

Catchment Management for Diffuse Contamination by Pesticides

Author

Degree

Submitted: One day - please!

Abstract

Words words words

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Acknowledgements

More words words words

Authors declaration

I declare that the work contained in this thesis is my own and has not been submitted for any other degree or award.

1 Introduction

Still more words

2 Soil hydrology and the management of diffuse pesticide losses at the catchment scale

Some figure action

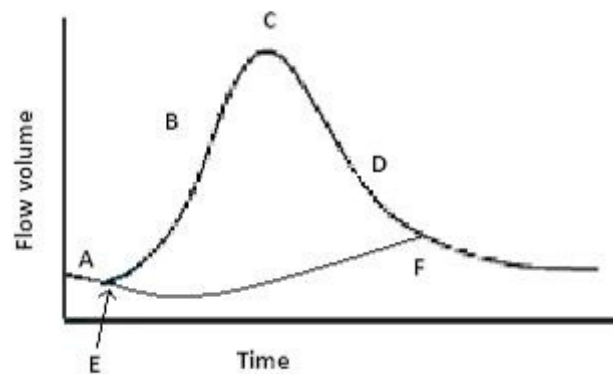
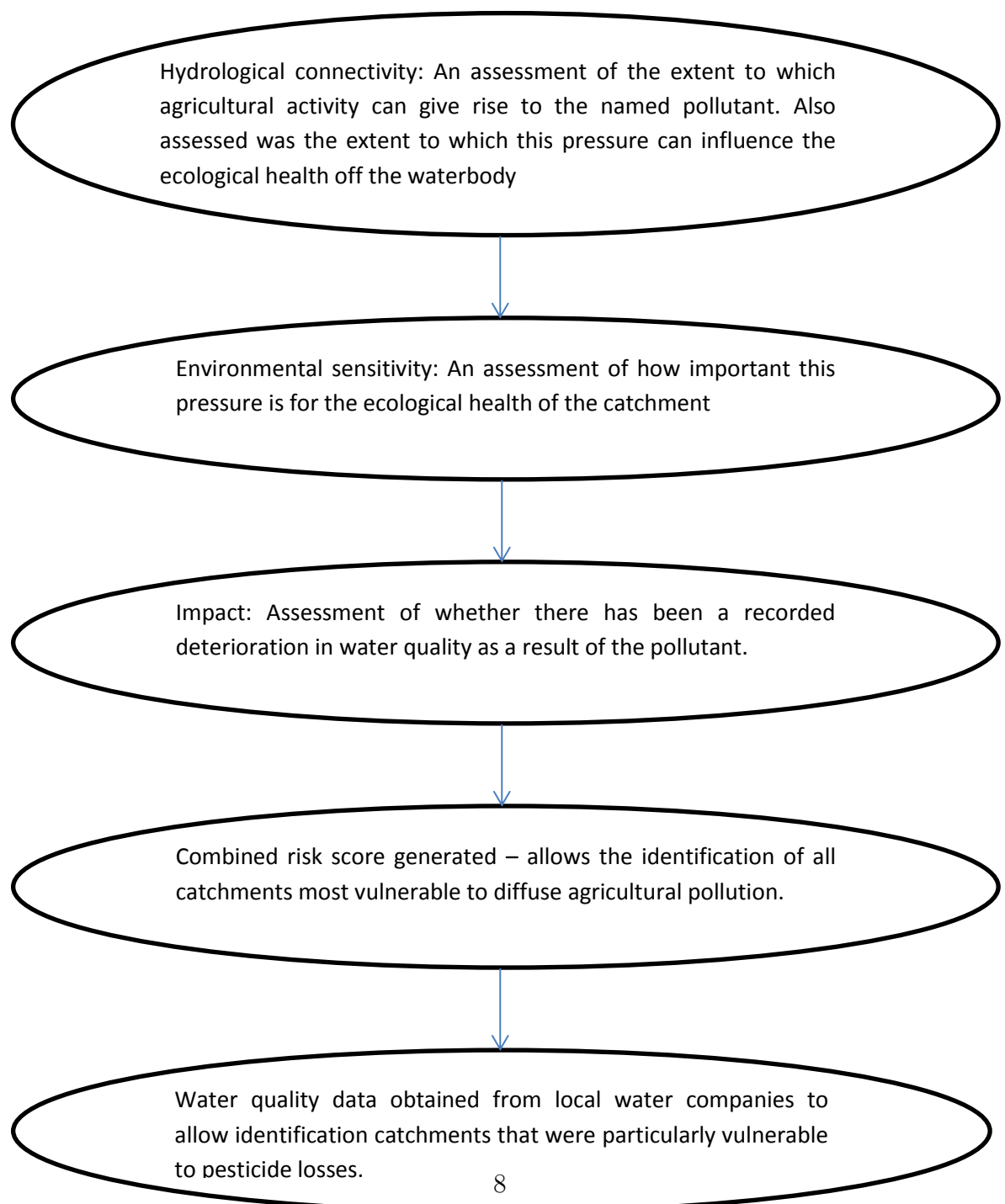


Figure 2.1: A hydrograph showing how flow volume varies in response to a rainfall event.

