# Preliminary Survey of House sparrow (*Passer domesticus*) in three Different Areas of Haridwar, Uttaranchal

*Dissertation submitted to*

**GURUKUL KANGRI UNIVERSITY, HARIDWAR**

*In partial fulfillment of the*

**MASTER'S DEGREE IN ENVIRONMENTAL SCIENCE**

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## INTRODUCTION

We shall never know how many different species of birds have inhabited our planet, because the majority came and went long before the arrival of *Homo sapiens.* Dr. Oliver Austen, in his *Birds of the World*, calculated from a study of fossil records that a peak of 11,500 species was reached during the Pleistocene, about 250,000 years ago. Since then there has been a decline to our currently accepted world total of about 9,000 living species. The extinction of species is though, part of the natural and continuous process of evolution. Unfortunately, man has sped up the process to such an extent that the great majority of recent extinctions are now directly traceable to this influence and activities. Some 100 unique species of birds are known to have become extinct during the past 600 years, but today more than 1,000 are considered as nearing extinction. Of these, nearly half have such critically small populations that they seem unlikely to survive for many more years unless vigorous action is taken to save them. The purpose of this preliminary analysis is to draw attention to the plight of house sparrow *(Passer domesticus)* and to analyse the various threats they face.

The sparrows are the brown and fluffy birds which are always around us but rarely noticed. They are omnipresent in our lives and are almost everywhere. They share our homes and share our food. The sparrow is the most widely distributed and common avian species of India, they affect almost all habitats. Whole of the country covered, including the desert areas and the cold region. When we say sparrows we usually refer to house sparrows which is the commonest and has the widest distribution and is ubiquitous in nature.

The wide spread and once abundant house sparrow which is universally familiar in appearance has become a mystery bird at many localities in recent times. For years we objected to the permanent resident flock in our garden taking more than a fair share of food during the winter. But now weeks pass without a single bird putting in an appearance.

It is thought that the house sparrow, originated in the Mediterranean and expended its range into Europe with the growth of civilization. Only at the insistence of man did the house sparrow make its way across the Atlantic Ocean to the United States. It is distributed all over India upto about 4000 m in the Himalayas.

The first introduction of the house sparrow was conducted by the Brooklyn Institute in 1851. Eight pairs were originally released but none were able to survive the change in climate. More attempts were made in New York City and other areas along the New England seaboard, and eventually the birds adopted to our colder climate and multiplied. The house sparrow rapidly spread across the United States. The abundance of spilled grain used for feeding horses and the artificial nesting cavities provided by man helped the sparrow along. (Lowther *et. al.* 1992).

**General Features of *Passer domesticus* :**

* Size : 14 - 16 cm
* Wingspan : 19 - 25 cm
* Weight : 26 - 32 g
* Small, Stocky songbird
* Bill thick
* Legs short
* Chest unstreaked
* Wing bars
    * MALE : White cheeks, Black throat and chest, Gray cap, Bill black, Broad white upper wingbar, under parts whitish grey.
    * FEMALE : Dingy brown all over, unstriped gray brown chest and underparts large pale yellowish eyestripe. Black and straw coloured striped on back. Bill yellowish, Eyes black, Crown plain gray brown.
    * IMMATURE : Juvenile similar to adult female.

* Ubiquitous in nature.
* SOUND : Calls a slightly metallic "Cheep, Chirrup". Song a series of cheeps, shrill monotonous.
* FOOD : Seeds, especially waste grain and live stock feed, Also weed, seeds and insects.
: Discarded food
: Primarily seedeaters but also eat insects especially during the breeding season. (Lowther and Cink, 1992)

**Migration :** House sparrow is a summer visitor (March - October) to higher elevations in Baluchistan and in the Himalayas

**Social Organisation :** In pairs or small family groups when breeding, otherwise gregarious, forming larger flocks, sometimes of hundreds of birds. Highly vocal. Breeding in small colonies, the house sparrow makes its homes in areas closely associated with human habitation, and is a common resident of agricultural, urban and sub urban communities. The male house sparrow is highly territorial, aggressively defending the nesting site during breeding season. Species that attempt to nest within the house sparrows territory will often be evicted. The sparrow will destroy the eggs of a competing species or kill the nectings or even incubating females.

