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SWALLOWS AND SWIFTS- BEHAVIOR IN A SMALL GEOGRAPHICAL AREA

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ABSTRACT:

Raigad District is one of the coastal districts of Maharashtra. There are many small ports on the seashore of the district. A comparative study was undertaken of Swallows and swifts found in Raigad District in the year 2019 from (June to May). In the present study six species were taken into consideration for taxonomic, habitation, nesting behaviour, foraging and breeding are focussed from Raigad District. Four different sites (Alibag, Panvel, Mangaon and Mahad) were selected. From each area two, two places were selected for the present study. Number of Swallows found were more in Mahad due to more bridges, water bodies and more insects available for food as found than other regions and swifts found were more in Mahad because of river and bridges and vast infrastructure and food available where Swifts can live.

Key words: *- Hirundinidae, Apodidae, Taxonomy, Foraging.*

INTRODUCTION:

Raigad district is also like Thane district, a part of North Konkan. It is spread just adjoining to the district of Mumbai to its east and south-east across the Thane creek. It is spread from the Patalganga river basin in the north to Savitri river in the south. Rivers of Raigad are Gangadhari, Surya, Savitri, Kundlika, Kal, Patalganga, Shrivardhana, Mahad, Poladpur, Tala. According to 2001 census, Raigad District has 15 tehsils having 26 census towns, 11 statutory town and 1919 villages.

The common swift was one of the many species described by the Swedish naturalist Carl Linnaeus in 1758 in the tenth edition of his *Systema Naturae*. He introduced the binomial name *Hirundo apus*.(*Linnaeus, C. 1758).* The current genus *Apus* was erected by the Italian naturalist Giovanni Antonio Scopoli in 1777 based on autonymy.

The term *Swallow* is used colloquially in Europe as a synonym for the barn swallow. There are around 90 species of Hirundinidae, divided into 19 genera, with the greatest diversity found in Africa, which is also thought to be where they evolved as hole-nesters. (Angela *et. al.*, 2010). They also occur on a number of oceanic islands. A number of European and North American species are long-distance migrants; by contrast, the West and South African swallows are non-migratory. The Barn Swallow is a common bird known from Andamans, Myanmmar, Malay Peninsula and Indonesia (Ali and Ripley: 1987; Turner, 2004). Available information on the reproductive traits of hirundines that breed in the tropics dshows significant deviation from the typical traits of tropical birds (Hails, 1984; Ali and Ripley: 1987; Turner, 2004).

Animal morphology and behavior are inextricably linked, with particular morphologies permitting particular behaviors, and behavioral innovation producing novel selective pressures on relevant morphologies (Allison at.el.2016). Changes in behavior have long been implicated in initiating changes in morphological traits by affecting how species interact with their environment and by altering selective pressures (Duckworth, 2008; Lapiedra, Sol, Carranza, & Beaulieu, 2013). All species of swallow primarily forage on the wing although occasionally come to ground to take prey. There are only a few

documented cases of Australian swallow species foraging while on the ground, and descriptions of foraging techniques in these instances are limited. Here we provide details of observations on ground-foraging of the Welcome Swallow *Hirundo neoxen*a in south-eastern Australia, as well as an instance of kleptoparasitism. (James at.el. 2012).

Hirundines shows significant geographic variations in the timing of breeding. In the sub-tropics and tropics nesting is limited to the wet season when insects are most abundant or can occur almost throughout the year, sometimes with peaks during rains (turner, 2004).Majority of the species in India breed chiefly during March-July (Ali and ripley, 1987)

Nest building material of birds has been studied by many like Dewar (1909), Ali (1931), Mathew (1972), Davis (1973), Clark & Mason (1985), Fauth et.al. (1991), Sharma (1991), Brouwer & Komdeur (2004). Generally, swallows select mud with appropriate proportion of silt and sand to build nest (Kilgore and Knudsen, 1977).

