

Table 1 National Vegetation Classification - bog communities and subdivisions (Rodwell 1991) and bog microtopes and communities (Lindsay *et al.* 1985; Lindsay *et al.* 1988)

Mire margin and smooth blanket mire

NVC	category
M15	<i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath
M15a	<i>Carex panicea</i> sub-community
M15b	Typical sub-community
M15C	<i>Cladonia</i> spp. sub-community
M15d	<i>Vaccinium myrtillus</i> sub-community
M16	<i>Erica tetralix</i> - <i>Sphagnum compactum</i> wet heath
M16a	Typical sub-community
M16b	<i>Succisa pratensis</i> - <i>Carex panicea</i> sub-community
M16d	<i>Juncus squarrosus</i> - <i>Dicranum scoparium</i> sub-community
M17	<i>Scirpus cespitosus</i> - <i>Eriophorum vaginatum</i> mire
M17b	<i>Cladonia</i> spp. sub-community
M17c	<i>Juncus squarrosus</i> - <i>Rhytidiadelphus loreus</i> sub-community
M18	<i>Erica tetralix</i> - <i>Sphagnum papillosum</i> raised and blanket mire
M18a	<i>Sphagnum magellanicum</i> - <i>Andromeda polifolia</i> sub-community
M18b	<i>Empetrum nigrum</i> ssp. <i>nigrum</i> - <i>Cladonia</i> spp. sub-community
M19	<i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire
M19a	<i>Erica tetralix</i> sub-community
M19b	<i>Empetrum nigrum</i> ssp. <i>nigrum</i> sub-community
M19c	<i>Vaccinium vitis-idaea</i> - <i>Hylocomium splendens</i> sub-community
M19ci	<i>Betula nana</i> variant
M19cii	Typical variant
M19ciii	<i>Vaccinium uliginosum</i> variant
M20	<i>Eriophorum vaginatum</i> blanket and raised mire
M20a	Species-poor sub-community
M20b	<i>Calluna vulgaris</i> - <i>Cladonia</i> spp. sub-community
M21	<i>Narthecium ossifragum</i> - <i>Sphagnum papillosum</i>
M21b	<i>Vaccinium oxycoccos</i> - <i>Sphagnum recurvum</i> sub-community
M2	<i>Sphagnum cuspidatum/recurvum</i> bog pool community
M2b	<i>Sphagnum recurvum</i> sub-community

Mire expanse

2.1 Hummock/high ridge/erosion hag (T2-T4)

M17	<i>Scirpus cespitosus</i> - <i>Eriophorum vaginatum</i> mire
M17b	<i>Cladonia</i> spp. sub-community
M18	<i>Erica tetralix</i> - <i>Sphagnum papillosum</i> raised and blanket mire
M18a	<i>Sphagnum magellanicum</i> - <i>Andromeda polifolia</i> sub-community
M18b	<i>Empetrum nigrum</i> ssp. <i>nigrum</i> - <i>Cladonia</i> spp. sub-community
M19	<i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire
M19a	<i>Erica tetralix</i> sub-community
M19b	<i>Empetrum nigrum</i> ssp. <i>nigrum</i> sub-community
M19ci	<i>Betula nana</i> variant

2.2 Low ridge (T1)

M2	<i>Sphagnum cuspidatum/recurvum</i> bog pool community
M2a	<i>Rhynchospora alba</i> sub-community

- M15b *Scirpus cespitosus-Erica tetralix* wet heath, typical sub-community
M16c *Ericetum tetralicis* wet heath, *Rhynchospora alba-Drosera intermedia* sub-community
M17 *Scirpus cespitosus - Eriophorum vaginatum* mire
M18a *Sphagnum magellanicum - Andromeda polifolia* sub-community

2.3 Hollows (A1, A2)

- M1 *Sphagnum auriculatum* bog pool community
M2 *Sphagnum cuspidatum/recurvum* bog pool community
M3 *Eriophorum angustifolium* community
M16c *Ericetum tetralicis* wet heath, *Rhynchospora alba-Drosera intermedia* sub-community

