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## Mobile Radiations Causing Loss of Biodiversity: An Overview

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### Abstract

The number of mobile phone users is increasing as the time passes and the technology keeps on evolving to meet the requirement of higher data rates than the previous generation. This in turn leaves a huge harmful biological impact on the biodiversity. The EMR emitted by the mobile antennas used at the base stations affects the cell structure of the living beings. To meet the demand of higher speed data transfer, we have now been used to 4G sets, instead of the older mobile sets without internet or with slow speed internet facilities. This is being even much more harmful, for both the flora & fauna, causing immense loss of biodiversity. As we know, any living organism in our mother Earth, has its own unique role in the ecosystem; so loss of any one will be disturbing the normal ecological balance, thus ultimately leading to environmental crisis. Nowadays, we are suffering from such crisis due to various reasons, mobile radiations being a primary one. Some recent studies have shown that due to mobile radiations, plants and animals are suffering equally, for example, loss of coconut yield & reduction in coconut water, sudden death & decline in the populations of sparrow, starling & many other birds, squirrels, and many more to add. We also know that experimental test of 5G radiation (which might come in future) in Netherlands in 2018, caused unexpected death of a large number of birds. Therefore, these are the high times that we should be aware of this curse of globalization & urbanization, and try to restrict ourselves, regarding use of such high frequency radiations, as much as feasible.

**Keywords:** Mobile phone, EMR, biodiversity, ecological balance, environmental crisis, globalization

### Introduction

*Globalisation* refers to the *integration* of markets in the global economy, leading to the increased *interconnectedness* of national economies. Markets where globalisation is particularly significant include financial markets, such as capital markets, money and credit markets, and insurance markets, commodity markets, including markets for oil, coffee, tin, and gold, and product markets, such as markets for motor vehicles and consumer electronics. The globalisation of sport and entertainment is also a feature of the late 20th and early 21st centuries.

The term *globalization* became popular in social science in the 1990s. It derives from the word *globalize*, which refers to the emergence of an international network of economic systems. The term 'globalization' had been used in its economic sense at least as early as 1981, and in other senses since at least as early as 1944. Theodore Levitt is credited with popularizing the term and bringing it into the mainstream business audience in the latter half of the 1980s. Sociologists Martin Albrow and Elizabeth King define globalization as "all those processes by which the people of the world are incorporated into a single world society."

### Mobile Telephony: One of the Biggest Inventions of Globalization

Technology is one of the leading factors in the evolution of

globalization. Technology has evolved to such an extent that mobile phones are used not only for family or business calls, but they are now a way of living. Mobile phones have become an important tool we can use anytime and anywhere and enable us to do various tasks all at the same time. As a portal for communications, messaging, entertainment and information, mobile phones have become the manifestation of the "digital age".

### Some Major Ways in Which Mobile Technologies Enable Globalization are

- Expanding the productive opportunities of certain types of activities by enhancing social networks, reducing risks associated with employment seeking, and enabling freelance service work;
- Transforming and reinforcing the social and economic ties of micro-entrepreneurs and making local economies more efficient;
- Enabling mobility of businesses;
- Extending the capabilities of mobile phones to entrepreneurship, banking, e-learning, and health delivery systems;
- Increasing the frequency of people's contact with friends, family, and existing business connections and facilitating new contacts with business partners, suppliers, and customers, no matter where they are.

### Harmful Effects of Mobile Waves on Wild Flora & Fauna: Disturbing the Balance of Ecosystem

Mobile phones were introduced for the convenient communication. Mobile phone subscriptions have grown at very fast pace in the last 20 years. It has penetrated over 70% of the population across the globe. India has also witnessed this growth and has approximately 910 million wireless connections today. Although there are many advantages of mobile phones but it has a negative side also. The effects of electromagnetic (EM) radiations from mobile towers and mobile phone handsets have many adverse effects on health. With increasing number of mobile phones, the numbers of mobile towers have also increased multifold. The towers installed on the rooftops of houses and in densely populated areas are causing some serious health hazards. On 31 May, 2011 World Health Organization (WHO) confirmed the radiations from the mobile phones as a carcinogenic hazard for human health.

The EMR emitted by the mobile antennas used at the base stations effects the cell structure of the living beings. To meet the demand of higher speed data transfer, we have now been used to 4G sets, instead of the older mobile sets without internet or with slow speed internet facilities. This is being even much more harmful, for both the flora & fauna, causing immense loss of biodiversity. As we know, any living organism in our mother Earth, has its own unique role in the ecosystem; so loss of any one will be disturbing the normal ecological balance, thus ultimately leading to environmental crisis.