METHOD AND METHODOLOGY:

In the starting many areas were toured and finally eight areas were selected. The eight given areas were surveyed weekly. Field exploration and survey was undertaken locate habitat of these birds. The investigation was carried out from January to December (2019). As the habitats varied considerably, the avifauna was assessed using both point count and line transect methods (variable width line transect method (Burnham et al 1980)). Birding was done in the early hour's i.e from morning 6.00am to 10.00AM and also in the evening from 05:00 pm to 07:00 PM. Sometimes whole day was spent in observing birds for their foraging behaviour and during nest construction. Birds were sighted using a 10X50 wide angle Celestron binocular and the birds were photographed using Mobile camera and canon simple camera. Birds were identified with the help of local bird watchers, farmers and wild life professionals and the identification was confirmed by authentic scientific literature on birds (felid books) (Salim Ali`s Book, Check List of ZSI and Research Papers). Birds were studied by direct observation. For observation of foraging activities breeding season was taken into consideration as these Swallows and swifts wander more in this period of time.

Various possible nesting sites of Wire-tailed swallows located especially under the large and high bridges of tar roads and railway were weekly visited specially in rainy season. One day at each nesting site was spent to observe the nest building process by Swallows and also changing positions. The Indian swiftlet (*Collocalia unicolor*) were very rare sighted only at Mahad and Murud in natural caves.

Study areas: The sites selected were numbered as:

1) Alibag : a)Pen b) Murud
2) Panvel: a)Uran b) Panvel
3) Mahad: a) Poladpur b) Mahad
4) Mangaon: a) Tala b) Roha

Objective of the study:

To Know the biodiversity of Swallows and Swifts and their behaviour related to foraging, nesting, breeding season, taxonomy in Raigad District. The species selected for the study are given below:

Barn swallows *(Hirundo rustica*), wire tailed swallow *Hirundo smithi* (Leach, 1818)/ *Hirundo filifera* (Stephans, 1826) and Little Swift –*Apus affinis* (J.E.Grey, 1830) and The Indian swiftlet (*Collocalia unicolor*) Hill Swallow (*Hirundo domicola)*

Nest construction Process:

The swallows (Barn and wire-tailed Swallows) carry the nesting material that is wet mud in its

mouth. They dig suitable mud from coastal areas as well as wet soiled area after rains. By preparing a mud pellet in their beaks and carried out one by one to their nests which is gourd shape. (Diameter about 1.0 to 1.5 cm) and about 1500 to 1800 mud pellets were used to construct a single nest taking few hours to few days as both male and females together builds a nest (Brown C R et.al.2000) . It depends upon availability of site, water bodies and bridges for swallows to decide the number of nests to be constructed. Sometimes there are buildings, bridges but no water bodies so the nests are less in numbers. Barn Swallows and Wire tailed Swallow Prepare nests of specific gourd shape having typical blue print design with specific architectural structures (Chayya at.el 2014), Swallows prefer higher elevation from ground to construct their nests near to raw materials required for nest building at safe distance from the reach of enemies like ants, snakes, and predators like crow, hawks, kite and nuisance from human being.The length can be from 6 to 10 inches long and breadth can be from 3 to 5 inches wide.The nests of Hill swallows were cup-shaped (nest diameter: 11.46 ±0.76 cm, cup diameter: 8.59 ±0.81 cm, outer nest depth: 7.86 ±0.76 cm, cup depth: 5.4 ±0.73 cm, nest thickness: 1.42 ±0.34 cm) made with mud pellets as major structural constituent. The nest of The Indian swiftlet (*Collocalia unicolor*) builds the nest with its own saliva but now it contains other materials also.

Nesting material:

The construction material majorly consists of sand, clay, slit, feathers, plastics, twigs, cotton threads, etc. along with their saliva was used in Barn or wire-tailed swallows. But in Cliff Swallows, dried grasses, moss, pteridophyte roots and lichens were also used in the structural layer, mostly in nests placed in tunnel/culvert sites. The amount of these materials was considerably minimal in the nests placed in buildings. (P. BALAKRISHNAN 2010). The Indian swiftlet (*Collocalia unicolor*) builds the nest with its own saliva which has some gastronomic and commercial value (Ali & Ripley 1981). In 2001, Mr. J. C. Daniel at.el noticed that the nests were made up with more grass and feathers than saliva. The nests were shaped like a deep oyster shell, 42-45 mm O.D. and 41-43mm I.D. in size.

