



Parameters Related to Decline the Population of House Sparrow, *Passer domesticus* (Linnaeus, 1758) in Indian Subcontinent

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Abstract: The population of house sparrows (*Passer domesticus*) in India has shown a declining trend in recent decades. In many places like Punjab, Haryana, West Bengal, Bangalore etc a very sharp decline has been observed by ornithologist. The species has shown a conservation concern in its native ranges. According to a recent study by Indian Council of Agricultural Research (ICAR) the house Sparrow population in Andhra Pradesh has reduced up to 88% and in other states like Kerala, Gujarat, Rajasthan it has dropped down up to 20%. In coastal areas of India the population has tremendously dropped to 70 to 80%. The main cause of decline of this species remains unidentified but it is believed the unavailability of nests because of modernization, constructions, and deforestation can lead to their decline. The other auses might also include rapid use of insecticides, competition with other species etc. Modern houses do not leave any space for the species to build their nests but in past few years artificial nest boxes are promoted like wooden nest boxes, shoes boxes as nests or earthen pots as nests, which give house sparrows an alternative to live in. The sparrows in India are endangered and still battling to reclaim their niche in their historical habitat range. In the global identification of the status of the species according to IUCN Red List, it is categorised as ‘Least Concern’ (a species evaluated as not being the focus of conservation). The global count of the species is on a decreasing trend, which indicates gradual degradation of the habitat and ecosystem worldwide for the species,” said Saxena from IUCN.

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Introduction:

House Sparrow is member of old world sparrows, considered by many as relative of weaver finch family (Srivastava and Sinha, 2010). *Passer domesticus indicus* belongs to the Oriental indicus group (Kurahde et al., 2013). It is one of the larger sparrows with length typically of 14-16 cm and weight of 26-32 gm. (Dandapat et al., 2010). It is rather large head, heavy billed, racy passerine. It is sexually dimorphic with the male being darkly coloured head markings having grey crown, white cheeks, black bibs and Rufus neck. In breeding plumage male is brightly coloured having dark black bill. Female has bluffy brown body with gloomy grey brown under parts while juvenile are deeper brown with dull yellowish bill. It produces cheep-chirrup sound, sing year-round, although less frequently in cold and rainy days (Joshi, 2009). They mainly depend on seeds but also eat insects especially during breeding season (Lowther and Cink, 1992). Insects constitute important diet of the nestling for its survival. However, they are also

opportunistic feeder of the back yard too. In Agricultural areas, an average of 60% of food comes from livestock feed, 36% from weed seeds while insect constitutes 4% of the diet (Joshi, 2009). House Sparrow is a social bird (Vincent, 2005). Generally, they are gregarious live in large flock which sometimes include more than 100 individuals and roosts inside the dense bushy vegetation. During breeding season it forms small colony and generally, do not spread distantly from the natal colony (Balaji et al., 2013). They are monogamous, peak breeding period includes March –June. They built their nests in the crevices of thatched roofs, electric poles, in ventilation holes and space available on the electricity meters and sometimes in natural trees too (Ali, 1996). Female lays eggs having clutch size of 4-5 most frequently. Both male and female take part in incubation. Incubation period lasts for 10-14 days. Males and females both feed the hatchling through regurgitation (Bharucha and Padate, 2009). Average 25- 27 days required to complete the cycle of nest occupancy (Bhattacharaya et al., 2011). House

Sparrow make up to 3- 4 nesting attempts per year (Summer Smith, 1963). House Sparrows are sedentary birds, living out their lives within an area of 1-2 km. (Summer- Smith, 1988).

The House sparrow (*Passer domesticus*) belongs to the sparrow family Passeridae. It is one of the most abundant birds with strong nexus with human settlements. House sparrows are originated in the Middle East and get introduced to most parts of the world. These introductions were successful because of its ability to adapt within human settlements quickly. However, currently a very large decline in House sparrow population has been reported from countries all over the world. In India the sparrow population is declining alarmingly by almost 70% in certain places (Dandapat *et al.*, 2010). Sparrows are found in great abundance in cities, towns and villages in the past is now declining mainly from cities compared with towns and villages. A possible reason for the urban decline of House sparrow is electromagnetic radiation (Balmori and Hallberg, 2007).