2.4 Pools (A3, A4)

- M1 *Sphagnum auriculatum* bog pool community
M3 *Eriophorum angustifolium* community
M4 *Carex rostrata-Sphagnum recurvum* mire
M16c *Ericetum tetralicis* wet heath, *Rhynchospora alba-Drosera intermedia* sub-community

Table 2 Present day remaining area of near-natural bog vegetation as a proportion of the area of land under soils formed from raised bogs

	Amount of land with raised bog soils		Amount of land with near-natural bog vegetation			
	Area (ha)	No. of Sites	Area (ha)	(*)	No. of Sites	(*)
England	37,413	210	493	(1)	15	(7)
Scotland	27,892	851	2,515	(9)	129	(15)
Wales	4,086	21	818	(20)	6	(29)
	69,391	1,082	3,826	(6)	150	(14)

(*) values in parentheses are percentages

Table 3 Mire microforms

Terrestrial (T) zones

- (T1) Low ridge ("lawn": Sjors 1948) - common on mire areas which are free from damage; 1-10 cm above the mean water table; generally the richest zone for characteristic mire species.
- (T2) High ridge - the general level of many mire surfaces, particularly outside pool systems; 10-20 cm above the mean water table.
- (T3) Hummock - normally the highest element in the pattern and always bryophyte-formed; 20 cm to 1 m above the mean water table.
- (T4) Peat hag - associated with erosion; 1-2 m above the mean water table.
- (T5) Peat mound - occurs only in Shetland, Caithness, Sutherland and the Outer Hebrides; 1-3 m above the water table and possibly linked to incipient 'palsa' form, though the origins are as yet obscure.

Aquatic (A) zones

- (A1) *Sphagnum* hollow ("carpet": Sjors 1948) - a true hollow (i.e. aquatic phase) of dense *Sphagnum cuspidatum*; 0-10 cm below the mean water table.
 - (A2) Mud-bottom hollow (Sjors 1948) - a hollow dominated by a relatively solid bare peat base, but with some aquatic *Sphagna*; 5-20 cm below the mean water table; not recorded from eastern Britain (including Caithness).
 - (A3) Drought-sensitive pool (Lindsay *et al.* 1988) - an area of open water with an unconsolidated peat base which remains flooded for much of the time but in drought conditions will dry up; 20-50 cm below the mean water table.
 - (A4) Permanent pool (Lindsay *et al.* 1988) ("summer pool": Tubridy 1984) - an area of open water which is sufficiently deep to remain flooded even during extreme drought; 1-4 m deep; restricted to north-west Strathclyde, Tayside and regions north of them.
- (TA2) Erosion gullies, resembling mud-bottom hollows but with flowing water.

These surface features are arranged into patterned areas in various combinations (see Figure 5). The range of surface patterns contributes significantly to variability within and between sites. **This range should therefore be represented in the selection process.** The distribution and abundance of particular levels or zones in areas of patterning provide one level of selection, but in addition the form and orientation taken up by the patterns are an important factor. Lindsay *et al.* (1985) indicated in general terms the geographical variation displayed by these patterns across Britain. A site may, for example, consist purely of low ridge (T1) and high ridge (T2) without any true aquatic phase. Increasing wetness of climate gives rise to patterned areas of increasing complexity. In the driest areas of bog formation in Britain the aquatic phase, if it exists at all, tends to form small unaligned hollows (A1/A2), but with increasing wetness these hollows become markedly linear. Open water hollows (A3) demonstrate extreme linear patterning towards the north and west of Scotland, whilst open-water pools (A4) are characteristically rounded, formed on the top of watersheds and restricted to the most northerly oceanic areas of Britain.

