours in all the major tributaries connected with the main river systems of Brahmaputra and Barak. Available reports of village elderly people and traditional hunters suggested that, large numbers of Gharials were available in Chandubi Tactonic Lake prior to 1972. The location of the lake is about 20 km away from the Brahmaputra river system with permanent feeding canal. The Gharial was also reported from Dikhow River of Sivasagar District in 1971 to 1972, but currently no reports. It was also available in the shoreline and swamps of Dibru-Saikhowa Biosphere

Reserve prior to 25 years, but no recent report was found. Again, several sporadic sighting reports of Gharial's were available in Brahmaputra River before 20 years back. Yet again, no such serious field surveys have been carried out to trace the Gharial in Assam since last few decades. Owing to un-documentation of the species since long time from Assam, conservationists believed that the species had certainly been extinct from the areas and hence, it is very much essential to find out the present distribution data to initiate the conservation measures of the eastern population of Wild Gharial in Assam.

During January 2004, a single Gharial was seen to bask on the Sandbars in the confluence zone of Ghagar and Subansiri river (SG). Again, in November 2004, one Gharial was observed by a boatman at Jengraimukhghat. A missing (local plain tribes) thatch collector was confessed to kill a Gharial, sized about 5 feet (in body length), during December 2004 at Kareng Chapori of Dihing Mukh (KC). The Gharial was basked at the thatch grassland of Sandbar, dominated by *Vetiveria zizanioides* (Linn.) Nash., *Phragmites karka* (Retz.) Trin ex Steud, *Imperata cylindrica* (Linn.) Beauv., *Saccharum spontaneum* Linn., *Saccharum ravanae* (Linn.) Murray etc. prior to it hunted. Again, a single medium sized Gharial was regularly observed by K. Dewan (Pers. Comm., 29/8/2006) in 2006 at the confluence zone of Manas and Brahmaputra river system near Kalgesia (KG) (Table 1 and Figure 1).

During April 2007, two adult Gharials were seen in Jinjiram River near Lakhipur. Several sighting records were also found from local people during survey in the confluence zones of Jinjiram and Brahmaputra River. On 15 and 16 August, 2007, 4 adult Gharials were observed in Urpod beel (UB) of Golapara near Agia station (Figure 2). This was the new range extension of the species at Urpod beel. One of that individual was captured by a local people on 16th August, 2007 and it was released in to the river Brahmaputra. Presently, three of them have happily survived at the swamps of Urpod beel. In Jinjiram river of Lakhipur area, 4 individuals of Gharials were observed, but the local people were not quite accustomed with the presence of these Gharials in the river water owing to regular stealing of their domestic ducks from vicinity. In Dhaleswary river system of Cachar district, the existence of several Gharials was reported by local people and they believed that, those were still survived in its permanent nest holes on the river bank. During recent surveys, altogether 5 live nests were observed in the riverbank on 21 to 25 September, 2007, and the live footprint and tracks were seen in the sand banks. The riverbank of the Dhaleswary River was occupied by large bamboo growths. The local peoples have strongly argued that the Gharials were still residing in the river systems and used the nests permanently. However, no direct sightings of Gharials were made during this survey at Cachar (Table 1). In more recently,

1 adult Gharial was reported in Manas and Beki river system during September and October 2007 within Manas Biosphere Reserve of Assam which has an injure mark in his body, but it was not known whether the individual was permanently resides in this area for long time or migrated from other parts of its range.

## DISCUSSION

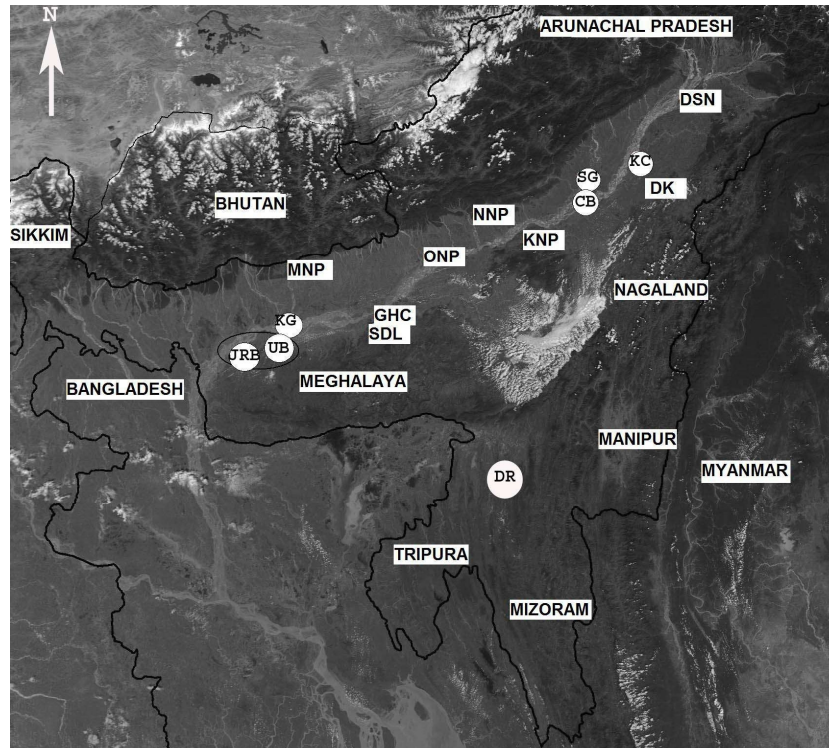
By analyzing the historic distribution of the Gharial in the Brahmaputra and Barak valley of Assam this can be enumerated that the Gharial distribution areas are mainly concentrated in the Brahmaputra valley. The reports of Gharial occurrence in the Dikhow River, Ghagar and Subansiri River (SG), Confluence of Dihing River with Brahmaputra and Kareng Chapori of Dihing Mukh (KC) implies that the present Gharial distribution in eastern Assam is mainly concentrated in the district of Lakhimpur (Undivided) and Sivsagar. From the records of Gharial occurrence in Kalgesia (KG) (Table 1 and Figure 1), Urpod Beel (UB), Jinjiram River of Lakhipur area, Manas and Beki River system implies that the distribution of Gharial in the western Assam is mainly in the Brahmaputra and its tributaries of Barpeta, Goalpara and Dhubri District. During the period of the survey the fishing activity, habitat destruction in terms of thatch collection, collection of housing material, fodder and erosion of potential nesting habitat is seen to be the potential threat in the eastern distribution area of Gharial in the Brahmaputra River system in districts of Lakhimpur (Undivided) and Sivsagar. In the western present distribution area in the river Brahmaputra and its tributaries in the district of Barpeta, Goalpara and Dhubri, the small Gharial population is threatened by high human activities on either side of river, which may be due to their daily activities, fishing, plying motorized boats. During the period of the study this is seen that though the river Brahmaputra and its tributaries have sufficient nesting banks yet they are not potential one due to lack of water depth, low fish density, high human disturbance and anthropogenic pressure. However, these eastern and western distribution areas of Gharial in the Bahmaputra valley are found to be the most crucial for the future conservation of this species.

