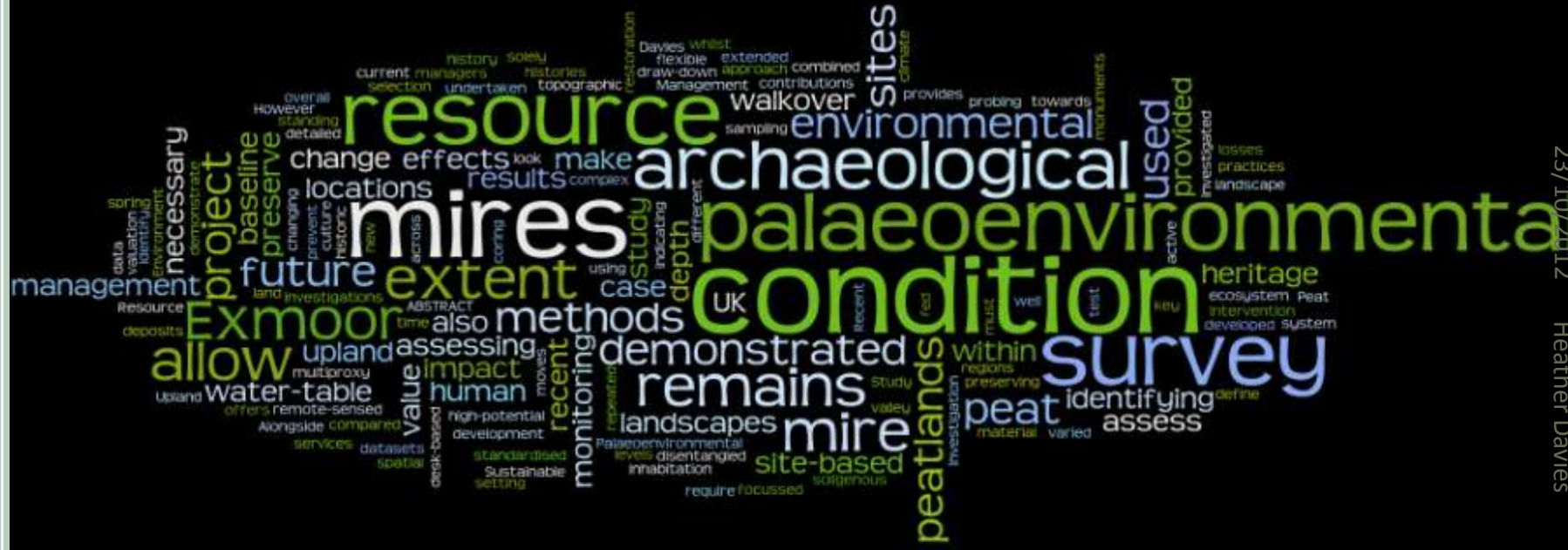
Heather Davies

(University of Liverpool)

Recent research on valley mires

or

Sustainable Management of the Historic Environment in Upland Peat : A study from Exmoor



