

# Better Thames Network

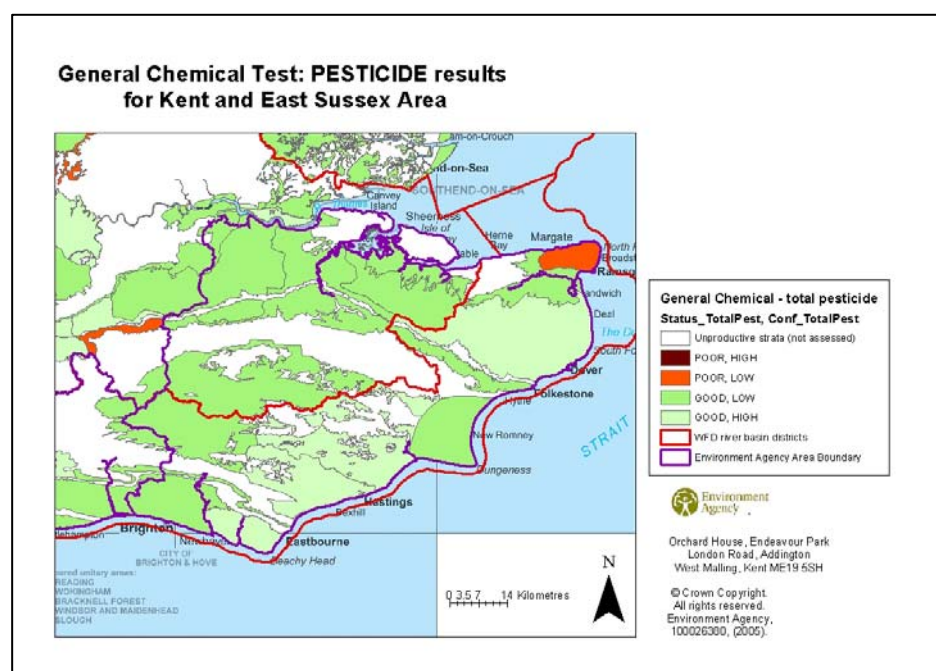
## Groundwater Workshop

### Case Study 4 – decreasing impacts of pesticides on groundwater and surface water

#### Introduction and Water Framework Directive investigations.

Pesticides include insecticides, herbicides, fungicides, rodenticides and some biocides. Groundwater pollution from pesticides is still significantly impacting groundwater and abstractions today. This includes pesticides from historic use and present day use.

