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Effect of Electromagnetic Radiations from Cell Phone Towers on Birds Community

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Abstract: ***The aim of this research article is to review the population of birds after the installation of a mobile towers for mobile phones. The factors that affect the population and health of birds are studied in this paper. A field survey was conducted on effect of mobile tower radiation on birds in west Tripura district in different sites of mobile tower situated in this area. Electromagnetic radiation from Cell phone and cell tower affects the birds, environment. The paper shows the variety and the richness of birds in different areas of West Tripura district in contrast of various distance of mobile towers. There are three different distance area of towers where survey is done. This study aims at studying the possible effects of Electromagnetic Radiations on birds and other mentioned living beings.***

Keywords: Electromagnetic radiation, Cell phone tower, Birds, Radiation, Frequency, Carcinogenic, Immune system, Growth. Electromagnetic radiation (EMR).

1. Introduction

Birds are the most specious group of land vertebrates. Birds are more susceptible towards the effects of electromagnetic radiation. So birds candidates for being good biological indicators for low intensity electromagnetic radiation. Cell phone technology has revolutionized the telecommunication scenario in India. Due to its several advantages, cell phone technology has grown exponentially in the last decade. Currently, there are more than 50crore cell phone users (TRAI 2012 [51]) and nearly 5.5 lakh cell phone towers to meet the communication demand (TRAI 2012 [51]). The numbers of cell phones and cell towers are increasing without giving due respect to its disadvantages. Telecommunications in the form of mobile technology was launched in India in 1995 and by 2012 the number of mobile phone subscribers reached a value of 811.59 million and a rise is expected by 2013 (Amruth, 2014 [3]). During the last 16 years. India has seen exponential growth of mobile telephoning. In October 2012, India has 736, 654 mobile base stations out of which Delhi accounted for 21, 992 base stations (Thomas, 2012). All over the world, people have been debating about associated health risk due to radiation from cell phone and tower.

Electromagnetic waves are the combination of radio waves, microwaves, infrared rays, visible rays, UV rays, X - rays, and gamma rays. The frequency range of electromagnetic waves is less than 3x10 9 Hz and greater than 3x1019Hz. Electromagnetic waves are harmful as well as beneficial to living beings. In the present era, electromagnetic waves are widely used in telecommunication and healthcare departments. The interaction of electromagnetic radiation with the living organs and the application of electromagnetic radiation in medical and telecommunication areas are studied. The benefits and harms of electromagnetic radiation are also discussed in this paper. Birds has thin skulls and their feathers can act as dielectric receptors of Microwave radiation (Liboff and Jenrow, 2000 [37]). There is so much research done in the area of birds' health, population, and safety.

Approximately 5245 bird species are suspicious all over the world whose population has decreased in the last decade. Rapid development of telecommunication device in the last decade has caused enhancement of human interference with nature, resulting in the undesirable impact on biological, physical and ecological system (Gottieb, 2013 [30]). Recently the electromagnetic fields from mobile phones and other sources have been classified as " possible carcinogenic to human" by the WHO's "International Agency for Research on Cancer " (IACR 2013). A number of biological effects induce by manmade and radiations of different frequencies are documented by some research groups. These include change in intercellular ionic concentration, changes in reproductive capacity of animals (Remondini et. al, 2006 [41])

It is observed that due to the installation of mobile phone base stations in many areas in the UK, a decline in the population of birds in urban areas was detected. One of the species was the sparrow, whose population decreased by 41% in the time period of thirty years. In Spain, during the period of 10 years from 1997 to 2007 (Balmori A, Hallberg Ö., 2007), three bird species out of fourteen totally vanished due to the installation of mobile phone base stations, and a decline in the population of four species was also recorded. The variation in the productivity of ***Ciconiaciconia*** (white stork) was also recorded; the productivity near the mobile base station was less than at a distance of 200 m from the source of EM radiation (Balmori A., (2005). A decline in the population of birds has been detected in some states of India like Punjab, Uttar Pradesh, and Madhya Pradesh, etc. Pigeons, sparrows, swans, and parrots are extremely affected by this harmful radiation. In Chennai, there are four species named ***Passer domesticus*** (house sparrow), ***Haliasturindus*** **(**brahmini kite), ***Pycnonotusjocosus*** **(**red whiskered bulbul) and ***Streptopeliachinensis*** (spotted dove) are declined. When birds pass through a region near a mobile phone base station, the EM radiation affects the navigational abilities of birds, which causes them to become disoriented from their path and fly in the wrong direction (Everaert J, Bauwens D. A, 2007).

Objective of study

1) To study the number of different within 50 meter radius of mobile phone tower
2) To study the number of different within 200 meter radius of mobile phone tower.
3) To study the number of different within 500 meter radius of mobile phone tower.