Introduction

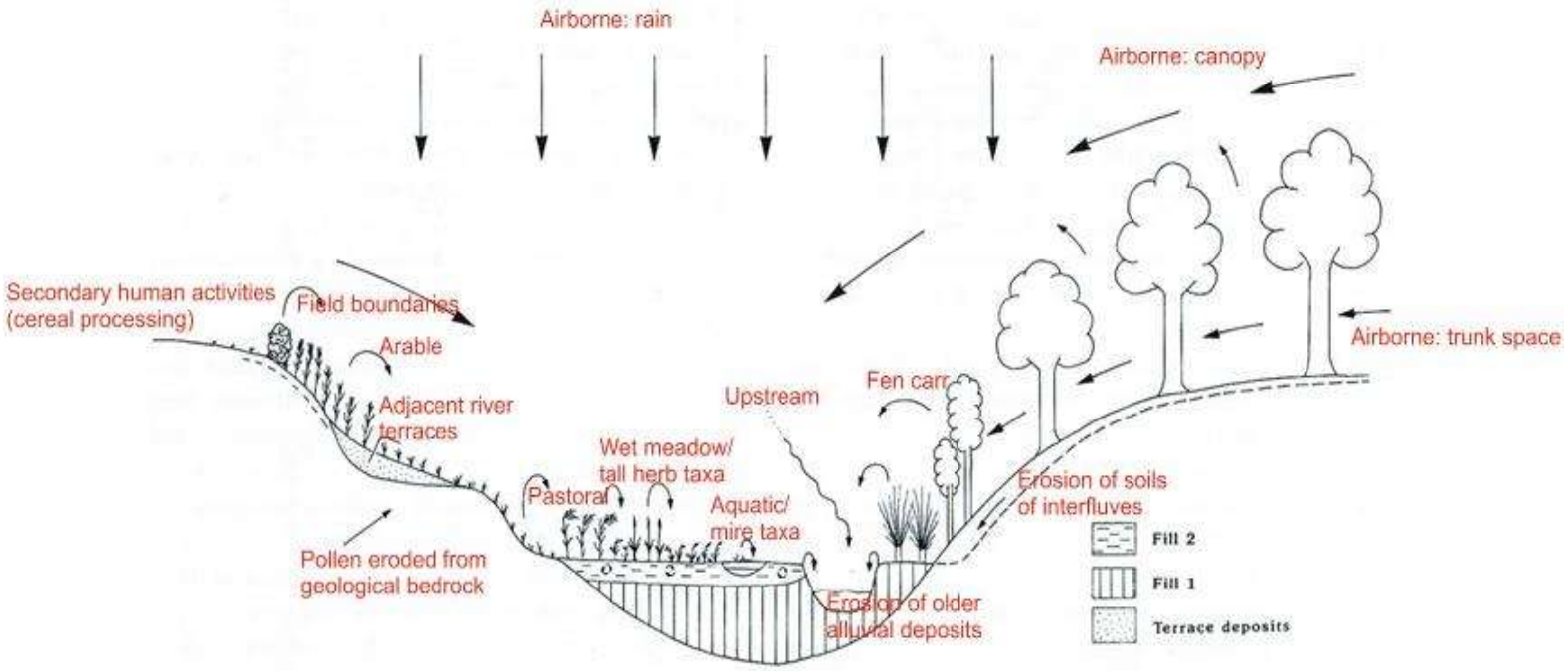
- Background and motivation for the project
- Aims of the project
- Developing methodologies
- Results and implications

Project outline

- PhD project: ‘sustainable management of the historic environment in upland peat: A study from Exmoor’
- Funding: GWR and ENPA sustainable development fund
- Based in Plymouth University (supervisors Ralph Fyfe and Dan Charman)

Background

- Why are archaeologists interested in mires?
  - What is peat? What is a mire?
  - Palaeoenvironmental remains preserved within peat
  - Peat accumulates over time and pollen preserved within it



Background

What type of mires was the project interested in and why?

- Smaller mires away from blanket peat (use a number of terms for these...)
- Blanket peat area mapped through earlier projects (Merryfield 1977, Bowes 2006)
- Size of mire: pollen counts smaller mires reflect more local vegetation change

What motivated the project?

The value of mires....

- Multi-disciplinary
- Many standing monuments in Exmoor's uplands
- Hard to find out about their landscape context
- Palaeoenvironmental data can set them in context (were they built in wooded, moorland, or agricultural landscapes??)
- Small mire in particular can tell us about spatial and temporal variation in Exmoor's landscapes

What motivated the project?

- Threats to mires: Land management impacts on mires over time – e.g. peat cutting and drainage

- Other projects – mire restoration projects
  - How can significance of individual mires to historic environment be assessed?

- Future changes? Climate change?
  - maintaining high water table important
  - allowing peat to accumulate (continued record) and preventing decay.
  - Are mires getting drier or eroding more quickly?

Challenges....

- How do we know where mires are? (resource assessment: 'known-unknowns')
- How can we tell if the palaeoenvironmental remains are well preserved?
- How can we say which mires will yield samples which are useful to archaeological research?
- Which sites do we need to protect from future damage? (recommendations for mire restoration)
- Should we attempt to 'value' archaeological/palaeoenvironmental remains?
- Manpower: thanks to volunteers!!

Aims of the project

Defining the…….

- **Extent**
  - where are mires?
  - how deep is the peat?
- **Condition**
  - how decayed is the peat?
  - are palaeoenvironmental remains in good enough condition to reconstruct past environments from?
- **Value**
  - How old is the peat?
  - Can we get high-resolution records from the peat?
  - Which mires can yield palaeoenvironmental records that can tell us about archaeological sites?
  - Are the remains in good condition?