Discussions: In the present studies foraging of is seen in air only of all species but twice foraging is seen in case of Indian Cliff Swallow Hirundo *fluvicola* Blyth 1885 which support that Welcome swallow was also seen in Australia on ground. (Higgins et al. 2006). Avian foraging strategies combine complex interactions among morphology, prey preference, foraging behaviour, habitat selection, prey availability and relationships with predators and competitors (Morrison et al. 1990). Quantifying these components of a species foraging strategy can explain niche relationship (Robinson & Holmes, 1982), patterns of habitat use (Karr & Brawn, 1990), and community structure (MacArthur, 1958) and can also help to focus conservation efforts (Petit et al. 1995). However much of the data necessary to characterize a species foraging strategy, are lacking including dietary information (Rosenberg & Cooper, 1990).

Swallows represent the most accepted exemplar for behavioral and ecological research (Brown and Brown 1991; Winkler and Sheldon 1993; Turner and Rose 1989). The swallows have an evolutionarily slender, streamlined body with elongated edged wings, which complements immense mobility, pertinacity, and facilitate in recurrent period of gliding adapted for hunting insects while on the wing (Turner 2004). The sexes exhibit partial or no sexual dimorphism, except for longer tail feathers in the adult males (Møller 1992). The family exploits an extensive

dimension of habitats. The nests and nesting sites vary among different species of swallow. Numerous species have expanded their range of habitation by inhabiting modified human surroundings consisting of agricultural land, bridges, culverts and urban locality (Brown and Brown 1986; Turner 2004). Swallows construct exclusively mud nests, which are attached to the vertical surface. Both the members of each pair contribute to the nest construction (Keith et al. 1992).

The species Swift Alpine *Tachymarpitis melba* are found in Mahad where Kal-Savitri valley is located in the south of the district. It comprises of parts of Mangaon and Mahad tehsils, and small parts of Mhasla and Poladpur tehsils. The Kal and Savitri are the main river systems in this region. The Kal River flows south into the Savitri River, which flows westwards. Hill Swallow *Hirundo domicola were found in Kundlika or Roha River.* Wire-tailed Swallow *Hirundo filifera* Stephans, 1825 were found near Mandad river, Tala and Mangaon. Common/ Barn Swallow *Hirundo rustica were* found in Poladpur, Uran. Mahad. House swift *Apus affinus were* seen at Poladpur, Pen, Panvel and Tala. Swift Alpine Tachymarpitis *melba* were seen at Mahad only. It dosent mean that these birds are specific to that region. They were also seen at different regions also but as a greater number of birds were present in the described place.

All species found were studied from Raigad Region. In the 2nd table some species were common while the variation of region may be possible in different seasons while comparing with table no. 1st. Variation is seen in morphometrics of present Wire-tailed swallow from Wire-tailed swallow of Chavan at. el. (2014) in size of tail and fins, Present Wire-tailed Swallow is bigger because the habitat is Western Ghats- Biodiversity hotspot; where food (insects) are available in abundance during and after rainy season. All species morphometrics was not performed. *Hirundo smithii* nesting period is all the year round. The foraging behavior is seen in House swift *Apus affinus affinus* from Nov to Feb. In Common/ Barn Swallow *Hirundo rustica* nesting period *from* April to July.

Results: From the table. I can conclude that Mahad has most of the nests of swallows and swifts then Murud has, but all the other places have only swallows' nests. For a single nest construction of swallows, it requires about 1800 rounds followed by Panvel nest constructionin Pen. Mahad and Roha, the clutch size is 3-4 eggs and in one-hour swallows visit their homes for security reasons 65 time in one hour in Roha and Panvel but makes less rounds in other places as it does not feel any insecurity. There were more manmade structures than natural because it is convenient for birds. The swifts are less and now using less saliva to construct nests because many poachers as well as predators eat their nest and its nest has high commercial values.

Conclusion: Number of Swallows found were more in Mahad due to more bridges, water bodies and more insects available for food as found than other regions and swifts found were more in Mahad because of river and bridges and vast infrastructure and food available where Swifts can live. The other favourable factor can be climatic conditions. It has been observed that a old used nest of one Cliff Swallow (solitary) was broken partly by another another Cliff Swallow and the remaining new construction takes place (figure 2 and figure 3). The structure of the nest showed variations in length of the entrance tunnel, outer entrance tunnel perimeter, upper attachment length.

