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Robin Gray, Development Manager, South Pennines Local Nature Partnership

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southpennines
localnaturepartnership

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- We are a partnership including local authorities and the utility companies.
- We manage programmes across the South Pennines including South Pennine LEADER and the Watershed Landscape Project.
- We have been appointed by Calderdale to support the DEFRA Flood Resilience Pilot.
- Pennine Prospects is the host for the South Pennines Local Nature Partnership.
- We act as a champion for the South Pennines natural environment.

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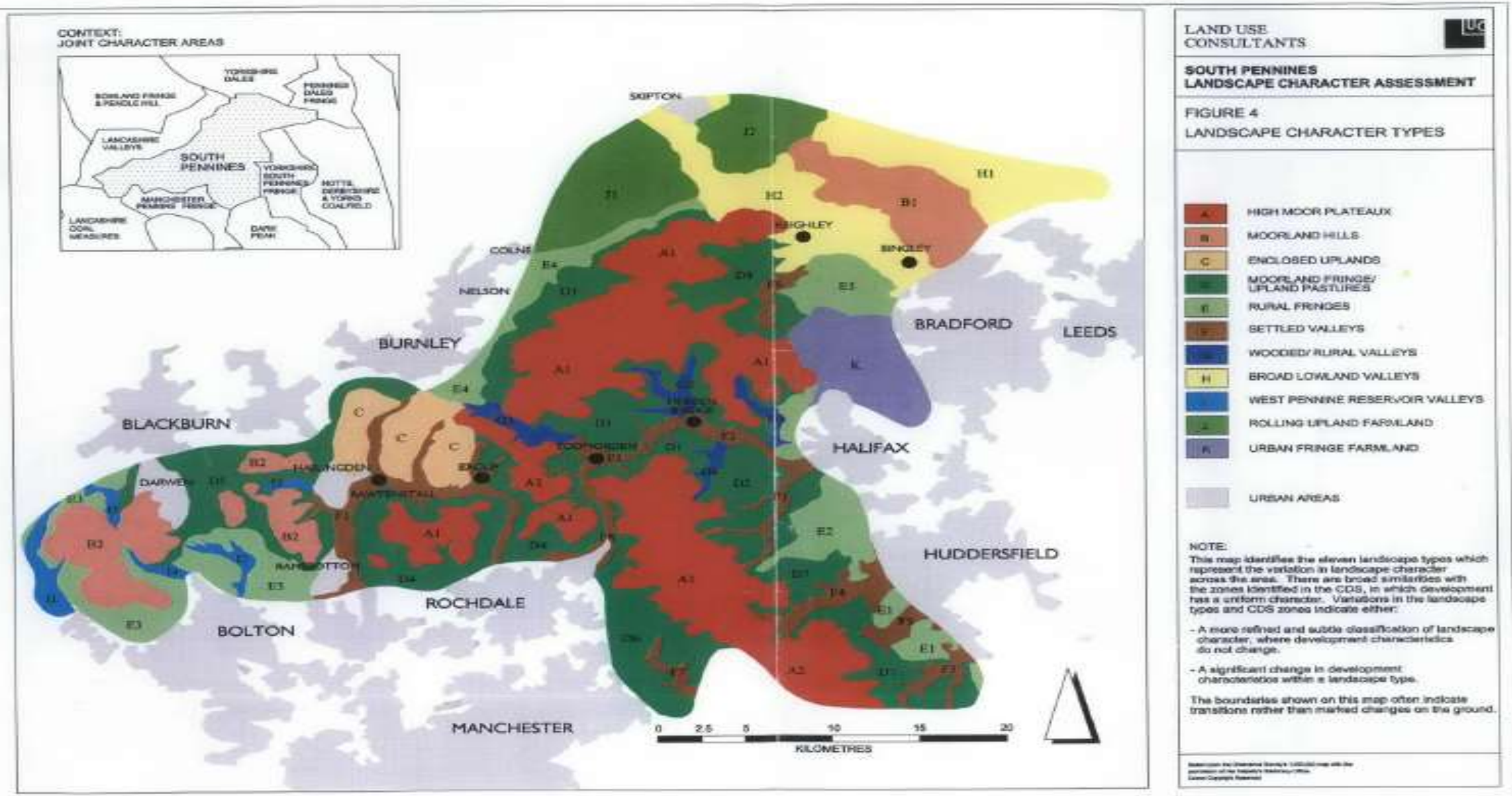
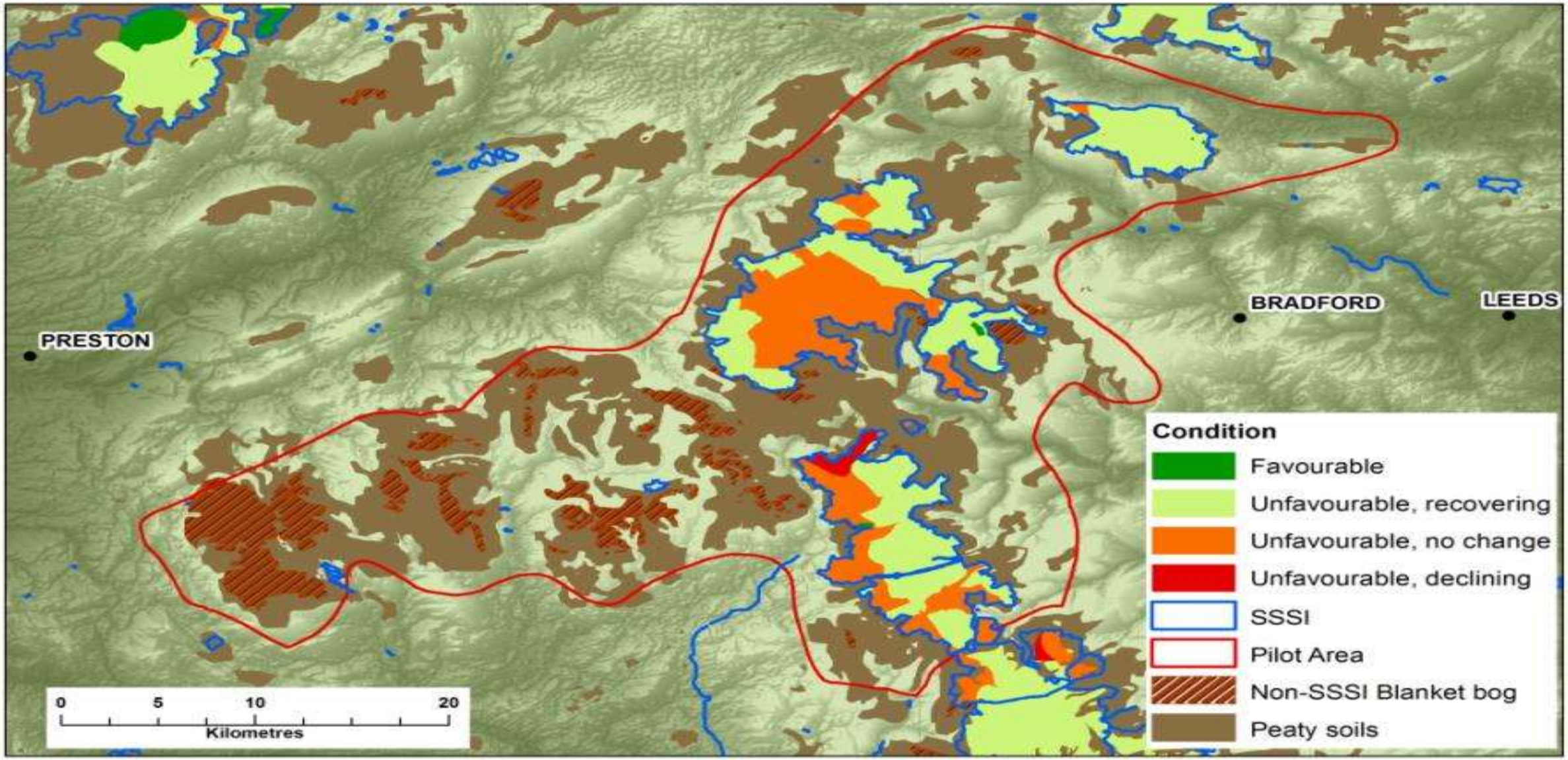
Land management : Health warning