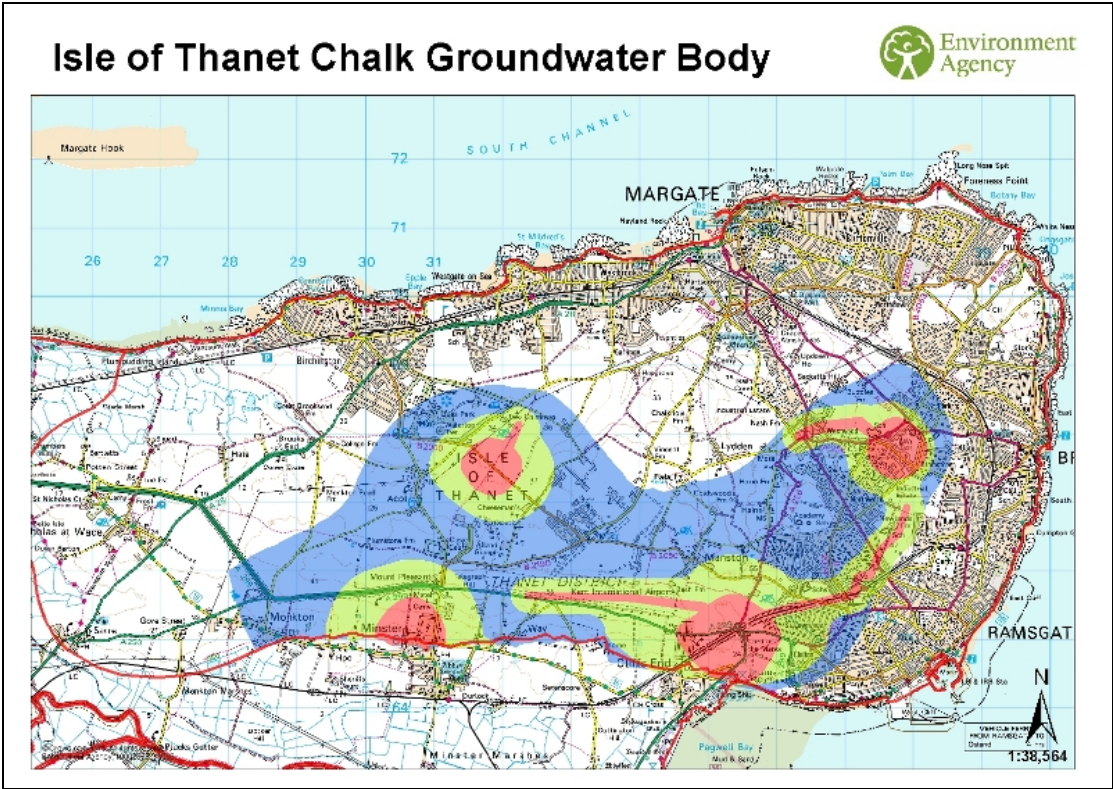
The Kent Isle of Thanet Chalk groundwater body, was classified at Poor Status in 2009 due to high and widespread concentrations of pesticides present in the groundwater. In the Isle of Thanet the unsaturated zone in the Chalk, a dual porosity aquifer, is approximately 40 metres in the centre. It thins to 0 metres at the edges where the groundwater emerges as springs in the Wantsum Channel or along the coastline.



Pesticides detected in the raw groundwater (prior to treatment) at the abstractions and in the groundwater discharges via springs to the surface water systems around the Isle of Thanet include: Atrazine, Simazine, Diuron, Bentazone, Glyphosate, Carbendazim, MCPA, Carbetamide, Chlorotoluron, Clopyralid, Cyanazine, Trifluralin and Dalapon.

Initially the land use and history of the area meant that the main sector to be targeted was considered to be the agricultural sector. As soon as the evidence was looked at closely the views on this changed! Now work is underway with many different groups!

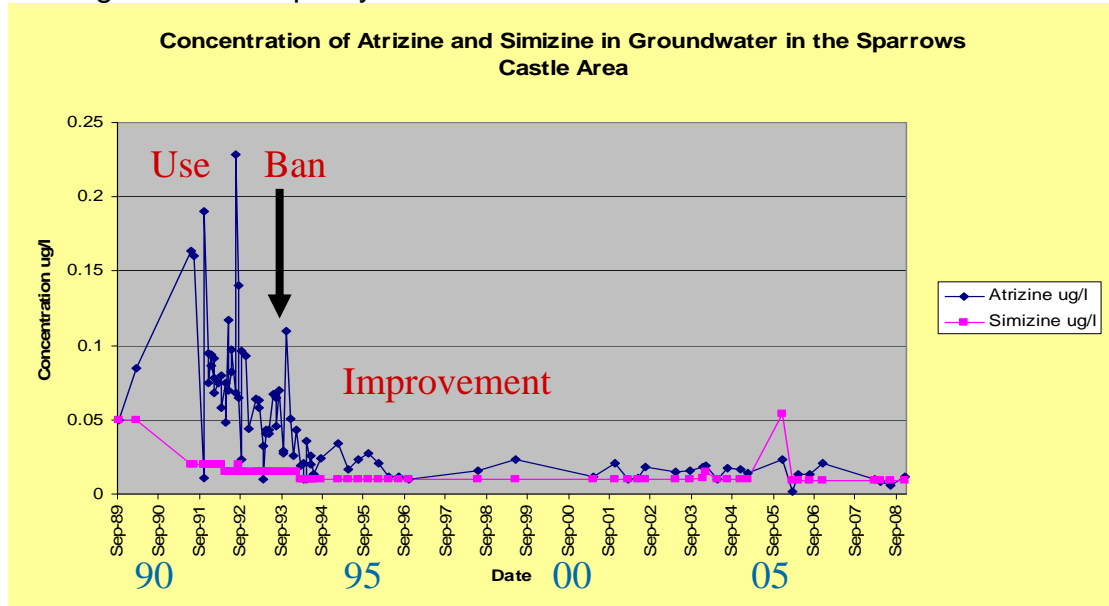
Aerial views of the Isle of Thanet, showing the land-use and the locations of the Source Protection Zones.