Erosion patterns and features can also be important characters in comparisons of mire mesotopes and macrotopes. The most obvious features are the deep erosion gullies and hags typical of many plateau and watershed sites. Further north, erosion features include empty pools, leaving exposed beds of peat or even bedrock. Deep gully erosion is a well-known feature of peat in the Pennines, with gullies attaining depths of 2-3 m. However, if an erosion complex forms only in the surface skin of peat comprising the top few centimetres, both the gullies and the hags tend to be extremely small, with hags no more than 20-25 cm high and with diameters of 10-30 cm, surrounded by a network of interconnecting shallow channels. This is not intense erosion, as many channels support a wet matrix of *Sphagnum* and peat; nor, however, is it completely intact mire. The term 'microbroken' has been coined to classify this particularly abundant mire feature. On aerial photographs the mire surface appears to be dimpled or covered with a dense mass of rounded papillae, rather than with the dramatic linear patterns or heavy reticulate networks associated with hag and gully erosion. This stage may later develop into more serious gullying or sheet erosion.

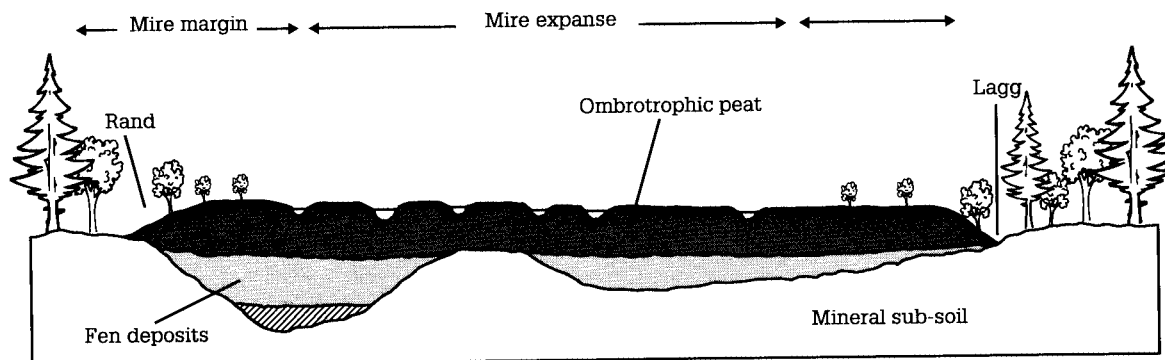


Figure 1 Profile of a plateau ("continental") raised bog. Oceanic raised bog is typically more domed throughout its profile and has less tree cover, but otherwise the components making up the profile in the two types are similar. (Adapted from Grünig *et al.* 1986).

