



FIRES

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-14th May 2009**

Programme and Abstracts

Sponsored by:



FIRES

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

FIRES is a series of four seminars and workshops on the effects of moorland and heathland wildfires and managed fires on ecosystem services that will be held during 2008-2009. The series is funded by the ERSC/NERC Transdisciplinary Seminar Series on Ecosystem Services. The objective of this scheme is to support the development of trans-disciplinary research across social and natural sciences under the theme of sustaining future ecosystem services. It will bring together economists, social and environmental scientists, other experts and stakeholders to explore and develop ecosystems services approaches and help to build research capacity for future interdisciplinary research in this field. The particular focus from ESRC/NERC is in advancing research and enhancing knowledge transfer with non academic users and/or the inclusion of international academics at events.

Context

Moorland and heathland ecosystems in the UK both sustain human use and are sustained by it. Fire plays a key but equivocal role, raising many controversies for management and policy making, especially under the anticipated threat of climate change.

The diverse environmental, social and cultural ecosystem services provided by moorlands and heathlands include carbon storage, biodiversity, water provision, flood protection, aesthetic/recreational value, and economic value from tourism, sporting enterprises and grazing.

Managed fire has traditionally played an important role in maintaining the landscape and biodiversity. For instance, rotational burning is used to maintain heather moors for grouse and grazing animals and contributes to floristic diversity.

In contrast, accidental or malicious wildfires increasingly threaten moorland and heathland ecosystem services and are likely to become more frequent and severe with climate change.

Managed fires and wildfires are linked. Managed fires can reduce wildfire risk by reducing fuel load and creating firebreaks, but, if poorly controlled, can result in wildfires themselves. Research on wildfires in UK moorlands and heathlands is in its infancy and lacks co-ordination. This seminar series seeks to contribute to effective management of wildfire risk by identifying policy implications and developing a joined-up research agenda for the UK.

Aims

The aims of the four workshops in the seminar series are:

1. to build capacity for inter-disciplinary research on fire and its impacts on ecosystem services of UK heaths and moorlands;
2. to establish a cross-cutting interdisciplinary research agenda on the relationships between ecosystem services, managed fire and wildfire in UK heaths and moorlands, especially implications of increased wildfire risk under climate change scenarios;
3. to incorporate the needs of policy makers, moorland managers and other stakeholders, facilitate knowledge transfer to policy makers and contribute to adaptive management response.

Specific Objectives

The objectives of the seminar series are:

- to facilitate dialogue between participants on three levels: socio-economic, environmental and physical scientists; researchers, international and UK academics and postgraduate students; and, especially, researchers, stakeholders and policy-makers;
- to identify the ecosystem services of UK heaths and moorlands, assess the role of managed fire in maintaining them and the costs and benefits of reductions in prescribed burning;
- to assess the threats to these ecosystem services posed by wildfire, including an anticipated increased threat from climate change;
- to evaluate the suitability for the UK of three broad categories of modelling tools designed to minimise damage to people and the ecosystem: forecasting the timing and severity of wildfire risk; modelling the behaviour of active fires; and spatially modelling their cause and distribution (including evaluating alternative conceptual and methodological approaches, identifying data needs and implications for policy);
- to identify alternative strategies for managing wildfire risk (now and in the future from climate change), discuss their relative costs and benefits for ecosystem services, and identify the political and institutional policy drivers;
- to disseminate findings and define an agenda for further cross-disciplinary research.

Funding

In addition to the core funding from the ERSC/NERC Transdisciplinary Seminar Series on Ecosystem Services, the FIRES Seminars are sponsored by Scottish Natural Heritage, the Game and Wildlife Conservation Trust, Manchester Institute for Mathematical Sciences (MIMS), and Peak District National Park Authority. Support in-kind is provided by the grant-holders' and steering group's institutions; the University of Manchester, University of Edinburgh, Moors for the Future Partnership, University of Leeds, Chief Fire Officers' Association, and the Heather Trust.

