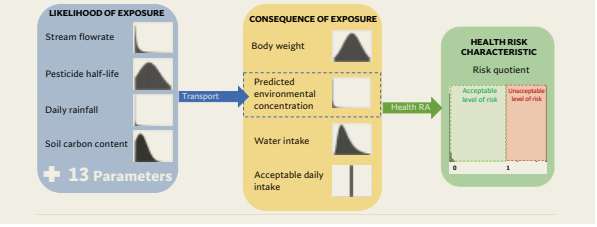

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PestMan: Pesticide Management for Better Water Quality

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Identifying pressures

An increasing world population means that the demand for food will inevitably increase. To address this, agriculture has intensified, which, in turn, has led to an increased use of pesticides. Although their use is strictly controlled, it is estimated that only up to 10% of pesticides reach target organisms. Consequently, pesticides are present in soil, groundwater and surface water, potentially adversely impacting waterways, ecosystems and human health. The assessment of potential pesticide transmission risk to waterways, based on soil texture and pesticide properties, is required, as is the development of remediation methods to break the pathway of loss from source to receptor. Furthermore, as the majority of human health risk models are often deterministic in nature, and do not reflect the inherent uncertainties and variabilities in pesticide transmission, it is necessary to develop robust probabilistic models to account for these uncertainties. Together, these will inform the implementation of risk mitigation approaches.

Informing policy

Pesticides are used as part of farm intensification strategies, either to bring marginal land into production or to maintain competitively high crop yields. Guidelines have been put in place by governments to regulate pesticide use and address the risks they pose. These guidelines lay out a framework for pesticide regulation consisting of limits on the amount of pesticides used, risk screening and detailed risk assessment to reduce harm to ecosystems, the environment and human health. Despite this, pesticides have been detected in surface water and groundwater at levels exceeding the drinking water parametric value of 100 ng l^{-1}.

Developing solutions

A screening tool was developed to allow farmers to determine the potential pesticide transmission risk. Intervention measures, conducted at field scale, to break the pathway between source and receptor showed that coconut-based activated carbon, when placed in filter pipes, was an effective adsorption medium for pesticides. Other "at source" intervention methods, such as "split" applications of pesticides, where the yearly application of pesticides is split into two equal doses, were effective in preventing surface run-off and leaching of pesticides. A semi-quantitative risk scoring method was developed to allow users to identify high-risk pesticides and examine how they may contribute to the health risks of a population on a regional or national scale. A probabilistic assessment of health risk levels arising from exposure to the modelled concentrations found very low levels of risk under current climatic and land use conditions. This model may be combined with alternative human health risk models and assessments or environmental risk models to provide a better understanding of the impact of pesticides on drinking water resources and to further quantify the risks posed to consumers and non-target organisms.

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