

# Heathland futures – a role for wood-fuel lots?

*Management of heathlands has been problematic for some decades and the situation is now acute.<sup>1</sup> These areas have mostly lost the economic drivers that once sustained them. Now, with eutrophication, successional change, and difficulties in getting reliable conservation grazing, many sites are under threat. This article suggests that the approach applied to North American and continental European wood-fuel lots could offer a local economic function for heathlands.*

**IAN D ROTHERHAM & PAUL TITTERTON**

## **A cultural landscape under change**

The decline of British lowland heath occurred dramatically during the eighteenth and nineteenth centuries facilitated by parliamentary enclosure.<sup>1,2,3</sup> From 1919 to the 1980s, heathland decline was compounded by Forestry Commission policy of planting large areas with trees and the abandonment of traditional land management practices. Once a cornerstone of local subsistence, heathland sites are now mostly in decline.<sup>4,5</sup> Some steps have been taken to graze areas with rare breeds of traditional cattle, and even to strip turf to reduce eutrophication. The problem is the abandonment of long-term community use of natural resources, which over centuries created the landscape and its ecology that we now seek to conserve. A challenge for conservation in the twenty-first century is to re-connect communities, economies and nature at the local level.

## **Cultural severance**

We define 'cultural severance' as the breakdown of the fundamental relations between human communities and their local environment as manifested in the landscape and its ecology as an eco-cultural resource.<sup>6,7</sup> There are consequences of the cessation of traditional land management. For individual sites, this can result in the following kinds of effects:

- Eutrophication due to non-removal of biomass (for fuel, animal bedding, fodder);
- Lack of micro-disturbance from grazing or other working animals, and from subsistence activities, including transhumance use, and the like;
- Lack of propagule dispersal, particularly seeds through grazing stock moving from site to site;
- Successional change due to abandonment (the rate varying with the landscape and its location, so upland zones in the UK for example are more resilient than lowland ones);



Birch scrub on former heathy common land.

Photo: Ian Rotherham

- Decreased value for local people and abandonment or replacement by other uses, including building development ;
- Fragmentation and isolation;
- Displacement of native species by exotics.

One consequence of severance is changed land management, such as woodland or heath having lost their social and economic function, being converted to farmland. Alternatively, the traditional management may cease or change radically, but the site remains physically intact.<sup>6,7</sup> A heath, once central to the local economy, if its function and value to local people is lost, is often grubbed up, 'improved' and so destroyed. Sometimes it might remain physically intact but abandoned to trigger a successional change to birch wood and a gradual loss of open heathland species, or planted with exotic conifers. On the other hand, heath or similar common land may be maintained as open grazing but without its traditional management such as harvesting gorse, bracken, ling and small wood for fuel, cutting wood for construction, bracken for bedding, or turf for fuel or roofing, holly, bramble, and gorse as fodder, and grass meadows cut for hay. The ecology is changed and a major successional shift occurs with the site nutrient enriched and low, open vegetation

replaced by taller more rank species. Rich ecological mosaics are converted to a few distinct landscape areas with limited diversity and stress tolerant species are generally lost.

### Moors, heaths and commons – the end of tradition

Britain's medieval woods, heaths, commons, and bogs supplied most people with fuel, food, and building materials.<sup>8</sup> A major problem for what are generally plagioclimax communities is the abandonment of the drivers that led to their formation and their maintenance.

Until around 1700 through until the late 1800s, moors, heaths, bogs, fens, and commons were the distinctive open landscapes of all parts of England. Many sites probably included extensive, managed, wooded commons. At the end of the Parliamentary enclosures, they were reduced in area dramatically to a few lowland groupings of intractable heathland such as the Lizard in Cornwall or the New Forest and Dorset heaths. Extensive upland moors proved resilient to improvement except drainage and some liming, but were now separated spatially and economically from the remaining lowland heaths. However, even in the uplands, traditional functions were abandoned for sheep grazing and intensive grouse rearing.

Woodland encroachment has a great effect on declining heaths, with up to a 60% increase in tree cover recorded across a single site in the late 1900s. Trees shade out the heather and reduce other light demanding species so grasses increase (up to 80% cover under birch woodlands). Overall species diversity decreases rapidly. Birch causes significant encroachment on heathlands due to its high seed production, the light seed allowing wide dispersal on to heathlands by wind.<sup>9,10</sup>

In the Sheffield area between 1850 and 1890, there was an estimated loss of around 20 km<sup>2</sup> of lower-lying heath, largely through enclosure and conversion. This was from a study area of about 385 km<sup>2</sup>. Parry noted a significant reversion between 1900 and 1935, but found 6,050 ha of Peak District heathland lost between 1870 and 1977.<sup>11</sup>

Heathland loss or abandonment led to dramatic declines in many typical wildlife species of these habitats. The examples below illustrate the point.

### Species declines

**Heathland and grassland birds:** Skylark (*Alauda arvensis*), Woodlark (*Lullula arborea*), Nightjar (*Caprimulgus europaeus*), Cuckoo (*Cuculus canorus*), Red-backed Shrike (*Lanius collurio*), Black Grouse (*Tetrao tetrix*), Stone-curlew (*Burhinus oedicephalus*), and Great Bustard (*Otis tarda*).