…….of mires on Exmoor

Developing new methods.... Defining the extent of mires

- Location, area, depth
- Key question:
  - Can we detect the location and extent of mires using existing datasets? (e.g. maps, soil maps, aerial photos)
- Desk-based survey (within open access land in moorland units)
- Ground-truthing: walkover peat depth survey.

Developing new methods.... The condition of the palaeoenvironmental resource

Key questions:

- What factors peat and palaeoenvironmental remains to decay?
  - Erosion
  - Peat piping
  - Historic peat cutting
  - Trackway erosion/poaching
- How many mires are likely to suffer from the loss of palaeoenvironmental remains?
- Can the threat to palaeoenvironmental remains posed by drainage systems and peat cutting be quantified?

Defining terms

- Mire condition
  - Visible physical damage to peat
  - E.g. drainage ditches, poaching, collapsed sections
- Peat condition
  - Peat humification
  - Measured on Troels-Smith scale (0-4)
- Vegetation condition
  - Indicator species of good and poor mire condition (CSM)
  - % bare peat
- Condition of palaeoenvironmental remains
  - Pollen condition (and testate amoebae preservation)
  - Cotton strip decay and peat humification used as a proxy for this

Developing new methods.... The condition of the palaeoenvironmental resource

Approach on 2 scales:

1. On-site monitoring

- 3 mires selected from a pilot survey
- Drying of the peat the main threat to the preservation of organic remains
- Water-table monitoring using dipwells: how much of the peat profile is dry, for how much of the year?
- Current decay rate monitored: speed of decay of organic material

Developing new methods.... The condition of the palaeoenvironmental resource

Approach on 2 scales:

1. On-site monitoring *(cont...)*

- The condition of palaeoenvironmental remains (pollen, peat matrix)
  - 7 locations across the 3 mires
  - pollen identification, classification into condition categories.
  - Method of weighing results to remove the effect of some pollen taxa being more susceptible to damage necessary to interpret results.

Developing new methods.... The condition of the palaeoenvironmental resource

Approach on 2 scales:

2. Extensive walkover survey

- Alongside peat depth survey
- Assess threats to peat (drainage, peat piping, peat cutting)
- Assess level of humification of peat
  - Use this as a proxy for condition of palaeoenvironmental remains i.e. peat very humified, palaeoenvironmental remains in poor condition.
- Assess vegetation condition
  - Rapid quadrat survey (% cover)
  - Vegetation condition: good, poor or mixed (based on indicator species, bare peat)

Developing new methods.... Developing a valuation system

Key questions:

- What makes a palaeoenvironmental remains within a mire valuable to archaeology?
- How does the condition of the peat and the threats to future preservation affect value?

Results: The extent of the resource

- Over 1000 peat depth measurements used to define mires
- 119 previously un-mapped mires defined (survey covered ~150km^2)
  - Size variation 20m^2 – 160000m^2 (0.16km^2/16ha)
  - Majority in central and western moorland areas
- Desk-based survey overestimated the number of mires (drains and mire-type vegetation on shallow peaty soils as well as peat).
- There is no easy way(?)

Results: the condition of the resource

Extensive survey:

- No clear correlation between condition of the vegetation and the condition of the peat beneath
  - Can't just use vegetation survey as a proxy for the condition of palaeoenvironmental remains
- Most common threats to peat condition is water-table draw-down caused by drainage (70% of mires)

Results: the condition of the resource

On-site survey:

- Current decay rate only noticeably faster where peat continuously above the water-table (always dry)
- Condition of the palaeoenvironmental remains and peat matrix
- Difficult to disentangle effects of current water-table draw-down from the effects of climate through time as peat forms, and from human impacts
- Conditions within the peat (pH and redox) are *just* within the range at which we would expect pollen to be preserved