FIRES Steering Group

Julia McMorrow (coordinator)	University of Manchester
Colin Legg	University of Edinburgh
Jonathan Ayles	University of Manchester
Jon Walker	Moors for the Future partnership
Klaus Hubacek	University of Leeds
Claire Quinn	University of Leeds
Simon Thorp	Heather Trust
Mark Jones	Chief Fire Officers' Association
Gina Cavan	University of Manchester

Coordinated by: University of Manchester

FIRES Series Programme

Seminar One

The role of managed fire in ecosystem services of UK moorlands and heathlands. Edinburgh, 31 March – 1 April 2008

Over 60 delegates attended the first meeting of the FIRES series on 31 March in the magnificent surroundings of Playfair Library, Old College, University of Edinburgh. This was followed by a dinner and workshop in the Raeburn room for 35 invited participants, and a discussion seminar the next day in the Crewe Building.

The seminar reviewed how fire has been used historically, and the role of managed burning today. The ecosystem services provided by UK moorlands and heathlands were identified, including: biodiversity; carbon budget; water provision; rural livelihoods; landscape quality and recreational use. The focus for debate was the extent to which managed fires contribute to the maintenance of these ecosystem services or pose threats to them, especially with changes in climate.

Seminar Two

The impact of wildfire on ecosystem services: relationships between wildfire, climate change and people. Manchester, 24 June 2008

An invited audience of 38 attended the one-day FIRES2 seminar in Manchester. Over half of the attendees were practitioners. Five participants were supported under the series' early career scheme, acting as session rapporteurs and presenting posters.

Mark Jones, the Chief Fire Officer Association's spokesperson on wildfire, gave the first keynote on the frequency, timing and distribution of wildfires in the UK. A lively discussion followed, assisted by contrasting views from respondents. In session two, Mark Gallani of the Met Office, outlined UKCIP climate change scenarios for uplands. The discussion focused on two related implications – fire risk and hazard. Breakout groups discussed the impact of these hypothesised changes in fire regime on ecosystem services of moorlands and heathlands, and the research needs arising from this.

The day closed with a reception and an excellent public lecture from Jim Smalley of the Wildland Fire Protection section of the National Fire Protection Association (NFPA),

which set the day's discussions in context by providing a North American perspective on climate change, wildfire and the implications for management.

Seminar Three

Forecasting and modelling wildfire risk for UK moorlands and heaths. Manchester, 31 March – 1 April 2009

FIRES3 focussed on 'where, when and how' of wildfires: Where do they occur? When do they break out? How do they behave once ignited? The official theme was 'Forecasting and Modelling Wildfire Risk for UK Moorlands and Heaths', but in practice the seminar ranged widely across Europe and California. There were no geographical boundaries to the discussion, either in the formal sessions or the lively coffee and meal breaks.

Our NERC and ESRC sponsors are keen to encourage transdisciplinary and international exchange; the seminar succeeded spectacularly well in this respect. We were fortunate to have speakers from California, Portugal, Spain, Corsica and Italy, as well as contributors from the Fire and Rescue Services, Met Office, academic and many other sectors. The result was truly excellent debate. It brought home the mutual benefits of cross-disciplinary working and of how much academics and fire-fighters can learn from each other.

Many important lessons emerged which will help to move knowledge and management of UK wildfires forward. These ranged from the importance of socio-economic drivers such as land abandonment via its impact on fuel management, to the need for better wildfire reporting and fire-fighter training.

Much good work goes on regionally but the UK needs a national policy on wildfire. The cross-sectoral impact of wildfire requires joined-up thinking by policy-makers – a topic which will be taken up in FIRES4.

Seminar Four

Economic impacts of wildfires and adaptive land management to reduce wildfire risk and impact. Peak District National Park, 13 - 14 May 2009

Further details of the Seminar Series are available from:

<http://www.fires-seminars.org.uk>

Seminar 4

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

Peak District National Park, 13-14 May 2009

In this final seminar in the FIRES series we will look at the economic impacts of wildfire, wildfire policy and adaptive land management to mitigate wildfire risk / impact. On day one there will be a series of talks that provide an overview of the costs of UK wildfires on ecological services, local economies plus the costs to suppress wildfires and restore wildfire sites. These presentations will be followed by discussion and questions to a distinguished policy panel. The aim of day is to provide comprehensive information of the 'costs' of wildfires to policy makers and hopefully initiate discussion on the importance of wildfires and potential policy reforms that address wildfire risk reduction and fire-fighting policy and resourcing. On day two we will turn our attention to adaptive land management. After an introduction to this management approach we will hold workshops in which we will address carefully selected current and aspirational policy and management scenarios to identify the data needs and changes in policy and working relationships and practices. At the end of day two, in the final plenary session of the seminar series, we will reflect on the seminar series, review what has taken place and discuss future directions for fire and climate change research on UK moorlands and heaths.