**Mating Behaviour :** House sparrows are monogamous, farming long term pair bonds. They have multiple broods, but it is rare that more than two of these will be successful.

**Breeding Behaviour :** Courtship display begin by male selecting a nest-site and remains as it advertisement calling, a quite chirrup, repeat at a rate of 1 call every 1-2 sec., sometimes accompanied by wing shivering and tail raising, if female approaches and shows interest in the nest, male becomes excited, jumping about in stiffly held posture, wings held out slightly and drooped head held high with black throat feathers erected.

At this time male goes in and out nest site, but prevents female from entering, sometimes for 2-3 days. During nest building, male may present female with nest material and touch bills, bill touching also preceeds copulations. (Summers - Smith, 1955)

**Eggs :** 5-6 whitish with gray or brown spots around the large end.

**Clutch Size :** Usually 4-5 eggs. Range 1- 8.

**Chick development :** Male and female incubate the eggs for a period of 10-13 days. Both adults feed the young and maintain the nest; on rare occassions other adults will also assist with raising the chicks. The young fledge after 14-17 days, remaining dependent on their parents for an additional 10 days.

**Fledging :** 14-16 days. Parents continue care for several days after fledging.

**Nest Type :** A ball of dried vegetation, feathers, strings and papers with an opening one side. Placed in cavity, on building, or in tree. Nests in small colonies.

Found in both natural and man-made cavities, nest are a bulky, loose mass of paper, string, grass and weeds lined with hair and feather.

The male selects the nest site and does most of the nest building, although the female may help. Nesting begins in March - April.

**Foraging :** Forages primarily on ground (by hopping).

*(The Birdhouse Network : House Sparrow - 2001)*

## Geographical Variation

| Features | House Sparrow (*Passer domestices indicus*) | Kashmir House Sparrow (*Passer domestices parkini*) | Turkistan House Sparrow (*Passer domestices bactrianus*) |
|---|---|---|---|
| * Local Name | Gouriya (Hindi, Urdu) Guora (Nepali) | Non recorded | Non recorded |
| * Size | 15 cm. | 15 cm. | 15 cm. |
| *Status, Distribution and Habitat | Very widespread and abundant resident; locally subject to vertical movements. The whole of India, Pakistan and Bangladesh (Himalayas above 1500 m); Sri Lanka in all zones; introduced into the Andman Islands (Port Blairs, S. Andaman). Breeds upto 3000m (Baluchistan), 2000m (Daula Dhar), 2100m (Simla), 1500 (Nepal), replaced above by *parkini*. In Sikkim upto 1300m, replaced above by P. *montanus*, in the Nilgris at all elevations but in the rest of Southern India apparently abasent or very local above 1000m, even in populated areas. | Common resident, subject to vertical movements, also partial migrants. The Himalayas from Balutistan, Kashmir and Ladakh east to Sikkim, breeding mostly above 2000m (Population of Nepal valley somewhat intermediate between *parkini* and *indicus*. In Ladakh breeds upto 4000 m, even 4500 m or wherever there is permanent cultivation. In winter, moves to lower altitudes and to the plains as far south at least as Bahawalpur, Sind and Rajasthan. Affects human settlements and cultivation. | Winter visitor to Rajasthan (and presumably Pakistan). |
| * Extralimital | Ranges from Arabia to Burma, introduced in S. Africa, Zanzibar, Comoro and Mascarene islands. | None recorded. | Breeds from Russian Turkestan and northern Afganistan west to the Caspian sea. |

