

## Research on Radio Frequency Radiation and the Environment

### [A review of the ecological effects of radiofrequency electromagnetic fields](#)

(RF-EMF) Environment International Volume 51, January 2013, Pages 116–140

- A Review of 113 studies from original peer-reviewed publications. RF-EMF had a significant effect on birds, insects, other vertebrates, other organisms and plants in 70% of the studies. Development and reproduction of birds and insects are the most strongly affected endpoints.

**Balmori A. [Electrosmog and species conservation](#). Sci Total Environ. 2014 Aug 1;496**

- “Conclusion: At the present time, there are reasonable grounds for believing that microwave radiation constitutes an environmental and health hazard....Concerning the exposure to electromagnetic fields, the precautionary principle is needed and should be applied to protect species from environmental non-thermal effects (Zinelis, 2010). Controls must be introduced and technology rendered safe to the environment, since this new ubiquitous and invisible pollutant could deplete the efforts devoted to species conservation.”

### [Mobile phone mast effects on common frog \(\*Rana temporaria\*\) tadpoles](#)

Electromagnetic Biology and Medicine [2010, 29(1-2):31-35

- Eggs and tadpoles of the common frog were exposed to electromagnetic radiation from cell phone antennas for two months, from the egg phase until an advanced phase of tadpole prior to metamorphosis. Results indicate that radiation emitted by phone masts in a real situation may affect the frogs development and may cause an increase in mortality of exposed tadpoles. “This research may have huge implications for the natural world, which is now exposed to high microwave radiation levels from a multitude of phone masts.”

# Radio Waves Affect Birds

Engels, S. et al. [Anthropogenic electromagnetic noise disrupts magnetic compass orientation in a migratory bird.](#) Nature 509, 353–356 (2014).

- Scientists found that migrating robins became disorientated when exposed to electromagnetic fields at levels far lower than the safety threshold for humans. “Here we show that migratory birds are unable to use their magnetic compass in the presence of urban electromagnetic noise...These fully double-blinded tests document a reproducible effect of anthropogenic electromagnetic noise on the behavior of an intact vertebrate.”

Balmori A. [Possible Effects of Electromagnetic Fields from Phone Masts on a Population of White Stork \(Ciconia ciconia\)](#) Electromagn Biol Med 2005; 24 (2): 109 - 119

- Interesting behavioral observations of the white stork nesting sites located within 100m of one or several cell site antennas were carried out. These results are compatible with the possibility that microwaves are interfering with the reproduction of white storks and would corroborate the results of laboratory research by other authors. In far away areas, where the radiation decreases progressively, the chronic exposure can also have long term effects [13, 49]. Effects from antennas on the habitat of birds are difficult to quantify, but they can cause a serious deterioration, generating silent areas without male singers or reproductive couples.

[Ants can be used as bio-indicators to reveal biological effects of electromagnetic waves from some wireless apparatus](#) Electromagn Biol Med. 2013 Aug 26.

- "the linear and angular speed of ants are immediately altered by the presence of EMF/RF fields. Based on these results, the authors advise users to deactivate the WiFi function of their PC/laptop."
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[Drosophila oogenesis as a biomarker responding to EMF sources.](#)

- A total of 280 different experiments were performed. Exposure to wireless devices such as WiFi, baby monitors, and phones created statistically significant effects regarding reproduction and cell death apoptosis induction, even at very low intensity levels (0.3 V/m bluetooth radiation), well below ICNIRP's guidelines.

# Bees and Butterflies

Research shows that Birds, Bees and Butterflies are sensitive to electromagnetic fields. Their behavior is disrupted by exposures to this radiation.

[A magnetic compass aids monarch butterfly migration.](#) Nature Communications 5(4). 24 June 2014

- "Here we use flight simulator studies to show that migrants indeed possess an inclination magnetic compass to help direct their flight equator ward in the fall. Another vulnerability to now consider is the potential disruption of the magnetic compass in monarchs by human-induced electromagnetic noise, which can apparently disrupt geomagnetic orientation in a migratory bird."

[Mobile phone induced honeybee worker piping](#) Apidologie (2011) 42:270-279

- Electromagnetic waves originating from mobile phones had a dramatic impact on the behavior of the bees, namely by inducing the worker piping signal. In natural conditions, worker piping either announces the swarming process of the bee colony or is a signal of a disturbed bee colony.

[Birds, Bees and Mankind](#) by Dr. Ulrich Warnke

- Bees pollinate approximately 1/3 of all crops and they are disappearing by the millions. Warnke raises the concern that the dense, energetic mesh of electromagnetic fields from wireless technologies may be the cause.

