

**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

Day 2: Adaptive land management session

Rapporteur: Adam Perry (University of Manchester)

Adaptive land management and managing fire risk and impact

Alistair Hamilton, *Scottish Agricultural College*.

The presentation began with an overview discussion of the processes of adaptive land management and how the framework is appropriate to managing wildfire risk and impact. Adaptive management (AM) is essentially the organisation of on-going thinking and research, in this instance, regarding wildfire management. One definition is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programmes. It involves an iterative loop (or learning wheel) of: planning (assessing the problem and designing); acting (implementing and monitoring); and reflecting (evaluating and adjusting). Good land managers already do this on a small scale, but it is not integrated with research and policy.

The problem

AM has been identified as seeking to overcome the problem of narrow focus of management interests from land managers, policy makers, researchers and fire fighters. This has led to a 'silo mentality', causing disconnected and isolated management. Alistair Hamilton identified the FIRES seminars as beneficial in enhancing integration and overcoming isolated land management. A problem has been continuing the progress achieved at multidisciplinary seminars. There has been a failure to maintain interdisciplinary linkages, mainly because of lack of follow-on funding.

Aims

The AM framework aims to: tie developments together; maintain dialogue; establish a long-term process; and ensure sectors and individuals remain in contact to increase joint rather than incremental understanding. AM can be used where uncertainty exists, especially regarding management practices, socio-economic impacts of actions (policy), environmental uncertainty and wider changes such as agricultural effects. AM accepts that changes will occur in the dynamic natural environment, meaning uncertainties in our knowledge continue to occur. The presentation showed that AM is not a solution that provides certainty; instead it is a framework for considering complex issues and management on a sounder footing.

Key Themes

It has been argued that AM must be prepared to:

- Confront often hidden *uncertainty* in order to change policy, influence legislation and understand effects. Competing hypotheses should put forward new ideas and alternatives which can be embedded in the modeling of resources, however simplistically.
- Models should be *appropriate* for the situation, with management undertaken at the necessary level.
- Include the *human element*, particularly a breadth of expert local input and opinion.
- Undertake *immediate action*, even before consensus is achieved. Action must be early, based on best information available, accepting uncertainty and not always waiting for new research. Later adjustment in response to results is then possible.

Current state of knowledge

Alistair argued that in the case of moorland wildfire there is a need to identify the current state of knowledge, which is significant but highly disparate. We need a meta-analysis of current and possible future knowledge on socio-economic and environmental conditions. Critical appraisal could also show what is not known (degree of biological and socio-economic uncertainty). There is a need to start forward thinking on a multitude of current and future issues, including management aims (e.g. retreat from farming), socio economic considerations, agricultural changes and future environmental condition (especially climate change).

The adaptive management framework

The presentation then detailed the AM framework, recognising the following attributes:

- AM as a framework for recognising the many uncertainties of management
- Working on best knowledge available using a systematic process for learning from outcomes.
- The cyclical process: allowing the revaluation of the problem and objectives in light of results.

Needs of the AM process

The talk then highlighted how AM can and, in some cases, is already producing multiple overall beneficial outcomes. These include: improved management and understanding; demonstrating that existing good practice *is* effective; the ability to learn from mistakes and alter management appropriately from what is learnt.

AM can overcome issues of small scale management, where the dissemination of findings is limited. This was identified as important in overcoming insufficient integration of policy and research, which currently fail to influence one another so that valuable learning is not shared.

AM requires flexibility and openness in management institutions to foster responsiveness to change in understanding and current thinking. Institutions are considered vital to the future of AM; however some deep-seated beliefs must be challenged.

An assumption of ecosystem resilience is necessary for the functioning of AM approaches. The ecosystem must be able to absorb pressures before changing state, as well as having the ability to bounce back after disturbance.

Risk results from a combination of the probability of event occurring, and the severity of its outcome. AM, it is argued, can implicitly help mitigate and minimise wildfire risk by quickly reacting to changes such as increased fuel load. This is achieved by intervening instead of waiting for the end of existing management cycles before analysing and only then adapting. However, it also requires policy-making agencies and legislation to be flexible.

Benefits

The framework, it was argued, could provide flexibility in the face of uncertainty, allowing reactivity through a learning-based approach and constant feedback loops. AM structures management according to what tasks do and when to do them, making adaption to change simpler.

The framework encourages long-term vision and integration of management by encouraging consistent stakeholder subscription. Long-term collaboration with stakeholders allows functioning across different scales, offering optimal decisions within resources available.

Problem scoping

The presentation demonstrated that AM facilitates criteria scoping which is specific to management circumstances. Effective functioning of the framework requires engagement with stakeholders and agreement of aims in order to overcome uncertainty and distinguish between alternatives. This emphasises the need for a model so that monitoring can be used to inform decision making and ensure that the correct evaluation of management is undertaken.

The talk established that AM can provide measurable targets if a baseline is established. From this point, the effectiveness of management action can be determined. It was argued that responses can then be appropriate to results, encouraging the alteration of management - which is so important to permit progress under the AM framework. AM must work within existing supporting legal and policy frameworks.