| Features | House Sparrow (*Passer domestices indicus*) | Kashmir House Sparrow (*Passer domestices parkini*) | Turkistan House Sparrow (*Passer domestices bactrianus*) |
|---|---|---|---|
| * Breeding | *Season*, chiefly March-June in the north continuing till Sept. – Oct. in central India; throughout the year in Southern India. | *Season*, April –Aug. in Kashmir, June to Aug. in Ladakh. | Extralimital. |
| | *Nest,* an untidy bulky collection (domed whenever possible) of straw, fibres, cotton strings or other rubbish, lined with feathers and placed in almost any kind of hole.<br><br>*Eggs,* 3-6 usually 4, very pale greenish white blotched and spotted with brown and ashy grey. | *Nest,* as in House Sparow, placed in holes in earth-cliffs in loose, colonies often high up in popular trees (in this case bulky globular grass structure sometimes several in the same tree).<br><br>*Eggs,* 3-7, normally 5 or 6, similar to those of *indicus.* | |
| *Museum Diagnosis | Young male begin to breed soon after assuming adult plumage, even before their skulls are perfectly ossified. | Differs from *indicus* in being larger, with larger bill. Chestnust of male deeper, black of breast more extensive. Female darker, more smoky grey below. | Differs from *parkini* in being paler. Wing averages longer than in *indicus* but shorter than in *parkini.* |

*(Ali and Ripley, 1974 and 1983)*

## Objective

Preliminary analysis of population dynamics of *Passer domesticus indicus* at three different sites viz. an agricultural field, forest and residential colony.

## REVIEW OF LITERATURE

The hypothesis that rural house sparrows may decline by a series of local extinctions was supported by a farmer survey. This revealed that house sparrow decline presents itself not as a reduction in number at all farms, but as a complete loss at some forms, with population stability at others. As well as winter food supplies, invertebrate food for nestlings or book of nest sites may be limiting at some sites. Given the house sparrow's sedentary nature, these resources must be provided as ubiquitously as possible. The new 'entry level' agri-environment scheme, which is hoped to reached upto 80% of farms, may help to achieve this. *[http://www.rspb.org.uk/science/ecology/2002/rural house sparrow].*

House sparrow spread over most of the United States and Canada, and its harsh, insistent chirp become the dominant bird voice about our homes, where it seemed as though we might never again hope to hear a chorus of native bird - music unmarred by the discordant chatter of this alien. But relief has come from a wholly unexpected quarter. As automobiles displaced horses, there has been a diminution in the sparrow's food supply, followed, in towns and cities, at least, by a marked decrease in their numbers." *[http://birds.cornell-edu/bird house/bird bios/species accounts/ houspa.html]*

London has lost nearly 60% of its house sparrows in the past six years. Nationally, over the past 30 years, the rural House Sparrow population has dropped by the same amount, yet no one knows why. Many theories have been put forward as to why such a decline has occured. These include pollution, the increase in predators and the loss of a reliable food source. However, while theories abound one fact is known : Sparrows are gregarious

birds that "Like to go around in gangs. When number drop below a certain level they all go." [This line is quoted by the Trust for Ornithology] As sparrows like to breed in relatively large colonies, Frieghtliners City farmes hope that the provision of sixty nest boxes, will help them nest, reproduce and stay in the area. Other activities to encourage the retention of House Sparrow population are to plant bushes and a new hedgerows within the farm's perimeter. Freightliners City Farm's timely breeding prog. for House Sparrow had received a Parish Pump Priming Award of £ 750 on thursday 20th Feb. 2003. *[http://www.conservationfoundation.co.uk/html/ news/n...)*

A new guidance leaflet 'House Sparrows' in Great Britain", which is funded by the Department for Env., Food and Rural Affairs (Defra) and produced in partnership with RSPB and British Trust for Ornithology (BTO), heralds the start of an initiative to encourage people to create suitable habitats to increase the number of the treasured British house sparrow.

Guidance comes as part of a house sparrow conference hosted by Defra. The conference, held in london at the end of last week, brought together current knowledge of house sparrow populations and demographics Research has found that :

* House Sparrow numbers over the last 30 years have fallen from 12 million pairs to fewer than 7 million pairs.
* 60% of House Sparrows are found in rural and urban gardens.
* Breeding has been more successful on formland.
* Increases in breeding performance have been least in South East England where populations have declined most rapidly.
* Increases in breeding performance have been most rapid in the North and West where some populations have increased; and
* A drop in the adult survival rate and poorer breeding success in suburban habitats in the South East of England is blamed for the overall decline in sparrow numbers.