### Data:

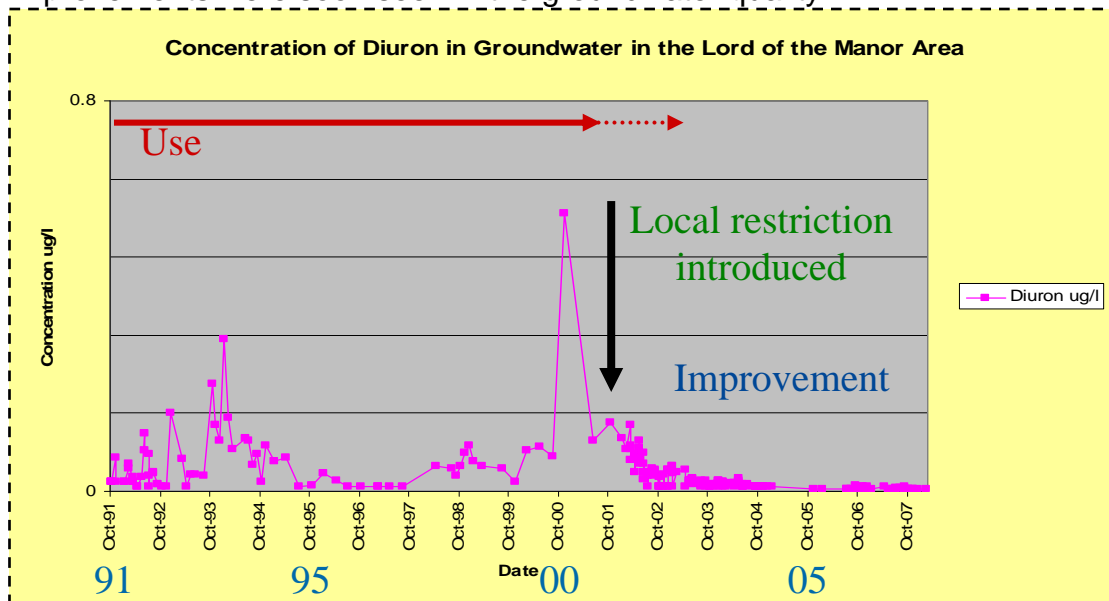
**Caution!** The data used in these examples is raw groundwater quality. Please note that the water is tested regularly and treated appropriately prior to putting it in to supply. A high standard of drinking water is available for public supply.

A national ban on the use of non-agricultural Atrazine and Simazine was introduced in 1993. These products could still be used in agricultural areas but were banned for urban and amenity use. Improvements were soon seen in the groundwater quality.



Local awareness raising and restriction on use of Diuron following incident.

In response to dramatically increased levels in Diuron detected in the raw groundwater, and the abstraction being switched off, the Environment Agency restricted the use of Diuron locally. We targeted urban (predominantly transport, council and amenity) users. Agricultural use remained unrestricted. Improvements were soon seen in the groundwater quality.





These graphs clearly show that changes in land-use and activities at the surface can make a huge difference to the groundwater quality.

It is also interesting to see the time taken to for the changes to occur. The main decrease in concentrations took place within a couple of years. Similar results are available in other areas too.