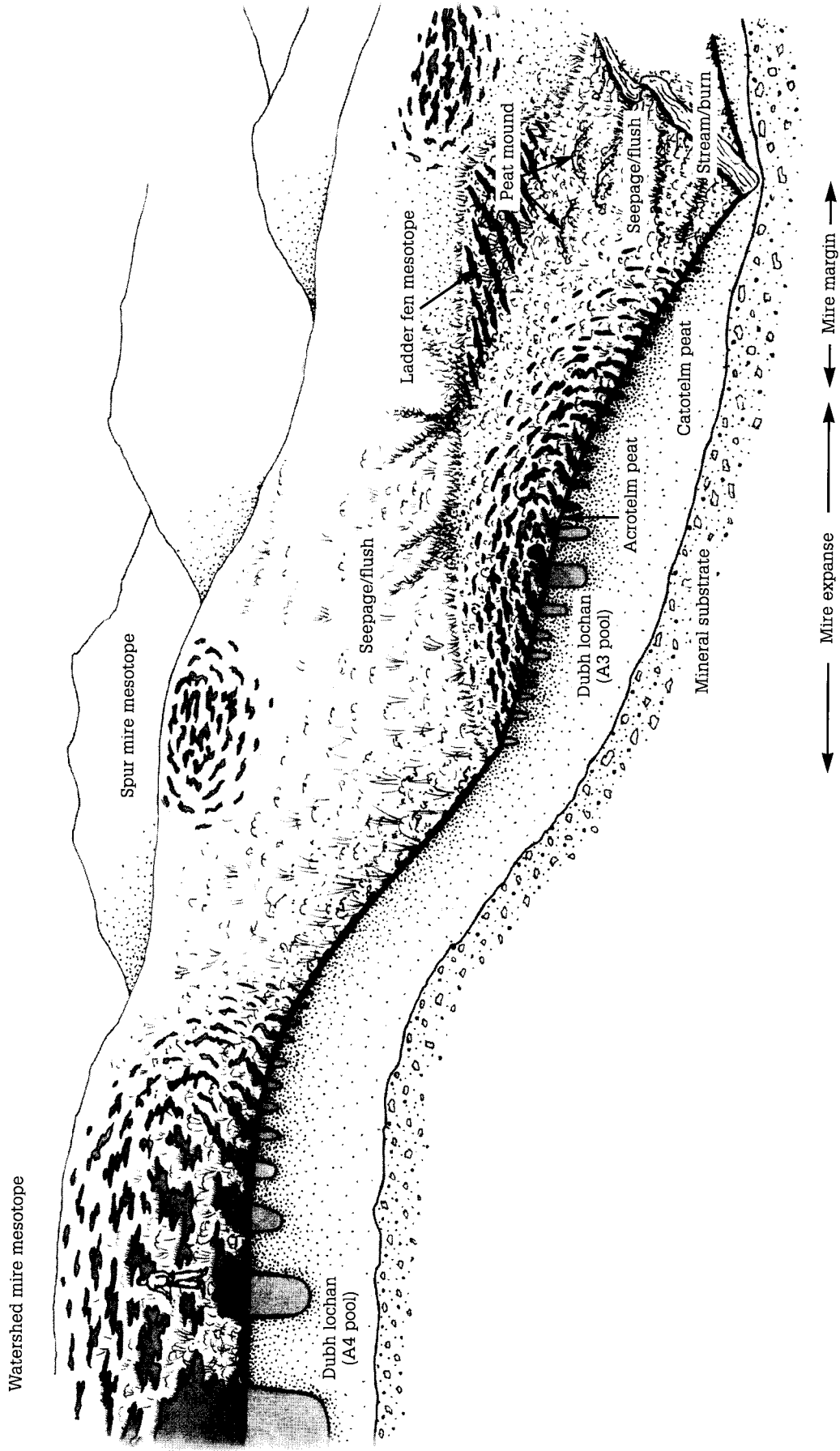


Figure 2 Characteristics of a blanket mire complex from one of the wettest parts of Britain (e.g. Sutherland), showing extreme forms of pool-and-ridge patterning. (Adapted from Lindsay *et al.* 1988).

Terrestrial (T)