**Heathland and grassland invertebrates:** losses of many species such as Dark Green Fritillary (*Argynnis aglaja*), High Brown Fritillary (*Argynnis adippe*), Large Blue (*Maculinea arion*), Adonis Blue (*Lysandra bellargus*), Chalkhill Blue (*Lysandra coridon*), Glow-worm (*Lampyrus noctiluca*), Orb-web spider (*Araneus quadratus*), and Silver-spotted Skipper (*Hesperia comma*), through direct habitat loss and also through successional change following abandonment.

**Heathland and grassland flora:** specific losses such as Pasque Flower (*Pulsatilla vulgaris*) and Dodder (*Cuscuta epithymum*) but removal of entire flora from most of the lowland landscape and desiccation and degradation of upland areas too.

Heathland and grassland herptiles: Adder (*Viper aberus*), Smooth Snake (*Coronella austriaca*), Common Lizard (*Lacerta vivipera*), Sand Lizard (*Lacerta agilis*); massive declines of amphibians too.

At the same time as species losses, on abandoned heaths, in the absence of traditional management and in the face of increasing biomass and nutrient levels, other species spread aggressively.

### Species increases

**Bracken (*Pteridium aquilinum*):** across moors, heaths and grasslands as a cultural artefact of changes in management.

**Birch (*Betula pendula* & *B. pubescens*):** massive spread over heaths and moorland fringe as a result of abandonment of traditional management.

Encroachment by exotic pines is increasingly problematic but is less so than birch. Some conservation organisations report being pressured to accept grant-aided tree planting on some sites, which increases the problem. Site nutrient levels, biomass and pH all increase and conservation target species and typical heathland biodiversity decline.

### Reconnecting people and their heaths

The UK BAP identifies the need to restore 58,000 ha of heathland, but the delivery of this outside a few key lowland areas remains elusive. A long-term study of the South Pennines, Peak District and Sheffield area, suggests that the problems of severance are leading to major, long-term declines.<sup>5,7,12</sup> Furthermore, the short-term and generally modest interventions of grant-aided conservation projects are inadequate to halt the losses. In some southern lowland heaths, the conservation stripping of turf is used to remove biomass and to end successional decline. Whilst this can be effective for ecology, it relies on the site being free of larger stones or boulders, and the operations may seriously damage archaeological features. However, whilst biofuel extraction can be immensely damaging to ancient woods, for re-grown birch infestation of a heath, there is great potential for fuelwood extraction. Remarkably, this source of possible biofuel is overlooked in regional energy strategies. Clearly, the use of heavy plant and big machines for commercial extraction would be inappropriate. However, we suggest that small-scale, community-based or Third Sector enterprises could provide a novel solution. Indeed, discussions with forestry professionals indicate that this might be an attractive proposition. From a conservation perspective, the approach could provide an economically viable way to address otherwise intractable heathland decline. The birch could be managed on a cycle of re-growth and coppice to produce firewood for local consumption. This was first suggested back in the 1980s for the heaths around the South Pennine and Peak District fringes. However, bureaucracy prevailed and no action was taken.

Small areas have been cleared of encroaching birch by conservation volunteers and countryside management staff supported by grant aid, but this is not enough and it is not sustainable.

Clearly, if tree felling and coppicing work is to be undertaken, there might be issues of health and safety and of appropriate skills and training if the lead is community-based.<sup>13</sup> However, these same issues have been addressed and overcome for community woodlands, and the necessary expertise and training are available.<sup>14</sup> Furthermore, a conservation business or a Third Sector enterprise could provide skills, training, insurance and a business plan. With harvested wood marketed for fuelwood, as either wood pellets for biofuel boilers, or firewood for domestic burners, there is a substantial demand for the product. Produced and sold locally this could deliver sustainable heathland landscapes, and environmentally friendly local energy. Fuelwood pellets could be used for heating schools and other community buildings. Furthermore, a summertime market for locally produced charcoal would give a year-round income-stream.

Models exist for woodland fuel-lots in both continental Europe and in the United States of America, and the same approach could be taken in England for heathland birchwoods. Community woodland projects easily make £1,000 to £5,000 per annum (according to work by the Community Woodland Association in 2012) from a woodland fuel project on a small site. With fuelwood process rising quickly as electricity and gas become more expensive, financial savings on fuel bills offset the modest profits for participants.

Marketing of the process and the product of these community woodland heaths, would stress the conservation and community friendly nature of the product. Sites in management would not be cleared of trees but managed as a sustainable cyclical system as heaths have been managed for centuries. A variety of silvicultural regimes might be applied:

- Clear cut system
- Shelterwood system
- Continuous cover forestry system
- Coppice system
- Patch cut system
- Seed tree cut system

A preliminary, regional case study was undertaken around the Sheffield Peak District, the South Pennine and Peak District fringe.<sup>14</sup> This study region has been subject to on-going research for nearly thirty years. A number of low-lying heathland sites suffering birch encroachment were identified. From these sites, five were selected

for intensive study. The idea was that by applying community woodland principles, invasive birch woodlands on heathlands could provide substantial wood harvest from individual sites. Two study locations, Owl Bar and Fox Hagg at Lodge Moor in the Peak District for example, could sustainably produce 367 and 262 cubic metres respectively of wood per year.

