

## **QUANTIFYING POINT SOURCE INPUTS OF PESTICIDES TO RIVER CATCHMENTS**

The objective of R&D Project PR655 was to develop a procedure for reviewing the results of pesticide analysis within a catchment so as to be able to identify short-term events in order to recognise the possible sources of pollution and respond appropriately.

Pesticide occurrences in rivers may result from diffuse runoff from farmland or from point sources. The former is a possible outcome from usage on crops in a manner, which accords with 'good agricultural practice'. The latter can arise from discharges to rivers from sewage treatment works or factories, accidental spills, deliberate disposal of surplus material into soakaways or rivers, poor application practices to crops close to rivers, amenity weed control leading directly to drainage systems, or vandalism. Diffuse inputs of pesticides into rivers are not easily reduced, since they are, by definition, physically dispersed. Also as they arise from 'good agricultural practice' reductions have to be achieved by alerting farmers and contractors to the issue and advising and persuading on the best ways to avoid water pollution occurring. Point sources, although difficult to identify and locate, arise from poor management. As they can be reduced or eliminated by making changes to pesticide storage, handling and

disposal, they are inherently more amenable to a regulatory approach by Agency staff. A method of reviewing monitoring data to identify those occurrences arising from point sources would assist Agency staff in controlling pesticide pollution.

R&D Technical Report P109, which covers an approach based on the use of a decision tree, has been developed and trialled in two catchments, the Gipping in Suffolk and the Avon in Hampshire/Wiltshire. Intensive programmes of pesticide monitoring were operated in the catchments during 1996 to provide the detailed data needed to calibrate the decision tree. Following calibration, the decision tree was able to identify occurrences resulting from point source inputs in a plausible and consistent way. The decision tree was applied to all monitoring points in the catchments and attributed point source inputs to 30% of occurrences exceeding 0.1 ug/l in the Gipping catchment and 38% of occurrences exceeding 0.1 ug/l in the Avon catchment.

The performance of the decision tree when data are more limited, as will normally be the case, was assessed. Even with no monitoring data from additional sites, the decision tree performed well in distinguishing point source pollution from diffuse. The availability of more frequent monitoring data from the test site, and from additional sites, improved discrimination.

It was not possible to test the decision tree against ground truth, and the method is therefore unproven against real incidents. Testing needs to be continued by the Agency, and the decision tree modified if required to gain confidence in its use. The decision tree uses data already available in POPPIE (Prediction Of Pesticide Pollution In the Environment), the GIS developed by the Agency, and could be incorporated into the system. The results of the findings are contained within R&D Technical Report P109.

R&D Technical Report P141 covers a survey of pesticide use and disposal practices undertaken by means of a questionnaire sent to all contractors and a sample of farmers in the

catchments of the River Gipping and the River Avon. About one third of the questionnaires distributed were returned.

Information on pesticides used by farmers was scaled up to provide estimates of catchment totals. The estimates agreed reasonably well with usage data obtained by combining regional pesticide and local land use statistics. Several of the pesticides used in the catchments had been detected in the River Gipping and River Avon at concentrations exceeding the EC Drinking Water Directive Limit.

Responses to the questionnaire indicated that farmers and contractors were generally aware of the need to exercise care in the handling and management of pesticides. However, two issues of particular concern were identified: a) the practice of disposing excess pesticides and rinse waters to soakaways, in use on 20% of farms surveyed, creates a significant risk with regard to surface water and particularly groundwater pollution; and b) only 30% of farm operatives had received training in the safe and efficient use of pesticides, although this is a legal requirement. One contractor (17% of respondees) had received no training.

This R&D Technical Summary relates to information from Project 655 contained in the following outputs:

**R&D Technical Report P109 - Quantifying Point Source Inputs to River Catchments (Phase II) - Development of a Decision Tree**

Internal Status: Released to Regions  
External Status: Public Domain

**R&D Technical Report P141 - Quantifying Point Source Inputs to River Catchments (Phase II) - Farmer and Contractor Pesticide Use Survey**

Internal Status: Released to Regions  
External Status: Restricted

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Copies of these documents are available internally from Regional Information Centre (Library) and externally from the Agency's R&D Dissemination Centre at WRc plc, Frankland Road, Blagrove, Swindon, Wiltshire SN5 8YF (Tel: 01793 865138; Fax: 01793 514562)

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