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Distribution of Mud nests of Wire-tailed swallow (*Hirundo filifera*) and first report on the nest parasitism by *Passer domesticus* in Godavari River basin, Maharashtra, India.

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Abstract:

In the present investigation mud nests of Wire-tail swallow (*Hirundo filifera*) from Godavari River basin, Maharashtra were studied, in which 19 different locations were identified as nesting sites of Wire-tail swallow (*Hirundo filifera*) from Godavari River and its tributaries in three districts of Marathwada region. In the present study nesting material, nesting pattern, cluster number, parental care, role of both parents, threats to the nesting sites and mortality of birds were observed. Total of 3397 nests of Wire-tail swallow (*Hirundo filifera*) from 19 locations were present in clusters. For the construction of mud nest, mud was used as the main constituent collected from the river mud flats and the remaining material was bird feathers and short dried grass, stem and root as structural support collected from nearby locations. The main threats to the nest were pollution and human activities, including habitat destruction, avian predators and Lack of food and water. In wire-tailed swallows (*Hirundo filifera*) mud-nest the nest parasitism by *Passer domesticus* was reported as a first report from Godavari River basin in India.

Keywords: Birds, Wire-tailed swallow, Nest material, Mud nest, Nest parasitism.

Introduction:

Birds are warm-blooded vertebrates that belong to the Class: Aves (Alexander, 1975). Over 11,000 distinct species, each with its special look and characteristics. There are around 11,000 bird species distributed all over the globe. Total of 1318 species of birds are found in India, of which 57 are endemic, 03 are breeding endemic, and 85 are threatened (TH) (Birdlife

International, 2022). There is a need on continuous monitoring of bird species occurrence and changes in population, nesting, migration in the various ecosystems including Godavari in India as a prime River system; in this line Chavan et al., (2015) has extensively surveyed the avifauna in Nanded region of Godavari River basin. A little passerine bird that belongs to the swallow family Hirundinidae is the wire-tailed swallow (*Hirundo filifera*). The Hirundinidae family, which has over 90 species is divided into 21 genera, is most diverse in Africa and developed as hole-nesters (Turner, 2010). Swallows are fast flyers, aerial feeders mainly on Dipteran insects particularly flies, in open country near water sources. The nest material utilized by the birds has a purpose linked to predation risk, nest microclimate, and incubation temperature needs, all of which require more thorough confirmation (Jadhav et al., 2018). For nest construction, nesting material is selected by birds which is available to their environment (Jadhav et al., 2024). The mud nests are constructed by using the short and dried branches of local grass stems and roots. The saliva of these birds acts as an adhesive to attach the mud balls to the nest base, whereas the grass material acts as an architectural supporting structure that supports and strengthen the nest. The wire-tailed swallow nests are in a cluster form usually attached to the under surface of road bridges, and railway bridges, the mud nests are lined with mud and saliva. (Chavan et al., 2016; Jung et al., 2021). The down-surface of road-bridge slabs and railway bridges at lateral sides, the water supply overhead tanks in the river systems, pumping stations built in river basins, and the concrete structures of river barrages were also used as nest construction sites. In the present observations, we found in the study area that the wire-tailed swallow nests are being used by common house sparrows (*Passer domesticus*) as their shelter. The house sparrow modifies the internal parts of the nest to develop nest cushions by arranging the soft feathers of pigeons, Egrets and other unknown birds. The modification also uses Cotton threads, jute thread pieces, and local grass branches. *Passer domesticus* is well known for constructing open-type cup-nest in the human residence. In the present investigation, we found the nest parasites in three locations out of 19 nest clusters (15.18 %).

Material and methodology:

Study area:

The study was conducted in Nanded, Parbhani and some parts of Hingoli district of Maharashtra State, India. Godavari River basin in Maharashtra and some border areas of Maharashtra and Telangana state were surveyed for one year. The Godavari basin covers 3,12,812 km^2 or around 9.5% of the country's land area. It is located in the states of Maharashtra, Andhra Pradesh, Chhattisgarh, and Odisha, as well as minor portions of Madhya Pradesh, Karnataka and the Union territory of Puducherry. Godavari River basin is one of the main river basins of Maharashtra. The Geo-locations of nest clusters were observed from various tributaries of Godavari River basin.

Mud nest colony sites in the Godavari River basin were surveyed between March 2023 to March 2024. Using a motorcycle and by walk the nesting sites of wire-tailed swallows were surveyed. Nikon (Wide optical zoom, Cool-pix800) digital camera type with an 83X zoom lens was used to photograph the nest and the nest construction activity. One full day was spent at one nesting site for the observation. GPS (Garmin) device was used to note the latitude and longitude. Based on the observations on presence of dumping grounds for plastic, garbage and

release of domestic sewage in the river or nearby the nesting sites are classified as polluted. All the identified nesting sites were visited monthly during study period.