### Ideas into practice – the South Pennine and Peak District fringes

The authors have investigated five local sites in detail.

- Fox House 19.9 hectares
- Holbrook Heath 11.2 hectares
- Fox Hagg, Lodge Moor 20.2 hectares
- Loxley and Wadsley Common 49.8 hectares
- Owl Bar 17.6 hectares

Four of these are upland moorland fringe and the other is a lowland post-industrial heath for contrast. The field and archival research undertaken in 2012 sought to establish the scale of birch invasion and the transformation of the heaths. Furthermore, the fieldwork provided an evidence base for the effects of birch invasion on the heathland flora and hence the fauna. Additionally, the studies assessed the amount of standing ‘timber’ available from selected sub-sites and the amount which could be harvested as ‘wood’ on a sustainable annual basis.

In addition, all the sub-sites have suffered major birch incursion and heath decline over the past 50 years. The biggest site-specific decline occurred between the 1980s and 1990s, two out of four sites experienced dramatic loss of heathland nature (Owl Bar 19.3% reduction and Fox House 29.1% reduction). Furthermore, the time-sliced landscape surveys indicated a rapidly increasing rate of decline with the most severe losses between 1980 and 2012. Over the study period, the sub-sites all exhibited major transformation of heath to secondary birch wood. The lowland site at Holbrook Heath Nature Reserve had almost 100% loss in the sub-site that was surveyed. The upland fringe area at Owl Bar in the Peak District was the least affected with a heathland decline of 44%, and overall the upland fringe sample sites had declines of around 40% to 90%. The ecological consequences of these successional changes are immediately shading, eutrophication and increased biomass. Wildlife value plummets and typical or characteristic species of heathland environments are lost. Suffering cultural severance and biomass increase, the flammability of sites increases and on dry sites and in dry summers, many succumb to devastating wildfires. With increased biomass, the burn temperatures are high and massive damage to the ecosystem results. A potential solution needs to address all of these issues. It is important to re-connect people to their common land heaths, to reduce biomass and nutrient levels, to open up habitats to sunlight, and to limit fire risk.

In order to consider the financial viability of a fuelwood enterprise we calculated the standing crop of timber (wood) within the case study sub-sites. The sample sub-sites ranged from 500 x 500 m for Owler Bar to 200 x 300 m for Holbrook. However, these are parts of much larger complexes with, in some cases, several times the harvestable area nearby.

- **Owler Bar:** standing crop 15,042 cubic metres, 367 cubic metres per year
- **Loxley & Wadsley Common:** standing crop 7,737 cubic metres, 63 cubic metres per year
- **Fox House:** standing crop 1,494 cubic metres, 65 cubic metres per year
- **Fox Hagg, Lodge Moor:** standing crop 10,986 cubic metres, 262 cubic metres per year
- **Holbrook Heath:** standing crop 185 cubic metres, 5 cubic metres per year

If we assume a price of between £30 and £50 per cubic metre for firewood<sup>15</sup>, then some quick calculations suggest that the Owler Bar sample site, for example, might generate a sustainable harvest worth £14,680 per year from 17.8 hectares of birch wood and Fox Hagg, £10,480 from 20.2 hectares. These figures are tentative and there would be costs in extraction and processing. Birch wood is not a premium product and its value may be lower. However, if we add the potential of harvesting wood to make charcoal as an added value product too, then the possibility of a number of heathland sub-sites being managed as a rotational crop suddenly seems a reality. Cutting and processing by hand with chains and extraction with low impact vehicles would allow an economically driven nature conservation output.

For the case study region and sites, these issues have been recognised for a considerable time<sup>16</sup>, and despite some modest successes on isolated, individual sites, there is presently no sign of any joined-up, long-term, economically viable approach to resolving the problems. Indeed, by comparison with wider issues of moorland management, or peat bog restoration, these lowland heath sites are conservation Cinderellas. In the face of current austerity measures, approaches such as this might provide a mechanism for effective conservation management to move forward. Grant aid would be a bonus and through associated education projects, we could sell both the product and the process. Importantly, and differing from many industrial biomass projects, this approach could begin to re-connect people to nature as a resource. If left to decline through severance and ecological successions, the future for many of these sites remains bleak.

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**Ian Rotherham** is Professor of Environmental Geography and Reader in Tourism & Environmental Change at Sheffield Hallam University. [i.d.rotherham@shu.ac.uk](mailto:i.d.rotherham@shu.ac.uk)

**Paul Titterton** was a postgraduate student at Sheffield Hallam University



'Cut your own for Christmas'... Christchurch Borough Council offers people a chance to select their own Christmas tree from the pine and spruce removed from heathland each winter.

Photo: Robin Harley