**Fire Interdisciplinary Research on Ecosystem Services: Fire and Climate Change in UK Moorlands and Heaths**

***SEMINAR 4***

***Economic impacts of wildfires and adaptive land management to reduce wildfire risk and impact***

Losehill Hall, Peak District National Park, 13th May – 14th May 2009

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# Day 1, Session 2: Economic Impact of Wildfires

**Rapporteur: Anita Karunasaagarar (University of Manchester)**

***Chair:*** Sean Prendergast (Peak District National Park Authority)
***Speakers:*** Jonathan Aylen (University of Manchester)
Claire Quinn (University of Leeds)
Jonathan Walker (Moors for the Future Partnership)

***Sean Prendergast*** introduced the session, highlighting some of the issues that affect the Peak District National Park in terms of wildfires. More than one fire will often occur at the same time. An example of this was 18th April 2003 which included fires at Kinder and Bleaklow and six others over a period of three days. This weighed heavily on the resources of the Fire and Rescue Services (FRS), stretching their resilience to deal with other incidents.

Six different fire authorities operate in the area and not all were equally experienced in tackling moorland fires. Resources were already being used for the other major fire at Kinder, so FRS with little or no moorland experience were sent to tackle the Bleaklow fire. The only water supply at Bleaklow was the fire pond at Snake Summit. A helicopter was available via the National Trust, whose High Peak Estate was affected. It was a national emergency so RAF helicopters were used to air lift people and equipment to the fire ground (they were not allowed to carry water), and bring in extra hose pipe from Derby.

The fire swept across the Bleaklow plateau, driven by strong easterly winds, carbonising the surface peat and, in places, back burning into the peat itself. It was the first time GPS was used to record the fire scar, this one being 7.4 $km^2$. Major restoration work was required and Bleaklow became the focus of the lottery funded project run by Moors for the Future (MFF). Already some of the economic impacts of wildfire were apparent from this example. The Bleaklow event has become iconic in shaping 'post-Bleaklow' wildfire management practices in the Peak District.

***Jonathan Aylen*** continued the session with a talk on the cost of suppressing wildfires and the importance of putting out a fire in its early stages. Wildfire suppression

requires different methods to structural (compartment) fires, for which FRS officers are primarily trained. Helicopters are used to bring in and drop water much sooner, to transport equipment and personnel, or as a fire watch network. The initial monetary costs of setting up and using this and other alternative strategies will inevitably outweigh present ones. However, early intervention is ultimately cost effective as it stops small fires setting in to become '3-day fires' and causing significant environmental damage.

There are two distinct size-duration categories of fire; small '4-hour' fires of typically less than 15 ha, and large' 3-day' fires of over 350 ha. From a preliminary study of fourteen fires, the former cost FRS around £15,000, and the latter £210,000. Such figures exclude helicopter costs, damage to property, livelihoods and other ecosystem services, or injuries to FRS officers. Most fires are reported in the late afternoon, so ideally the fire should be tackled hard and quickly before FRS officers are stood down overnight to avoid the fire developing overnight into a much more costly 3 day fire.

An FRS 'appliance hour' must include components such as fuel, crew and retrieving and servicing equipment on return. Suppression costs for the Bleaklow April 2003 fire were estimated at approximately half a million pounds. Costs vary with appliances and different appliances are required for different types of fire, which itself depends on fire behaviour. Therefore, in order to investigate the cost effectiveness of alternative strategies, more needs to be known about the character, severity, location and frequency of wildfire. More case studies of actual fires are needed, and more knowledge of fire behaviour in UK environments.

The lively discussion covered a variety of local alternative strategies. In response to a question about FRS policy of not normally fighting moorland fires overnight, John Dold pointed out that fires spread more slowly at night as the vegetation absorbs water, but that even though this would be the most effective time to fight the fire, there was a conflict with risk to firefighters' safety.

Geoff Eyre, a manager of 7000 acres of grouse moor with 45 years experience, warned about an observed build up of fuel over the last three years in the Peak District. This was due to a combination of Natural England restrictions on prescribed burning, reduced grazing and mild wet conditions. This was seriously increasing wildfire risk.

Steve Gibson felt that costs could be reduced by indirect attack of the fire, as is done in Catalonia. Instead of directly attacking the fire front (colloquially known as 'chasing the flames'), fire can be used as a suppression tool to create a fire defensible line (fire break). Gullies can also be used as natural fire breaks. Northumberland FRS had successfully used these techniques at the 10km$^2$ Harbottle fire in April 2007.

Mark Jones raised the issue of who should bear the costs of wildfire. FRS currently bear suppression costs and landowners bear losses to property and livelihood. Climate change was likely to increase the need for specialist FRS vehicles, but would such additional resources be forthcoming? It was suggested that strategies employed by other countries with higher fire risk should be studied. Northumberland FRS had already learnt from Catalonia. However, Albert Simeoni from Corsica pointed out that in countries with high fire risk, there is also an increased risk to life, so more money is invested in wildfire. There was also the question of what is socially

acceptable and relevant to the ecosystem in question. Fire is a much more politically sensitive tool than water, especially where wildfire is not yet recognised as a major hazard.

