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# CATCHING THE FLOOD

When ICF asked Vince Carter to write about forestry and water management, we didn't know how current his article would be as floods then dominated UK news

**H**istorically, forestry was not the most sensitive of industries in terms of the problems faced by the water environment. With the development of the Forestry and Water Guidelines in 1988, our industry started to get its act together. Those guidelines, now in their fifth edition, and the incorporation of other subject-specific guidance, led to the development of the UK Forestry Standard.

In many ways forestry now leads the way in sustainable land management. Not only have we changed the way we work, progressively addressing past practices, but today we also recognise that forestry can be part of the solution to the wider problems faced by the water environment, in particular to diffuse pollution and flood risk. The launch of the Catchment Based Approach presents a significant opportunity for the sector to expand and demonstrate just how versatile forestry is in terms of the benefits it provides society.

### **Catchment Based Approach (CaBA)**

CaBA is a new government initiative which encourages local communities to take a bigger role in helping to look after their local rivers, lakes and other water bodies. Only 26 per cent of water bodies in England are considered to be in good ecological status, with the target being to bring them all up to good status or good potential by

2027. The legislative driver for this is the Water Framework Directive, but the Government is clear that it is pursuing this whole agenda because it is the right thing to do, not just because it is a directive from Europe.

The reasons for the current poor condition of most of our rivers and lakes are many and varied. They range from urban pollution, barriers to fish passage, diffuse pollution from agriculture, erosion and sedimentation, polluted mine waters, over-abstraction, poor sewage treatment, right through to artificial drains and engineered channels.

The forestry sector itself is occasionally the cause of a few problems, such as excess sediment resulting from poorly managed felling operations. Fortunately, these instances are relatively rare compared to the very large number of significant water issues across England and simply require owners and contractors to follow the guidance in the UK Forestry Standard more closely.

Some of the problems that the Environment Agency has identified can only be addressed through changes in national regulations or significant capital investment. However, many can also be addressed by local action, and this is where the government hopes local communities can get involved and where opportunities might present themselves for forestry.

(Top) Trees, shrubs and woody debris alongside streams and rivers can exert a drag on flood waters and delay flood flows

(Opposite page) Top left and far right: 2014 saw a repeat of the extensive flooding that has been experienced several times already over the last decade



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### Woodland for Water

A comprehensive review of the evidence for the role of woodland in relation to the water environment resulted in the publication of the *Woodland for Water* report<sup>1</sup> in 2011. This was commissioned jointly by the Forestry Commission and Environment Agency, and the study was undertaken by Forest Research and environmental consultancy ADAS. The study concludes:

- There is strong evidence to support woodland creation in appropriate locations to achieve water management and water quality objectives.
- Woodland contribution to tackling diffuse pollution includes both a barrier and interception function. They help to trap and retain nutrients and sediment in polluted runoff.
- The benefits of riparian and floodplain woodland for protecting river morphology and moderating stream temperatures are well proven, while a good case can also be made for mitigating downstream flooding.
- Targeted woodland buffers along mid-slope or downslope field edges, or on infiltration basins appear effective for slowing down runoff and intercepting sediment and nutrients, but the evidence base is limited.

- Wider-targeted woodland planting in the landscape can reduce fertiliser and pesticide loss into water, as well as protecting the soil from regular disturbance and so reduce the risk of sediment delivery to watercourses.
- Evidence from Europe and further afield provides a range of examples of effective action plans and incentive schemes for water-related woodland services, which have succeeded in achieving woodland creation and a reduction in nutrients reaching watercourses.
- The evidence presented supports the use of woodland measures in helping to meet water quality objectives in future River Basin Planning cycles.

It is the development of River Basin Management Plans that offers the opportunity to consider and plan new woodland planting where it can help address problems like diffuse water pollution. There is a similar process in place to tackle flood risk issues through the development of Flood Risk Management plans. The new catchment partnerships will be key players in both these processes. They have been set up to allow local communities to influence the development of these Plans and many are starting to consider options for woodland creation and

management in light of the strong evidence from the *Woodland for Water* report.

### Water Quality

The comprehensive *Woodland for Water* science report has now been synthesised into a brief Evidence Summary available on the Forest Research website<sup>1</sup>. From laboratory experiments, field trials and modelling studies, there is evidence to suggest that carefully targeted, designed and managed new woodland could significantly reduce diffuse pollutants reaching rivers. Table 1 (p16) shows the potential reduction achievable for a range of diffuse pollutants from planting on a given area of land. While it will require co-ordinated action and a sizeable level of woodland creation to make a difference at the catchment scale, there is scope to deliver local benefits as part of a more integrated approach to managing water quality.