## Conclusions

The recent photographic evidences and confirmed sightings records of wild Gharials in Brahmaputra and Barak valley suggested that the Gharials is still survived with tremendous survival threats. The species has extremely sensitive to its enemy, particularly human being for its lucrative meat and skins and thus hide from the enemies all the time. The risk factors of Indian Gharials are as follows:

**Table 1.** Observation numbers, sighting locations and major habitat types of *G. gangeticus* Gmelin in Brahmaputra Valley, Assam, India from 2004 to 2007.

Date/Year	Habitat/ location	Zonal character	River system	Number sighted	Global Positioning System (GPS) location	Methods used
11/01/2004	Sand Bars (Char or Chapori)	Confluence zone	Ghagar and Subansiri River	1	27°20'32.41" 94°13'09.26"	Direct Observation
15/11/2004	River water Jengraimukh Ghat	Confluence zone	Chela and Subansiri Rivers	1	27°04'58.34" 94°12'40.58"	Observed by Boatman
14/12/2004	Sand Bars in Kareng Chapori near Dihing Mukh	Sand Bars of River Brahmaputra	Brahmaputra	1	27°16'36.76" 94°40'15.81"	Killed by a Missing thatch collector
2006	River water near Kolgesia	Confluence zone	Manas and Brahmaputra	1	26°14'43.98" 90°48'15.48"	Observed by Mr. Kasem Dewan
10/04/2007	River water near Lakhipur of Dhubri district	Confluence zone	River Jingiram	2	26°04'26.5" 90°17'40.60"	Direct observation
??/04/2007		Confluence Zone	River Jingiram and Brahmaputra	>5	26°04'39.58" 90°18'01.44"	Reported by local people
15/8/2007	Natural utrified Lake habitat Near Agia of Golapara District	Natural Lake	Urpod Beel (or Lake)	1	26°03'15.27" 90°20'43.56"	Captured at Lake & released at Brahmaputra by Forest Dept.
16/8/2007	Natural utrified Lake habitat Near Agia of Golapara district	Natural Lake	Urpod beel (or Lake)	3	26°03'22.37" 90°20'43.82"	Observed by fisherman, still survive at lake
18/04/2006	Sand bars near Pandu of Guwahati City	Main River	Brahmaputra	1	26°10'19.94" 91°41'08.18"	Sub-adult was observed by fisherman
21/09/2007	River bank and sand bank near Lala Bazar	Tributary of Barak River	Dholeswary River	5	24°41'21.03" 92°53'16.02"	Altogether 5 live nests were observed in the riverbank and also footprint and track was observed.
22/09/2007	Near Lela Bazaar	Tributary of Barak River	Dholeswary River	10	24°41'22.08" 92°53'16.03"	Altogether 5 live nests were observed in the riverbank and also footprint and track was observed.



**Figure 1.** Location map and Ghorial sighting areas in study areas, Assam, India.



**Figure 2.** Gangetic Gharial-*G. gangeticus* that have been captured by the local people in Urpod Beel of Agia in Goalpara district (the individual was later released in the River Brahmaputra by the Forest Department).

1. Degradation of riverine swamps through eutrophication and forest destruction in catchments areas, which were the potential habitats for Indian Gharial.
2. Decline of large and small Ichthyofauna in Brahmaputra River and its tributaries round the year. This happened due to uses of gill nets and small mesh size fishing nets in the river Brahmaputra and its tributaries.

3. Regular killing of Gharial by local poachers for flesh and fat owing to superstition about the use of extracted oil and flesh for curing arthritis and various diseases. The skin of Gharial also high demand in the market for making various articles.

The existence of wild Gharial and the new sighting records

records in some previously undocumented area has provided tremendous scope for its conservation. Yet, there is a possibility to get more small populations of Indian Gharial in eastern and western reaches of Brahmaputra River system. However, the sightings of small wild population of Gharial in Urpod beel, river Jinjiram, Beki and its confluence zone of river Brahmaputra and its tributaries provided the scope as a last known conservation strongholds of this species. The River Jinjiram and its confluence zone of River Brahmaputra and Urpod Beel is the known habitat of Gharial, and therefore plays a vital role in its survival till now in NE India. There is also need for extensive status survey of Gharial in those localities to save the species from the jaw of total biogeographic extinction from the Brahmaputra and Barak valley.

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