



Tackling diffuse pollution of water from agriculture – the Westcountry Rivers Trust, UK

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Persuading farmers to adopt more efficient management of fertilizers and farmyard manures can result in economic savings for the farmer and benefit the river ecosystem as less polluting run-off enters the water courses. But building up trust with farmers so that they take the risk of following new methods can take time.

In the west of England, as in many other areas, diffuse (or non-point source) pollution of water from agricultural sources has become a concern. In recent years a whole range of stakeholder groups has become interested in either consuming, producing or protecting water supplies. Diffuse pollution, in the form of nutrient enrichment of water bodies, microbiological contamination from livestock, and leakage of pesticides and other agricultural chemicals, is increasingly raising fears on human health grounds. It is also associated with deteriorating ecosystem integrity on a number of levels.

Legislation has, on the whole, been extremely effective in the UK at

reducing point-source pollution from industrial applications, which are relatively easy to identify, monitor and regulate through enforcement. There has been less success in using legal instruments to deal with diffuse pollution, which by its very nature has multiple sources and pathways into the environment, making regulation very difficult, if not impossible, to implement.

Policy makers tasked with developing environmental protection strategies have effectively three main instruments at their disposal: legislation; economic instruments such as taxation and subsidies; and the provision of advice, education and information. Many policies end up promoting a combination

of instruments to achieve a stated outcome involving some form of ‘stick’ (e.g. legal sanctions) allied to a ‘carrot’ designed to bring about voluntary behavioural change (e.g. economic incentives or the provision of awareness-raising activities).

This article outlines a methodology for managing diffuse water pollution from agriculture involving the encouragement of voluntary action by farmers. This method has been used by the Westcountry Rivers Trust (WRT), an independent charitable trust based in Launceston, Cornwall, UK. The approach developed by WRT has similarities to that used in the New York watershed programme, USA, and the Water4All project (<http://www.water4all.com/>) in north-west Europe, and may be of interest in developing countries wherever the intensification of agriculture is resulting in dangerously high levels of nutrient run-off into water courses.

In essence, WRT’s methodology involves the adoption of a systematic approach to identifying environmental impacts at a river catchment scale, followed by a practical approach to tackling these impacts at source by engaging with local stakeholders to implement solutions ‘on the ground’ (see Box 1). Importantly, the link between environmental improvements and economic profitability is promoted heavily to facilitate uptake of new ideas and approaches. The methodology is characterized by two key stages: catchment planning and the proactive engagement of stakeholders.



Blue-green algal growth in a drinking-water reservoir – the result of excessive use of fertilizers on agricultural land

Box 1. Catchment-based projects delivered by WRT

Since 1995, WRT has undertaken several catchment-based projects involving the delivery of over 1300 farm plans across a land area of 80 000 hectares. All activities have been designed to combat nutrient enrichment of waterbodies and microbiological contamination by dealing with problems at source rather than seeking an end-of-pipe solution.

The most recently completed programme of work – Cornwall Rivers Project – delivered 700 farm plans across ten catchments in Cornwall over a three-year period. Other outputs included the establishment of eight demonstration sites and 130 km of riverbank fencing to exclude livestock from watercourses, thereby protecting water quality.

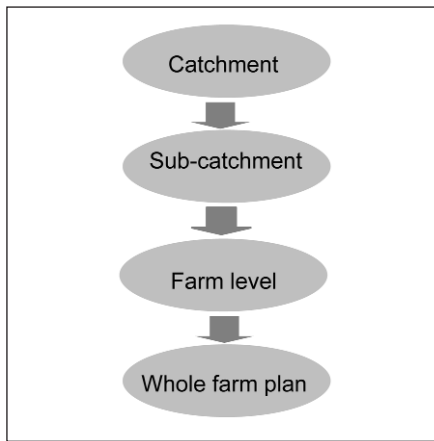


Figure 1 The process of engaging targeted farmers

within the catchment as a whole, the delivery phase involves contacting farmers and river managers to raise awareness of the problems identified at the planning stage and to seek practical solutions to these problems at an individual site or farm scale. Two main tools are used to achieve these outcomes: proactive farm visits and the production of whole farm plans. In order to engage landowners effectively, it is necessary to ‘cold-call’ individuals in target areas to initiate dialogue. WRT field advisers spend a considerable proportion of their time approaching landowners, progressively contacting as many individuals as possible within a specific catchment or sub-catchment. Intimate knowledge of specific geographical areas and communities is developed over time, which provides advisers with credibility when approaching ‘new’ farmers for the first time.

Free field visits are offered to farmers with the objectives of reviewing jointly on-site land use and identifying environmental and economic improvements. Site-specific management plans are then developed, integrating advice on best management practices with an appraisal of options to improve land use, reduce costs, improve returns and meet specific conservation needs. To date, WRT has worked with over 2000 farmers to implement a broad range of changes in farming practice designed to improve water quality and protect freshwater ecosystems, with in excess of 90 per cent of farmers contacted agreeing to participate in the development of a whole farm plan.

A key objective driving all WRT projects is to demonstrate economic

savings and gains to farmers, for example through efficient management of fertilizers and farmyard manures. Many farms encountered by the Trust have an opportunity to derive financial benefit from reducing nitrate fertilizer usage, the savings coming from careful targeting, timing and application of bag fertilizer and the application of correct values to soil N and organic manures in the crop-requirement calculation (see Box 2). Coupled with the use of clover in suitable grass leys and focused cropping, grazing and cutting regimes, benefits accrue to both farm profitability and the environment. The substantial savings on fertilizer are equivalent to that which previously would have leached from the soil and contributed to the nutrient enrichment of adjacent watercourses.

