

Humans have inadvertently changed global ecosystems and triggered the dawn of a new geological epoch, the Anthropocene. The rapid development of industrial production and the extraction of fossil fuels in the 19th and 20th centuries has led to massive pollution of the Earth environment and changed the biogeochemical cycles of many elements. Questions about the dangers that this pollution may bring to human health and environment arose only in the middle of the 20th century. Among other pollutants, industrial activities emit a range of metals into the atmosphere, which end up deposited on soil, plants and some animals. Metals tend to accumulate in soils, reaching in industrial areas concentrations few orders of magnitude higher than those found in pristine environments. From there, metals enter the food chain, through plants to herbivores and detritivores to predators.

However, not only industrial and urban areas bring danger for wildlife – nowadays rural and agricultural areas are also heavily contaminated, although the sources and nature of this contamination are different. Agricultural production across the world is highly dependent on the use of pesticides. Insecticides are particularly dangerous to wildlife as they comprise a group of chemicals that act mostly on biochemical processes which are universal across the animal kingdom. Because of that, insecticides can be dangerous at extremely low concentrations in the range of parts per billion.

Worldwide, many bat species are threatened by various environmental stressors, including global climate change, habitat loss as a consequence of urbanization and deforestation, and diseases. Persistent pollutants in the environment, such as trace metals and pesticides, are a further and still not fully recognized threat for bats. These pollutants are transferred through the food chains and may bioaccumulate within organisms, so that concentrations in internal organs may eventually cause toxic effects. The overall aim of this study is to evaluate the risk of contamination of bats – the very special group of animals, with anthropogenic pollutants. The study will focus on contamination with trace metals and insecticides as the two most important groups of contaminants that bats can be exposed to.

The project addresses a particular case of the global problem of a widespread pollution of the environment with trace metals and pesticides. It covers two major threats potentially detrimental to bat populations inhabiting both urban/industrial areas and agricultural land: the transfer of metals to top predators represented by bats and exposure of bats to insecticide sprays. By comparing concentrations found in bats with effect concentrations in other mammals, results of the study will help to address the questions about potential effects of metal and pesticide pollution on bats.