Decline in Houses parrow population is reported from different part of the world (Moss, 2001; Prowse, 2002; SummersSmith, 2003) with multiple reasons. The causes for the decline of sparrow are not scientifically proved, but several factors have attributed to their decline. Change in agriculture patterns and increased use of pesticides results in a decline in invertebrate pray. Decline in insect food badly affects the survival of young chicks and their population can be increased by providing more insects (The Royal Society for the Protection of Birds, 2015). Poison residues from contaminated food grains also have devastating effects on sparrows. Sparrows prefer thatched houses and Bungalows for nest building. Modern trends in house construction reduced safe nesting places for sparrows. Hygienic practices of modern man in fear of bird droppings keeps away birds like sparrows from houses by fixing nets in the windows and ventilation . The sparrows are forced to nest in open places which make it easy for predators to kill these birds. Hedges which provide shade and hiding places for birds are replaced by iron and concrete fences. Paved gardens in new houses without any mud keep away birds. Single variety grasses grown for beautification in gardens reduced much native variety of grasses whose seeds are food for these birds. Modern means of transport resulted in urban decline of the house sparrow as sparrows were deprived of leftover food grains in the roads. Moreover the roads also became unsafe for them to feed. Now a day's people aware of the decline of House sparrow from urban and sub urban areas

initiated the movement of fixing man made nests for them (Chethan, 2012).

It is noted that the boxes placed in high noise level zone remain inactive. Buildings with concrete roof and rolling shutter doors are extremely good nesting locations for house sparrow but the shopping mall buidings of recent pattern with glass fittings in the exterior donot provide much space for constructing the nests. Pollutants from motor vehicles seems do little harm to house sparrows in towns and cities but modern houses with clean tidy gardens affected their feeding and nesting for which they need old fashioned houses and weedy gardens (Monika, 2005). There has been a steep fall in House sparrow population that is about 75% since 1994 in London and studies shows a corelation between the disappearance of sparrow and the introduction of phone mast GSM towers (Girish, 2010). The electromagnetic radiation is proved to affect reproduction, circulatory and central nervous systems and may cause microwave syndrome which leads to decline in general health (Kamath *et al.*, 2014). The criss cross electric cables also do harm to them. Loss of birds increases the number of harmful insects like mosquitoes which were vectors of numerous pathogens.

Status of House Sparrow in India

The sparrows in India are endangered and still battling to reclaim their niche in their historical habitat range. In the global identification of the status of the species according to IUCN Red List, it is categorised as 'Least Concern' (a species evaluated as not being the focus of conservation). The global count of the species is on a decreasing trend, which indicates gradual degradation of the habitat and ecosystem worldwide for the species," said Saxena from IUCN. The common house sparrow, once an integral part of a household, is gradually edging towards extinction and is listed in the Red list of the endangered species of the International Union for Conservation of Nature (IUCN). Expressing concern, deputy director of Bombay Natural History Society (BNHS), Vibhu Prakash, said over the past three decades, there has been an 80% decline in sparrow population in the country as per some reports. It is worrying as there is no way of scientifically finding out its exact population and the actual reasons for its decline.

No significant documentation found regarding the population status of House Sparrow in India. However, dramatic decline has been observed by ornithologist in different parts of country like Banglore, Mumbai, Hyderabad and other cities in India (Dandapat *et al.*, 2010). A survey conducted by the Indian council of Agricultural reported 80 %