Farmyard manure, slurry and dirty water suffer from being referred to as farm ‘waste’. This means farmers regularly underestimate its nutrient value as well as the costs associated with its storage and application. Here WRT project officers seek to attach real values to this important farm by-product and reduce handling costs by waste minimization techniques, in particular by concentrating effort on clean and dirty water separation in the farmyard. Advice is then directed to its careful application to reduce run off and maximize take-up by the growing crop.

Phosphates have perhaps played a bigger part than nitrates in the eutrophication problems associated with many rivers in the south-west of England. As with nitrates, soil testing has revealed that on many livestock farms the application of bag phosphate can be dramatically reduced or even cut out altogether. This work, coupled with developing best management practices to reduce loss of topsoil and erosion (phosphates often enter the river attached to soil particles), brings further gains to both farmer and water quality.

An on-going feature of WRT’s work has been the development of over 100 ‘Best Farming Practice’ guidance notes, which are distributed to landowners and river managers in conjunction with whole farm plans. These guidance notes provide practical information on a whole host of environmental management concerns, and stress the link between economic benefit and

Catchment planning

At the heart of the WRT methodology is the ‘ecosystem approach’, a framework adopted under the Convention On Biological Diversity (CBD, a UN lead convention adopted in 1992 at the Earth Summit in Rio de Janeiro; www.biodiv.org) to tackle environmental problems at a scale appropriate to their successful remediation. Given that diffuse sources of pollution are transferred via an interconnected web of land and water that exists within each river catchment, it follows that each catchment must be managed as an integrated unit in order to solve these impacts. To protect or enhance one area of a catchment, whilst ignoring adjacent or interconnected areas, is not a viable solution.

Based on this rationale, the initial planning phase for WRT projects involves the assessment of river catchments in their entirety to identify key problem areas, the nature and scale of the impacts emanating from these areas and the most effective methods of dealing with these impacts. Ultimately, the aim at this stage is to trace impacts to a sub-catchment (tributary) or individual stream level, which can be targeted, thereby optimizing the use of available resources to deliver maximum benefit (see Figure 1).

Stakeholder engagement

Having identified specific sub-catchments or target areas in which to work

Box 2. Some examples of management practice changes encouraged by WRT

Livestock manures on arable crops

A farm with 300 ha of combinable crops (crops that can be harvested with a combine harvester), roots and 100 dairy cows spreads manure during the autumn. The nutrient value was not accounted for. As a result, problems involving low sugars and high amino acids occurred in sugar beet, whilst the potato crop suffered from excess nutrients.

After receiving advice, the farm developed a nutrient management plan taking full account of organic manure for both previous and future applications. Soils in all fields were sampled on a three-year cycle, and top-up fertilizer was applied on an individual field basis to exact crop and yield requirements.

The new system has saved in excess of £3000/year, and made a positive improvement to farm performance.

Silage

By undertaking soil tests on 10 ha of grass silage land with a history of receiving manure on an annual basis, a farmer discovered a phosphate and potash index of over three. Using existing soil reserves (and stopping the application of mineral fertilizers), for two cuts of silage he saved 75kg P/ha and 175kg K/ha (P=29p/kg and K=21p/kg, 2003 prices, therefore the savings are £22/ha and £37/ha respectively).

The soil testing of 10ha for P, K, and pH (on a 4–5 year rotational basis) cost some £75/year, assuming the farmer collects the samples.

improved environmental husbandry wherever possible. Importantly, they are presented in a user-friendly format, accessible to both technical and non-technical readers.

Recommendations

So what are some of the key lessons that can be derived from the experiences of the WRT, with relevance to catchment managers operating in both the developed and developing world? Socio-economic and cultural conditions vary markedly from region to region, country to country and continent to continent; all of which means that what will work in one situation may not necessarily work in another. However, the following observations may be

relevant to practitioners working within a wide variety of locations.

Firstly, by adopting a simple approach of empowering farmers with information and a practical tool kit of techniques, the Trust has demonstrated how it is possible to bring about changes in management practices through persuasion rather than coercion. An interesting point to note here is that many of the changes in practice advocated by the Trust involve 'low-tech' solutions with little, if any, capital outlay and having positive cost-benefit outcomes to the farmer, which would make the approach particularly appropriate within a developing world context.

Secondly, the work of the WRT has highlighted the importance of develop-

ing trust – on a human and technical level – between farmers and advisers. Trust is a vital component in the process of working with farmers to adopt new practices; mainly because they equate new ways of doing things with risk, and must have faith in what their adviser is advocating prior to changing a tried-and-tested mode of operation. It should be noted that establishing trust can take considerable time, and this has resource implications for advisory personnel who must often work with farmers over an extended timeframe to build credibility and acceptance. Trust appears easier to establish if advisers represent an independent organization with no political allegiances or direct links with a government agency, or private sector organization.

Finally, and very importantly, WRT projects have revealed that in order for farmers to adopt change, it is vital to provide bespoke advice tailored to the specific requirements of individual landholdings, every one of which will demonstrate different characteristics. It takes about three days to work with each farmer to put together a plan; the process involves meeting with the farmer, undertaking a farm walk with the farmer, writing the plan and then reviewing the plan with the farmer.

This is why WRT project delivery and farm plans are rolled out on a farm-by-farm basis. If advice is regarded as too generic, it will very likely be regarded as of limited value by farmers, resulting in low take up of new practices.

Management of diffuse pollution from agriculture presents many challenges, which blunt legal or economic instruments are unlikely to solve in isolation. This example from the south-west of England of an alternative approach may offer some ideas to catchment managers looking for a more subtle approach to dealing with the same problem in a different place.

About the author

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Pig farming often results in significant sediment loading in adjacent watercourses