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Nest of Indian Cliff Swallow *Hirundo fluvicola* Blyth 1885

Gourd shaped.

Figure 1

Broken nest partly

Figure 2

Broken nest partly

Figur

Nests of Wire-tailed Swallow *Hirundo filifera* Stephans, 1825 on underside of terrace.

Figure 4

Table 1: showing details of one or few observations at every site visited randomly.

Site No.	Location of sites	Nests found in/under man made structures /Natural habitat	Water bodies present with in 100 Mts. Area	No. of nests found	No.of rounds to build a nest	No. of visits after hatching of eggs till juveniles are grown by swallows in one hour	Clutch size
1	Pen (Swallows)	Bridges/buildings	Yes/No	200	1500	23	3-4 eggs
	Murud (Swallows/Swifts)	Tunnels, culverts, buildings, under caves or ceilings	Yes/No	500/34	1450	43	2-3 eggs
2	Uran (Swallows)	Caves, buildings,	Yes/no	35	1600	54	3-4eggs
	Panvel (Swallows)	Buildings	No/Yes	545	1765	65	2 eggs
3	Poladpur(Swallows)	Tunnels,Buildings	No/Yes	375	1674	37	2-3 eggs
	Mahad (Swallows/swifts)	Mounds, buildings, bridges	Yes/no	1234/28	1800	61	3-4 eggs
4	Tala (swallows)	Buildings, bridges at various places	Yes/No	200	1678	32	3 eggs
	Roha (swallows)	Under Water tanks, buildings	Yes/No	354	1456	65	4 eggs

Note: where water bodies are not present there also nests were sighted because swallows used wet soil during rainy season for construction of nests and sometimes other sources wetting soils were also used by birds to establish their nests.

Table no.2 showing details of other species available with references in characterstics.

Sr. nos	Species Name	Characters	Behaviour	Classification
1	Indian Cliff Swallow *Hirundo fluvicola* Blyth 1885	A small Swallow with a very slightly forked tail. Above glossy steel blue brown rump. Below fulvous white , profusely streaked with blackish on sides of head, Chin, throat and breast , Sexes:Alike Resident or Partly migratory Colonial nest.	Native (breeder, year-round resident or winter visitor) The architecture of the nest resembles the inverted dome or gourd.	Kingdom:*Animalia* Phylum :*Chordata* Class:*Aves* Order:*Passireformes* Family:*Hirundnidae* S.Fam:*Hirudninae* Genus:*Hirundo* Species: *Hirundo fluvicola* Blyth 1885
2	Hill Swallow *Hirundo domicola*	This species is a small swallow at 13 cm (5.1 in). It has a blue back with browner wings and tail, a red face and throat, and dusky underparts.	Foraging behavior seems to be at peak during breeding season on during Feb /Nov in different areas.	Kingdom:*Animalia* Phylum :*Chordata* Class:*Aves* Order:*Passireformes* Family:*Hirundnidae* S.Fam:*Hirudninae*