Feedback form

We would appreciate your views on the event. Please complete the feedback form in your information pack and hand it into the registration desk before you leave. The responses will help us to write the feedback section of the ERSC/NERC report.

There will be a raffle for completed feedback forms to be drawn after the seminar.

Day 1 Programme – Wednesday 13 May 2009

Economic impacts of wildfires and wildfire policy

Chair: Sean Prendergast, *Peak District National Park Authority*

11:00-11:45 *Registration*

11:45-12:00 **Summary of FIRES seminar series and introduction to seminar 4**
Julia McMorrow, *University of Manchester*

Session 1 **Fighting UK wildfires**

12:00-12:20 **Wildfire risk and data**
Cath Reynolds, *Department for Communities and Local Government*

12:20-12:40 **Fighting UK wildfires**
Andy Elliott, *Dorset County Council*

12:40-13:00 **The role of the helicopter in moorland wildfire fighting**
Chris Ruddy, *Pennine Helicopters*

13:00-14:15 *Lunch and poster session*

Session 2 **Economic impact of wildfires**

14:15-14:30 **Introduction to session and the Bleaklow 2003 fire case study**
Sean Prendergast, *Peak District National Park Authority*

14:30-14:45 **Costs of suppressing wildfires**
Jonathan Ayles, *University of Manchester*

14:45-15:00 **Economic impacts on local economy**
Claire Quinn, *University of Leeds*

15:00-15:15 **Costs of restoring wildfire sites**
Jonathan Walker & Matt Buckler, *Moors for the Future Partnership*

15:15-15:45 **Sum up and discussion of Bleaklow fire costs**

15:45-16:00 **The economic value of Ecosystem Services**
Mette Termansen, *University of Leeds*

16:00-16:30 *Tea, coffee*

Session 3 **Policy Panel and discussion**

16:30-18:00 **Policy panel**
Mark Jones, Chair, *English Wildfire Forum*
Trevor Johnson, Chair, *Scottish Wildfire Forum*
Cath Reynolds, Senior Civil servant, *Department for Communities and Local Government*
Malcolm Hay, Chairman, *The Heather Trust*
Richard Campen, Director of Operations, *Peak District National Park Authority*
Jon Stewart, Team Leader, National Upland SSSI Project, *Natural England*

18:30-19:45 *Dinner*

19:45-20:30 **Informal evening session**

20:30 *Close*

Day 2 Programme – Thursday 14 May 2009

Discussion Seminar - By invitation

Adaptive land management to reduce wildfire risk and impact

09:15-09:30	Introduction to the day
09:30-10:15	Adaptive land management and managing fire risk and impact <i>Alistair Hamilton, Scottish Agricultural College</i>
10:15-11:15	Workshop introduction <i>Aletta Bonn, Moors for the Future Partnership</i>
11:15-11:45	<i>Tea and coffee</i>
11:45-13:00	Workshop sessions
13:00-14:00	<i>Lunch</i>
14:00-15:00	Feedback from workshops and discussion
15:00-15:30	<i>Tea and coffee</i>
15:30-16:30	Plenary session and farewell
16:30	<i>Close</i>
[16:30-17:30	Steering Committee meeting]