British trust for Ornithology house sparow Officer, Rosie clearly said : "The disappearance of house sparrows seems to be connected to the way we build our houses and the ease with which birds can find food. The situation is becoming critical in London, but there are large number of gardens across the UK from which house sparrows have disappeared. We need help from both people who still have house sparrows and, probably more importantly, from home owners who have lost them." *[http : /www.nfucountryside.org.uk/ newsruralwildlife-941.htm]*

The UK Houe Sparrow population was not monitored adequately by the CBC until 1976, partly because that scheme did not target urban areas and gardens. Data collected by CBC / BBS indicate a rapid decline in abundance over the last 25 years, as does the BTO's Garden Bird Feeding Survey though this commenced later (Siriwardena et al. 2002). These results are supported by many other data and anecdotal reports that have generated great conservation concern (Summers - Smith 2003). A change in the listing criteria has resulted in the admission of the species, previously Green listed, to the Red list. The decline is likely to have been driven by reductions in overwinter Survival (Siriwardena et. al. 1999) and has been linked to a range of changes in rural and urban habitats; the causes are likely to be different in the true areas. Possible explanations for the decrease in house sparrow abundance include general reductions in food supply, reductions in the amount of grain split during agricultural operations, tighter hygiene regulations, increases in predation, and the use of toxic additives in unleaded petrol. BBS data suggests that the spieces has shown increases recently in Scotland and Wales. (Crick *et. al.* 2002)

Estimates suggest the number of House Sparrows in Britain fell between 1972 and 1966 by 9.6 million birds from a total around 17 million. While the cause is unknown, the best theories suggest the demise of the urban sparrow is either due to lack of food or the wrong sort of pollution. Food sources in cities may be declining or it may be that sparrows are losing out to other species in

competition for food. Differences in the levels and types of pollution - including the introduction of unleaded petrol - may also have had an effect.

One other factor may be a lack of suitable nesting sites in modern towns and cities. Modern houses are simply not sparrow friendly, because they lack the holes, nooks and crannies that make for good nesting positions.

The Royal Societyfor the protection of Birds is currently backing research which it hopes will provide the explaination. This is running alongside a survey using reports from the public, which the RSPB is conducting in conjunction with the BBC, to determine actual numbers of sparrows and nests in urban areas. Rural sparrow numbers have also declined in recent years but the reasons behind this seem easier to pinpoint. Modern farming methods have reduced the number of weed seeds on which rural sparrows feed and this, along with a decline in insects thanks to more effective esticides, has led to a vast reduction in countryside sparrows. This mirrors a reduction in around 20 small rural birds species, some of which have declined by upto 90% Sparrow populations can be supported by providing regular supplies of weed seeds. Supplies of seeds suitable for birds can be obtained in supermarkets. (Everett *et.al.* 2001)

Although we don't know why the House Sparrow has declined so dramatically in London, it is probably connected with a decline in the population of invertebrates that are essential for the nestings in their first few days of life. The decline began in the late 1980s around the same time that unleaded petrol containing methyl tertiary-butyl ether was introduced. An impact on the invertebrate population is possible but not proven. The decline in urban Sparrows is not confined to London. It has also occured in other large cities in Europe, though not in small town where traffic density is lower. Interestingly, the decline appears smaller in Paris where there is a proportionately higher use of diesel fuel. (Summers - Smith. 2001)

# MATERIAL AND METHODS

## Study Area

The study was conducted in Haridwar and nearby areas. The Latitudinal range is $29^0$ 45' N to $30^0$N and Longitudinal extension is $78^0$E to $78^0$ 15' E. The maximum height of Haridwar from mean sea level in SE is 230 m and in NW is 305 m. The total area is 2458 sq. km of which 262.4 sq. km. is covered under forests while City Areais 64.6 sq. km. The land slopes from NW to SE.