#### **Work is underway with:**

Farmers, growers, transport operators (railways, roads, airport), the county council and the local authorities. Additionally councillors, schools, colleges, horticultural groups, history societies and the public have all been made aware and are involved in

**ensuring safe storage, use and disposal of pesticides.**



#### **Further research is already underway**

Research is underway to determine if no weed killer or fewer applications of weedkiller can be used on pavements and roads, while still controlling weeds to an acceptable level. This research is being undertaken by East Malling Research, Kent County Council, Languard, Defra, Environment Agency and the University of Hertfordshire.

The research assesses practical use, impact on groundwater and surface water, social acceptability, the economics and the carbon footprint of proposals and changes. While this is a five year project results are being fed back throughout to influence ways of working and to make immediate improvements to ways of working.

## Further reading:

The Pesticide Manual – 15<sup>th</sup> Edition

Weed trial via [www.kent.gov.uk/highways](http://www.kent.gov.uk/highways) or <http://www.weedcontrolproject.info/>



Local schools help us keep a record of the weather, which can affect weed growth and effectiveness of the weedkiller, using weather stations.

We collect measurements of the amount of weedkiller and fuel used, as well as the time taken to control the weeds, so detailed cost and environmental analysis (including carbon footprinting) can be carried out.

### How long will the project last?

The project runs until 2015 to provide a robust data set and overcome factors such as year to year variation in weather patterns.

### Who is paying for it?

The project is funded by Defra through the Chemicals Regulation Directorate at no extra cost to local residents.

### How will the results be used?

The results of this project will provide valuable data on the environmental impacts, costs and public perception of different methods of weed control. This can be used by local authorities and the landscape industry alike throughout the UK.



We would like to thank the Thanet community for their cooperation in this valuable research work.

Public perception is an important consideration in the project. So your feedback is welcome as it makes a useful contribution to the findings of the research.

Please contact us with any feedback on:

**08458 247 800**

[www.kent.gov.uk/highways](http://www.kent.gov.uk/highways)

Please quote 'Thanet Weed Project'



## Thanet Weed Project



## Research into methods of controlling weed growth on pavements



### Who is involved in this project?

KCC Highways and Transportation is working with East Malling Research, University of Hertfordshire and the Environment Agency to participate in an important scientific project being carried out in your area.

### Why is it taking place in Thanet?

Thanet was chosen because the thin soils and underlying geology make the groundwater vulnerable to pollution.

### What is the aim of the project?

The aim is to assess if methods using no weedkiller or fewer applications of weedkiller can be used on pavements and roads, while still controlling the weeds to an acceptable level.

### What methods are being used to control the weeds?

Three control methods are being trialled within the project.

1) Weedkiller (glyphosate).

2) Thermal and mechanical methods:

#### Thermal:

- flaming
- infra-red
- hot water
- steaming
- hot air



#### Mechanical:

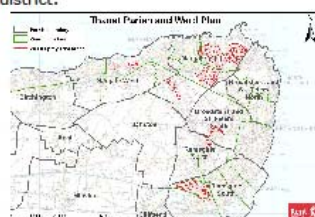
- brushing
- sweeping
- removal by hand



3) Integrated weed control includes reduced herbicide application in combination with thermal and mechanical methods.

### Is the project being carried out across the whole of Thanet?

No. There are 10 trial areas across the district.



The areas are divided into three zones with each zone receiving one of the following control methods:

- 1) Weedkiller only
- 2) No weedkiller – thermal and mechanical methods only
- 3) Integrated weed control – one weedkiller application, along with a mixture of thermal and mechanical methods

### What impact will these methods have on roads within the trial areas?

We are aiming to maintain a consistent level of control across the trial areas. The 'weedkiller only' areas will stay the same as before as they will still receive two scheduled weedkiller applications. The 'no weedkiller' and 'integrated areas' will be monitored closely by KCC Highways and Transportation and the contractor, LanGuard VM, to ensure the roads and pavements have an acceptable level of weed control.

