



New maps show “hotspots” of risk to wildlife from chemical mixtures

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Ecological risk maps showing ‘hotspots’ of risk to wildlife from single or combined soil pollutants have been developed. These maps can be used to improve risk analysis and stakeholder communications.

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Ecological risk maps are made by using and combining information on vulnerability of wildlife species, wildlife habitats, individual soil pollutants and modes of action for mixture effects of the pollutants.

The risk assessment of harmful substances in the environment has traditionally been carried out on individual pollutants. In reality, wildlife species are exposed to a mixture of toxic compounds and more realistic assessments should take account of these combined effects.

As part of the EU-funded NoMiracle¹ project, new methods have been developed to assess the potential risks to wildlife from the combined effect of toxic compounds in the soil.

A new method, vulnerability analysis, uses trait-based ecological risk assessment. This is based on analysing the vulnerability of wildlife species to soil pollutants, by assessing the role of various traits of the species on the effects of pollutants, for example, food preferences, life cycle and behavioural characteristics. This process is based on three factors: 1) exposure of the species to the chemicals; 2) sensitivity of the species to the chemicals; and 3) the potential for populations to recover from exposure.

The results of the vulnerability analysis can be used to produce wildlife vulnerability maps and, when overlaid with maps of soil pollution, ecological risk maps for single or combined soil contaminants. Using Denmark as a case study, the researchers mapped the vulnerability of different habitats to the effects of the metals copper, zinc, cadmium and nickel and the insecticide chlorpyrifos.

As a first step, a suitable habitat map is combined with a vulnerability analysis of the different wildlife species found in each habitat. This process results in five habitat vulnerability maps for wildlife: one for each of the four metals and one for chlorpyrifos.

Next, soil hazard maps are constructed for each of the pollutants, based on soil characteristics and the estimated concentrations of the contaminants (relative to their Maximum Permissible Concentrations) found in Danish soils.

Combining vulnerability maps with soil hazard maps produced ecological risk maps for each of the pollutants. These relative risk maps identify ‘hotspots’ where wildlife is most at risk from individual pollutants in Denmark.

Finally, different cumulative ecological risk maps are developed by combining maps of individual pollutants according to the various ways in which the pollutants can have a combined effect on wildlife. These maps reveal where wildlife is most at risk (i.e. the ‘hotspots’) from the combined effects of these pollutants in Denmark.

Source: Lahr, J., Münier, B., De Lange, H.J. *et al.* (2010). Wildlife vulnerability and risk maps for combined pollutants. *Science of the Total Environment*. Doi:10.1016/j.scitotenv.2009.11.018 (8 pages)

1. NoMiracle was supported by the European Commission under the Sixth Framework Programme, under the theme ‘Global Change and Ecosystems’. See: <http://nomiracle.jrc.ec.europa.eu/default.aspx>