Watercourses damaged by initial drainage works struggle to recover as the dense canopy shades out understorey vegetation.

Seeing the wood for the trees

Clear-felling releases large amounts of fine sediment which can be channeled into watercourses via drains and roadways.

Vaughan Lewis

Recent visits by WTT advisors to some of the wilder corners of Britain and Ireland have highlighted a range of issues connected with forestry that are having significant and damaging impacts on many upland rivers. Our Upland Rivers Habitat Manual (see www.wildtrout.org for details) examines some of the problems associated with extensive conifer plantations. But let's take a closer look at the history of the practice and how we got to this situation…

Coniferous plantations have been a feature of British and Irish landscapes since the end of the 18th century but the majority owe their origins to successive government initiatives in the 20th century. The first big push came at the end of the First World War and continued through a series of policies until the Budget of 1988 ended the tax regime in Britain which had encouraged large scale private sector planting.

The impact of these plantings on upland fisheries has been thoroughly researched and there is a wealth of literature available which describes the interaction of air, soil and water in these forests. The unavoidable conclusion has been that large scale planting has had a significant impact on water quality and hydrology and this has often been to the detriment of fisheries.

But why should this be, when the trees we grow come from the Pacific coast of the United States and Canada, where the forests sustain some of the finest fisheries in the world? The answer, I believe, lies in the way the plantations were originally established and in the way they are now managed. Many, particularly those planted after 1960, were planted on waterlogged peatlands, which were first deep-ploughed and drained to ensure a good start for the young seedlings. Because Sitka spruce is the only conifer which thrives on the most challenging sites, it was often the only species planted. In its native range it is a long-lived forest tree, but grown in monoculture on exposed upland sites this shallow rooted species is prone to windthrow. This has led to the practice of short rotation cropping, usually at around 40 years.

When forests were planted, the initial ploughing, draining and road building disrupted the hydrology of many catchments, inducing flashiness and causing erosion of soil and stream banks. As the crop matures, the dense canopy suppresses all other vegetation which might otherwise heal the scars. When the crop is clear-felled there is inevitable mechanical disturbance from the felling and restocking operations, often releasing large volumes of fine sediments to the detriment of trout and salmon spawning habitat. Another significant process occurs in the soil where the tree roots break down rapidly, releasing a sudden pulse of nitrates which reduce water quality through over-enrichment. This can last until the site is colonised by pioneer species like birch, willow herb and sallow whose wind-blown seeds germinate readily on the exposed peat.

So trees which sustain fisheries when grown in mature, mixed forests in their homeland, actually damage fisheries when grown in short-rotation monoculture here. Understanding how this happens should enable us to do better. The priority is to diversify the forest - and not just along the stream margins but right back into the body of the forest. Deep and shallow-rooted species can then grow side by side, helping with tree stability, nutrient cycling and being able to respond when harvesting of mature trees releases nutrients into the soil.

On some sites, plantations are being cleared and returned to heathland and moorland, often at great expense. However, for the majority of sites this is not practical or desirable. The alternative, converting the monoculture to a mixed forest, can be achieved very simply by retaining a proportion of birch and other deep-rooted deciduous species and by changing the pattern of harvesting to reduce the area of clear-felling, and increasing the frequency of thinning. The aim should be a continuously productive, mixed forest where seedlings of conifers and native species replace their parents as they are harvested. With skill, this equilibrium can be sustained indefinitely.

These changes in practice would soon begin to influence the way water moves through the forest. In time, this buffering effect would reduce the magnitude of high flows and sustain better flows in dry weather; in turn this will reduce erosion, improve water quality and greatly benefit trout habitat. Over decades, on upland sites where soils have often degraded through centuries of agriculture, forest soils will begin to rebuild. This has to be good; good for the fishery, good for the water cycle and especially good for future timber production.

Growing the first generation of spruce in 'raised beds' was always seen as just the first step to re-establishing forests in the uplands, so why do we continue to pursue this unsustainable practice? Given that large tracts of forestry continue to be state run in Britain and Ireland, it is not unreasonable to ask why public money continues to be spent on enterprises that so damage our river systems. Surely it's time for a fundamental re-think of policy and practice?

A valley recently clear-felled in north-west Ireland. Pulses of nitrates are released from decaying tree roots on sites like this, impacting adversely on water quality.