### What else will be monitored during the project?

East Malling Research is recording the types of weeds and measuring their growth regularly in all of the trial areas (every five to six weeks) using sample squares (picture below).



The drain water is also sampled regularly to determine the amount of herbicide that has washed off the roads and pavements following rainfall.

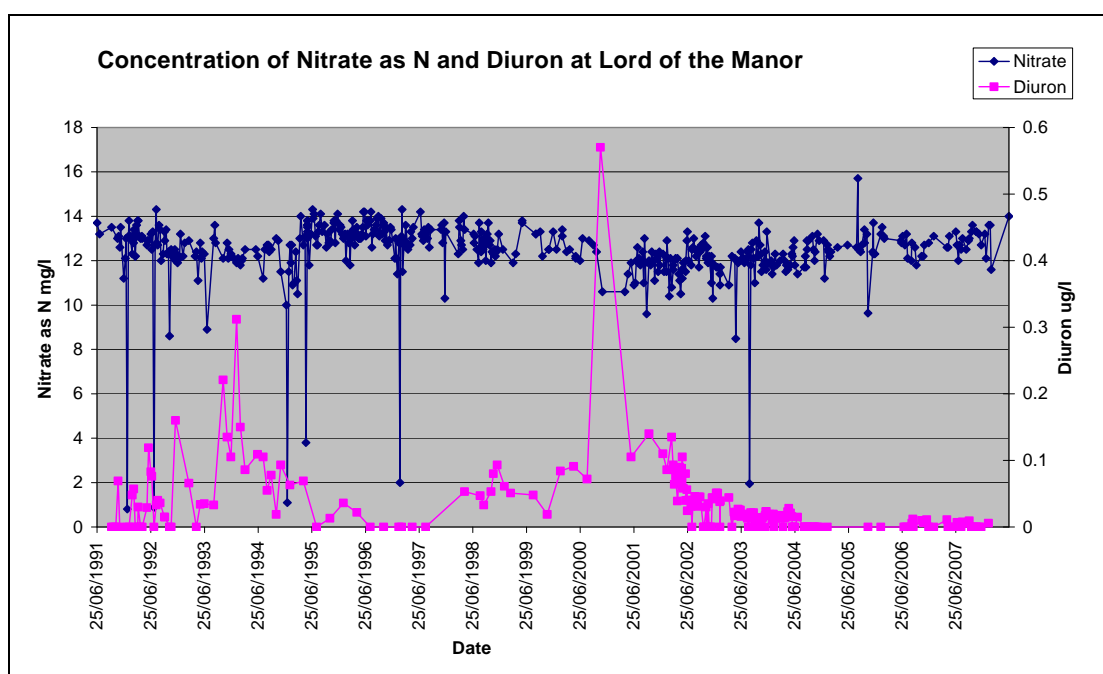
## Workshop objectives

### 1) Identifying sources and uses of pesticide within a catchment.

The work carried out in the Isle of Thanet could apply to any catchment in the country. Thinking about a particular catchment (or Thanet if you have not got your own favourite!), what urban and rural sources, or uses, of pesticide could be adding to the total concentrations of pesticides found within the catchment? *Create two lists – one for urban and one for rural.*

### 2) Fate and transport processes of pesticides

There is a clear decrease in the amount of pesticides detected in the groundwater following cessation in their use at the surface. Not all of the processes involved are clearly understood. What processes are likely to be involved and what current research is available for groundwater environments? Are there any research gaps that could be filled? *Please note graph of nitrate concentrations for comparison too.*



### 3) Changing pesticide use

Following the bans on Atrazine, Simazine and Diuron many sectors have changed over to less persistent and less mobile products. What products are now being used or discussed for future use? What advice, and to whom, should be given when a new product is being used in an area?

### 4) Research of impacts of pesticide use in urban areas

There is plenty of research and case studies of pesticide use in urban areas available within mainland Europe, but what is available within the United Kingdom? Are there any examples within the South-East that could be used to enhance research?