#### Some Evidencial Reports

- In Germany, Nordhessen, five schoolkids: Niklas Binder, Maximilian Görlitz, Jakob Ruckel, Carl-Moritz Köpp and Alexander Popov performed an interesting experiment to know the effect of mobile radio waves on bee population. Behind the idea for the project was the town beekeeper Victor Hernández: He had seen problems develop in a beehive he had, placed near a telephone mast. Funkmastes The five kids decided to try and find out, with his help, whether the mobile phone waves really were affecting the bees. Hernández took a hive to the Schülerforschungszentrum and after a few months of preparation, in June 2016 the experiment was ready to start.

The kids were able to demonstrate a link between mobile phone radiation and bee behaviour. The whole swarm was hooked up to various measuring devices, which monitored different aspects of their daily life: a thermometer measured the temperature, an infrared camera was installed and delivered photos every minute via Raspberry-Pi, a photoelectric switch at the entrance monitored the bees' comings and goings and a microphone recorded the volume of the humming. The strength of the mobile radiation was also measured over a long period of time.

Radiation probably causes honey bees (*apis mellifera*) to partially lose orientation and makes them more aggressive too. Indicators for this included the raised temperature in the hive, decreased movement in and out and louder buzzing. It could have other consequences too.

The young researchers have been recognised publicly too, winning the WWF Galileo Green Youngster Award for their clever experiment. On the 12th of May 2017 they've received their prize at the Green Tec Awards in Berlin.

- Sparrows were once abundant in the city spaces and rural markets in India. But rising concrete jungles, increasing

pollution and now, mobile phone towers are causing them to disappear from the Indian landscape, says a group of conservationists in the country. Meanwhile, reports from other parts of the country shows that squirrels also could be victims of increasing mobile phone tower presence and resulting impact of high Electro-Magnetic Radiation.

Ornithologist Amarjit Gupta has pointed out that the number of sparrows across the country has been falling down drastically over a period of time, raising serious concern. According to him, a recent study has shown that sparrows were present only in localities which are located at a particular distance from the towers.

The issue has attracted the attention of Indian authorities in India earlier itself, which forced Ministry of Environment and Forests to constitute an Expert Group to study the possible impacts of communication towers on wildlife, including birds and bees in 2011.

With a wide and deep review of the existing research literature on the issue, the committee found that exposure to Electro Magnetic Radiation at high levels adversely affects living organisms. Later, MoEF has issued an advisory saying that new cell phone towers should not be installed within one kilo meter radius of existing ones.

- Villagers and farmers in the Northern parts of the Indian state of Kerala reported on the sudden disappearance of squirrels from the farms and nearby places.

According to George K., a Cocoa farmer in Kannur district, Cocoa cultivators used to face serious annoyance from squirrels during the fruit ripening season. "Cocoa cultivators used to apply pesticides like Furadan, as poison to ward off the issue. But now, they are nowhere to see".

According to him, squirrels are almost absent in these areas now that the ripened Cocoa fruits remain intact, without the need to poisoning. "Though poisoning could have killed many squirrels in the past, we doubt that the increasing presence of mobile phone towers is a reason which has caused the sudden disappearance of the creatures", says he.

Though many conservationists suspect the chances of any particular pesticide used in the farms as a possible cause for the disappearance, they are not ready to rule out the role played by increasing mobile phone tower density in these areas.

- Dr. Manish Kumar & Dr. Rajendra Kumar Singh of Dr. C. V. Raman University performed an experiment to investigate impact of mobile tower radiation on birds in Durg district both urban and rural area from January 2018 to May 2018. They recorded and analyzed the data with statistical value obtained from mobile tower impact on birds of different five places of urban and rural area. The urban area has 27 mobile tower and rural area only 6 mobile towers. During the study period they recorded 13 species both urban and rural area namely *Bubo bengalensis* [Indian eagle-owl], *Aquila aquila* [Eagle], *Corvus splendence splendence* [Crow], *Acridotheres tristis* [Myna], *Eudynamys melanorhynchus* [Cuckoo Koel], *Columba livia* [Pegion], *Passer domesticus* [House Sparrow], *Psittacula krameri* [Parrot], *Coracias banghalensis* [Indian Roller], *Antigone* [Sarus crane], *Luscinia brunnea* [Common nightingale], *Chaetorhynchus papuensis* [Drongo] and *Copsychus fulicatus* [Indian robin]. Results indicate that density of birds 69% decrease in Durg city area and 31% in Anjora Village because increase number of mobile tower radiation.