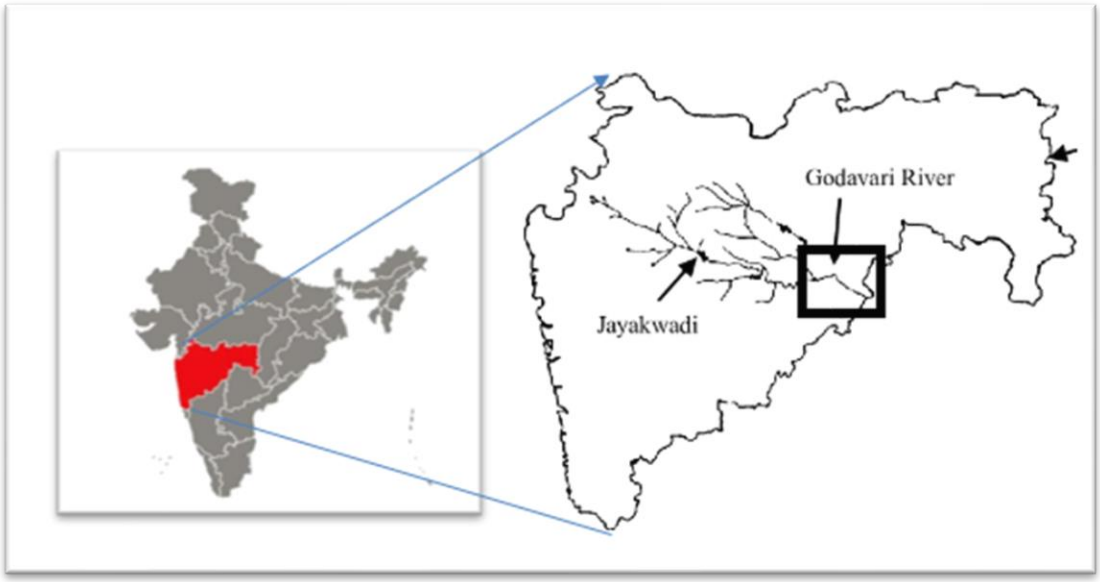

Fig. 1. Study area: Godavari River basin, Maharashtra state and Telangana State of India.

Result and Discussion:

Wire-tailed swallows were found nesting in the form of clusters at 19 different locations (Table 1.). Total 3397 number of mud nests of the swallow were found in the study area. The nest locations were mainly at the eastern side of road bridges and railway bridges. We observed 100% nesting was on human-made construction like railway bridges, road bridges and buildings from where the water source was close. The mud nest is mainly composed of different percentages (80-90%) of mud. In two types of mud nests the retort (Cluster type) and cavity (Isolated single, pocket shape). The mud pellets are the main constituent used in nest construction. A group of birds is involved in the construction of nests. Each nest supported each other to form a cluster. but they construct their nests. Each nest is supported by each other in form of clusters. To study the habitat ecology of these swallow species and construction of nests 26 habitats were selected for this investigation. It was found that both parents were involved in nest construction and parental care. House crow, Pigeon (wild) and black shoulder kite (*Falco peregrinus*) were found the main enemies for damaging the nests of swallows and to predate up on young ones. The availability of mud banks as a main resource for the construction of nests. The presence of stagnant water pools in the river and non-polluted sites in the river basin was identified as suitable for the wire-tailed swallow *Hirundo filifera* for nest construction (Chavan et al., 2018). Occurrence of mud nest colonies in an area is an indication of healthy, clean and non-polluted ecological habitats in the Godavari River basin (Chavan et al., 2016). Majority of the nesting sites were unreachable from land predators and human interference. In overall observation adult and chick, mortality was observed at different nesting sites (9.5/1000/year). Many birds found left their nest at nesting sites at Purna Road and

Railway Bridge as well as at Godavari Bridge A and B (Porta, 2014). Nest parasitism was found at three nest locations in the nest colonies (15.18%) by *Passer domesticus*. The parasitism is a very specific type that 01- 02 mud nests in a colony were found encroached by *Passer domesticus* to use the nests of wire-tailed swallow for living by modifying it. However, the Wire-tailed swallow accepts the encroachment hence both the species live together without any major conflict.

Table. 1.: Distribution of nests of Wire-tailed swallow (*Hirundo filifera*) in Godavari River basin.