The major physiogeographic divisions of Haridwar are Shivalik montane region, Submontane region, Plains and Tarai Belt. The region experiences mainly sub-humid monsoons. Besides north westerly winds bring whirls of cold waves from December to February. (Balooni and Arya, 2005)

## Locations of Survey

(1) A colony, Govindpuri which is located near Ranipur Mod and population density is high and traffic is dense in this locality.

(2) An agricultural field which is located in Kankhal near Delhi Highway and surrounded by residential area.

| | | |
|---|---|---|
| Crops | : | Wheat (Rabi) |
| | : | Rice (Kharif) |
| Fertilizers and Pesticides used | : | Urea, Dye and Manure |
| Ownership | : | Nirmal Bagh Akhada |

(3) Chilla forest which is located 3 kms. away from Hardwar and common plant species found in this forest are - Trevia, Lantana, Zizyphus, Malutus and Pogostenon.

**Methods**

The study was conducted over a period of two months (Jan - Feb, 2005). Regular field trips were made throughout this period at intervals of one or two days. The study consisted primarily of the study of population dynamics of House Sparrow of the selected areas. Then the status of House Sparrow was determined by comparing the population pattern in different localities.

Two different methods were adoped for study of population pattern in different localities. The first one was LINE TRANSECTS METHOD and the other one was POINT COUNTS METHOD.

***Line Transects Method :*** The idea of walking about and counting all the birds detected has the appeal of simplicity. One would expect to count more individuals of a species in its favoured habitat than elsewhere and more in a year of high than low population density.

By keeping moving, it is possible to cover more ground in a fixed time than by any more eleborate method. Long transects can be divided into small sections whose habitats can be measure line transects are best suited to large areas that are relatively uniform within section of hundreds of meters or more. To avoid double counting of birds detectable at long range, trans need to be fairly widely spaced. Detecting and identifying birds while walking is a challenge to ornithological skill. The approach is thus sensitive to bias from observer quality and experience. Transects are probably more accurate than point counts. This is because the most likely violations of assumptions concern distances between bird and observer. Their impact rises linearly for transects and by square for point counts.

***Point Counts Method :*** If we stand at one place, it is possible to count all the birds seen and heard. At its simplest such a method repeated over several places will assemble a list of species present in area. Point counts are similar in conception and theory to transects.

In fact, they can be imagined transects of zero length conducted at zero speed. They have the advantage over transects of being easier to incorporate into a formally designed study. It is easier to locate point randomly or systematically than it is to layout transect route because route required better access which may bias the habitat sampled. A well-spaced sample series of points in an area will provide more representative data than a few transects point count are often preferred to transects in more fine grained habitats if identification of habitat determinants of birds communities is an objective of the study. This is because the habitat data can more easily be associated with occurrence of individual birds.

Point counts are similar to transect in requiring a high level of observer skill. By waiting at each point, there is slightly more time to detect and identify difficult birds than in transect. In some habibats, there is also the advantage of being able to concentrte on birds without the noise and distraction of avoiding obstacles while walking. In scrub or woodland, points may be preferred offer a chance these reasons. On the other hand, transects offer a chance to record flying birds ahead of the observer. A great advantage of point counts is that they are efficient.

**Table-1 : Occurrence of *P. domesticus* in Forest Area**

| Date | Day | Time | Male | Female | Total | Sex Ratio (M/F) | Weather |
|---|---|---|---|---|---|---|---|
| 25-01-05 | Tuesday | 7-10 am | 0 | 0 | 0 | 0 | Clear |
| 01-02-05 | Tuesday | 7-10 am | 0 | 0 | 0 | 0 | Cloudy |
| 08-02-05 | Tuesday | 7-10 am | 0 | 0 | 0 | 0 | Clear |
| 15-02-05 | Tuesday | 7-10 am | 0 | 0 | 0 | 0 | Clear |
| 22-02-05 | Tuesday | 7-10 am | 0 | 0 | 0 | 0 | Clear |