Readers should be aware that the results summarised in the table reflect planting in ideal circumstances. Nevertheless, they paint an optimistic and encouraging picture and we should all become firm advocates for the potential benefits forestry can offer.

### Flood Risk

Following two very wet winters, attention is turning to how land management change

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might help to reduce flood risk. There are a number of ways that trees can help. Firstly, trees generally intercept and evaporate more water than shorter vegetation, which reduces the volume of water draining from the land into rivers. Secondly, soils under woodland tend to be better structured than under other land uses, enabling more rainfall to enter and drain through the soil rather than running straight off. Thirdly, trees, shrubs and large woody debris (LWD) along streambanks and within floodplains exert a greater drag on flood waters compared to grass, thereby delaying flood flows. The Slowing the Flow project at Pickering<sup>2</sup> and the Holnicote project in the South West<sup>3</sup> are being used to demonstrate these techniques. Lastly, tree cover can decrease soil erosion and the delivery of sediment to watercourses, which helps reduce siltation and thereby increases the capacity of river channels to convey flood waters downstream.

There is a strong understanding of the processes involved that is supported by scientific evidence. This suggests that woodland creation has the greatest scope for reducing flood risk within smaller catchments (<100 km<sup>2</sup>) but could also potentially contribute to flood alleviation within larger catchments given a sufficient and targeted level of land use change.

In general, the ability of woodland to reduce flood risk declines with increasing event size, although evidence suggests that it may be possible to exert a significant effect on relatively extreme events, at least up to a one in 100 year event.

**Opportunity Mapping**

The Forestry Commission and Environment Agency have commissioned Forest Research to develop detailed opportunity maps to identify where woodland creation could help reduce flood risk and diffuse pollution from agriculture. These opportunity maps will then be used with priority catchment data from the Environment Agency to target locations where woodland creation would deliver maximum benefit. This process will be used both to target future woodland creation and management grant support to where it is needed, and to inform the new catchment partnerships where woodland options could assist in tackling local problems.



Jeremy Dick, Forestry Commission, and landowner Les Hughes inspect the site at Backstone Gil

**How can you help?**

The new catchment partnerships were only set up in the autumn of 2013 but are already developing their ideas ready to feed into River Basin and Flood Risk Management Plans. This process presents opportunities for the forestry sector, both to get involved with these new partnerships as advocates of Woodland for Water, but also to support and work with landowners to facilitate targeted woodland creation and management. It is hoped that landowners will welcome this targeted use of woodland creation to reduce their impact on the water environment as it can represent an economically productive land use where land is taken out of agricultural production.

The GOV.UK website<sup>4</sup> includes a map to show where the 100 partnerships have been established together with a list of the host organisations. The Catchment Based Approach Knowledge Hub<sup>5</sup> and the Catchment Change Management Hub<sup>6</sup> both provide very useful sources of information. Contact

your local Environment Agency office or the partnership host organisation in your area to find out more and become an advocate of the woodland for water message.

**Vince Carter, Climate Change Adviser, Forestry Commission England**

**References:**

1. Woodland measures for meeting Water Framework Directive objectives and Woodland for Water. Download both reports at: [www.forestry.gov.uk/fr/INFD-8JHELN](http://www.forestry.gov.uk/fr/INFD-8JHELN)
2. Slowing the Flow project: [www.forestry.gov.uk/fr/INFD-7YML5R](http://www.forestry.gov.uk/fr/INFD-7YML5R)
3. Holnicote project: <http://ecosystemsknowledge.net/resources/examples/holnicote/>
4. Catchment Based Approach for a healthier environment: <http://bit.do/catchment>
5. CaBA Knowledge Database: [www.catchmentbasedapproach.net/](http://www.catchmentbasedapproach.net/)
6. Catchment Change Management Hub: <http://ccmhub.net/>

**POTENTIAL EFFECTIVENESS OF WOODLAND CREATION FOR REDUCING THE DELIVERY OF DIFFUSE POLLUTANTS FROM AGRICULTURE TO WATER**

	Nitrate	Phosphate	Sediment	Faecal Indicator Organisms	Biochemical Oxygen Demand	Pesticides	Ammonia
Replacement of agricultural activity forming the pollutant source	70-90%	90-100%	90-100%	90-100%	90-100%	90-100%	70-90%
Planting of woodland as a buffer to agricultural activity, either in the riparian zone or on a downslope or field edge	50-90%	70-100%	50-100%	50-100%	50-100%	60-100%	50-90%