PRESS RELEASE

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Is sound driving us crazy?

Modern technological environments produce noise on a basis never before endured by humans, and there is increasing evidence of serious threats to human and animal health, according to author and scientist **Dr Bruce Rapley**.

Dr Rapley has written a book that shows how **sound pollution from made-made technology is hurting humans**. In Conversations for a Small Planet, Volume 3, Biological Consequences of Low-Frequency Sound, Dr. Rapley combines his broad knowledge of science and technology to examine and explain the adverse health effects of sound pollution from man-made technology. The most recent example of technological sound pollution comes from **wind turbines**. However, he is quick to stress that this is **only one source of modern environmental sound pollution - there are many others**. Yet with the rapid expansion of wind turbines across the globe, this new technology is presenting us with increasing evidence of a serious threat to human health.

Dr. Bruce Rapley is an applied biologist with a specialist interest and expertise in the area of environmental health, acoustics and cognition. Dr. Rapley has always had an interest in the effects of external energy on living systems. Much of his research career has been spent examining the effects of electromagnetic fields on biological systems ranging from the cytogenetics of plants to human health and applied medical research.

To set the scene, Dr. Rapley provides a comprehensive background of the underlying science that leads us to the understanding of how sound pollution can affect animals. From aquatic to terrestrial mammals to humans, the underlying physiology and anatomy explains why they all react adversely to certain sounds. Two poignant examples include badgers in England and mink in Denmark, the latter responding with aggressive behaviour leading to injury and death, as well as reduced fecundity, auto-abortions and the production of abnormal pups with severe, often fatal, birth-defects.

Critical to the overall understanding of the effects of environmental sound pollution is the working of the mammalian brain. Dr. Rapley explains, in simple language, how the brain developed through evolution and how this relates to psychoacoustics. The neurophysiology of the brain is responsible for the way it reacts to environmental sound, some of which can trigger detrimental physiological responses. The concept that sound is an ***information source***, rather than just another form of ballistic energy, goes a long way

to explaining what we are observing in human near neighbours of wind turbine installations.

That certain types of sound can produce a cascade of hormones that result in the “fight or flight” response is a critical step forward in understanding the importance of sound as a pollutant as well as a health hazard. This conclusion is the result of 20 years of research by Dr. Rapley and his international research team, culminating in a new pc-based technology that can monitor and analyse environmental sound from the perspective of an environmental pollutant: the SAM Technology - Soundscape Analysis and Monitoring.

In **Volume 3** of the series, **Conversations for a Small Planet,** Dr. Rapley provides examples of soundscape analysis using the new SAM technology that clearly demonstrates why all low-frequency sound, and infrasound, is not equivalent. The sound from many of the industrial noise polluters is quite different to the natural soundscape of the ‘wind in the trees’ or a ‘babbling brook’, two examples proponents of various infrastructure often use to compare emissions to.

Combined with his research for his PhD in Human Health and Acoustics with the New Zealand Defence Force (NZDF), Dr. Rapley has a unique knowledge base and understanding of how sound in the environment can affect cognition (brain function - thinking processes) and physiological responses. That the human brain responds to sub-liminal sound is exemplified by the latest functional magnetic resonance imaging research from the German research team (**Weichenberger et al. 2018**). They conclude that:

> **“Low-frequency sound (including infrasound) can, and does, affect the brain, at sound power levels below conscious perception”.**

