

AGRONOMY

News and agronomy advice for arable farmers

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Farming practices have a key role in delivering WFD objectives

With soil erosion, leaching of fertilisers and run-off from crop protection products capable of impacting water quality, Frontier crop production technical lead, Dr Paul Fogg, reviews the legislation where water and agriculture intercept.



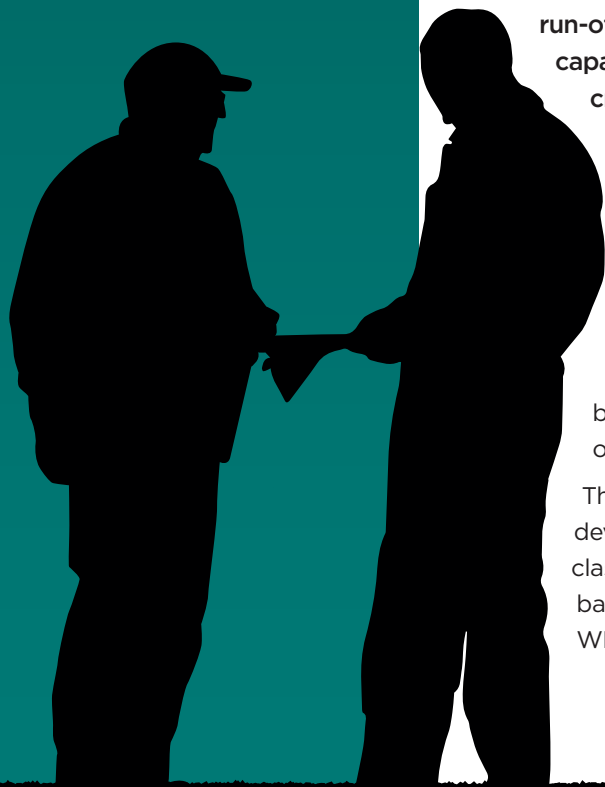
Dr Paul Fogg

“Much of the UK’s water-related legislation stems from the Water Framework Directive (WFD). It hasn’t fundamentally changed since its adoption into UK law in 2003, but current regulations date from 2017,” he says.

The aim of the WFD is to protect the UK’s water and aquatic environments by preventing deterioration of watercourses and improving quality. It set an original target to achieve good ecological and chemical status by 2027.

The WFD is based around river basins and catchments and requires the development of River Basin Management Plans. There are five possible status classifications awarded to a body of water: high, good, moderate, poor and bad. To achieve ‘good ecological status’ a body of water must meet a range of WFD standards for pollution, aquatic life and groundwater quality.

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“Sadly, the proportion of waters classed as ‘good’ in England in 2019 was slightly less than in 2015 - 16% compared to 17%, meaning the majority of UK water bodies (84%) are considered moderate, poor or bad,” says Paul.

“A progress report in 2021 identified a number of causes, including that many measures in River Basin Management Plans didn’t go far enough.

“Meanwhile, the Government’s 25 Year Environment Plan set the ambitious target for 75% of UK water to be as close to its natural state as possible. But with many water bodies still falling short of objectives set by River Basin Management Plans, some question whether this is a realistic target.

“In reality, improvements to many water bodies have plateaued. There is still too much pollution from sewage, farming and industry, as well as new threats such as microplastics and ‘forever chemicals’.”

Revised water protection policies

Because of this, Defra continues to develop new policies and regulations. These include the Farming Rules for Water, which came into force in April 2018. These require farmers to prevent diffuse pollution from manure, fertiliser and soil getting into watercourses, and cover practices such as using and storing organic manure or manufactured fertiliser, planting and harvesting, soil management and rearing livestock.

Schemes such as Catchment Sensitive Farming (CSF), run by Natural England in partnership with the Environment Agency and Defra, are also positioned to raise awareness of the issues around diffuse pollution from farming. They offer free training and advice to farmers, with capital grants to help fund improvement works.

“Meeting these statutory requirements is a key reason that water companies are keen to work with farmers.”

Drinking water

In England around 30% of drinking water comes from groundwater, with the rest originating from surface water sources.

Paul explains these need to be protected to prevent pollution and avoid or minimise the need for additional purification treatments which can be costly and resource intensive. Drinking Water Protected Areas are defined by WFD Regulations.

“In addition, water companies must ensure compliance with the Drinking Water Directive and the Priority Substances Directive chemical parameters at the tap,” adds Paul.