decline in House Sparrow population in Andhra Pradesh only while in Gujarat and Rajasthan it is 10 to 20 % decline, while the decline in coastal area was as sharp as 70- 80%. Dwindling population of House Sparrow has rung an alarming call which has engendered deep public concern. In India numbers of NGOs and Institutions have started campaign to conserve the status of House Sparrow in different parts of the country but there is lack of authentic data to actually evaluate the population status of House Sparrow periodically. Like in Bhavnagar (Gujarat) Jivdaya Premi “Jay Malnath” Group has started campaign to save the Sparrow since 1992 and distribute artificial nest box and water pot for sparrow. Similarly, so many people are active in this field and has joined hands together to save this little creature like, Jagat Kinkhabwala better known as ‘Chakliwala’ for his passion to save House Sparrow has done marvellous job by distributing 50,000 nest till date and over 4,500 of those have become homes for the birds (TOI News-2017) one of the appreciated job done by him. But scientific documentation regarding the actual status of House Sparrow is lacking. Till date the study carried out on House sparrow is not consistence, there is lack of proper documentation on the recordings of local bird monitoring at regular time interval which constitute a kind of hurdle to actually compare and analyse the rate of declining of the species. The Nature club, Surat (Gujarat), in coordination with Bird Conservation Society has decided to actually record the head counting of Birds in different area of the city (TOI News 2017). The scientifically proper bird survey techniques could help us to collect the authenticate data regarding the actual status of the bird in different area which is still lacking in India. However, In India BNHS and ICBN, with the aid of RSPB, have programmed a scheme to monitor local birds in India.

Factors Influencing Population Pattern of House Sparrow

House Sparrow is considered as an r-selected species (Daniels, 2008), which is intimately associated with civilization however increased urbanization has changed the population pattern of House Sparrow. Various hypotheses have been put forward to determine the key factors responsible for the population decline. Possible environmental factors contributing to decline in House Sparrow populations include reduced availability of food (Hole et al., 2002), Predation (Thomas et al., 2012; Bell et al., 2010) and loss of nesting sites (Summer-smith, 2003), ‘Allee effect’ (Allee, 1938), loss of roosting site, electromagnetic radiation (Memon et al., 2013) etc.

Use of chemical fertilizers and insecticides is another factor for the dwindling sparrow population. Referring to a study carried out in the United Kingdom recently, Prakash said thousands of sparrow chicks died of starvation as they survive only on the insects’ larvae for the first five days after hatching out of the egg. They could not be fed by the mother birds as insects are killed on a massive level due use of chemical spray in lawns, kitchen gardens and agricultural fields,” he said. Ashok Kumar Tiwari, director of the Central Avian Research Institute (CARI) in Bareilly, was of the view that changing lifestyle of humans had adversely impacted these birds. The possible effect of mobile towers on air waves and use of household electrical appliances like air conditioners could have affected the sparrow. He also attributed increased noise and air pollution as possible causes for disturbing the birds.

One of the key factor responsible for the lower reproductive success in avian species is food limitation in urban than other Landscapes (Chamberlin et al., 2009). Invertebrate constitute important part of nestling’s diet for their better survival, although adults are largely seed eaters (Anderson, 2006). Hence, invertebrate availability limits the reproductive success (Peach et al., 2015). Studies in England and Hungary have reported high rates of chick starvation and lower BMI (Body Mass Index) correlated with the local availability and quality of invertebrate prey (Peach et al., 2008, Seress et al., 2012). So that when there is availability of larger invertebrate prey such as Lepidopteran Larvae and Orthoptera in diet of nestlings, fledgling has higher body mass, this in turn is positively related to the likelihood of recruitment as healthy breeding adult individual (Ringsby et al., 1998; Schwagmeyer and Mock, 2008). Small scale studies of a declining House sparrow population in Hamburg, Germany suggested brood starvation might have been caused due to no availability of aphids (Aphidioidea) and Ants (Formicidae) as part of nestling’s diet near nesting site (Bower, 1999; Mitschke et al., 2000). It has been reported that 84% of Sparrow nestlings were comprised insects, with caterpillars constituting 38% (Simvat, 1977). Hence, invertebrate prey availability is one of plausible demographic factors responsible for decline in urban-suburban House Sparrow population. Coverage of exposed soil by concrete, different planting pattern in modernized garden, improved street hygiene, unleaded petrol etc., play important role in reducing invertebrate availability. Similarly, seed constitute the important diet of the adult birds, with increasing dependence of birds on kitchen scrapes may reduce the fitness of the species, which could result in failure of female to come into breeding condition or