SR. NO.	Name of the location.	Code for the location	Coordinates of the locations	Number of clusters	Total mud nests	Distance of mud-banks from nesting site.	height of nesting site from ground	Number of wire-tailed swallows found
1.	Godavari bridge-2, New Mondha, Nanded.	**L1**	Lat:19.142439° Long:77.317318°	7	200	300	80	450
2.	Godavari Old Bridge, Degloor Naka, Nanded.	**L2**	Lat 19.175977° Long 77.366065°	1	1000	80	80	1500
3.	Godavari bridge-4, Zero road Nanded.	**L3**	Lat 19.146611° Long 77.291854°	3	100	20	70	200
4.	Yesgi bridge, Biloli.	**L4**	Lat 19.146611° Long 77.291854°	3	300	600	80	500
5.	Railway bridge-A Near Purna Railway station.	**L5**	Lat 19.178895° Long 77.013678°	6	350	50	80	350
6.	Purna road bridge.	**L6**	Lat 19.178972° Long 77.017043°	4	500	150	80	1000
7.	Dudhna River bridge at Rahtee 16 km.NE to Parbhani.	**L7**	Lat 19.146841° Long 77.310724°	2	200	50	80	350
8.	Vishnupuri Dam, Nanded.	**L8**	Lat 19.146841° Long 77.310724°	3	200	150	70	400
9.	Sahapur road bridge near Degloor, Dist Nanded.	**L9**	Lat 19.146841° Long 77.310724°	1	50	500	80	70
10.	Cherli bridge, Jarikot.	**L10**	Lat 18.876306° Long 77.709974°	2	100	50	60	150
11.	Karadkhed dam Ta, Degloor.	**L11**	Lat 19.146841° Long 77.310724°	1	10	1500	60	10
12.	Railway bridge-B Near Purna Railway station.	**L12**	Lat 19.178895° Long 77.013678°	4	100	50	80	150
13.	Chudawa bridge -A (Purna road).	**L13**	Lat 19.169988° Long 77.141301°	1	1	100	50	8
14.	Chudawa bridge-B (Purna road).	**L14**	Lat 19.166616° Long 77.096509°	2	2	100	50	10

15.	Asana bridge (old).	**L15**	Lat 19.194656° Long 77.341154°	1	2	60	80	20
16.	Degaon BK, Mugat.	**L16**	Lat 19.175977° Long 77.366065°	1	60	60	60	100
17.	Basar, Telangana (Railway bridge).	**L17**	Lat 19.175977° Long 77.366065°	3	120	15	80	200
18.	Baburao Patil college Hingoli.	**L18**	Lat 19.175977° Long 77.366065°	2	2	500	20	2
19.	Machnur, Bodhan.	**L19**	Lat 18.783946° Long 77.831436°	2	100	100	40	250

Swallow (*Hirundo smithii* and *Hirundo filifera*) mud nests have been observed in areas of Maharashtra State such as Mumbai and the Western Ghats region (Balkrishnan, 2010). The swallows in Tamil Nadu have also been investigated, as have the specifics of the structural engineering techniques these birds apply to craft their gourd-shaped nests (Chaya et al., 2014; Sandilayan et al., 2008) whereas in the present study, we found most of the nests of Wire-tailed swallow are of retort type. While the wire-tailed swallow's mud nest in the current study was similar to the Cliff and Barn swallow's, except for variations in other materials, only the major components that were found attached from the inner side of the dome region and entrance tube were feathers from their own body was reported by Chavan et al., (2016) whereas a change we found that the feathers enveloped from inner side of the nests were of Pigeon (*Columba livia*), Egret and some other unknown bird species. Delbert et al., (1977) analyzed the type of nest material used by Cliff and Barn Swallow and found that a major part of the nest was mud that contained sand, clay, and silt. Chavan et al., (2016) reported that the cluster of mud nests, consisting of 5 to 600 nests in the same study area whereas in the current study, 1 to 1000 nests were found. Chavan et al., (2016) reported the occurrence of wire-tailed Swallow nests in the Godavari River at 06 different locations out of 12 possible nest location sites he surveyed, whereas, in the present study, the nest locations are reported at 10 new sites in the Godavari River basin. However, there are changes in the nest number and nest cluster at the reported nesting sites. As compared to the nesting success found at the same locations during the present investigation Chavan et al., (2016) reported Zero number of nests at L1 site and L2 site but in the present study, we found 07 clusters and 200 nests at L1 site and only 01 big cluster comprising 1000 nests at L2 site. This change in the number of clusters and nests is remarkable besides the fact that both the nest success sites are polluted and in the very close vicinity of Nanded city outskirt area. Its specially engineered various parts support the nests, which is a structural marvel with a dome-shaped main body attached to lateral vertical or inclined cement concrete surfaces (Chaya et al., 2014). The bridges still had attachment marks from the mud pellets in a few different locations we observed but these we considered as abandoned nesting sites. The primary causes of the decline in the number of mud nests in the area were decreased river levels, excessive water consumption for human needs, and a lack of precipitation is reported by Chavan et al. (2016) also reported that a flock of 200–300 swallows was observed flying freely in the vicinity of the nests in the early morning and late evening at major nesting sites. It was found that the swallows bring small Dipteran flies from the air to the nests, where they enter through a tubular opening and feed their offspring (Kitti, 1965).

Fig. 2 (a). Nest location Godavari River Bridge, Nanded city.

Fig. 2 (b). Wire-tailed swallow Nests at Fig. 2(a).

Fig. 3 (a). Nest location at Railway Bridge-Purna Railway Station.

Fig. 3 (b). Wire-tailed swallow Nests at Fig. 3(a).

Fig. 4. Nest materials.

Fig. 5. Parental care by (Male and Female Swallow.

Fig. 6. Retort nest construction process by Swallow

Fig. 7. Isolated Pocket nest.

Fig. 8. Chick and adult mortality of Swallow at nest site.

Fig. 9. Nest destruction/abandoned site.

Fig. 10. Nest modification by nest parasite Passer domesticus

Fig. 10. Nest parasite Passer domesticus at nesting site.

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