“This is regulated by the Drinking Water Inspectorate (DWI) and bolstered by a five-yearly Ofwat Price Review (or ‘PR’) of water companies, with the next one due to be implemented in 2024, hence ‘PR24’.

“Meeting these statutory requirements is a key reason that water companies are keen to work with farmers,” he says.



Water sources need to be protected



Soil infiltration: the value of organic matter



Rob Nightingale

Alongside air, water is key for good soil health and structure - both of which are vital for infiltration, flood prevention and ensuring crops can access enough moisture.

“A really good soil should contain air and water in equal measure, demonstrated by good structure with pore space and worm channels, for example,” says Rob Nightingale, Frontier national technical sustainability specialist.

“At certain times of the year though, soils will either be mostly water or mostly air.”

With the Met Office suggesting that climate change will lead to more intense rainfall events, wetter winters and drier summers, managing infiltration is crucial. Rob points out that improving soil structure, for example through the addition of organic matter, will improve crop water availability between rainfall or irrigation events.

“Organic matter opens up the soil, increasing pore space which in turn reduces bulk density.”



Improving soil structure will improve crop water availability

“Measuring infiltration is easy and shows how long it takes for the water to enter the soil. Organic matter is key to improving infiltration, with studies suggesting that a 1% rise in soil organic matter increases soil water infiltration by 3mm. This is equivalent to holding an extra 275,000 litres of water per hectare.

“Organic matter opens up the soil, increasing pore space which in turn reduces bulk density. Better soil structure can also increase opportunities for machinery to access land in order to apply herbicides and other crop inputs, while overall crop emergence and crop health are improved too. You also lose fewer nutrients through leaching and can reduce the risk of waterlogging, lowering nitrous oxide emissions.”



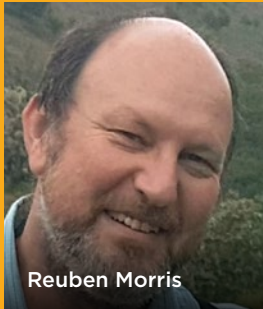
Leaving crop residue on the surface - such as that created by chopping straw - is one of the easiest ways to add organic matter. Maintaining cover crops over winter will also help capture rainfall and reduce surface run-off.

There are physical means of influencing soil structure too, with dry summers often providing the best conditions for subsoiling or even conventional ploughing to remove compaction. “But it’s important soil conditions are suitable, or you could make issues worse,” warns Rob.

In some cases, field drains may need to be installed or replaced and while drainage is not cheap, it can pay for itself in as little as five years in terms of improved travel on soils and better crop yields.

With soil health a focus of the SFI (Sustainable Farming Incentive), funding is available to assess your soil, produce a soil management plan and test organic matter. Your local Frontier agronomist or SOYL advisor can provide more information.

Stewardship and crop protection



Reuben Morris

The risk of pesticide residues ending up in water and the difficulties involved in removing them are nothing new, with metaldehyde - the active ingredient in slug pellets - being one of the most prominent examples before it was withdrawn.

While its removal reduced the list of farming agrochemicals that were of concern to water companies, some products remain problematic.

“Acceptable levels for different chemicals in drinking water are based on a precautionary principle. The maximum permitted concentration for individual pesticides in drinking water is 0.1µg/l (microgrammes per litre), which corresponds to a concentration of one part in ten billion,” says Frontier crop production specialist, Dr Reuben Morris.

“Even the Drinking Water Inspectorate stresses that this is ‘not a health-based’ standard; it’s based on the limit set by the European Commission in 1980 to reflect the analytical methodology at the time, and as an environmental policy to generally limit pesticides.”

Even so, there is currently no sign that the UK Government will move to a risk-based approach to this issue, despite this being adopted by the World Health Organisation (WHO).

The Water Framework Directive

Under the Water Framework Directive (WFD), water companies must assess upstream threats to the water supply. This includes the use of crop protection products, as several pesticides carry a greater risk of ending up in water. Due to their application timings and the way they are used, herbicides (including some of those used with oilseed rape), present a particular challenge - something which is analysed considerably when the approvals for these products are reviewed.

“There are some crop protection products that are important for today’s production systems, but they are now being actively looked at by water companies,” says Reuben.

“In many cases these chemicals are being detected with increased frequency or at higher levels. It’s therefore vital that our industry fully embraces product stewardship.