reduction in breeding attempts per pair (Summer-Smith, 2005). Study carried out by Murgui et al., (2010) in Valencia (Spain) has suggested that the absence of holes and Crevices in new buildings could make them unsuitable for nesting, one of the key factors responsible for reducing population due to lack of nesting sites. The House Sparrow being a social bird, forms loose colony during breeding seasons, which depend on social stimulation for successful breeding. It is suggested that the colony size when falls below threshold size, the bird stop to breed due to lack of social stimulation and the colony collapses ('Allee effect') (Allee, 1938). In urban centre where lack of nesting sites has been one of the significant factor, while in case of suburban areas the buildings are fairly separated on which bird prefer to build nest, lead to lack of social stimulation than in case of other residential areas (Summer-Smith, 2005). However, habitat needs do not end with finding suitable nesting sites only, other ecological behaviour like 'dust bath', not common to other passerine birds require a sandy ground, in modern architecture there is paved garden with no mud to bath in (Dandapat et al., 2010; Daniels, 2008). It require hedges or bushes formed of different shrubs, as their suitable roosting sites which is also reducing now a days could also affect the population pattern of the species directly or indirectly. Many considered increasing effect of Electromagnetic radiation as one of the possible factors responsible for the declining population of House Sparrow (Memon et al., 2013). It is believed that increased microwaves released from tower are responsible for reproductive and coordination problems and aggressive behaviour in birds such as Sparrow (Sri Suci et al., 2001).

Surya Prakash, a zoologist at the School of Life Sciences, Jawaharlal Nehru University (JNU), said compared to the sparrow's fast depleting count around the year 2012, when numbers had fell by about 60-70% (only an estimate), its numbers are now "improving", if one goes by sightings, and that's good news as Delhi gets ready to mark yet another World Sparrow Day on Saturday (March 2020).

Causes for decline

Urbanization

Sparrow population declined severely in several areas of Europe in the past two decades. The post decline survey states that in urban landscapes the human socio-economic status also reflects the distribution of sparrows. They disappeared predominantly from the people with high socio-economic status. It can be attributed to change in their habitat structure with sophisticated designs, where there is no scope for making nests. Relatively more sparrow appears in low socio economic status

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areas, where the predation risk is also low. Other than this reason, extreme rainfall, low or high temperatures, diet with more vegetable matter, high concentration of air pollution, increased traffic etc., are also some of the factors that stabilize the population in urban areas. Unavailability of natural plant material also one of the reasons for decline of sparrow population. A gradual decrease in the usage of plant materials in the urban areas has been observed. In the recent nests, less plant materials and more anthropogenic materials are the nesting materials. It leads to the parasitic load and can leads to the population decline. Long term stressors among the urban sparrows affect the physiological and behavioural aspects in sparrows. Chronic stress was examined by measuring the aspects of Hypothalamic Pituitary Adrenal Axis function in the blood samples. The predominant reason for existence of Sparrow in rural areas and residential areas could be due to close availability of both foraging and nesting.

Habitat Loss

Decline in the habitat or its periphery or intolerable change in its optimal habitat results in the decline of the species. The predominant cause of species extinction is habitat destruction. In Europe, both tree sparrow (*Passer montanus*) and House sparrow population decline due to the developmental practices in agriculture and reduction in the nest sites due to modern building designs and food supply. In Valencia-Spain, during the years of 1996 to 2006, loss of 157 hectors of waste land and 473 hectares of cultivated land (converted for housing), resulted in habitat loss for sparrows. Surveys in Kolkata indicate negative impact on growth of sparrow population with urbanization.

Food Resources

As the sparrow is an altricial bird, the nestlings depend on the parents from hatching day to fledging day. Laboratory investigations revealed that sparrows prefer natural food. When blue colour coated grains were given along with natural non coloured grains, they fed on non coloured grains. Newly hatched out birds feed on insect food for the first three days and gradually depend on plant material, soft grains, insects, cooked soft food etc. When the laboratory experiments were conducted on three different nests with three types of diets, one with insect like food (only protein), one with fat and protein and another with only starch containing food, results showed that the starch consumed young ones were weaned first than the Protein-Fat food consumed ones. The young ones fed with Insect like food also not showed normal growth. Food resources also affect the nestling survival. Studies state that

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survival of the nestlings was lowest in the larger broods during the peak of the season as the survival rate is less due to demand for food resource. As per the records of BTO – (British Trust of Ornithology) per each season, the number of sparrow population (at the end of July), increases to maximum. But it decreases at the onset of breeding season. This is mainly due to shortage of protein rich food.