Duration of Observation : 7 am to 10 am

**Table-2 : Occurrence of *P. domesticus* in Agricultural Field**

| Date | Day | Time | Male | Female | Total | Sex Ratio (M/F) | Weather |
|---|---|---|---|---|---|---|---|
| 23-01-05 | Sunday | 9.00am<br>9.30am | 2<br>3 | 1<br>2 | 8 | 5:3 | Fog |
| 30-01-05 | Sunday | 8.50am<br>9.20 am<br>9.30 am | 1<br>3<br>1 | 2<br>2 | 9 | 5:4 | Cloudy |
| 06-02-05 | Sunday | 9.00am<br>9.45am | 2<br>3 | 1<br>5 | 11 | 5:6 | Clear |
| 13-02-05 | Sunday | 8.45 am<br>9.15am | Many<br>3 | 5 | 8+ | 3+:5 | Clear |
| 20-02-05 | Sunday | 9.45 am<br>10.00am | 3<br>2 | 5<br>3 | 13 | 5:8 | Clear |
| | | | | | **41+** | | |

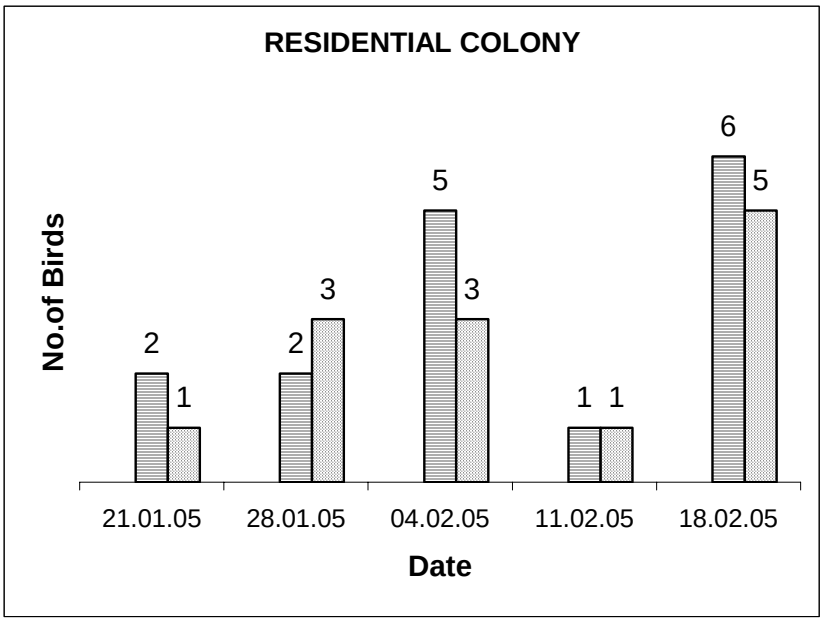
Duration of Observation : 7 am to 10 am

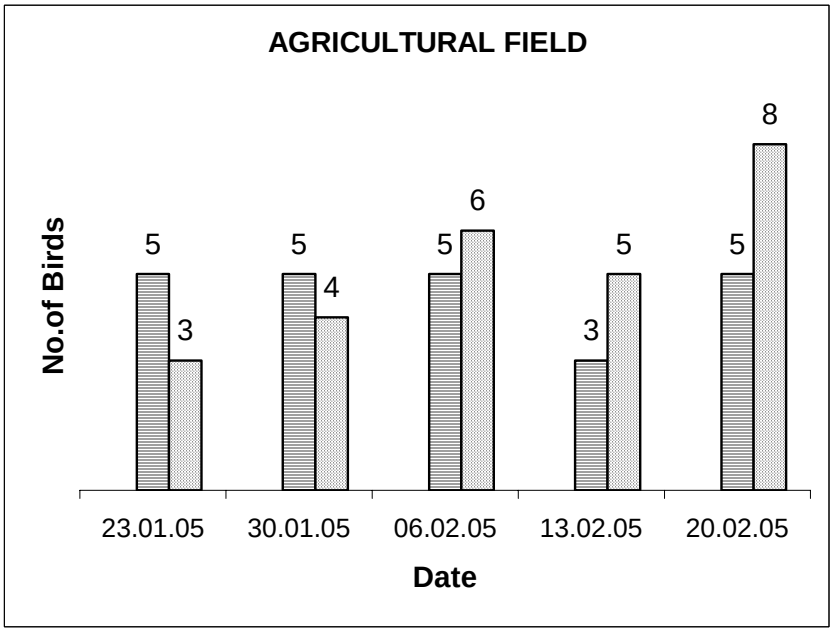
**Table-3 : Occurrence of *P. domesticus* in Residential Colony**