It's important to understand the pathways through which products can enter water systems

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Supporting farms with compliance

Frontier’s MyCompliance service provides UK farmers with advice and management plans across five key areas of agricultural legislation, including the Farming Rules for Water.



www.frontierag.co.uk/compliance



It's important to understand the pathways through which crop protection products can end up in water systems – such as run-off, drift and through field drains – and to utilise all the methods available to prevent pollution.”

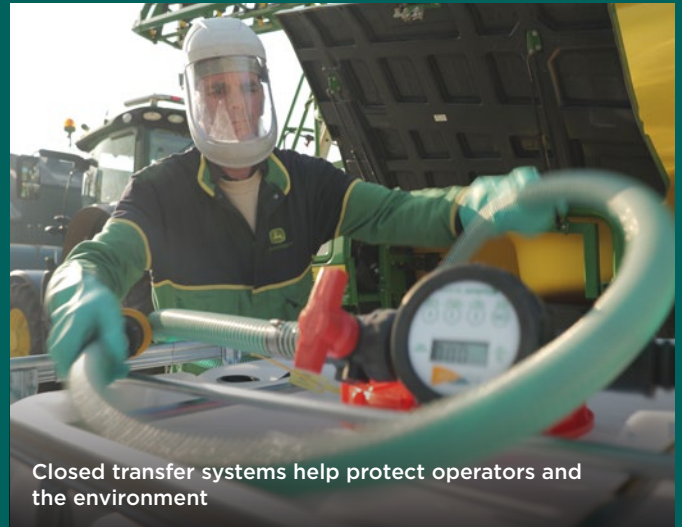
This involves understanding the risks that certain actives can pose and the effectiveness of different mitigation options. For example, while buffer strips can be good at preventing contamination through spray drift and surface run-off, they are no use if chemicals find their way into field drains - something which can be a real issue with some herbicide products. Understanding and preventing point-source pollution from areas like roadways, filling and washing areas - even storage buildings - is also important.

Reuben adds: “Specifying a maximum dose per area as part of a product’s approval is one way in which regulators are looking to reduce the diffuse pollution potential of some products.

“Meanwhile on farm, increasing soil water holding capacity also reduces this risk, while simultaneously improving crop growth and flood prevention.

“At Frontier we are also supporting novel methods such as the use of closed transfer systems; working with Severn

Trent Water, for example, to encourage uptake amongst farmers in key catchment areas.”



Closed transfer systems help protect operators and the environment

Practical advice is available from a number of sources including Frontier’s technical advisors, water companies and the network of 36 Voluntary Initiative Champions located around the country.

[Learn more about Frontier’s closed transfer system](#)

 www.frontierag.co.uk/cts



Availability of water on farm

On-farm stewardship is key to protecting water quality and availability, not least because agricultural and horticultural systems rely on it too - particularly for irrigation.

The demand for water from society and other industries continues to grow, but at the same time climatic change is reducing its availability in many areas yet increasing irrigation requirements for some crops. Faced with these challenges, maintaining access to water and using it efficiently is increasingly important for farmers.

“In a changing climate, water is going to get more expensive and difficult to get hold of,” says Dr Paul Fogg.

“Historically the irrigation demand for water has been focused on higher value crops, but as we’re seeing elsewhere in Europe, that could change. Irrigation may become more common to ensure crop establishment or to preserve yield and quality.”

Changing weather patterns and moves to protect rivers mean the opportunity to abstract water in the spring and summer is only going to reduce, leading to increased interest in water storage infrastructure such as on-farm reservoirs.

While building a reservoir comes with significant capital cost, the Government frequently makes grant funding available for projects to improve irrigation infrastructure. For example, the now-closed second round of Water Management Grants offered between £35,000 and £500,000, with other selected schemes having until 31 October 2024 to obtain planning permission and to make a full application.

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The demand for water is increasing irrigation requirements for many crops

“If you are growing crops which require irrigation then it’s increasingly important to secure access to water,” says Paul.

He points out that having a reservoir means there needs to be water to fill it, and as many farms found out in the spring of 2023, that can be easier said than done. The Environment Agency can issue ‘hands-off’ notices when rivers fall below a certain level, so even with a suitable abstraction licence you cannot take water.

Another change affecting growers is that within the Government’s 2017 Water Abstraction Plan, the Environment Agency is moving from abstraction licences to permits under the Environmental Permitting Regulations (EPR).

All existing licences will eventually be replaced, although the timeline for this is still to be determined.

Once a farm does secure a water supply, it’s important to use it as efficiently as possible. Though the NFU estimates that agriculture accounts for just 2% of UK water use, irrigation is a very visible activity.