## Workshop Discussions and Feedback

### Identifying sources and uses of pesticide within a catchment.

The work carried out in the Isle of Thanet could apply to any catchment in the country. Thinking about a particular catchment (or Thanet if you have not got your own favourite!), what urban and rural sources, or uses, of pesticide could be adding to the total concentrations of pesticides found within the catchment? *Create two lists – one for urban and one for rural.*

Clarification and general discussion about using the generic term “pesticides” for insecticides, herbicides, fungicides, rodenticides and some biocides etc. Increased understanding that these can all be looked at separately and linked to their own use, storage and disposal. Explanation that the reason for grouping them was linked to work with broad categories and sectors for the Water Framework Directive.

General discussion about need to include urban activities when considering potential sources of pesticides, rather than just focussing on agricultural activities (as has happened historically).

| Urban   | Rural  |
|---|--|
| <b>Railways</b> – Memorandum of Understanding between Environment Agency and Network Rail already exists and restricts spraying of pesticides in Source Protection Zone 1s and next to watercourses. Updated annually. Replicated with other rail enterprises, such as Channel Tunnel Railway Link.   | Farms – use depends on types / crops. Good to work with agronomists. |
| <b>Roads</b> – links with Highways Agency, County Councils and Local Authorities. Memorandum of Understanding exists between Environment Agency and Highways Agency, covering many subjects including pesticide use. Restricts spraying of pesticides in Source Protection Zone 1s, Safeguard Zones (SPZ 1 and 2) where pesticides are issued and next to watercourses. | Horticulture – as above.   |
| <b>Allotments</b>   |  |
| <b>Private gardens</b>  |  |
| <b>Pesticide manufacturing plants</b>   |  |
| <b>Airports</b>   |  |
| <b>Schools and sports fields etc</b>  |  |

Discussion on toxicity levels of pesticides and why there is an EC limit. We agreed to park this subject otherwise we would have needed several weeks for this workshop! Agreed that UK had already raised this issue in Europe and that the question was still be asked at a high level. Other countries in Europe think that this should not be risk based or toxicity based, but should be a set level. For future discussions in Europe!

Many different sectors involved and discussions underway.

Need for general public and schools education on groundwater and on pesticide use.

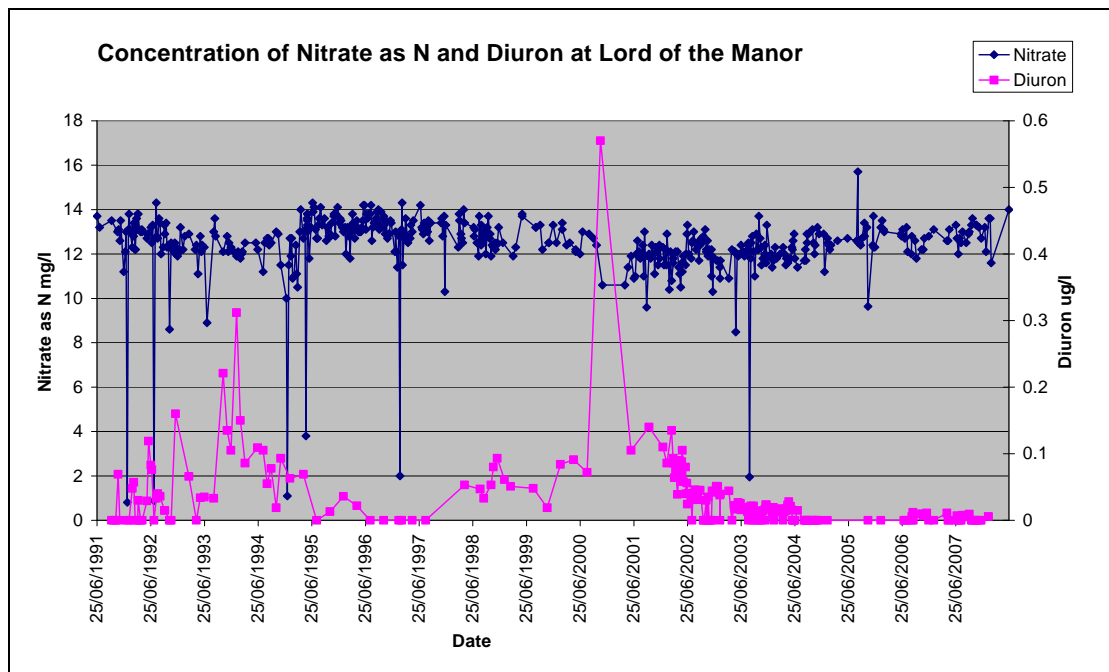
Need clear disposal routes for spent pesticides or containers in country. Some civic amenity sites not equipped. Need to prevent fly-tipping too.



