Pesticide Source Risk Identification - An Evaluation of Decision Support Tools in the Derg Drinking Water Catchment.

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Introduction

In the Derg cross-border drinking water catchment (Fig 1) MCPA (acid herbicide) is applied primarily to control rush growth (*Juncus effuses*) in pasture and concentrations in excess of the EU Drinking Water Directive limit of 0.1µg/L in surface waters are regularly observed. The FAIRWAY project (https://www.fairway-project.eu/) evaluated the exchange and transferability of a selection of Decision Support Tools (DST) for protecting drinking water from nitrate and pesticide pollution in a number of catchment across the EU. Three DSTs were selected for evaluation in the Derg Catchment

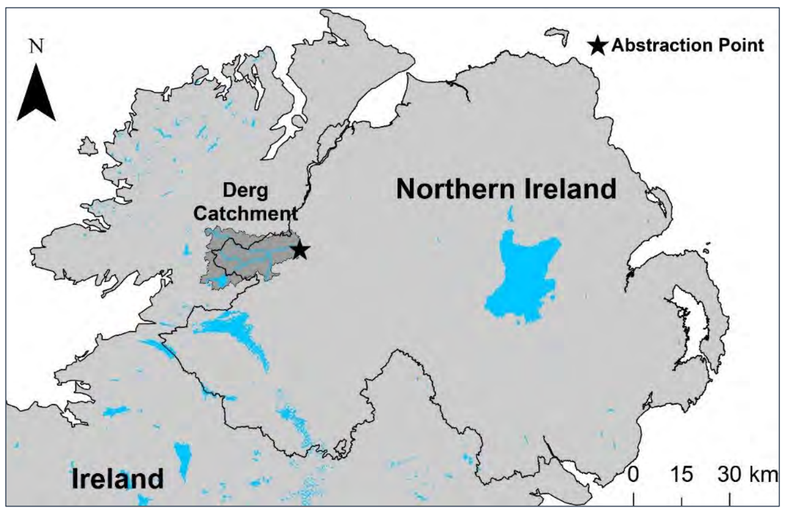

Fig. 1: Location of the Derg catchment

Methodology

Following a comprehensive review of 150 DSTs each case study selected 2-3 of the most relevant DSTs for evaluation. Farmscoper, Phytopixal and SCIMAP were selected and applied to the Derg catchment. Key features of each DST are summarised in Table 1. In each case '*ease of use*' and '*data availability*' and '*stakeholder needs*' were considered. The DST were applied to the Derg catchment using existing datasets and subsequently presented to catchment stakeholders, to elicit their input on each DST.

Table 1: Key features of each Decision Support Tool considered in this study

	Farmscoper	Phytopixal	SCIMAP
Scale	Farm or catchment	Catchment or regional	Catchment or regional
Country of origin	England	France	England
Purpose	Identify cost-effective measures to reduce pesticide loads to water	Risk assessment of pesticide applications	Risk assessment of pesticide applications
Inputs	Field parameters and farm practice	DEM, Land use, Watercourses, Soil type	DEM, Land use
Outputs	Graphical/tabular estimates of load	Risk map	Risk map
Model type	Spreadsheet	GIS-based spatial	GIS-based spatial/Website
Target audience	Farmer/Catchment manager	Catchment manager	Catchment manager

Results and Conclusions

Table 2 outlines key strengths and weaknesses for each DST when applied to the Derg catchment. While each of the DST have strengths, application within the Derg catchment is limited due to barriers such as; *inter alia* availability *of* input data, regional variation in precipitation, soil types. For example in the case of Farmscoper, difference in soil drainage characteristics between Great Britain (where the model was developed), and Northern Ireland (NI) would require further development of the model before it could be fully adopted.

Table 2: Key strengths and weaknesses for each DST when applied to Northern Ireland.

	Farmscoper	Phytopixal	SCIMAP
Pro's	Easy to use spreadsheet design	User can select input data	Output is intuitive for the user
	Uses real-farm or model-farm data	Can be re-sampled to different spatial scales	Open source software
	Cost-benefit - mitigation measures	Output is intuitive for the user	Stakeholders liked ease of use
Cons	Pesticide usage data are not applicable	Moderate level of GIS skill needed	Doesn't address subsurface flow
	Rainfall/runoff parameters too small for Northern Ireland	Written protocol - User develops the risk assessment framework	Pesticide source locations not explicitly handled
	Mitigation measure implementation costs do no reflect of Northern Irish costs	High resolution data not available in Northern Ireland	High resolution data not available in Northern Ireland