2. Material and Methods

The present study on the "Effect of Electromagnetic Radiation from mobile phone towers on Bird community" was undertaken in different observation sites like 'Amtali, Hapania, Laksmanpara, Bishalghar, Sepahijala ' etc. Birds were identified according to the Book of Indian birds (Ali 2012) [2] Identification of birds done on the basis of their morphological character like shape and colour of beak, wings, eyes, feathers, legs, and other body parts and then comparing them with those described by (Ali 2012) [2].

Observation were takes thrice a week in morning 6.00 - 11.00 am and in the evening from 3.00 pm to 6.00 pm, with proper records and calculations.

Instrument used:
a) Camera
b) Writing pad & Pen
c) Water bottle
d) Memory card
e) Binocular

3. Observation

The present study was conducted for the period of December 2022 to May 2023. Observation were taken on the abundance of birds within the area of 50 meter, 200 meter and 500 meter respectively from the area of mobile phone tower. The result has been discussed as per study area.

1) Birds within the radius of 50 meter of Mobile tower on: -

More than ' Five ' places at different time schedule was taken to observe the diversity and the number of birds in the these areas. Observations were taken thrice in a week in morning and evening. Normally each observation was for 2 hour. The timing were between 6.00 am to 11 am in morning and 3.00 pm to 6.00 pm in evening. The visited areas are written below –

a) Amtali
b) Hapania
c) sanitila
d) Subhas Colony
e) Old dumping area.

Name of birds which are observed most in these areas they are –

Common Name	Scientific Name	Abundance/ IUCN category
1. Common myna	*Acridotheres tristis (*Linnaeus, 1766)	LC
2. Jungle myna	*Acridotheres fuscus (*Wagler, 1827)	LC
3. Spotted dove	*Streptopelia chinensis (Scopoli, 1768)*	LC
4. Oriental Magpie Robin	*Copsychus saularis (Linnaeus, 1758)*	LC
5. Asian Palm Swift	*Cypsiurus balasinensis (Gray, 1829)*	LC
6. Black drongo	*Dicrurus macrocercus (*Vieillot, 1817)	LC
7. House sparrow	*Passer domesticus (Linnaeus, 1758)*	LC
8. House swift	*Apus affinis (J E Gray, 1830)*	LC
9. Pallas's leaf warbler	*Phylloscopus proregulus (Pallas, 1811)*	LC
10. Indian pond herone	*Ardeola grayii (*Sykes, 1832)	LC

LC= Least Concern

2) Bird within the 200 meter Radius of Mobile tower: -

The observation methods are taken here is same as that of 50 meter mobile phone tower range. Observation were taken in the morning as well as evening, thrice in a weak.5 places were selected to find out the abundance of birds in these areas.

My areas of survey are enlisted bellow: -

a) Rose vally park area, Amtali
b) Chandranagar, Bisalgarh
c) Kathaltali.
d) Maheshkhola.
e) MBB college campus

Name of birds which are observed most in these areas they are –

Common Name	Scientific Name	Abundance/ IUCN category
1. Jungle myna	*Acridotheres fuscus (*Wagler, 1827)	**LC**
2. Common myna	*Acridotheres tristis (*Linnaeus, 1766)	**LC**
3. Red vanted Bulbul	*Pycnonotus cafer (*Linnaeus, 1766)	**LC**
4. Blue rock pegion	*Columba livia (*Gmelin, 1789)	**LC**
5. Black drongo	*Dicrurus macrocercus (*Vieillot, 1817)	**LC**
6. Cattle egret	*Bubulcus ibis (*Linnaeus, 1758)	**LC**
7. Indian pond herone	*Ardeola grayii (*Sykes, 1832)	**LC**
8. Asian Palm Swift	*Cypsiurus balasiensis (*J. E. Gray, 1829)	**LC**
9. Wandering whistling duck	*Dendrocygna arcuata (*Horsfield, 1824)	**LC**
10. Chestnut - headed bee - eater	*Merops leschenaultia (Vieillot, 1817)*	**LC**
11. Chestnut - tailed starling	*Sturnia malabarica (Gmelin, 1789)*	**LC**
12. Oriental Magpie Robin	*Copsychus saularis (Linnaeus, 1758)*	**LC**
13. Red - wattled Lapwing	*Vanellus indicus (Boddaert, 1783)*	**LC**