Lack of awareness

The present generation pays much attention on technology aspects and least bother about the nature. They neglect the nature and natural resources and their utility. This is mainly due to lack of emotional connections that pushed the conservational concepts aside. As a result our domestic friend put at the edge of extinction.

Pesticides and Pollution

Indiscriminate use of pesticides to increase the crop yield is also one of the reasons for decline in sparrow population. Insects die up to certain extent and the remaining live ones are poisoned by the pesticides. The adult sparrows and fledglings also die due to the poisoning. This also effects sparrow population as nestlings primarily feed on animal food. Nelson's Sparrow (*Ammodramus nelsoni*) is another sparrow in United States of America. It is exposed to heavy metal Mercury. Its resident marshes are contaminated with Mercury Methylation. The Mercury may have toxic effects on the nervous, digestive, immune systems, on lungs, Kidneys, skin and eyes. The concentration of Mercury at tissue level exceeds the threshold. Sparrow is a bio-monitor for heavy metal pollution in urban areas. Heavy metals like Cu, Cd, Pb, Sn were measured among various young ones of sparrow from the age 1 to 14 weeks, in West Bank. Both male and female young-ones accumulated equal proportion of the pollutants in their body organs. In the liver, the concentration of heavy metals is more, followed by stomach, bones, lungs, feathers, muscles and the concentration is least in egg shell. Along with the age, the concentration of heavy metals has been increased.

Electro Magnetic Radiation

The Electro Magnetic Radiation (EMR) from cellular base towers causes sleep deprivation, irritation, headache, cancer etc., in man. EMR pollution also has negative impact on wild life also. The pulsate Magnetic waves are 900 MHz, for analog and 1800MHz for digital transmission, which has bad impact on neuronal system of animals and birds. It is proved that the EMR affect circulatory, reproductive and Nervous systems which leads

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microwave syndrome and results in the decline of general health. The EMR is one of the reasons for declining of urban sparrow population [58]. Since 1994, the sparrow population has been declined to about 75% in London, by the introduction of cellular GSM towers. In Belgium, studies by Evarent and Bauwens [60] showed the gender variation in and around the cellular phone base station. Comparatively fewer male sparrows were seen than females. Still sparrow population is able to survive, where the EMR of cellular towers exists. No study clearly reveals how far EMR affects the behavior and breeding of sparrows. So, further studies are needed to find out the effects of Electromagnetic radiation on breeding behavior of sparrows.

Population Dynamics

Female lays four to seven eggs in every attempt as maximum. In Europe, each year, each adult sparrow can breed four times [61,62] where as in India two to five eggs. Peter observed egg laying capacity daily in the nest boxes. During one breeding season, female lays one egg per a day. Peach et al. reported that in each breeding time, 77% eggs been hatched and among them 68% of young ones only fledged out. The young ones after fledging use to disperse from the nesting area. Several factors influence the dispersal such as females use to disperse with females where their number is more. Age, and smaller body size in females are the intrinsic factors. Lesser level of colonial philoparty, low breeding productivity are extrinsic factors. Urban population is under stress. Hypo-hyper thermic temperatures, elevated sound levels, over illumination (reflection of day light, night lamps) over crowding are the stressors for urban populations. Sparrows are not exempted from these stressors. Urban sparrows are exposed to more stress compared to the sub urban and rural populations. Exposure to long-term stress impacts physiological, immunological, and nutritional aspects. When compared with rural populations, Lymphocyte ratio and innate immunity are significantly lower in urban sparrows. Urban sparrows with poor nutritional diet also have low Heamoglobin and low haematocrit value, and low cholesterol. These stressors ultimately affect breeding that leads to decline of species.