| Date | Day | Time | Male | Female | Total | Sex Ratio (M/F) | Weather |
|---|---|---|---|---|---|---|---|
| 21-01-05 | Friday | 7.30am<br>7.40am | 3<br>1 | 1<br>1 | 6 | 2:1 | Clear |
| 28-01-05 | Friday | 7.50am<br>8.10 am<br>8.30 am | 1<br>1 | 2<br>1 | 5 | 2:3 | Fog |
| 04-02-05 | Friday | 7.45am | 5 | 3 | 8 | 5:3 | Clear |
| 11-02-05 | Friday | 7.35 am<br>8.20am | 1<br>1 | 1<br>1 | 4 | 1:1 | Cloudy |
| 18-02-05 | Friday | 7.50 am<br>8.25am | 5<br>1 | 3<br>2 | 11 | 6:5 | Clear |
| | | | | | **34** | | |

Duration of Observation : 7 am to 10 am

## Male / Female Sex Ratio




Male

Female

## RESULTS AND DISCUSSION

This preliminary analysis of population dynamics of *Passer domesticus* was conducted at three different sites viz. forest, an agricultural field and a residential colony. The study results are as follows -

- Over the period of two months of study (Jan - Feb 2005), 34 birds were seen in residential area, more than 49 in agricultural field and not a single bird was seen in the forested area at the time of observation.
- 56% of total birds sited in Residential area were males and 47% in agricultural field.
- Maximum number of house sparrow were spotted on bright and sunny days.
- Breeding has been more successful in agricultural field.
- House sparrow number over the last decade has fallen. More birds were seen in the agricultural field compared to the residential colony. This is accounted for by the abundant food supply (cereal grains) and relatively quiet and unpolluted environment of the agricultural field.

The decline in bird population over the year has been inferred by survey conducted locally. There is no hard data to corroborate the observation due to lack of regular censuses. Many theories put forward to explain such a decline include pollution, increase in predators and loss of a reliable food source. The disappearance of house sparrow seems to be connected to the way we build our houses and the ease with birds can find food.

However, vehicular pollution seems to do little harm to the growth of house sparrow which is found mostly in towns and cities.

Modern houses and clean, tidy gardens have not helped this little bird. They are in need of homes and weedy areas where they can feed.

The house sparrows Latin name, *Passer domesticus*, aptly describes its nesting habits around houses. Many new house designs and home improvements have restricted the number of suitable nooks and crannies for house sparrows to nest in.

To help the house sparrow we can put up nest boxes. They feed mainly on seeds especially cereal grain, but also seeds of grasses and chick weed. Wild, weedy or shrubby areas in the garden provide a natural seed source and supply.

# *Summary*

*The common houe sparrow (Passer domesticus indicus) once seen widely everywhere has now shown remarkable decline in its population in many areas.*

*This study was undertaken to collect information about population density of house sparrow in different localities of Haridwar. The study aims at finding reasons and consequences of changing population pattern of house sparrow.*

*The sparrows are fluffy brown birds 15cm in length and are distributed all over india up to 4000m in the Himalayas. Different sites of study include a colony, an agricultural field and a forested area in Haridwar. The study was conducted over a period of two months (Jan - Feb 2005) during which regular field trips were made at intervals of one or two days. Population pattern was studied either by Point count method or by Line transects method.*

*It was seen that house sparrow do not inhabit dense forest. They are more abundant in agricultural field as compared to residential colony. There is a definite decline in their number over the last decade. This is because of loss of nesting sites, food sources, increase in predators and pollution.*

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# HOUSE SPARROW

Male

Female