			Cup shaped nests Tunnel/culver nest	Genus:*Hirundo* Species:*Hirundo domicola*
3	Wire-tailed Swallow *Hirundo filifera* Stephans, 1825	The nest is similar to that of the Crag-Martin, but the mud is reinforced with grass and straw. It is fixed in the corner of a verandah near the ceiling, under caves or against rafters in buildings, both inhabited and disused. Several birds may be seen loosely together skimming over the surface of a jheel or village tank, or hawking insects a few feet above it or over ploughed fields around its margin. The nest does not diller from that of the Crag-Martin. It is attached under arches of bridges and culverts, to cliffs flanking streams, and frequently to rafters in the verandahs of bungalows. The nest is usually solitary, but occasionally several are built close together.. (Salim Ali).	Foraging behavior continuously with a little break in search of food or to monitor nests	Kingdom:*Animalia* Phylum :*Chordata* Class:*Aves* Order:*Passireformes* Family:*Hirundnidae* S.Fam:*Hirudninae* Genus:*Hirundo* *Hirundo filifera* Stephans, 1825
4	Common/ Barn Swallow *Hirundo rustica*	It has steel blue outer or upper parts and a rufous forehead, chin and throat, which are separated from the off-white underparts by a broad dark blue breast band. The outer tail feathers are elongated, giving the distinctive deeply forked "swallow tail". There is a line of white spots across the outer end of the upper tail.	In winter, the barn swallow is cosmopolitan in its choice of habitat, avoiding only dense forests and deserts.	Kingdom:*Animalia* Phylum :*Chordata* Class:*Aves* Order:*Passireformes* Family:*Hirundnidae* S.Fam:*Hirudninae* Genus:*Hirundo* Species: *Hirundo rustica*
5	House swift *Apus affinus*	A small smoky black swallow-like bird with conspicuous white rump, white throat,short square tail and a long narrow sickle shaped wings. Seen in scattered rabbles wandering over towns and villages,Sexes alike, It is a resident and common bird. Local migration in some areas. It is dark brown. Bill black. Legs and feet dark purplish black. (baker) .Breeding Nov to Feb.	It is capable of flying long distances	Kingdom:*Animalia* Phylum :*Chordata* Class: *Aves* Order: *Apodiformes* Sub -Order: *Apodi* Family: *Apodidae*, Genus: *Apus* Species: *Apus affinus*
6	Swift Alpine *Tachymarpitis melba*	A large sooty brown swift with white underparts and a brown pectoral band across breast, Sexes alike. Body plumage brownish. Wing feathers (especially secondaries) more greyish brown. Incubation period 18-19 days,		Kingdom:*Animalia* Phylum :*Chordata* Class: *Aves* Order: *Apodiformes* Family: *Apodidae*, S.Fam: *Apodinae* Genus: *Tachymarptis* Species: *Tachymarpitis melba*

Table 3: Number of foraging records of 3 bird species without considering height.

Sr,Nos	Name of species	Foraging every one hours with break in between in a single day of season	Ground foraging
1	Indian Cliff Swallow *Hirundo fluvicola* Blyth 1885	45, 21,61,52,46,34,43	Twice seen on ground
2	Hill Swallow *Hirundo domicola*	34, 45,56,21,33,45.51	Never
3	Wire-tailed Swallow *Hirundo filifera* Stephans, 1825	66,54,23,53,46,61,45	Never
4	Common/ Barn Swallow *Hirundo rustica*	23, 55,45,23,12,33,45	Never
5	House swift *Apus affinus*	70,65,63,56,62,66,43	Never
6	Swift Alpine *Tachymarpitis melba*	71,65,55,36,54,67,44	Never

Table no.4; Showing comparison of different species with species under study.

Sr.Nos	Species Name	Area found	Characterstics	Author
1	Hill Swallow *Hirundo domicola*	Silent Valley National Park and Muthikkulam Reserve Forests, Western Ghats, India.	All the breeding sites were located within an elevation range of 800 to 1,200 m above msl All the nests were cup-shaped (nest diameter: 11.43 ±0.72 cm, cup diameter: 8.59 ±0.71 cm, outer nest depth: 7.84 ±0.71 cm, cup depth: 5.2 ±0.72 cm, nest thickness: 1.42 ±0.32 cm) All the nest sites were in the vicinity of water No. of eggs 53in Silent Valley No. of eggs 35 in Muthikkulam	P. Balakrishnan
2	Wire-tailed Swallow *(Hirundo filifera*): Stephans, 1826)	Godavari river ecosystem, Nanded	556 mud nests in Godavari river basin, Nanded Stephans, 1826). About 1000-1400 mud pellets were used to construct single nest. Details of time required to construct various parts of mud nest are variable from few hours to few days . The nesting material mainly composed of sand, silt and clay; also consists of crushed parts of bivalve shells, feathers etc.	Chavan Shivaji at.el.(2014)
3	Common/ Barn Swallow *Hirundo rustica*	Western Ghats Regions of Shimoga and	Order: Hirundidinidae Occurances:Common Migratory Status:Resident Habitat: Wet lands Food: Insectivorous Sexual Morphology: Alike	Sharath at.el.(2019).