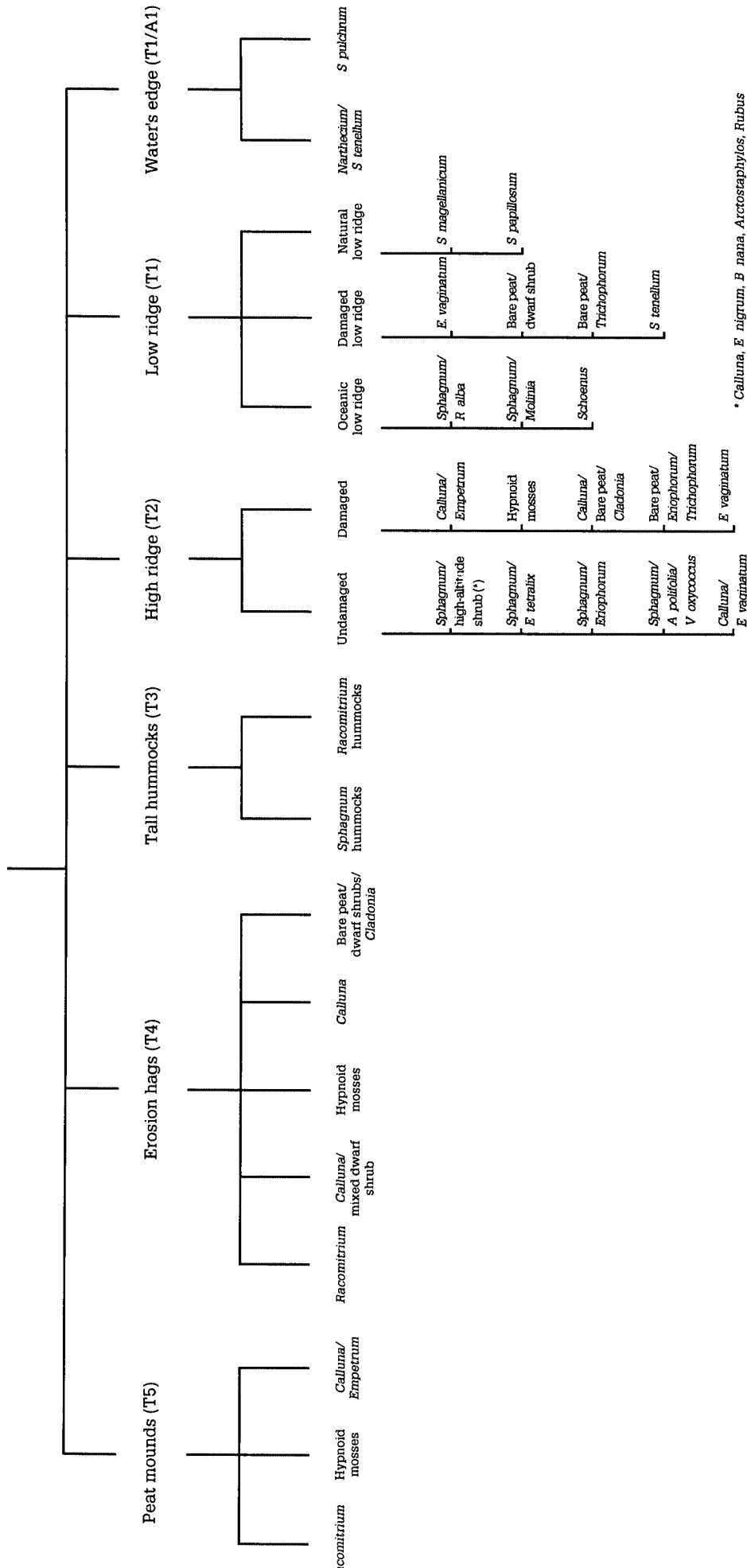


Figure 3(a) Hierarchy of microtopo and vegetation stands - Terrestrial. Vegetation stands refer to species constants, though often they are also dominants. In general, these are visually distinct, sometimes striking, stands although obvious cases of co-dominant mixtures also occur (see also Lindsay *et al.* 1985, Lindsay *et al.* 1988). The broad abundance of each stand within each distinct area of pattern type (microtopo) should be recorded for comparative evaluation. The list is not comprehensive and other types may be encountered. Work to harmonise the vegetation stands with those used widely in Europe is currently on-going.

