Institution: University of Manchester

Unit of Assessment: 19 (Business and Management Studies)

Title of case study: Research impact on UK Wildfire Policy and Practice

1. Summary of the impact

Research at the University of Manchester on the risk and cost of wildfire has altered government policy, changed firefighting practice and help conserve a National Park. Aylen's advice to the Resilience & Emergencies Division of the Department for Communities & Local Government in 2012 ahead of a submission to the Cabinet Office helped build the case for inclusion of wildfire in the Government's National Risk Assessment. His confidential briefings drew extensively on his published research on the novel topic of forecasting and costing wildfire incidents in the UK and his unpublished work on the costs of the Swinley wildfire in 2011.

2. Underpinning research

There was *no* work on forecasting wildfires in the UK until this research was undertaken at the University of Manchester.[1] The UK was not seen as having a wildfire problem as there was no systematic evidence on the issue. Yet considerable Fire Service resources were tied up fighting wildfires which caused widespread disruption in the areas affected. Nor was there any attempt to cost these wildfire incidents, or try to identify more cost effective methods of tackling them.

The complete novelty of Aylen's approach was to collect evidence from an unusual data source - diaries kept by National Park rangers - relate this to weather and recreation variables using advanced time series econometric techniques and show the timing of wildfires in the Peak District was readily 'forecastable'. The research was novel in terms of data used, statistical techniques employed and its application. The results allowed precise predictions about high risk times for wildfire and showed the non-linear influence of temperature and rainfall on fire incidence.

Relevance of the work to the climate change agenda is clear: hotter, drier weather is likely to bring more wildfires in its wake while warmer, wetter winters will encourage vegetation growth to provide extra fuel for these fires. The research [1, 2] showed fire occurrence could be forecast on a daily basis in terms of both the weather and human factors. The research went on to predict the likely effect of climate change upon wildfire incidents up to the year 2100 using simulated weather data, finding the risk of summer fires would rise from 2070. The key findings included:

- An increase in the occurrence of summer wildfires
- The likelihood of spring wildfires is not reduced by wetter winter weather
- Temperature rise has a non-linear impact on wildfire risk
- Risk management will be necessary in the future as the risk increases

The research began in 2004 as part of a project on the impact of climate change on tourism in the North-West of England led by Professor John Handley at the Centre for Urban and Regional Ecology at the University of Manchester. The Peak District National Park is a key tourist attraction in the region and has been severely damaged by past wildfires.

The research was undertaken by an interdisciplinary team of an economist (Jonathan Aylen, Senior Lecturer, 2001-date), a GIS specialist (Julia McMorrow, Lecturer/Senior Lecturer, 1991-date) and a meteorologist (Gina Cavan, Research Associate, 2009-2012) at the University of Manchester. They called upon an econometrician from Manchester Metropolitan University (MMU), Kevin Albertson, who had worked extensively with Jonathan Aylen in the past.

Discussing the findings with stakeholders it became clear the cost of fighting wildfires and their impact on the environment were also key concerns. Novel work was funded by a stakeholder organisation, Moors for the Future, based in Castleton, Derbyshire, from 2006. Here Jonathan Aylen and Gina Cavan investigated the costs of wildfires and identified better ways of tackling them

This body of research was particularly appealing to Fire Services who have given extensive guidance to follow-on work outside the Peak District, including an unpublished but widely reported

case study on the Swinley Forest Fire, a major incident on the Surrey-Berkshire border in 2011. This research led directly to the approach in 2012 by the Department of Communities and Local Government who were keen to assess the risk posed by wildfire in the UK and successfully built a case to put to the Cabinet Office.

3. References to the research

1. K. Albertson, J. Aylen, G. Cavan, J. McMorrow, Forecasting the outbreak of moorland wildfires in the English Peak District, *Journal of Environmental Management*, vol.90, issue 8, June 2009, pp.2642-2651 DOI: 10.1016/j.jenvman.2009.02.011

2. Kevin Albertson, Jonathan Aylen, Gina Cavan and Julia McMorrow, Climate change and the future occurrence of moorland wildfires in the Peak District of the UK, *Climate Research*, vol.45, December 2010, CR Special 24, pp.105-118 open access – DOI:10.3354/cr00926

3. J. McMorrow, G. Cavan, J.Walker, J.Aylen, C.Legg, C.Quinn, K.Hubacek, S.Thorp, M. Thomson and M.Jones, Fire Interdisciplinary Research on Ecosystem Services (FIRES) Policy Brief, 2010. http://www.fires-seminars.org.uk/downloads/FIRES_Policy_Brief_final.pdf Copy available on request

4. J. McMorrow, S. Lindley, J. Aylen, G. Cavan, K. Albertson and D. Boys, Moorland wildfire risk, visitors and climate change: patterns, prevention and policy, *Drivers of Environmental Change in Uplands*, (eds.) A. Bonn, K. Hubacek, J. Stewart and T. Allott, Abingdon: Routledge, 2009, chapter 23 – Copy available on request

[1] is published in a leading international peer reviewed journal [2] is published in a major internationally recognised journal [3] is a sponsored policy brief. [4] is published as a chapter in an edited book.

4. Details of the impact

Introduction

Research at the University of Manchester on the risk of wildfire has altered government policy, influenced fire fighting practice at a local level and built a community of practice which spans fire fighters, countryside stakeholders and academics. All the impacts described below drew extensively on published interdisciplinary work relating to the risk of wildfire in the Peak District. This formed the knowledge base for policy change and new management practices.

Pathways to Impact

Research findings were published in international journals, and extensively discussed with stakeholders including landowners, fire authorities, amenity bodies, fire operations groups and the Met Office. The multidisciplinary FIRES seminar series funded by ESRC and NERC was the first time fire authorities had engaged closely with the research community on wildfires as an issue [3, 4].