A)

3 Determining catchment characteristics that influence diffuse agricultural pesticide losses

3.1 SO exciting!



OH look a table

Table 3.1: Soil characteristics identified for use in this analysis

pH
Average sand content of topsoil (%)
Number of 1 km areas predominantly sand (%)
Average silt content of topsoil
Average clay content of topsoil (%)
Average organic carbon content of topsoil (%)

Table 3.2: The minimum and maximum effective application rate of pesticides used on grassland (kg/ha). (Grassland pesticide usage per km²)

2,4-D
Carbetamide
Chlorotoluron
Clopyralid
Isoproturon
MCPA
Mecoprop
Propyzamide
Simazine

4 Exploration of factors influencing farmer's awareness of mitigation measures and their willingness to adopt.

4.1 Will he ever shut up?

4.1.1 Apparently not!

In order to explore whether there are regional differences in awareness and willingness to adopt measures, this analysis divided England into regions. The regional map of England used by the Rural Development Agency (Figure 4.1) was adopted. Wales was also included as a separate region.



Figure 4.1: The Rural Development Agency regions adopted in this study

Table 4.1: Schemes designed to raise the awareness of farmers about the negative impacts of pesticides upon the environment and potential management options.

Scheme name	Operational period	Key features	Reference
Environmental Sensitive Areas (ESA)	1987 - 2004	22 areas with particular wildlife or historic value targeted. Financial support offered for continuing to use, or adopting traditional management techniques.	Natural England (2012c)
Countryside Stewardship Scheme (CSS)	1987 - 2004	Available to farmers outside the identified ESA areas Financial support offered for the preservation and enhancement of the landscape and wildlife.	Natural England (2012a)
Voluntary Initiative	2001 - present	National campaigns increase awareness and adoption of good practice. Six trial catchments allow exploration of efficacy of dissemination techniques.	The Voluntary Initiative (2010)
Entry level and Organic Entry level stewardship Scheme (ELS or OELS)	2004 - present	Available across England and Wales Financial support for the adoption of management options which improve biodiversity and the character of the landscape.	Natural England (2012b)
Higher Level stewardship scheme (HLS)	2004 - present	Scheme available within 110 areas across England and Wales. Farm must already be part of an ELS or OELS agreement. Candidate proposes measures which will lead to an improved local wildlife, landscape or historic environment.	Natural England (2012d)
Catchment Sensitive Farming	2006 - present	65 catchments identified as being at high risk of experiencing diffuse agricultural water pollution. Farmers targeted with operational advice on techniques to reduce diffuse pollution	Natural England (2012e)

5 Details of the questionnaire used in Chapter 6.

5.1 Introduction

In order to standardise the approach that was taken to all interviewees a cover letter was written. This introduced the potential interviewee to the topic and the interviewee (??). The individual was then contacted a few days later, in order to answer any questions that they had about the study and participation.

During the interview all questions were asked according to the script in ??. The mitigation measures which interviewees were asked to comment on were detailed in item 5.2.

5.2 Mitigation measures considered

Pesticide mitigation techniques

Inter-farm co-operation

1. Pesticide usage - Where possible use a variety of pesticides to target pest species.
2. Timing of application - Where possible avoid application of pesticide on the same day as neighbours.
3. Integrated Pest Management - determine a locally acceptable level of pest presence and damage in crops. Control populations to that level.

In-field management

1. Minimum tillage techniques.
2. Contour ploughing.
3. Adoption of precision farming technology – e.g. GPS.

In-field mitigation measures

1. Riparian vegetated buffer strips – Buffer strips beside streams and rivers
2. Edge of field buffer strips.
3. Mid-slope buffer strips
4. Grassed waterways - natural or constructed waterways downslope where water is known to flow over the surface during rainstorms.
5. Sub-surface drainage – Adopt less efficient drainage systems

Ex-field measures

1. Vegetated ditches – Allow vegetation to grow in ditches surrounding actively farmed fields.
2. Detention ponds – Create/Enlarge ponds in areas prone to waterlogging for long periods of time adjacent to ditches.
3. Constructed wetlands – Develop wetlands in areas prone to waterlogging for long periods of time adjacent to ditches.

5.2 Mitigation measures considered

Definitions

AAPS - Arable Area Paymens Scheme

BFI - Baseflow index

CCS – Countryside Stewardship Scheme

CSA - Critical source area

Defra - Department for the Environment, Food and Rural Affairs

DEM – Digital Elevation Model

ECSFDI – English Catchment Sensitive Farming Delivery Initiative

ELS - Entry level stewardship scheme

ESA – Environmental Sensitive Areas

EU - European Union

FERA - Food and Environment Research Agency

FFI - Fast flow index

FFV - Fast flow volume

FSR - Flood studies report

FWAG - Farmers and Wildlife Advisory Group

GCSE - General Certificate of Secondary Education

GLM - Generalised linear model

Ha - Hectare

HLS - Higher level stewardship scheme

HSA - Hydrological source area

IPM - Integrated Pest Management

LEAF - Linking Environment and Farming

LERAP - Local Environment Risk Assessment for Pesticides

Mrel - Proportion of applied pesticide lost to surface waters

OELS - Organic entry level stewardship scheme

NFU - National Farmers Union

NIAB - National Institute of Agricultural Botany

RDA – Rural Development Agency

SPR - Standard percentage runoff

Step AIC - Step Akaike Information Criteria

USEPA - United States Environment Protection Agency

TWI - Topographic Wetness Index

WRAP - Winter rainfall acceptance potential

References

- Natural England. Countryside stewardship scheme (CSS), 2012a. <http://www.naturalengland.gov.uk/ourwork/farming/funding/closedchemes/css/default.aspx>. Accessed 23rd August 2012.
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