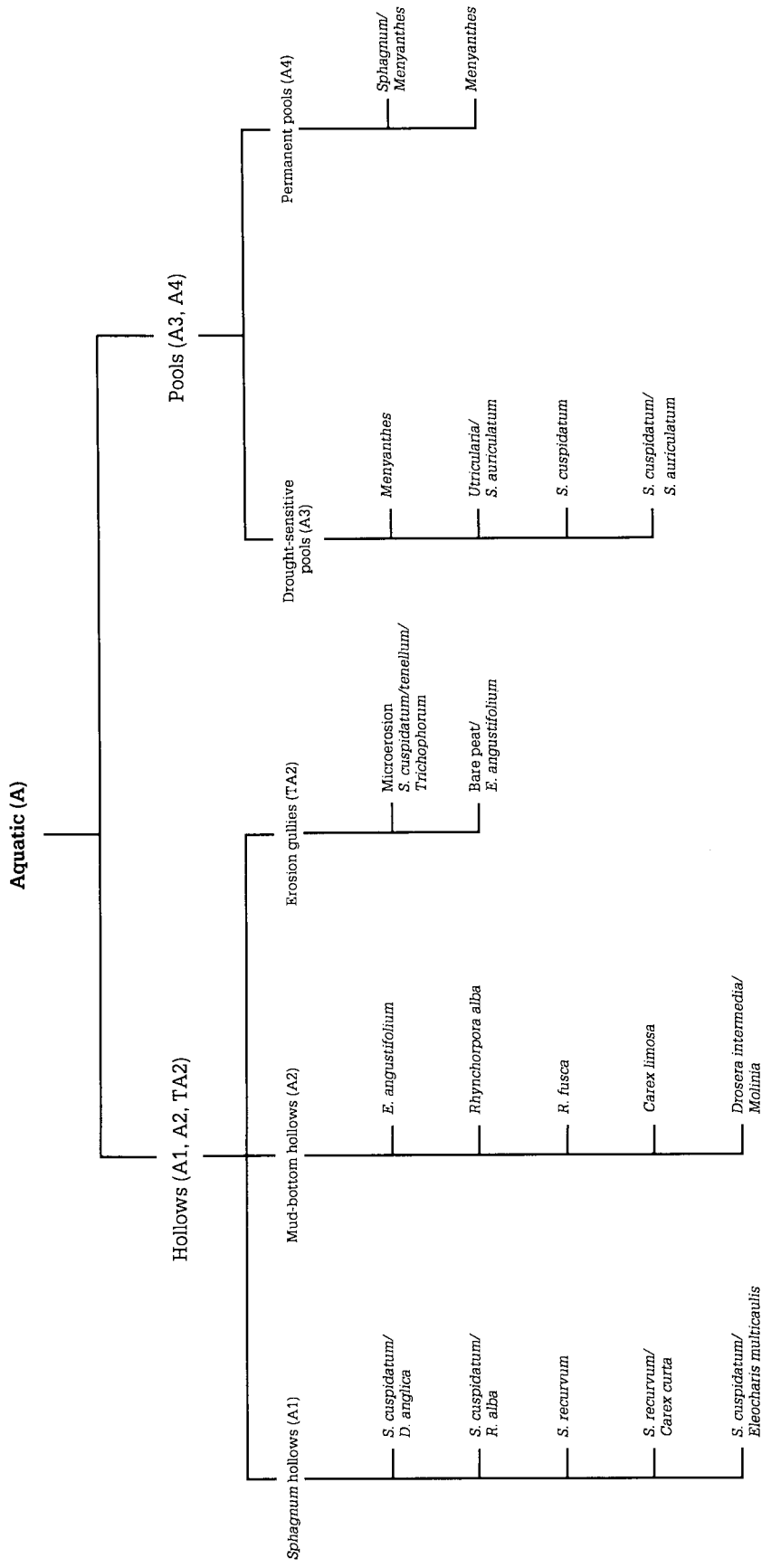


Figure 3(b) Hierarchy of microtopo and vegetation stands - Aquatic. Vegetation stands refer to species constants, though often they are also dominants. In general, these are visually distinct, sometimes striking, stands although obvious cases of co-dominant mixtures also occur (see also Lindsay *et al.* 1985, Lindsay *et al.* 1988). The broad abundance of each stand within each distinct area of pattern type (microtopo) should be recorded for comparative evaluation. The list is not comprehensive and other types may be encountered. Work to harmonise the vegetation stands with those used widely in Europe is currently on-going.