Irrigation methods

A range of technologies are available for irrigation, including rain guns and booms attached to hose reels, drip tape and solid-state sprinkler systems. There are pros and cons to each and considerations not only include the amount of energy required to run the pumps (rain guns operate at the highest pressure and drip tape the lowest), but also the infiltration of the applied water into the soil and the timeliness of application.

Using forecasting systems to monitor both soil water content and the weather are useful to schedule irrigation and maximise efficiency – for example, to avoid irrigating when rainfall is forecast or when soils contain adequate moisture. The increased availability of monitoring devices and weather stations has been paired with more apps to control irrigation equipment too, preventing the overlap of applications and enabling systems to be shut off remotely in the event of a problem.

Where irrigation occurs, records of water usage must be kept along with regular laboratory water tests for microbial, chemical and mineral pollutants. Growers who irrigate must have a Water Management Plan focused on reducing water usage and increasing water efficiency to satisfy Red Tractor requirements.

Further details can be found in the appropriate Red Tractor standards.



Water protection in practice



Clive Wood

Water is a valuable commodity but a limited resource facing growing demand. As water users and custodians of the land, farmers are in a unique position to help safeguard this vital natural asset.

Across the UK, only a relatively small proportion of land can adequately capture the annual rainfall it receives. This, coupled with the high costs associated with removing contaminants and treating water, means

that water companies are partnering with farmers and organisations such as Frontier to mitigate potential risks posed to water quality in catchment areas.

“The time taken to get water from an abstraction point in a natural body of water to a clean potable state can be anything from a few hours to a day,” says Clive Wood, northern technical advisor for Kings Crops.

“Rivers running with high levels of sediment can prove particularly problematic, so keeping potential sediment on land is just one reason water companies want to work closely with farmers.

“Removing soil at the water treatment plant is expensive, particularly because the soil becomes a waste product which cannot go back to the field. Water companies are keen to collaborate with farms to avoid this, providing support to help action practices such as cover cropping and increasing organic matter. In turn, soil health and structure is improved which aids productivity, water sources are better protected and the need for extensive water treatments is reduced.”

Because most catchments extend far beyond a single farm or landowner, a collaborative approach is required encompassing different schemes such as Catchment Sensitive Farming (CSF) groups and Landscape Enterprise Networks (LENs).

Clive adds: “Within these groups Kings and Frontier can provide expert advice on capturing and retaining nutrients, as well as how cover crops and buffer strips can be integrated into different farming situations, for example.

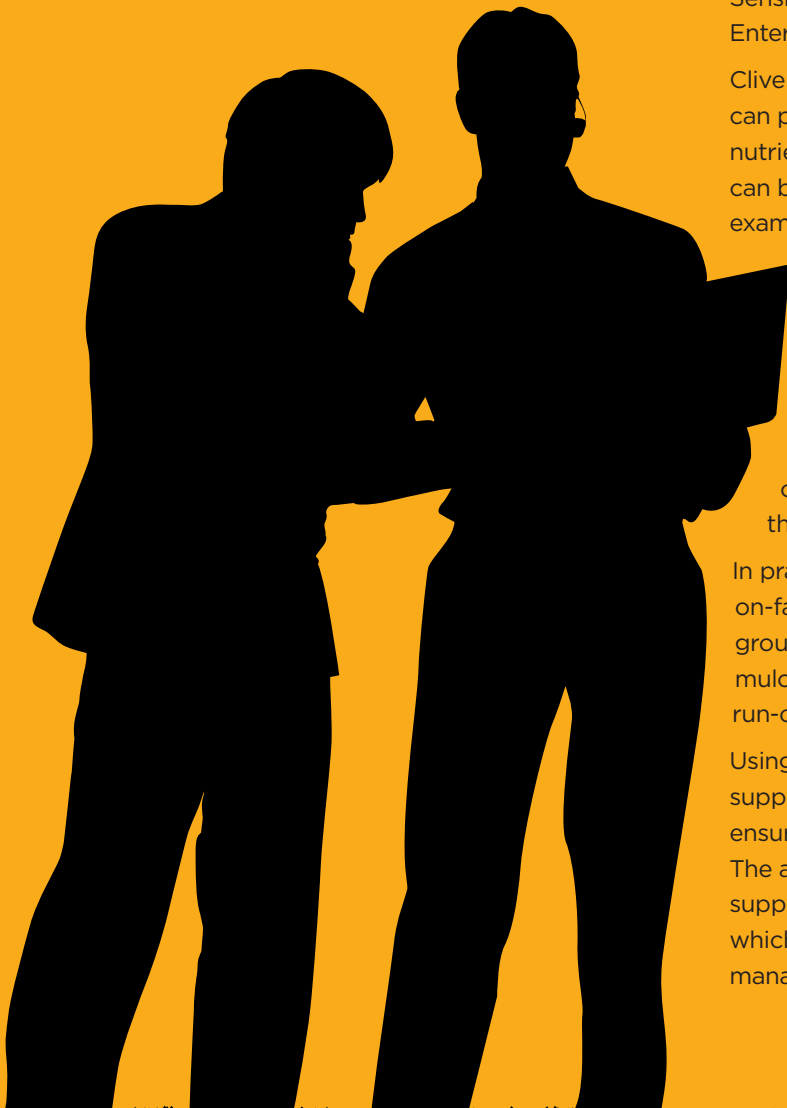
“Everyone involved learns from each other.”