AM process

A distinction was drawn between the set-up stage and iterative stages of the AM framework. The set-up phase was 'institutional learning' or 'process learning'. The iterative stage was the 'technical learning' phase of effectively learning how to actually do it in practice, and could require a complete change of objectives or simple minimal change in management.

The 'set-up' stage includes five steps: (1) initiating stakeholder involvement; (2) defining clear measurable and agreed objectives; (3) identifying potential management actions; (4) using models to assess different management ideas; and (5) designing and implementing monitoring.

The iterative element of AM includes a further four steps: (6) a separate decision making process helping to select actions; (7) follow-up monitoring to track how the system responds to management; (8) assessing the outcomes; and finally (9) a feedback loop to the first of these four steps to reevaluate aims and continue monitoring.

Challenging the management process

It was argued that there is a reluctance to change management, often because of personal and/or institutional bias. This should be acknowledged and worked with so that agreement of aims and methods can be achieved across all management levels, aiding the funding and research of management. AM encourages commitment to long-term monitoring and evaluation. In the case of wildfire where ecosystem change is long-term, lasting commitment of stakeholders is important, especially for funding, government input and long-term (years) monitoring and evaluation. One issue highlighted was that of the long *time lag* before effects of management for ecosystem services are clearly seen. AM helps the collection of sufficient and relevant

information. It must, however, overcome legal framework issues, which particularly limit research.

Wider evidence of the use of AM

Examples of good progress in the United States were discussed, particularly the extent and type of monitoring and analysis which is then frequently cycled back into management considerations. The feedback cycle was considered to be longer for UK wildfire management.

The Kissimee River restoration showed that it was important to be aware of the political will of the people, including accepting that goals will evolve. Evidence suggests that feedback from increased knowledge could alter goals, requiring acknowledgment of mistakes to learn from them. Managers should be cautious of early success, as initial solutions may not always be the answer. It was very important to build constituencies stakeholders, which can be slow process; the adage 'go slow to go faster' applies. The AM trials discussed required reactivity to change, proactive problem solving and the need to build stakeholder trust, especially to counter misconceptions. It was important to target research and education at killing popular media myths.

Changing stakeholders' approaches to AM

It was argued that certain changes in approach by key stakeholders are necessary to achieve effective AM:

Managers: should demonstrate willingness to work with researchers, develop new practice, allow research monitoring, develop a willingness to accept result and modify practice appropriately.

Policy makers: should develop flexibility for appropriate trials, encourage legislation that will accommodate change, encourage support (funding), accept results and modify accordingly.

Researchers: must commit to the needs and type of *unglamorous* research essential to advance knowledge, quickly turn around results and data, feed quickly back into management, scale results into local and national models and accept results by modifying research according.

Outstanding issues regarding AM in wildfire management

Management is usually very local and short term; spatial and temporal scaling up must be possible.

An integrated framework to collate results is needed so that national scale patterns can be seen, and these can feedback into local management and *vice versa*. This will help too build tools such as risk assessment, prediction systems and fire behaviour models.

Adaptive Environmental Assessment and Management involves two interlinked plan-act-reflect loops, one for the management itself, the other for stepping back and more strategically assessing the assumption used in management being implemented. That is, it involves considering competing hypotheses, uncertainties and wider inter-relationships. For instance, we need to ask whether we can maintain current systems in the face of change. Climate change was highlighted as a powerful reason for adopting AM.

Applying AM to wildfire

The talk finished by identifying how some of the nine stages of AM were already being practiced for UK wildfire and where further effort was needed. Elements of AM had begun to be implemented by various stakeholders present. However, the talk demonstrated how incomplete processes had begun to show many conflicting issues and outcomes.

The discussion highlighted the need to encourage further stakeholder involvement and increase commitment, which had already begun to occur. Important aspects which AM could address

were: the need to enhance knowledge exchange and public education; the need for on-site specialists before, during and after a wildfire event; greater involvement of local people in the management process; the promotion of partnership working and interdisciplinary initiatives.

Several key characteristics necessary to implement AM in wildfire management were identified. These included:

- Clear definition of objectives (using *SMART*). The seminar series had highlighted many.
- The incorporation of socio-ecological values on a wider scale than individual specialism.
- Planned adaptation to changes and encouragement of new approaches and management techniques on a national level.
- Ensuring explicit options and alternatives for management, this includes modelling to improve understanding management effects.
- Establishing necessary base line data to ensure modelling is undertaken appropriately, results are correct, beneficial management alternatives get explored, expert opinion is captured, all suitable interests are acknowledged and change identified in monitoring is effectively incorporated.
- The inclusion of data that will encourage agencies to take wildfire seriously.
- The need to establish management at the scale appropriate to the specific wildfire location.

Conclusion

AM is not a solution, it is a framework that requires flexibility and commitment. There is significant knowledge, especially environmental, which must be collated so that areas of uncertainty can be identified. A consensus is forming, however there is increasing uncertainty regarding future wildfire instances. Therefore, there is a need to adopt a common approach and framework, so stakeholders and management can adapt to change.