## Workshop Discussions and Feedback

### Fate and transport processes of pesticides

There is a clear decrease in the amount of pesticides detected in the groundwater following cessation in their use at the surface. Not all of the processes involved are clearly understood. What processes are likely to be involved and what current research is available for groundwater environments? Are there any research gaps that could be filled? *Please note graph of nitrate concentrations for comparison too.*



Discussion about pesticide approval and working with manufacturers. Where there is a two-way process it is possible to make improvements. Two-way process present for Metaldehyde (industry working group) but not so apparent for other pesticides.

Need for strong feedback loop to enable impact on groundwater to be fed back to manufacturers and approvers.

Groundwater environment – systems.

General discussion about movement of pesticides through to groundwater.

Usual to find that they are:

- Held up on the vegetation
- Held up in the soil zone  
(Unless this is by-passed by gravel / soakaway etc)
- Once in groundwater there is very little carbon content and the environment is very dark so the mechanisms for pesticides to breakdown are much slower than in a surface water environment.  
Tend to rely on dilution so they can be present for many years.

Access to data from suppliers. Access to groundwater data by suppliers and approvers to help inform choices.

To be considered for best practice:

- Sampling methods and types
- Pharmaceuticals in surface water and in groundwater
- Setting standards (and publishing data)

Discussion around using a precautionary approach to pesticide use, for example vulnerability or risk mapping.

## Workshop Discussions and Feedback

### Changing pesticide use

Following the bans on Atrazine, Simazine and Diuron many sectors have changed over to less persistent and less mobile products. What products are now being used or discussed for future use? What advice, and to whom, should be given when a new product is being used in an area?

Ask main users to change practices. Example discussed, of good work underway, was the changes that the Highways Agency had adopted following their increased awareness.

Farmers lists. Discussion around the present use of Glyphosate. The farming and horticultural communities use Glyphosate and, as a rule, follow the guidance available on safe use – for example “Every Drop Counts”. Unfortunately the use by some other sectors is not so controlled. The danger is that poor practice by other sectors will lead to impact on groundwater and surface waters and potentially lead to a future ban. This could lead to the risk of the loss of use of useful pesticides. Also concern by water companies that any future pesticides will be less treatable.

Best way of influencing farmers – agronomist, farm advice, farm assurance, supermarkets.

### Catchment management methods

- Environment Agency work in catchments
- Water companies now carrying out more catchment based work too
- Working with landowners, pesticide users, pesticide suppliers

Question raised, “What are all specific water companies doing?” Discussion around what is happening in south-east from those there and a few examples from outside the region (Wessex agronomy, Midlands and North-West examples)

- Catchment work
- Specific targeted projects
- Rural and urban
- Wide range of substances
- Agronomy
- Unsaturated zone

- **Workshop Discussions and Feedback**

Research of impacts of pesticide use in urban areas

There is plenty of research and case studies of pesticide use in urban areas available within mainland Europe, but what is available within the United Kingdom? Are there any examples within the South-East that could be used to enhance research?

Out of time – question left for the future and for individuals to think about.