The research was particularly appealing to Fire Services who have given extensive guidance to follow-on work by the team outside the Peak District, including an unpublished but widely reported case study on the Swinley Forest Fire, a major incident on the Surrey-Berkshire border in 2011. This research led directly to the approach in 2012 by the Department for Communities and Local Government who were keen to assess the risk posed by wildfire in the UK and successfully built a case to put to the Cabinet Office.

Impacts on National Policy

Using the research, Aylen gave specific advice to the Resilience & Emergencies Division (RED) of the Department for Communities & Local Government (DCLG) in June 2012 as part of a submission to the Cabinet Office advocating inclusion of wildfire in the Government's confidential National Risk Assessment for 2012. Evidence submitted to the Cabinet Office drew extensively on Aylen's unpublished advice on the Swinley wildfire incident in 2011 and his participation in

discussions about emergency planning for a major wildfire incident. The wildfire lead of the Chief Fire Officers Association [A] states: *"The dedicated assistance and information Jonathan provided last summer to members of the CFOA WG who were involved in detailed discussions with central Government on shaping national policy towards wildfire risk was of tremendous benefit. Without a very robust and resilient evidence base across a number of factors, of which the economic cost of wildfire was a principal focus, I am convinced we would not have made the case to Government about the threat and risk to UK Plc. and our local communities from wildfires in such an impressive and convincing way. The outcome of those discussions was the inclusion, for the first time, of wildfire as a risk within the National Risk Register"*

As a result, wildfires have been included in the National Risk Register [F] for the first time and forms part of the forthcoming National Risk Assessment due out in the summer of 2013. This impact is confirmed in a statement [D] from a technical adviser to the Forestry Commission: *"Aylen was able to draw on his extensive academic research on wildfire risks and costing to help shape both local thinking and high level national policy. This work was vital in the successful inclusion of Wildfire Incidents in the Government's National Risk Register."*

Impacts on the Peak District National Park and the Fire Service

At a very practical level, the academic forecasting work on timing of wildfires is used by the Peak District National Park to inform the location of fire fighting ponds and deployment of fire watchers at high risk times indicated by the research. It has influenced the fire service's approach to moorland fire fighting, including decisions on helicopter response.

Aylen's work with Cavan on costing wildfires is described by the Research Manager at 'Moors for the Future' as: "*an incredibly valuable body of research and evidence to us on a number of levels*" [C]. It helped the Peak District National Park

a) "*demonstrate the value of our moorland restoration*";

b) "*communicate the impacts of moorland wildfires to these conservation organisations and major land owners, for example, the wildfire costings and risk models have fed into Severn Trent Water Limited's 'catchment characterisation' report for the Derwent catchment and informed the catchment action plan*";

c) "*communicate to Defra the 'value' of the ranger service in their role in delivering 'fire – an early wildfire detection programmme carried out by rangers at times of high fire risk*". The timings of these fire watches were also suggested by this academic work on wildfire forecasting.

These changes in practice have begun to diffuse nationally. A research briefing given to the Chief Fire Officers Association in 2012 led to their national initiative on wildfires. Among other events, there has been a presentation to the Institute of Fire Engineers in 2012 and the work now forms part of a training course for firefighters run by the Peak District National Park. Closer to hand, the work is being developed through knowledge exchange with the Greater Manchester Fire and Rescue Service with a programme of knowledge sharing for 2013 relating to fire prevention, costing and deployment of fire fighting resources. A statement from the Watch Manager at Greater Manchester and Fire Rescue Services [B] confirms: *"Mr Aylen continues to be an unceasing font of knowledge in the realm of wildfire costing's, risk assessment and economic estimation of fire suppression and has greatly assisted the Fire and Rescue Services to implement changes to existing policy and procedures to deal more effectively with Wildfires."*

An educational computer based "wildfire forecasting game" is also being commissioned at the Peak District Visitor Centre in Edale in 2013 based explicitly on the forecasting equations estimated in Aylen's research [1].

Impacts on Raising Awareness of Wildfire Risk

Research on wildfires helped build a community of practice around wildfire prevention, suppression and remediation. A member of the team wildfire team at Manchester – McMorrow was instrumental in convening the ESRC/NERC seminar series FIRES (Fire Interdisciplinary Research on Ecosystem Services) which brought together scientists, social scientists, policy makers and firefighters. The series resulted in a lively policy brief [3], *Fires Interdisciplinary Research on*

Ecosystem Services (FIRES) Policy Brief (2010) which has become the widely circulated standard source on the topic. Its key messages, policy recommendations and listing of knowledge gaps have set the policy agenda ever since. The Station Commander at Dorset Fire and Rescue Service represents the South West of England on the Chief Fire Officers Association Wildfire Group and confirms [E] the research has raised awareness: *"Jonathan's work helped to raise the profile of Wildfire in the run up to the 2012 Olympics particularly in respect of the potential costs and disruption and this, again, led to a full risk assessment being undertaken to minimise the potential impact."*

5. Sources to corroborate the impact

All sources cross-referenced in section 4.

A. Letter from Wildfire Lead, Chief Fire Officers' Association and Chair England and Wales Wildfire Forum.
B. Letter from Watch Manager, Greater Manchester Fire and Rescue Service.
C. Letter from Research Manager, Moors for the Future, Peak District National Park.
D. Letter from Adviser on Technical Guidance, Forestry Commission. Received
E. Letter from Station Commander, GIS Manager, Dorset County Council and Dorset Fire and Rescue Service.
F. National Risk Register of Civil Emergencies