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Society for the Environment

A call for integrated environmental management on World Environment Day 5th June 2016

in collaboration with:

CIWEM Chartered Institution of Water and Environmental Management

Institute of Water

Institute of Chartered Foresters

Forestry and water management – integration for multiple benefit

Overview

The way in which we manage our land has a direct bearing on the way in which we interact with water. Poor land management increases the risks and impacts of both flood and drought. It will lead to reduced water quality and poor ecological health in both the aquatic and terrestrial environment (including soil health). It can also lead to emission of carbon from the soil and reduced carbon sequestration of soils. Well managed forestry can play a major part in mitigating against these risks and in driving a wide range of benefits. Presently these factors are not sufficiently reflected by policy at most levels, but there is growing recognition of the need to work with natural processes in order increase our resilience to climate change and maintain and conserve our valuable environment.

Deforestation

Centuries ago much of the world's land area was covered in forest. In the past 50 years, around half of the planet's original forest has been lost due to pressure for agricultural land and developments. In Europe, humankind has transformed the landscape through widespread deforestation since the mid-Holocene when the first agricultural societies developed. As settlements and agriculture grew in size, so did the impacts of flood and drought as witnessed increasingly in recent years across Europe.

As the impacts of climate change manifest themselves, extremes are predicted to become the new normal. More traditional measures of flood defence or water storage play a major role in future protection of societies, but they are unlikely to meet all needs. Costs may become prohibitive and visual and amenity considerations become an increasing factor as communities are unwilling to live behind ever higher flood walls.

Afforestation and water

The concept of slowing the flow of water across the landscape – runoff – is central to the understanding that trees and their management can play a vital role in reducing the reliance upon conventional flood defence and water storage approaches. Contributions of trees to this process vary with species, maturity and density but on a basic level they intercept rainfall as it falls through the canopy and physically slow the pace of runoff over the surface of the ground in a downslope / downstream direction. Moreover, tree root structures facilitate the infiltration of water into the ground and its absorption into the soil, through which it flows far slower than it runs downstream over the surface.

These factors have the effect of increasing the time taken for water to flow from upper areas of river catchments to lower parts, where settlements are more commonly found. Not only this, but in promoting infiltration of water into the ground, tree root structures (as well as those of other vegetation) also aid the recharge of groundwater reserves, ensuring that valuable water resource does not flow quickly down river to the sea but is retained to benefit low flows. In addition, tree planting can reduce soil erosion and sediment runoff, and provide vital shading to help keep rivers cool in the face of climate change.

Knowledge, awareness and understanding

The concepts which underpin these dynamics are well understood. However, for varying reasons there has been a trend over the past century towards hard engineered solutions which channel water into physical structures either to convey water away from areas where it can pose a hazard (in the case of flood) or to those where it may be stored for future use. There is a growing recognition that such approaches deliver often limited (or one-dimensional) benefits, and that in some instances they can exacerbate risk. Conversely, multi-dimensional benefits may be attained through the deployment of a wide range of measures at the right locations across an appropriate geographical area (such as a river catchment) as part of an integrated approach to catchment management. The planting of increased numbers of trees, and their management (for example in creating woody debris dams in streams), particularly in upper catchments, is one such example of this.

Evidence of the benefits of this approach is emerging as more examples of its deployment are analysed. At the present time, the extent of the evidence base is small in comparison to that relating to hard engineered approaches to water management. This can make it difficult to justify deploying widespread planting as a water management measure, particularly to audiences who are unfamiliar with the benefits. Conversely, as appreciation of the benefits is increasing amongst the media and its audience, there is a risk that the benefits may be overstated. It is important to recognise that planting trees is not a universal panacea and may have only limited benefits during the most extreme rainfall events. A fundamental principle is that in working with natural processes, every case is different and the respective contributions of different water management measures will vary depending on factors such as location, geology, slope, aspect, native vegetation, climate and land use.

We therefore recommend:

- Increased rates of afforestation and the subsequent management of trees and vegetation should be sought as a low regrets measure for water management in the upper parts of catchments.
- Evidence should be gathered to demonstrate how effectiveness varies according to a wide range of parameters. This evidence and experience should be shared as widely (internationally) as possibly in order to develop the evidence base, which is currently limited, as quickly as possible.
- Evidence should be gathered on the benefits of bringing the governance of water and forest managements into greater harmony to reflect the integration of the ecosystems underpinning a diverse and flourishing environment with water and forests as major elements.
- Evidence should be gathered not just in relation to impacts on flood risk management, but also to factors such as the effect on low flows, soil health and erosion, ecology and biodiversity and soil moisture content.
- Current good practice guidance should be routinely updated and disseminated as additional evidence becomes available.
- Understanding of the value of working with natural processes should be communicated widely so that beneficial activities are not compromised by activities elsewhere e.g. unnecessary channel clearance.

Examples of this approach in practice:

Pontbren, Wales
"Research has demonstrated that small scale strategically planted hedgerows and shelterbelts can significantly reduce runoff and sediment movement, and improve water quality. Tree planting can reduce peak water flows, intercepting rain in the canopy and holding back water in the soil thereby helping to reduce flooding. A number of hydrology gauges and measures are in place across the Pontbren catchment and a report published by the Flood Risk Management Research Consortium has shown that strategically placed tree belts were found to reduce peak water flow by 29%."
http://www.forestry.gov.uk/pdf/CCpack_casestudy_Pontbren.pdf/$FILE/CCpack_casestudy_Pontbren.pdf

Slowing the Flow at Pickering, Yorkshire
"The new approach to flood management relies on making changes to the way the landscape is managed, so that the passage of rainfall to rivers and its movement downstream is reduced and delayed. This involves a range of 'measures', including:

- *Constructing low-level bunds*
- *Planting more trees, especially along streamsides and in the floodplain*
- *Restoring woody debris dams in small streams*
- *Restoring wetlands.*

These will: *"slow down water in the upper catchment, store more in the middle section and improve its conveyance through the town. Success will be gauged by the number of measures that are implemented and by their combined effect on the frequency of future flooding in Pickering."*
http://www.forestry.gov.uk/fr/infd-7zucl6

Notes for Editors:

1. The Society for the Environment would like to thank the following authors for their contribution: Ian Barker (IWater); Alastair Chisholm (CIWEM); and Shireen Chambers (ICF).

2. The Society for the Environment is a leading independent, non-political umbrella organisation for environmental and sustainability professionals. Our purpose is to support and champion the role of environmental professionals everywhere in the pursuit of a sustainable future. The 24 institutions and learned societies that form our membership represent hundreds of thousands of practitioners, working across a broad spectrum of disciplines and sectors.

3. The Chartered Institution of Water and Environmental Management (CIWEM) is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector. The Institution provides independent comment on a wide range of issues related to water and environmental management, environmental resilience and sustainable development.

4. The Institute of Chartered Foresters (ICF) is incorporated by Royal Charter as the only professional body in the UK to award Chartered Forester, Chartered Arboriculturist and Chartered Environmentalist statuses. Full details of how to join the Institute, and routes to professional membership are available on the ICF website: www.charteredforesters.org

5. The Institute of Water (IWater) is the only professional body dedicated solely to supporting the careers of people working in the UK water sector, in all professions and at all levels.