		Chikmagalur Districts, Karnataka, India	Nesting Period:April to July Status:Least Common Trends of Population: Decreasing	
4	Wire tailed Swallow *Hirundo smithii*	Western Ghats Regions of Shimoga and Chikmagalur Districts, Karnataka, India	Order: Hirundidinidae Occurances:Common Migratory Status:Resident Habitat: Wet lands Food: Insectivorous Sexual Morphology: Alike Nesting Period: All Year Status: Least Common Trends of Population: Increasing	Sharath at.el.(2019).
5	Common Swallow *Hirundo rustica*	Near Kotagiri, Coonoor and Ooty town. Davison (1883) recorded it as common in the Nilgiris	Common winter visitor, Betts (1930) records its arrival in the Nilgiris as early as October	
6	House Swallow *Hirundo tahitica*	- Upper Nilgiris	House swallow *Hirundo tahitica* Common resident, widespread, seen practically throughout the. Several nests recorded at different locations in March and April. Two nests seen in April 2002 in our garage were reoccupied in 2003 with little modification.	Ashfaq Ahmed Zarri and Asad R. Rahmani
7	Red Rumped swallow *Hirundo daurica*	Bangitappal Valley	Rare passage migrant to the study area, a flock of nearly 100 individuals seen on 2 November 2003, Flock making a nasal “queenk” every now and then.	Ashfaq Ahmed Zarri and Asad R. Rahmani
8	House swift *Apus affinus*	Dasve and Warasgaon reservoirs, Western Ghats in Maharashtra	----------	Swati at.el.(2012).
9	Dusky Crag Martin *Hirundo concolor* Wire-Tailed Swallow Hirundo smithii Barn Swallow *Hirundo rustica* Red Rumped Swallow *Hirundo daurica*	Nigade	Rare Rare Migratory Rare	Kuldeep at.el.(2013)

10	*Collocalia unicolor*	Vengurla Rocks Archipelago	build pure and white nests which have a which have a commercial culinary value. Half -Cup Shaped nest. Blackish brown and rump concolorus Nesting: March to June Nest:Whitish, translucent to opaque with some mixture of extraneous matter Legs and feet purplish black.	Anil Mahabal at.el.(2007)
11	*Collocalia fuciphaga*	Vengurla Rocks Archipelao	Build pure and white nests which have a which have a commercial culinary value. More or less Half -Cup Shaped nest. Legs and browinish Nest:Whitish, translucent to opaque with no mixture of extraneous matter.	Anil Mahabal at.el.(2007)
12	*Wire tailed Swallow Hirundo smithii,* *Swift Alpine Tachymarpitis melba, Red Rumped Swallow Hirundo daurica*	Tamhini Ghat	------	Anand at.el . (2007)
13	Sand Martin *Riparia riparia* , Dusky Crag Martin *Ptyonoprogne concolor*, Eurasian Crag Martin *Ptyonoprogne rupestris* , Streak-Throated Swallow *Hirundo fluvicola* Nahar ababil , , Barn Swallow *Hirundo rustica* Masjid-ababil , Red-Rumped Swallow *Hirundo daurica* Masjid-ababil , Wire-Tailed Swallow *Hirundo smithii*,	----------	---------	Sunjoy Mongaat (2009 to 2011 -Two phases of Project):
14	Asian Palm Swift *Cypsiurus balasiensis* , Alpine Swift *Tachymarptis melba* , House Swift *Apus affinis*, Crested Treeswift *Hemiprocne coronata* , Barn Swallow *H. tahitica* , Wire-tailed Swallow *H. smithii* , Red-rumped Swallow *H. daurica* , Streak-throated Swallow *H. fluvicola*	Sharavathy landscape, Karnataka.	----	Barve at.el (2011):
14	Wire-tailed Swallow *Hirundo smithii*	Navi Mumbai	occasional	Asad at.el.(2013)
16	Barn Swallow *Hirundo rustica*	Navi Mumbai		Asad R. Rahmani at.el.(2013):

17	Dusky Crag-Martin *Ptyonoprogne concolor* *R Hirundinidae* Barn Swallow *Hirundo rustica* Red-rumped Swallow *Cecropis daurica* , Wire-tailed Swallow *Hirundo smithii*	----------	----------	Anish Pardeshi at.el. (2017)
18	Hill Swallow *Hirundo domicola* , Eurasian Crag Martin *Ptyonoprogne rupestris*, Dusky Crag Martin *P. concolor* , Common House Martin *Delichon urbicum* i	Munnar Hills, Kerala.	----------	Praveen at.el. (2015)