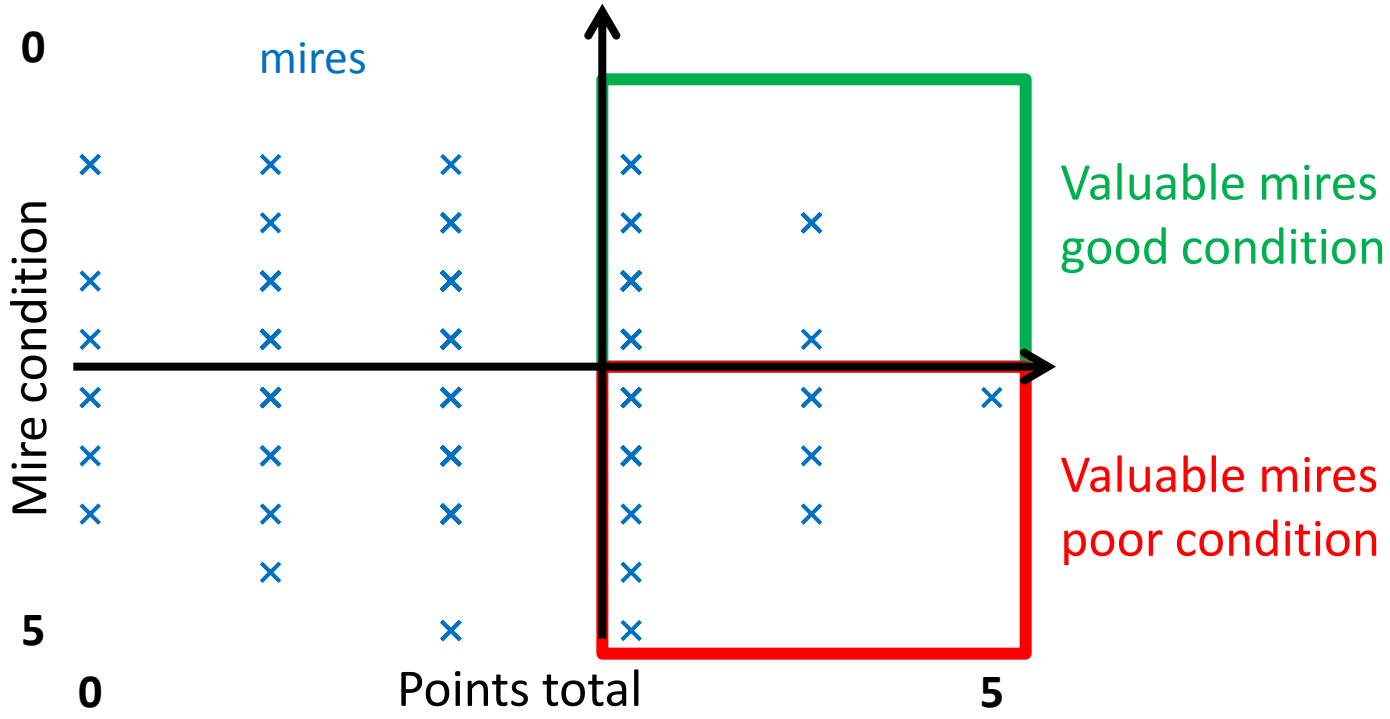
Results: the condition of the resource

On-site survey

- Pollen condition affected by local activities: Deforestation and erosion in the LBA/EIA detected
- Pollen condition affected by past climate change
- More damaged pollen grains in part of the peat which were always above the water-table (not enough *yet* to bias assemblages: drainage ditches 60-150 years old)
- Pollen quite tough, but still being damaged
- Testate amoebae preservation very poor
- other organic remains (e.g. wood) likely to be damaged, and becoming more damaged in zones above water-table based on current decay-rate

Results: Valuation system

- Create a matrix – mire value versus mire condition
  - Important sites for research
  - Sites which require management intervention to prevent the future loss of the resource



How might this research be useful?

Within ENPA:

- Database of potential sites for future palaeoenvironmental research (targeting context of particular archaeological sites)
- Propose mires where mire restoration may be beneficial to archaeology as well as ecology/water-management

How might this research be useful?

Methodological developments:

- No straightforward way to detect mire remotely – need walkover survey. BUT: Potential for using the dataset to ground-truth new peat detection techniques (e.g. using LiDAR data)
- Methods for assessing the condition of palaeoenvironmental remains refined. Results can give us information about past land use as well as the impact of current management practices.

Summary

- An interesting problem: ‘known-unknowns’
- Why is resource assessment and valuation necessary in archaeology?
- How can we find palaeoenvironmental sampling sites?
- How can we value these sites as well as preserving ‘important’ sites for future research?

Acknowledgements

- ENPA staff (Rob Wilson-North, Jessica Turner, Lee Bray, Faye Glover, David Smith)

- Volunteers (especially Keith Elliott, Anne Hand, Ian and Philippa Thompson)

- Supervisors: Dr Ralph Fyfe and Prof Dan Charman