- According to some coconut producers and vendors, the installation of mobile and WIFI towers across Goa has affected their plantations. They claim that the size of the coconut has been shrinking drastically and so too the water content.

Horticulturist, Vivek Rao from Madkai said, “Since the mobile towers have increased, the yield of coconuts has reduced and the water inside the coconut is gone. The problem is that the trees get directly exposed to the beam of radiations because of the height of the tower.

**Biological Mechanisms of Causing the Harms to Living Cells:**

**Cell Phone Radiation and Oxidative Stress:** As we all know, excessive amounts of harmful free radicals lead to oxidative stress in our body. These free radicals, alternatively called reactive oxygen species (ROS) are continuously neutralized by antioxidants present in body tissues. Thus, there occurs a constant fight between the ROS and antioxidants. To live a healthy, disease free life, the extent of ROS must be within limit. In 1992, researchers found that electromagnetic fields increase free radical activity in cells. Within the last decade, *in vivo* animal studies have shown that OS develops in response to cell phone radiation, moreover, RF-EMW might disturb ROS metabolism by increasing production of ROS or by decreasing antioxidant enzyme activity. Studies have demonstrated that antioxidants such as melatonin, caffeic acid phenyl ester, vitamin C and vitamin E have the ability to prevent oxidative stress or apoptosis caused by cell phone radiations in animal tissues.

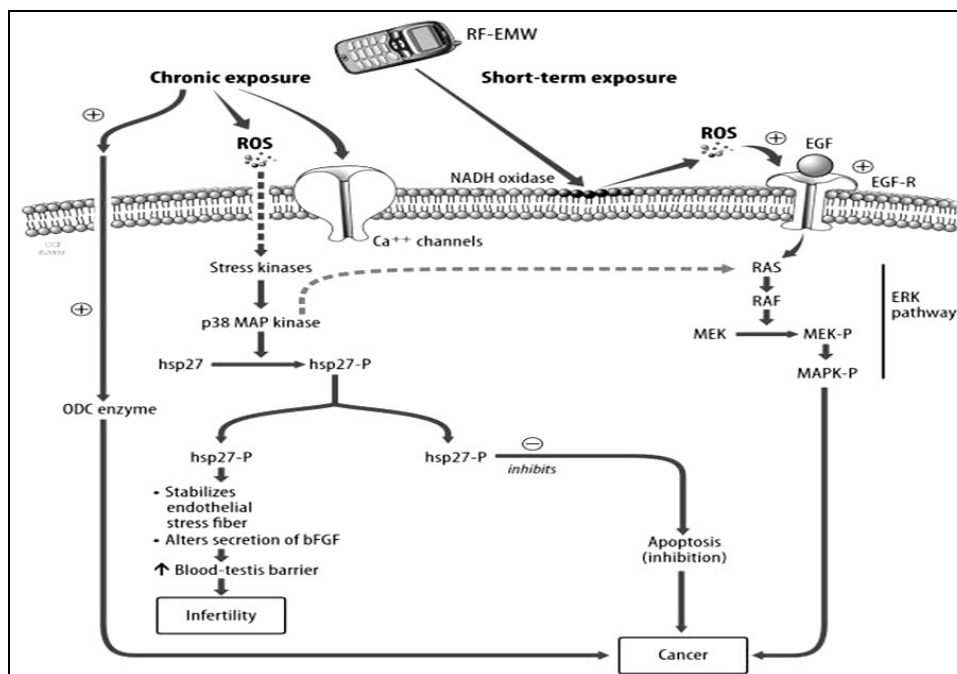
**DNA Strand Break and Apoptosis:** The effects of RF-EMW on DNA damage have been reported in various recent studies. In a study done by Lai and Singh (1996) [3] it was seen that an

increase in single and double-strand DNA breaks happened in the brain cells of rats that were exposed for 2 hrs to a high frequency radiation. They also found that EMW exposure caused DNA-protein and DNA-DNA crosslinks and increased apoptosis in biological samples from rats.

More recently, some other group of scientists also reported similar kinds of observations. Paulraj and Behari (2006) reported an increase in single strand DNA breaks in the developing brain cells of rats that were exposed for considerably long duration to high frequency radiations. Nikolova *et al.* (2005) reported a low and transient increase in DNA double strand breaks in mouse embryonic stem cells after acute exposure to a 1.7-GHz field.