***Claire Quinn*** outlined the impacts of the April 2003 Bleaklow fire on the local economy. The UK does not cost the local economic impacts of wildfire, unlike countries such as Australia and the USA. Therefore two issues were brought to light: first, the question of what needs to be involved in costing; and second the lack of data do this. A plea was made to participants for primary data, since secondary data are so lacking.

Much work had been done on economic loss assessment for flooding but very little for wildfire. Three categories are used for flooding: direct damage, e.g. buildings; indirect damage, e.g. transport closures; and intangibles, e.g. health. Fire statistics reports compiled by the Department for Communities and Local Government estimate 'costs as a consequence' of fires. Average outdoor fire consequential costs are given as at £880 per fire, but this is only about half the total cost, as many cost headings are omitted.

Tentative estimates for the Bleaklow fire were presented. The assumptions were stated in each case. For instance, costs for sheep farming over ten years can be estimated at £35,000, assuming store lambs at £35 head for 10 years. For grouse shooting, the figure is £350,000 over five years, assuming average grouse moor income in good year. For tourism, it could be £850,000 over 5 days, assuming an average spend of £5.60 per person per day, or 25,500 as a proportion of area if all 30,000 visitors were deterred. What could not be costed was equally interesting. This included water treatment costs and disruptions to the wider economy from road and airport closures. Even the threat of closure creates opportunity costs when emergency crews are put on standby and business travellers are deterred.

Properly determining the economic impact of wildfire faces temporal, spatial and sectoral scale issues: how far beyond the fire ground does one try to measure impacts; how far into the future; and across how many sectors? It also omits the benefits that wildfire might have on the local economy. The main questions raised were how do we compile the right information, and is there a better way of factoring in the costs of wildfire on the local economy?

The discussion reinforced how much data was actually missing in current costing strategies. For instance, we are unaware how many people use or travel through the UK's national parks each day because they do not have set gateways as is the case in USA national parks. Andy Elliott pointed out that wildfires had threatened high voltage power lines in Dorset with the potential to cause widespread disruption. There was a slight economic gain from 'disaster tourism' with people coming to watch the FRS in action. Cath Reynolds said that insurers are reluctant to give CLG commercially sensitive data on property losses. Categories of CLG reporting tend to make it difficult to ascertain the real costs; 'outdoor fire' includes many types of fire which are not vegetation fires, and the type of vegetation fire is not adequately recorded. Trevor Johnson pointed out that it is important not overcomplicate the issue, and that even approximate figures at this stage can be useful. Mark Jones made

the point that we cost damage incurred by a fire but we should also calculate costs *not* incurred because of FRS intervention, i.e. avoided costs.

***Jonathan Walker*** concluded the session with the costs of restoring wildfire sites. Restoration needs to be site, incident and priority-specific. The environmental resilience of each site should be taken into account. Targets for the restoration should be set. They can range from stabilising eroding soils, or restoring biodiversity to a previous agreed historic state, to restoring ecosystem function. Should restoration be immediately undertaken or should monitoring occur first? A number of different techniques can be employed but will be site-specific and this will affect the cost of restoration.

Moors for the Future (MFF) have so far restored 4.3 $km^2$ of peatland at Bleaklow at a total cost of approximately £1,235,000. Approximately another 3 $km^2$ of the area burned in the April 2003 fire remains to be restored. Cost per hectare has been £2,900. This excludes setting up MFF, office and GIS costs. It should be noted that about half the area restored was not damaged by the April 2003 Bleaklow fire, but by older fires and other factors. Not just immediate wildfire damage but historical damage must also taken into account with restoration projects. Figures were also presented for restoration at Fylingdales after the September 2003 fire, where the main driver for restoration was English Heritage's desire to protect archaeology exposed by the fire.

Avoided costs of damage to ecosystem services need to be costed against costs of restoration. They include dredging of peat from reservoirs, treatment of discoloured drinking water. Restoration costs are also offset by the potential enhancement to ecosystem services such as carbon sequestration.

Richard May began the discussion asking how much can actually be restored and whether the project should be referred to as a stabilisation project, since restoration implies full agreement about the target vegetation. Much of the remaining unrestored 3$km^2$ of the fire scar had regenerated to heather which has value for grouse. Jon Stewart pointed out that if Bleaklow were to have another fire, the costs would include the restoration costs, plus those from the new fire. Costs would be huge, especially if restoration had to be undertaken on the same site for a second time.

The key issue brought up by all three speakers was the lack of data. More research needs to be done not only to prevent and mitigate wildfire, but also to calculate the true economic impacts of wildfire in the UK, both direct and indirect impacts, and all categories of costs from prevention and suppression through to restoration.