[Changes in honeybee behaviour and biology under the influence of cell phone radiations.](#) Current Science 98 (10): 1376 – 1378.

- We have compared the performance of honeybees in cell phone radiation exposed and unexposed colonies. A significant ( $p < 0.05$ ) decline in colony strength and in the egg laying rate of the queen was observed. The behaviour of exposed foragers was negatively influenced by the exposure, there was neither honey nor pollen in the colony at the end of the experiment."

[Briefing Paper on the Need for Research into the Cumulative Impacts of Communication Towers on Migratory Birds and Other Wildlife in the United States](#)  
[Division of Migratory Bird Management \(DMBM\), U.S. Fish & Wildlife Service](#) 2009

- Of concern to DMBM are the potential impacts of radiation on bird populations. For example, preliminary research on wild birds at cellular phone tower sites in Spain

showed strong negative correlations between levels of tower-emitted microwave radiation and bird breeding, nesting, and roosting in the vicinity of the electromagnetic fields.

**Can electromagnetic exposure cause a change in behaviour? Studying possible non-thermal influences on honey bees – an approach within the framework of educational informatics.** Acta Systemica-IIAS International Journal 6(1):1-6.

- A pilot study on honeybees testing the effects of non-thermal, high frequency electromagnetic radiation on beehive weight and flight return behavior. In exposed hives, bees constructed 21% fewer cells in the hive frames after 9 days than those unexposed.

Sainudeen Sahib.S, **Electromagnetic Radiation (EMR) Clashes with Honey Bees.** INTERNATIONAL JOURNAL OF ENVIRONMENTAL SCIENCES Volume 1, No 5, 2011

- Recently a sharp decline in population of honey bees has been observed in Kerala. Although the bees are susceptible to diseases and attacked by natural enemies like wasps, ants and wax moth, constant vigilance on the part of the bee keepers can overcome these adverse conditions. The present plunge in population ( $< 0.01$ ) was not due to these reasons. It was caused by man due to unscientific proliferation of towers and mobile phones.”
- Six colonies of honeybees ( *Apis mellifera* ) were selected. Three colonies were selected as test colonies (T1,T2&T3) and the rest were as control (C1,C2&C3). The test colonies were provided with mobile phones in working conditions with frequency of 900 MHz for 10 minutes for a short period of ten days. After ten days the worker bees never returned hives in the test colonies. The massive amount of radiation produced by mobile phones and towers is actually frying the navigational skills of the honey bees and preventing them from returning back to their hives.
- The study concludes, “More must also be done to compensate individuals and communities put at risk. Insurance covering diseases related to towers, such as cancer, should be provided for free to people living in 1 km radius around the tower. Independent monitoring of radiation levels and overall health of the community and nature surrounding towers is necessary to identify hazards early. Communities need to be given the opportunity to reject cell towers and national governments need to consider ways of growing their cellular networks without constantly exposing people to radiation.”

[Electromagnetic radiation: influences on honeybees](#) (Apis mellifera). Institute Environmental Sciences,

- 39.7% of the non-irradiated bees had returned to their hives while only 7.3% of the irradiated bees had.

[Detection and Learning of Floral Electric Fields by Bumblebees](#) (2013) Science 5 April 2013

- "We report a formerly unappreciated sensory modality in bumblebees (*Bombus terrestris*), detection of floral electric fields. Because floral electric fields can change within seconds, this sensory modality may facilitate rapid and dynamic communication between flowers and their pollinators."

[Read More Research on Wildlife Here.](#)

## **RF Radiation Stresses Plants and Trees**

[Adverse Influence of Radio Frequency Background on Trembling Aspen Seedlings](#)

International Journal of Forestry Research Volume 2010 (2010), Article ID 836278,

- **"This study suggests that the RF background may have strong adverse effects on growth rate and fall anthocyanin production in aspen, and may be an underlying factor in aspen decline."**

Watch a [Video](#) of an Expert Conference on the damaging effects of EMFs on Trees.

**Nanometer-scale elongation rate fluctuations in the *Myriophyllum aquaticum* (Parrot feather) stem were altered by radio-frequency electromagnetic radiation.**

- **Statistically significant changes to this plant from a non thermal effect.**

**Influence of microwave frequency electromagnetic radiation on terpene emission and content in aromatic plants J Plant Physiol. 2014**

- Microwave irradiation resulted in thinner cell walls, smaller chloroplasts and mitochondria, and enhanced emissions of volatile compounds, in particular, monoterpenes and green leaf volatiles (GLV). These data collectively demonstrate that human-generated microwave pollution can potentially constitute a stress to the plants.

The above is only a small sampling of the research showing effects at non thermal levels.