**Effect on Protein Kinase C and Calcium Homeostasis:** Protein Kinase C (PKC) is a multifunctional protein kinase involved in the regulation of a variety of cellular events including modulation of receptor functions for major hormones and certain enzymes such as adenylate cyclase. It also plays key role in mediating cellular responses to extracellular stimuli involved in proliferation, differentiation, apoptosis, and exocytotic release in a number of non-neuronal and sperm cells. The PKC enzyme complex is present in rat seminiferous tubules and leydig cells, where it might play a crucial role in regulating sperm motility. The activation of PKC is biochemically dependent on Ca<sup>2+</sup> ions.

Recently, Paulraj *et al* reported decreases in the activity of PKC in developing rat brains that were exposed to radiations. They reported that the microwave damage was more extensive in the hippocampus, which may cause memory loss. RF-EMW can probably cause decline in sperm motility rate by affecting PKC activity. Mobile phone-altered PKC activity has been linked with various types of malignancies.



**Fig 1:** The Figure Shows Various Cellular Targets of Radiofrequency Electromagnetic Waves (RF-EMW)

Acute (short term) exposure to RF-EMW can stimulate plasma membrane NADH oxidase which can increase reactive oxygen species (ROS) formation. Increase in ROS can stimulate endothelial growth factor (EGF) receptor which in turn activates extra cellular signal regulated kinase (ERK) pathway. ERK pathway consist of subsequent activation of Ras, Raf proteins and mitogen-activated protein kinase

(MAPK). MAPK pathway has tumor promoting role. Chronic exposure to ROS can activate various stress kinase (p38 MAP kinase). Activation of p38 MAP kinase can stimulate ERK pathway and also lead to phosphorylation of heat shock proteins (Hsp) which inhibits apoptosis. Inhibition of apoptosis might promote carcinogenesis by prolonging survival of cell with damaged DNA. Hsp also stabilizes

endothelial stress fiber and alters secretion of bFGF. This can lead to increase in permeability of blood testis barrier and causes infertility. RF-EMW can also promote cancer by stimulating ornithine decarboxylase (ODC), a rate limiting enzyme in polyamine synthesis pathway as well as by interfering with plasma membrane calcium channels.

### Can 5G be Our Future??

On 5th November 2018, Erin Elizabeth's medical conspiracy blog *Health Nut News* "reported" a seemingly disturbing story out of the Netherlands with the headline "Hundreds of birds dead during 5G experiment in The Hague, The Netherlands."

We are now experiencing the 5G Revolution in telecommunication industry. 5G is truly the next generation of mobile and wireless communication. It is providing us faster speeds (up to 100 times) and higher capacity transmissions to carry the massive amount of data in different devices. There are even plans to provide 5G from space, meaning thousands of satellites to cover every square inch of the earth with wireless radiation.

5G technology includes the higher millimeter wave frequencies never before used for internet and communications technology. Thus, all the living creatures on this planet Earth, including ourselves, cannot avoid continuous exposure to high-frequency radiations, 24 hours a day, 365 days a year, irrespective of our choice, without any possibility of escaping anywhere on the planet. These 5G plans are imposing threats to provoke serious, irreversible effects on us, the human beings and permanent damage to all of the Earth's ecosystems."

### Risks from 5G Include

- Damage to the eyes-cataracts, retinal damage
- Severe sweating
- Skin damage
- Immune system disruption
- Metabolic disruption
- Neurological disturbance
- Leakage of blood brain barrier
- Damage to sperm
- Increased risk of cancers
- Collapse of insect populations, the base of food for birds and bats
- Rise in bacterial resistance and bacterial shifts
- Damage to plants and trees

Thus, it is evident that 5G technology, though apparently seeming revolutionary for human civilization, is actually showing extremely detrimental effects on the entire living flora and fauna, increasing the chances of extinction. So, it can never be our future, in any sense!

### Conclusion

Although mobile telephony has been proven as an indispensable part of our everyday life, and it has made us much more globalized, the negative effects on living beings (which includes ourselves too) cannot be denied at all. Overall, mobile telephony is destroying the living world surrounding us, slowly but steadily, and it is absolutely alarming for us, the human beings, as we do also belong to this biota. Knowingly or unknowingly, killing them means enhancing the chances of our own living status, at a higher risk.

This is the high time that we should be aware of the restricted use of mobile phones. It must be Used, but not Misused. Therefore, we must try to restrict ourselves, regarding the use of such high frequency radiations, as much as feasible.

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