

## Effect of electromagnetic radiation on the house sparrow *Passer domesticus*: State-of-Art review

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### ABSTRACT

In the contemporary era, the cell phones are an integral and indispensable appliance to the human civilization. However, according to some research investigations cell tower antennas with CDMA technology transmit electromagnetic field and radiations in the frequency range of 869-894MHz and those with GSM 900 and GSM 1800 technology transmit electromagnetic radiation with a frequency range of 935-960MHz and 1810-1880MHz respectively. Unfortunately, the electromagnetic radiation (EMR) has a negative impact on several animal species including human. But EMR released from the cell tower masts have mortal effect on the bats, bees, birds etc. as reported in scientific researches.. The present study is focused to a detailed review on the effect of EMR on the house sparrow (*Passer domesticus*). House sparrow is a small bird of length 14- 16 cm and prefers to build its nest near urban settlements or farms. During last few decades with the increase in the number of cell phone towers, the populations of house sparrow are significantly declining across the globe. And presently, they are sighted rarely and are declining at an alarming rate. House sparrow has been listed as an endangered species in 2012. According to the researchers, there are many reasons for the disappearance of this bird, such as use of unleaded petrol, EMR from cell tower masts, pesticides and urbanization that resulted in the lack of habitat. In a research article it has been proposed that the radiations that are emitted from the base stations usually cause irritation among the birds causing them to change their habitat far off places where the radiation intensity is nil or low. The mortality noticed in the house sparrow probably can be acclaimed to behavioral changes followed by loss of determination of communication signals and direction and ultimately, affecting the central nervous system to its extreme. Thus, it can be concluded from the study that along with elucidating the effect of EMR on the disappearance of the sparrows some path breaking researches should also be designed with the purpose to develop new technologies in telecommunication industry, thus making the earth safer and eco-friendly for all the lives created by the Almighty.

**Key Words :-** *Passer domesticus*; Electromagnetic radiation; Cell-tower masts

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### INTRODUCTION

Cellular phones are essential to our lives and so are the cellular phone base stations (Balmori *et al.* 2007). They are not simply free-standing towers but a balloon of invisible electromagnetic field with

radiation that threatens life around them, specifically the birds. The limited number of observations and studies are focused towards the negative impacts the electromagnetic radiations carry for the various bird species in the country (Ferne & Reynolds 2005). Overall, there is a decline in the diversity of the bird species.

Therefore, it has become important to pay considerable attention to the observed patterns for a sustainable development approach for the protection of bird species. Electromagnetic field and radiations that are invisible to human eye are omnipresent. There are several natural and anthropogenic sources that generate electromagnetic field in the surrounding air like television towers, radio towers and cell phone towers (Panagopoulos & Margaritis, 2008).

#### **House sparrow (*Passer domesticus* L.) and cellular phone-based station**

According to several reports and studies the radio/television transmitters transmit a weak radio frequency (above 10MHz) field while all the electrical appliance transmits a low frequency (up to 300Hz) electromagnetic field or intermediate frequency (300Hz-10MHz) electromagnetic field (Everaert & Bauwens, 2007). Cell tower antennas with CDMA technology transmit electromagnetic field and radiations in the frequency range of 869-894MHz, whereas the cell phone tower antennas with GSM 900 and GSM 1800 technologies, transmit electromagnetic field with a frequency range of 935-960MHz and 1810-1880MHz respectively (Smith & Denis, 2003).

Several countries have observed a reduction in bird diversity coinciding with the proliferation of cellular mobile base stations (Balmor, 2005). The most prominent example of this impact comes from the UK where a huge decline in several species of urban birds was observed, including the sparrows. The sparrow population in the country decline from 24 million to 14 million birds in the period of 30 years. An abrupt decline with 75% descent occurred between 1994 and 2002 that coincided with the rollout of mobile technology in the country. In Belgium, many sparrows disappeared recently.

Disappearance of house sparrows has been reported from different parts of the country. The microwaves (300MHz to 300GHz) emitted by cell phone towers and handsets has been found to be responsible for damaging eggs and embryos of sparrows (Dongre & Verma, 2009).

House sparrows are disappearing at an alarming rate. There are many reasons identified behind the decline of these birds like the use of unleaded petrol, changing the climate, depleting greenery and radiation from wireless technologies and cell phone towers crossing the skyline (Durgam *et al.*, 2017). Electromagnetic radiation from wireless technology and telecommunication is not blamed for affecting human health but it is also attributed to the disappearance of the sparrow population in our country. As per the recent researches, domestic sparrows' population in cities are estimated to have fallen by 75% in the last 23 years (from 1994-2017). The sparrows are now spotted only in those areas which are located at a distance from the radiation circle of mobile towers (Manish & Singh, 2018). Radiation from cell phone towers interferes with the navigational skills of sparrows, causing them to lose their sense of direction and leads them astray from their homes making them more valuable.

#### **Impact of EMR on the behavior of house sparrow**

Long-term exposure to low-level radio frequency radiation has damaging effects on the nervous system and immune system of sparrows [Balmori, 2009]. Moreover, sparrows are known to have thin exo-skeleton penetrated easily by microwave radiation, making them sick, lethargic and incapable of foraging. Nesting grounds built in close proximity to roof towers results in delayed egg hatching or increased unhatching. Research investigations propose that short-term exposure to radiation from cell phone tower reduces the reproductive capacity of birds by 60% (Batellier *et al.*, 2008). Prolonged exposure to microwave radiation also reduces the activity level in sparrows. This makes them less alert and more vulnerable to attack by predators. Sparrows have been declared as endangered and placed in the Red Data list of endangered species

by International Union for Conservation of Nature and Natural Resources (IUCN).

The 20th day of the March is observed as sparrow day. The occasion is seen more as a sad one as the number of sparrows has dwindled over the years and one seen commonly, the small bird has become rare to find. According to a renowned researcher from IIT, Mumbai, India, the harmful effects of mobile tower radiation on human beings and animals said birds like sparrows and peacocks are several affected by the cell-tower radiation since their surface area is more as compared to their weight (De Laet & Smith, 2008).

### **Solution to the problem**

Some basic changes in human lifestyle can change the scenario. May be one day we can compensate the loss by following the given measures so, that all the creations of Almighty can stay safe and healthy in the Universe.

Minimization of the use of cell phones as much as we can.

Prefer to make only important calls or at least cut down your talking time over cell phones minimal time.

Communication through text messages instead of making a call to cause less radiation.

Prefer not to use multiple SIM cards as a greater number of SIM card will release more radiation in the air.

Minimization of the use of mobile internet to reduce the amount of radiation in the atmosphere.

Prefer not to use mobile phones when the signal is weak because, during weak signals, the radiation becomes very strong to connect with a nearby mobile tower.

Awareness program should be launched about the harmful effects of cell phone radiation in birds and what we can do to save the birds from radiation.

### **Conclusion**

From the fore-going study it can be concluded that the electromagnetic signals are directly or indirectly associated with the decline in the house sparrow population. Cellular phones are essential to our

lives for all the communications. However, their extensive usage and upgraded services continue to threaten the species diversity and the lives of different birds in the region. While the cellular phones cannot be completely wiped out of our lives, it is important to find an alternative technology that can keep the wireless communication strong but do not pose any risk to the lives of these little creatures around us. Bird diversity is important to keep the plant diversity and all the researchers must try to begin looking for alternative technology for safe surroundings.

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