LC= Least Concern

3) Birds within the 500 meter Radius of Mobile Tower: -

As previous observation the method and timings are same within these areas. The place I had selected for the observation these are enlisted below: -

a) Bishalghar
b) Chandranagar
c) Office Tila
d) Jogendranagar
e) Sipahijala

The birds which are observed most in these areas they are –

Common Name	Scientific Name	Abundace/ IUCN category
1. Black napped oriole	*Oriolus chinensis (Linnaeus, 1766)*	LC
2. Chestnut - tailed starling	*Sturnia malabarica (*Gmelin, 1789)	LC
3. Greater coucal	*Centropus sinensis* (Stephens, 1815)	LC
4. Rufous treepie	*Dendrocitta vagabunda* (Latham, 1790)	LC
5. Asian Koyel	*Eudynamys scolopacea* (Linnaeus, 1758)	LC
6. Lessar whistling duck	*Dendrocygna javanica* (Horsfield, 1821)	LC
7. Great cormorant	*Phalacrocorax carbo* (Linnaeus, 1758)	LC
8. Little cormorent	*Phalacrocorax niger Vieillot*, 1817	LC
9. Pied kingfisher	*Ceryle rudis* (Linnaeus, 1758)	LC
10. Common kingfisher	*Alcedo atthis* (Linnaeus, 1758)	LC
11. Black hooded oriole	*Oriolus xanthornus* (Linnaeus, 1758)	LC
12. White tailled lapwing	*Vanellus leucurus* (Lichtenstein, 1823)	LC
13. Yellow footed green pegion	*Teron phoenicoptera* (Jerdon, 1840)	LC
14. Black kite	*Milvus migrans* (Boddaert, 1783	LC
15. Spotted owlet	*Athene brama (Temminck, 1821)*	LC
16. Greater racket - tailed drongo	*Dicrurus paradiseus* (*Linnaeus, 1766)*	LC
17. Fulvous Whistling - Duck	*Dendrocygna bicolour (Vieillot, 1816)*	LC
18. Barn owl	*Tyto alba* (Scopoli, 1769)	LC
19. Great egret	*Ardea alba (*Linnaeus, 1758)	LC
20. Asian koel	*Eudynamys scolopacea (Linnaeus, 1758)*	LC

LC= Least Concern

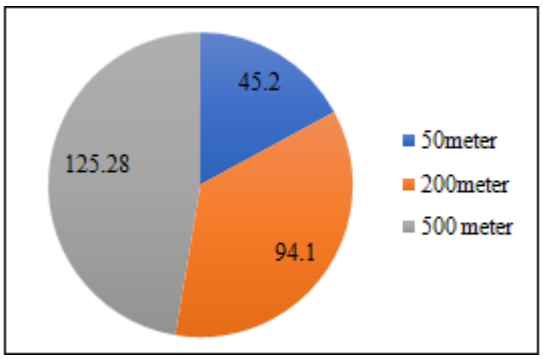
4. Result & Discussion

Observation is taken for 6 months in different sites. Total 430 observation are conducted in these duration.

1) In 50 meter region i. e area in 50 meter radius of mobile tower has lowest amount of abundance of birds as well as less amount of species.
2) The adverse effects of electromagnetic radiation is clearly seen. Besides that most of the birds are found ill or weak. We have found an average **45.2** number in this region. Which is very low and it's shows the poor condition of urban birds.
3) In 200 meter area i. e areas in 200 meter radius of mobile phone towers are slightly better than 50 meter area. This phenomenon clearly shows comparatively less impact of EMR and thus numbers of birds are also slightly better in this area. Common myna, Asian Palm Swift, Jungle crow are some bird which are abundant in both 50 meter and 200 meter areas. An average of **94.1 (apx)** birds are recorded in these areas. Which is slightly better from 50 meter region but although it's not that up to the mark.
4) In 500 meter area we can easily understand the deadly effect of electromagnetic radiations. We found more than 17 species of birds in this region and also in good quantity. Due to very low power of electromagnetic radiation birds can live here without any stress Due to less amount of radiations the role of producing heat is low here that's why birds are comfortable with such situation. An average of **125.28** number of birds which is clearly showing the great abundance of birds here.

Total number of 430 observations shows that: -

1) There are some common birds like common myna, Asian Palm Swift, Jungle myna , spotted dove, Jungle crow are present abundantly in any area due to their high adaptation.
2) Observation says, temperature/ high wavelength of EMR of particular area is inversely proportional to the number of birds
3) Due to less amount of electromagnetic radiations in 500 meter region, the rate of heat produce due to EMR is also low in these areas, that's why the temperature fluctuation rate is there low at these sites. As a result birds diversity is high.



A- House Sparrow | B- Red-wattled Lapwing | C-Fulvous Whistling-Duck

D- Greater Coucal | E- Leafy Warbler | F- Black Drongo

G- Large golden-backed woodpecker | H-Chestnut-headed bee-eater | I- Oriental Magpie Robin

J- Black-naped oriole | K- Black kite | L- Chestnut-tailed starling

M- Jungle mayna **N- Great-egret** **0- Little cormorant**

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