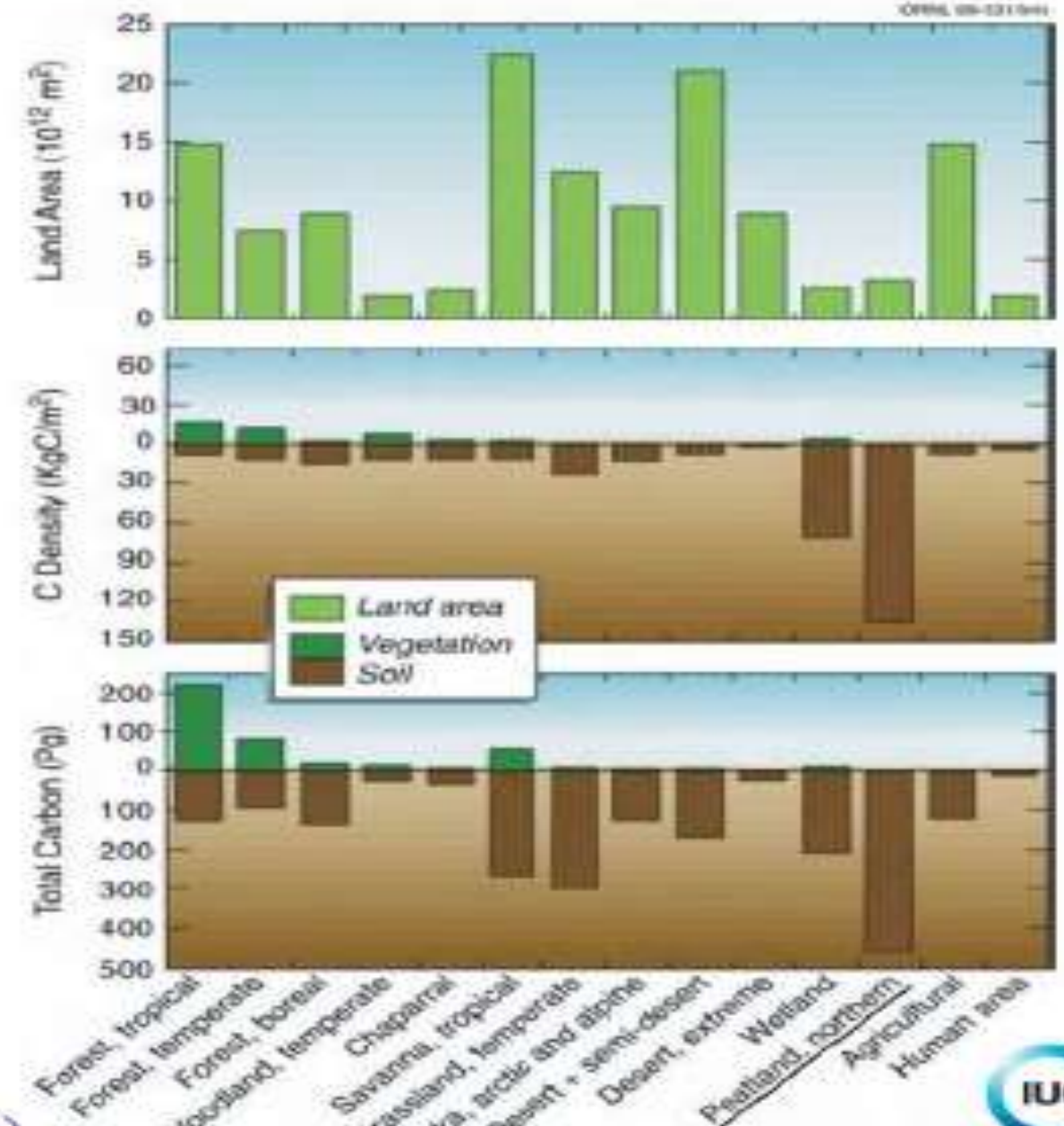
- Does land management of flood alleviation? Yes –but there are other factors...rainfall, topography.
- Upland hydrology is complicated
- ....but we know that bare peat is a major cause of concern .
- Land ownership is complicated
- The agri-environment grant regime available is changing – but there are opportunities in the new regime to consider new ways of working – this is farmer led