Conclusion:

Impact of climate change in the decline of sparrow population in India is yet to be studied. The above mentioned causes have a role in the decline of sparrow population in India. Detailed studies are required to elucidate the real status. As sparrows are closely associated with humans and human habitats; drastic decline in house sparrow population is a

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matter of great concern. Perhaps it is a warning signal of the approaching dooms day. It is time for humanity to wake up and to act for retaining the ecological balance and harmony.

References:

- [1]. Dandapat A, Banerjee D and Chakraborty D (2010). The case of the Disappearing House Sparrow (*Passer domesticus indicus*). *Veterinary World* 3(2) 97-100.
- [2]. Daniels RJ (2008). Can we save the Sparrow. *Current Science* 95(11) 1527-1528.
- [3]. De Laet J and Summers - Smith JD (2007). The status of the urban house sparrow *Passer domesticus* in North - Western Europe: a review. *Journal of Ornithology* 148 275 - 278.
- [4]. Dott HEM and Brown AW (2000). A major decline in House Sparrows in central Edinburgh, *The Journal of the Scottish Ornithologists' Club* 21 61-68.
- [5]. Girish C, Ajay K and Parmesh K (2012). Population of House Sparrow, *Passer domesticus* (Linnaeus, 1758) in Different Habitats of District Kurukshetra, Haryana (India). *Nature and Science* 10(1) 113-122.
- [6]. Gulati V (2005). House Sparrow on Verge of Extinction, (Tribune News Service, Chandigarh, India). Gupta L, Silori CS, Mistry N and Dixit AM (2003). Use of animals and animal products in traditional health care systems in District Kachch, Gujarat. *Indian Journal of Traditional Knowledge* 2(4) 346-356.
- [7]. Hole DG, Whittingham MJ, Bradbury RB, Anderson GQA, Lee PLM, Wilson JD and Krebs JR (2002). Widespread local house-sparrow extinctions – Agricultural intensification is blamed for the plummeting populations of these birds. *Nature* 418 931-932.
- [8]. Joshi DK (2009). House Sparrow (*Passer Domesticus*): The Endangered Bird. *Orissa Review* 53-55. Kurhade S, Kshirsagar J, Wagh P and Kasar R (2013). Habitat wise distribution of house sparrow (*Passer domesticus indicus*) in Parner tehsil of Ahmednagar district, Maharashtra, India, Pelagia Research Library. *European Journal of Experimental Biology* 3(4) 194-197.
- [9]. Lee KA, Martin LB and Wikelski MC (2005). Responding to inflammatory challenges is less costly for a successful avian invader, the house sparrow (*Passer domesticus*), than its less-invasive congener. *Oecologia* 145(2) 244-251.
- [10]. Lowther PE and Cink CL (1992). In: *The Birds of North America* (Editor: A Poole, P Stettenheim, and F Gill) No. 12, (The Academy of Natural Science, Philadelphia, PA and The American Ornithologists Union, Washington, DC, USA).
- [11]. Mahawar M and Jaroli DP (2006). Animals and their products utilized as medicines by the inhabitants surrounding the Ranthambhore National Park. *India Journal of Ethnobiology and Ethnomedicine* 2(46) 1- 5.
- [12]. Memon A, Sheth H, Patel PU and Ansari M (2013). *Passer domesticus*- a disappearing species due to increasing effects of electromagnetic radiations (emrs). *International Journal of Pharmaceutical and Biological Science Archive* 1(1) 71-76
- [13]. Minock ME (1969). Salinity Tolerance and Discrimination in House Sparrows (*Passer domesticus*). *The Condor* 71(1) 79-80.
- [14]. Mitschke A, Rathje H and Baumung S (2000). House Sparrows in Hamburg: population habitat choice and threats. *Hamburger Avifaunistische Beiträge* 30 129-204.
- [15]. Murgui E and Macias A (2010). Changes in the House Sparrow (*Passer domesticus*) population in Valencia (Spain) from 1998 to 2008. *Bird Study* 57(3) 281-288.
- [16]. Peach JW, Vincent EK, Fowler AJ and Grice VP (2008). Reproductive success of House Sparrows along an urban gradient. *Animal Conservation*. 11 493-503.

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