DDT dangers

Global monitoring in raptors

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The Peregrine Falcon was a sentinel species in the monitoring of DDT.

Although DDT was first synthesised in 1873, its insecticidal properties were only discovered in 1939 by Swiss chemist Paul Müller, earning him a Nobel Prize in 1945. DDT helped protect Allied soldiers against malaria and typhus during World War II, but it is best known for its pervasive negative impacts on the environment. After World War II, it was widely used as an insecticide both in agriculture and to combat vector-borne diseases. Scientists soon raised concerns over the environmental hazards posed by DDT, but it was Rachel Carson's 1962 book, *Silent Spring*, that focused global attention on the pesticide's environmental impacts. The book sparked a public outcry that forced the USA, Britain and other European countries to ban the use of DDT in the 1970s and 1980s.

DDT's long lifespan in the environment and high solubility in fatty tissue enable it to accumulate in wildlife. It is 'biomagnified' as it moves up the food chain, resulting in dangerous levels in top predators such as raptors. High DDT concentrations can cause acute neurological damage, endocrine disorders and, in some cases, death. Research on species such as Peregrine Falcons has provided convincing evidence of the link between DDT, eggshell thinning and subsequent population crashes, particularly in the global north.

Despite these well-known environmental impacts, the use of DDT continued in many developing countries throughout the 20th century. It was only in 2004, when the Stockholm Convention was adopted by more than 90 nations, that DDT production was banned throughout most of the world. However, in 2006 the World Health Organization argued for the continued use of DDT to control diseases such as malaria and it is still employed in various tropical countries in Asia, Africa and South and Central America.

DDT and its metabolites in raptors have been monitored over the past 60 years, but the spatial and temporal biases in these monitoring programmes have not been explored. In a recent review led by Fitz PhD student Kailen Padayachee (*Science of the Total Environment*, in press), we show how DDT monitoring in raptors has been biased towards the global north, with 95 per cent of samples collected mainly from Europe and North America. This geographical bias is worrying given that most current DDT use is in the global south, a region that is home to most of the world's raptors. It is also a region notorious for poor enforcement of environmental legislation.

Although DDT has been measured in more than 100 raptor species, just three species account for half of all samples collected during the past 60 years: Bald Eagle, Eurasian Sparrowhawk and Peregrine Falcon. Sampling peaked in the 1960s and 1970s and decreased thereafter, coinciding with international concern surrounding DDT after the publication of *Silent Spring*. Although not unexpected, these biases highlight how monitoring of DDT in raptors has not been representative of all global environments and species.

The historical declines that befell raptor populations in the global north are a stark reminder of what could happen in tropical areas of the global south. We are currently witnessing rapid decreases in many raptors in the global south, but it is unclear whether DDT and other persistent organic pollutants are contributing to these downward spirals. This uncertainty stresses the need to monitor DDT levels in raptors inhabiting areas where it is still used, such as many malarial areas. Our review is a critical first step in consolidating the disparate information about the global monitoring of DDT. The next step is to explore how DDT levels in raptors in tropical regions have changed over the past few decades.

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