CONTEXT:
JOINT CHARACTER AREAS
SOUTH PENNINES
SKIPTON
KEIGHLEY
BINGLEY
COLNE
NELSON
BURNLEY
BRADFORD
LEEDS
BLACKBURN
HALIFAX
HUDDERSFIELD
ROCHDALE
BOLTON
MANCHESTER
0 2.5 5 10 15 20
KILOMETRES
LAND USE CONSULTANTS
SOUTH PENNINES LANDSCAPE CHARACTER ASSESSMENT
FIGURE 4
LANDSCAPE CHARACTER TYPES
A HIGH MOOR PLATEAUX
B MOORLAND HILLS
C ENCLOSED UPLANDS
D MOORLAND FRINGE/ UPLAND PASTURES
E RURAL FRINGES
F SETTLED VALLEYS
G WOODED/ RURAL VALLEYS
H BROAD LOWLAND VALLEYS
J WEST PENNINE RESERVOIR VALLEYS
K ROLLING UPLAND FARMLAND
L URBAN FRINGE FARMLAND
URBAN AREAS
NOTE:
This map identifies the eleven landscape types which represent the variation in landscape character across the area. There are broad similarities with the zones identified in the CDS, in which development has a uniform character. Variations in the landscape types and CDS zones indicate either:
- A more refined and subtle classification of landscape character, where development characteristics do not change.
- A significant change in development characteristics within a landscape type.
The boundaries shown on this map often indicate transitions rather than marked changes on the ground.

South Pennines Ecosystems Services Pilot - Condition of Blanket Bog on SSSIs



Peatlands contain more carbon than any other ecosystem on earth



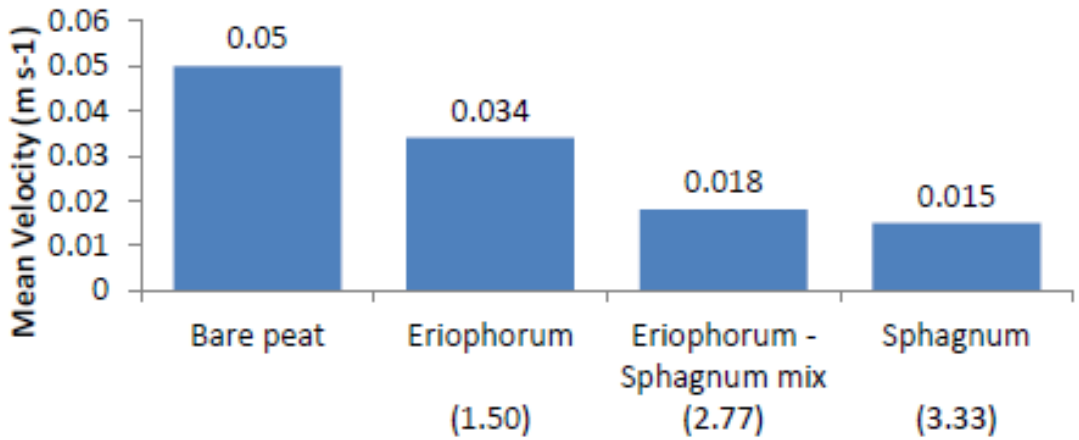
Joosten & Couwenberg (2008)