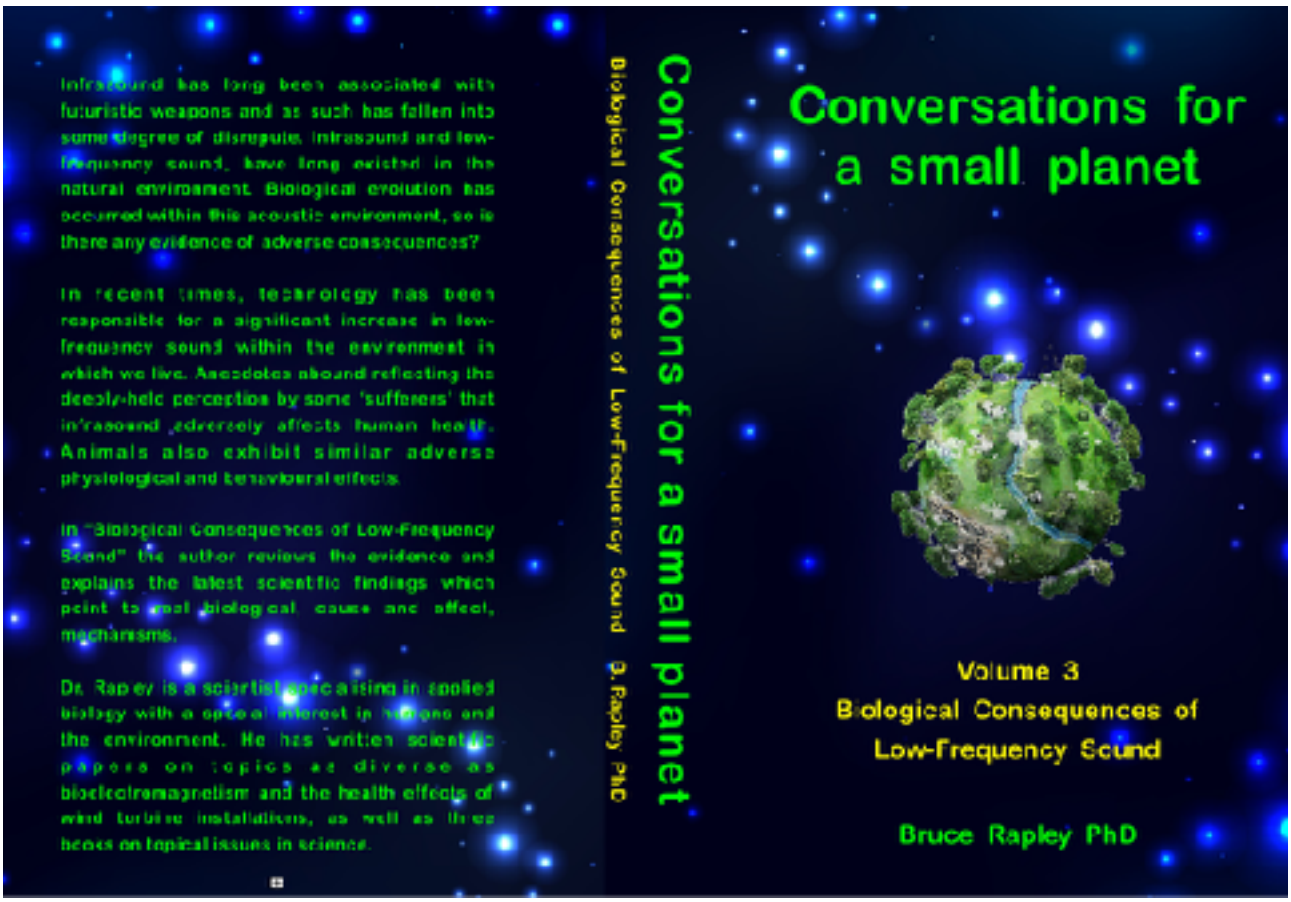
The Weichenberger study is the first to demonstrate that infrasound near the hearing threshold may induce changes of neural activity across several brain regions, some of which are known to be involved in auditory processing, while others are regarded as key players in emotional and autonomic control. These findings allow the researchers to speculate on how continuous exposure to subliminal infrasound could exert a pathogenic influence on the organism, such as are observed in humans and animals living in close proximity to wind turbine installations. Of critical importance to the public debate regarding health effects of wind turbines is that the Weichenberger research negates the so-called Nocebo Effect.

Dr. Rapley dedicates an entire chapter to explaining how sound is analysed before moving on to explain how sound is a natural information source for animals. That information source causes behaviour as well as deep, subconscious, physiological responses that can lead to adverse health outcomes. To understand the mechanisms involved, Dr. Rapley provides a clear, simple, explanation of the phenomenon of

stochastic resonance and why this is critical to understanding animal response to sub-threshold sound. Stochastic Resonance is a natural phenomenon whereby a normally sub-threshold signal (sound) can be detected when 'noise' is added to the signal.

Biological Consequences of Low-Frequency Sound, is written in a clear style and uncomplicated language that the lay reader can readily understand. The text is supplemented wtih 387 coloured images. In the final two chapters, Dr. Rapley knits together the various strands of information, culminating with the latest German research.

Biological Consequences of Low-Frequency Sound is a richly illustrated text in plain English that includes lots of laughs along the way as Dr. Rapley uses anecdotes to explain and simplify the complex science. This is a very readable book and one which is important as it alerts us as to the potential danger of our technology. It is a must-read for anybody concerned about the overall health of the planet and its inhabitants, both animal and human.



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