List of delegates

NAME	ORGANISATION
Kevin Albertson	Manchester Metropolitan University
Turkia Al-moustafa	University of Salford
Isabel Alonso	Natural England
Penny Anderson	Penny Anderson Associates
Jonathan Aylen	University of Manchester
Aletta Bonn	Moors for the Future
Richard Campen	Peak District National Park
Gina Cavan	University of Manchester
Gareth Clay	Durham University
Gordon Danks	Peak District National Park
Mark Danson	University of Salford
Sharon Davison	Moors for the Future
Chris Dean	Moors for the Future
John Dold	University of Manchester
Andy Elliott	Dorset County Council
Geoff Eyre	Moor Habitat
Rob Gazzard	Forestry Commission
Steve Gibson	Northumberland Fire & Rescue Service
Alistair Hamilton	Scottish Agricultural College
Astrid Hanlon	Yorkshire Wildlife Trust
Neil Hanshaw	Peak District National Park
Mike Harris	University of Liverpool
Malcolm Hay	The Heather Trust
Steve Heath	Greater Manchester Fire & Rescue Service
Will Hewson	Moors for the Future
Kate Hutchinson	Rural Development Initiatives
Danny Jackson	Pennine Prospects
Trevor Johnson	Scottish Wildfire Forum
Mark Jones	English Wildfire Forum
Anita Karunasaagarar	University of Manchester
Colin Legg	University of Edinburgh
Ian Long	Northumberland Fire & Rescue Service
Kath Longden	Penny Anderson Associates
Julia McMorrow	University of Manchester
Richard May	Moorland Association
Adam Perry	University of Manchester
Sean Prendergast	Peak District National Park
Claire Quinn	University of Leeds
Cath Reynolds	Dept Communities and Local Government
Chris Ruddy	Pennine Helicopters
Julia Ruddy	Pennine Helicopters
Albert Simeoni	University of Corsica
Jon Stewart	Natural England
Metta Termansen	University of Leeds
Marion Thomson	Heather Trust
Vasileios Tsitsopoulos	University of Manchester
Andy Valentine	Peak District National Park
Jonathan Walker	Moors for the Future
Simon Wightman	RSPB

Speaker Biographies

Jonathan Ayles is Senior Lecturer, at the Manchester Institute of Innovation Research, University of Manchester. The co-authorship of Gina Cavan and Dr Kevin Albertson and funding from Moors for the Future are warmly acknowledged.

Matt Buckler is the Conservation Works Manager at Moors for the Future and has been responsible for the delivery of MFF's restoration works on Bleaklow and is now leading on all Moors for the Future restoration projects, within and outside the Peak District.

Andy Elliot has an unusual combination of skills related to 'wildfire'. He is currently a Station Commander on the Retained Duty System with Dorset Fire and Rescue Service and has served for over 25 years. In addition he has been employed by Dorset County Council since 1984, initially working as a Countryside Ranger on a variety of sites and habitats including the Dorset Heaths. As a result of the national Foot and Mouth outbreak in 2001 his career took a change in direction as he was seconded into the Geographical Information Team to help manage the crisis. This secondment became a permanent position and his current full time post is 'Senior GIS Developer'.

As a result of this combination of skills he has been working on Heath Fires for Dorset County Council since the late 90's, initially under the guidance of the Heathland Forum and more recently with the EU funded LIFE Heathlands Partnership and currently with the Urban Heaths Partnership. Andy's involvement has included advice and research on firefighting equipment and techniques but more importantly the development of GI based systems to collect and monitor information relating to damaging acts on Dorset Heathland, including fire. These systems have proven to be very popular with Wardens, Police and Fire colleagues and have contributed greatly to Dorset's attempts at reducing unwanted fires on its valued Heathland asset.

Alistair Hamilton has a PhD from University of Edinburgh in management fire ecology and characteristics in north-west Scotland. He held brief post-docs in modelling and management of Scots pine habitats, then lectured in Australia. Alistair returned to the UK to work with Forest Research and Stirling University, and now is Programme Leader at SAC for the Environmental degrees, with interests in applied ecology and in applying interdisciplinary studies to management of upland habitats.

Dr Claire Quinn is an ecological social scientist with over 10 years of experience working on interdisciplinary projects both in the UK and Africa. Her research interests lie in the links between ecological and socio-economic processes in the management and conservation of natural resources. She currently works as a research fellow in the Sustainability Research Institute at the University of Leeds, collaborating with researchers on the RELU funded Sustainable Uplands project and the ESRC funded Centre for Climate Change Economics and Policy.

Cath Reynolds is a Deputy Director in the Fire and Resilience Directorate at the Department of Communities and Local Government, where she heads the Research & Statistics Division. Cath has spent most of her working life in fire research and enjoys the new challenges it brings everyday, the chance to meet lots of interesting people including academics, fire & rescue service staff, people in the fire industry and many others, as well as the opportunity to speak at and be part of events such as this.