“We can also facilitate introductions to water companies and help build relationships throughout the supply chain.”

In practice, a number of techniques may be employed on-farm, including borehole testing to measure groundwater quality and using cover crops and living mulches to increase soil biota, build soil health, reduce run-off and help control grassweeds.

Using digital tools from specialists like SOYL can also support farmers with enhanced levels of monitoring to ensure compliance with slurry and manure management. The ability to record inputs in Frontier’s MyFarm also supports the stewardship of crop protection products, which can have adverse effects on water quality if not managed correctly.

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Group approach

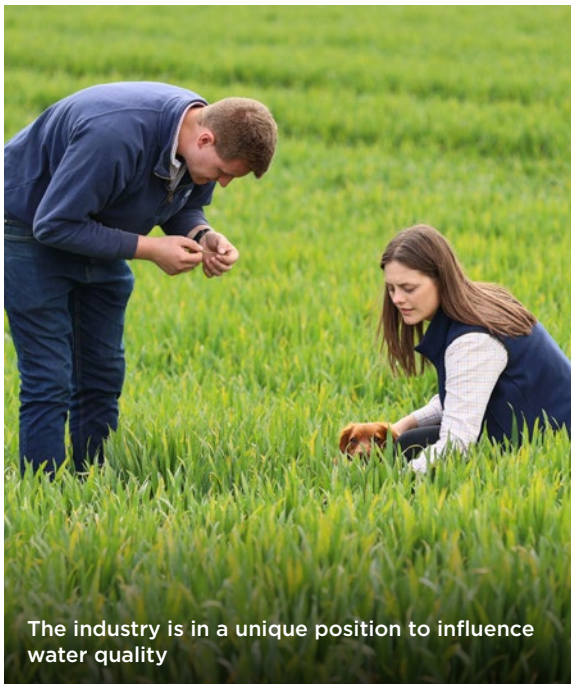
While funding from water companies provides farmers with practical support, Clive stresses that the collaboration between all parties is one of the reasons these schemes are so successful.

“These farming groups operate at a really high level thanks to the exchange and cross-fertilisation of knowledge,” he says. “I think that’s possibly the most valuable aspect of working across catchments. Everyone involved learns from each other.”

One recent example saw Yorkshire Water attend Frontier’s 3D Thinking trial site at Haywold near Driffield, where its representatives heard about the challenges facing farmers

and the innovative solutions and land management methods being adopted.

Elsewhere, Kings is also working with Southern Water to trial the use of cover crops across three farms in Kent, West Sussex and Hampshire to reduce nitrate leaching during the winter months, while also measuring how much nitrogen is retained for the following crop. Similarly, the team is working with United Utilities and Darley Hall Farm in Cheshire trialling undersown grass in maize crops to reduce soil erosion and run-off into local water courses. So far, the results have been positive, suggesting that this could be an option for growers looking to maintain soil cover as required by the SFI.



The industry is in a unique position to influence water quality

At a larger scale, Frontier is working with LENs (Landscape Enterprise Networks) to support farmers with practical sustainability improvements in land management, including the protection of water courses. Frontier is one of the aggregators of the project, promoting the scheme with farmers and land managers in catchments in the East of England.

Frontier agronomist, Marcus Mann explains, “The idea is that those who benefit from these improvements - such as water companies – can support growers to implement the necessary changes.

“Through these partnerships we are supporting farmers to produce the food we need in ways that are more sustainable and environmentally considerate, protecting our valuable ecosystem services.”



Marcus Mann



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