IUCN Peatland Programme

Blanket bog

- Key components are the existence of peat of at least 0.5m thick, formed because the environmental conditions (i.e. water logging) prevent decay of vegetation. The main species present are mosses Sphagnum spp, cotton grass Eriophorum spp, heathers Calluna, Erica spp, and deer grass Trichophorum cespitosum. Other habitats such as grass moor & pools are present and form an integral part of the blanket bog landscape.

Influence of vegetation on overland water flow velocity in blanket peatland (adapted from Holden et al. 2008)



water @leeds

Lag times

Preliminary results indicate shorter lag times at the bare peat sites in comparison with the intact reference site.

Lag time	**Bare peat catchment**	**Intact catchment**
Mean lag time	13 mins	48 mins

- ***Gullies***

•Gullies result in more rapid runoff and typically have a positive feedback leading to increased erosion and export of particulate and dissolved organic carbon (Evans and Warburton 2007).

•Gully edge peats provide a key linkage between the hill slope hydrological system and channel flow so that their influence on the hydrological functioning of the peatlands is disproportionate to their aerial extent within the catchment (Daniels *et al*. 2008).

•Future climate change may lead to further degradation of the bogs and a reinforcement of the importance of erosion gullies to runoff generation and water quality (Daniels *et al*. 2008).

Water tables

- Catchment water tables are significantly higher in the intact site than at the bare peat or late-stage restored reference sub-catchments.
- There is also evidence that restoration by re-vegetation results in higher water table conditions; mean water tables at the late-stage restored reference site are 75 mm higher than mean water tables at the bare/eroded control catchment.

Surface water and overland flow

- Surface water generation during rainfall events is more regular at the intact reference site than at the bare peat or late-stage restored sites.
- The percentage of rainfall resulting in overland flow is high at the intact reference site, but restricted at the bare peat and late stage restored sub-catchments.

- ***Peat Pipes***

•Peat pipes are large macropores, often many centimetres in diameter, via which water may move through the soil (Holden *et al.* 2012).

•These pipes can often be several hundred metres in length and typically form branching networks. Holden (2005a) found land management (moorland gripping) to exert the most important control on hillslope pipe frequency in blanket peats, and that management practice in peatlands may therefore induce more rapid subsurface erosion and carbon loss. Further, Holden (2005b) demonstrated that heather (*Calluna*) species are one causative factor of piping in blanket peat catchments; pipe occurrence was significantly higher where bare peat (149 pipes/km) and heather (87 pipes/km) were present compared to other plant species (67 pipes/km).

•In the blanket bog of the Moor House NNR, North Pennines, Holden and Burt (2002) found pipes to have a prolonged recession limb such that they maintain low flow for longer periods than most other runoff production processes; pipeflow contributed ~10% of the streamflow but did, at times, contribute up to 30%.

MOORS FOR THE FUTURE PARTNERSHIP

Land management can influence runoff by:

1.Changing the amount of water which flows off the hills.

2. Changing the timing and reducing peak runoff - slowing the rate of flow and / or by storing water:
a) Drawing down reservoirs to create spare capacity which can hold back flood water
b) Creating temporary ponds and wetland areas which fill up at times of high flow
c) Installing timber / woody debris dams in areas of wet woodland alongside streams.
d) Restoring degraded moorland - blocking drainage grips and re-vegetating bare peat.
e) Vegetation [ie ‘longer’ or ‘rougher’].
f) Increasing woodland cover.
g) Reduce soil compaction
h) Re-naturalisation of river channels