Chris Ruddy is Chief Pilot at Pennine Helicopters which was founded in 1991. Pennine Helicopters is one of the only companies in the UK to specialise in moorland wildfire fighting. Chris is very experienced at fighting moorland wildfires and works

closely with the Fire Services and landowners. He is a member of the Fire Operations Group for the PDNP and regularly gives talks and training to the Fire Services, National Parks and organisations such as National Trust. Living within a moorland area personally, this is an issue close to his heart, and Chris appreciates the special qualities of moorlands and the need to protect them.

Mette Termansen is a Senior Lecturer at the Sustainability Research Institute, School of Earth and Environment, University of Leeds. Prior to her appointment Mette was a postdoctoral research fellow at York University. Her general research area is the development and application of modeling approaches to understand linkages between ecological and economic systems. In particular, she has applied these to forest and upland ecosystems in the UK and abroad.

Jonathan Walker is a research manager at Moors for the Future Partnership where he focuses on wildfire research and the monitoring of restoration works.

Poster Abstracts

Damage to the Ecosystem during Peat and Humus Fires

Jose Garcia^{*}, Guillermo Rein^{*}, Albert Simeoni^{**}

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Smouldering fires of organic soils are a flameless form of combustion that propagates slowly through surface and subsurface layers of the forest ground. Large smouldering fires are rare events at the local scale but occur regularly at a global scale. Subsurface wildfires can linger for very long periods of time and represent a large contributor to biomass consumption and carbon emissions to the atmosphere. This poster reports on the recent studies of ignition, mass loss and thermal effects from peat and humus fires using small-scale laboratory experiments. Ignition results show that the critical moisture content for ignition is a sharp transition separating low and large mass losses. The critical value for the fuel moisture content in dry base proved to be equal to 125%, despite the different nature of the fuels. It is proposed that the fire severity on the soil is given by the thermal severity and the mass loss. Results display mass losses up to 90%, resulting in the destruction of the soil layers. The measured thermal severity in terms of temperature threshold vs. residence time show that smouldering leads to soil sterilization.

The Urban Heaths Partnership in Dorset

Andy Elliott

Dorset County Council

A.C.Elliott@dorsetcc.gov.uk

30% of Dorset's heathlands are situated in and around the urban areas of south east Dorset with nearly half a million people living nearby, these heathlands experience urban pressures such as fires, trampling and disturbance as a result of being used for recreation by this substantial human population. In addition Dorset hosts approximately 15 million visitors per annum. However, visitor surveys reveal that very few tourists visit the urban heaths in comparison to local people. The most popular activity being dog walking.

In response to these urban pressures, a local initiative, the Urban Heaths Partnership, made up of 10 partner organisations including the local councils, Dorset Wildlife Trust, the Herpetological Conservation Trust, English Nature, Dorset Police and Dorset Fire and Rescue Service was set up. They successfully applied for £1.2 million funding from the European Union LIFE-Nature fund which was matched by the members of the partnership.

A 4 year project, the Urban Heaths LIFE Project, was then launched in July 2001 to work on 49 separate urban heathland sites in south east Dorset.

The project has been successful in its aims to address urban pressures on the heaths by providing extra wardening, new fire fighting equipment for Dorset Fire and Rescue Service, a Heathland and Wildlife Protection Officer in Dorset Police and delivering an education programme within the local community and its schools.

With the recent end of the original LIFE project in June 2005, it is expected that changed public attitude towards heathlands and an increased awareness and support for the heaths amongst local people, including school children, will have led to a reduction in the levels of each direct threat to the heaths, especially from deliberately set fires. Early signs are encouraging showing a significant drop in the number of unwanted fires when compared with the four years prior to the project.

Since the end of the LIFE Project the Urban Heaths Partnership has continued to do its valuable work on the Dorset heaths. Permanent staff have been employed in key roles such as Partnership Manager, Education Officer, Senior Warden and Area Wardens. In addition, a team of Seasonal Wardens are employed during the peak fire season – March to September – to warden sites and to monitor the effects of damaging acts to these important heathlands.