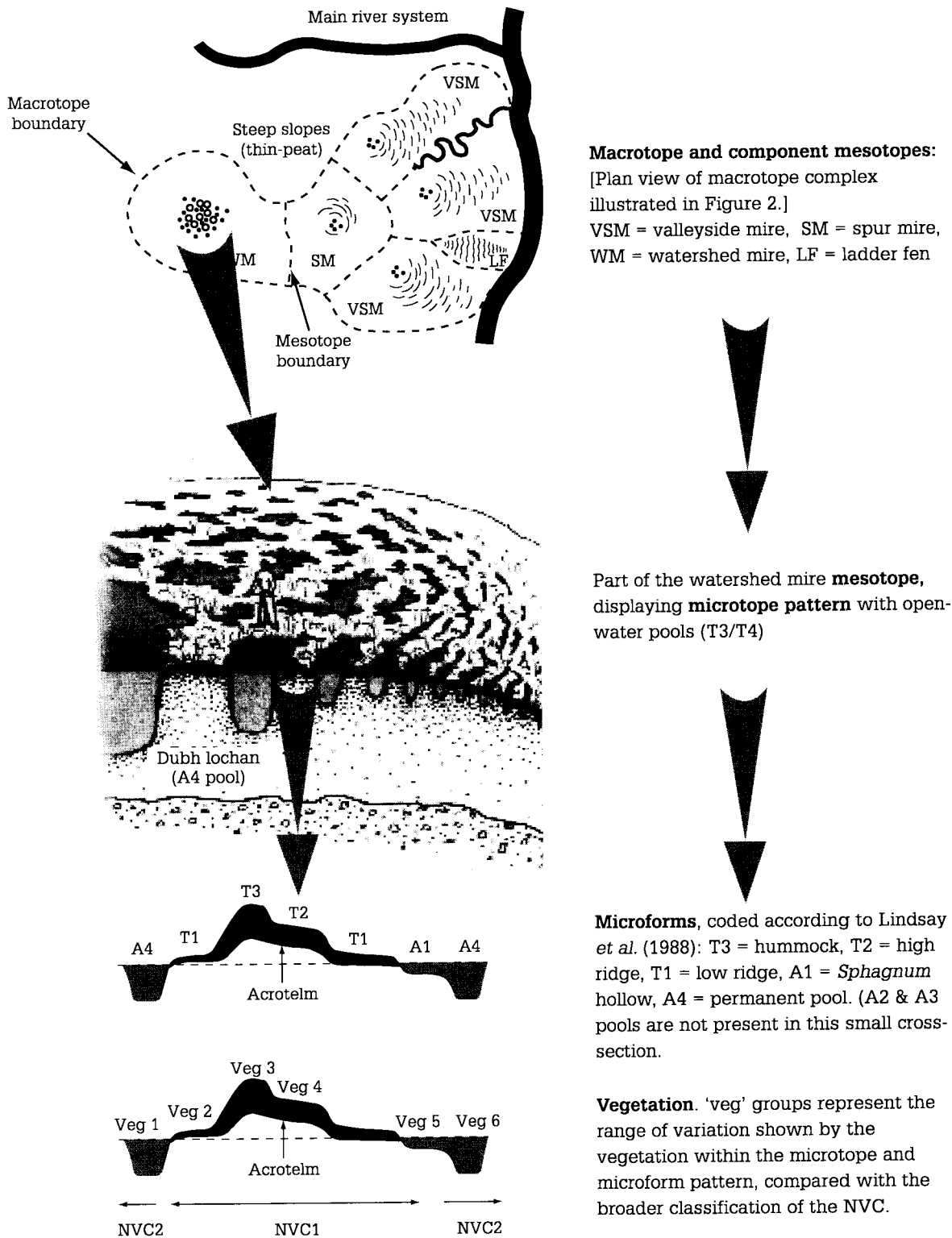


Figure 4 The hierarchy of features used to classify bog systems. Terms are derived from Ivanov (1981) but are described in the accompanying text.

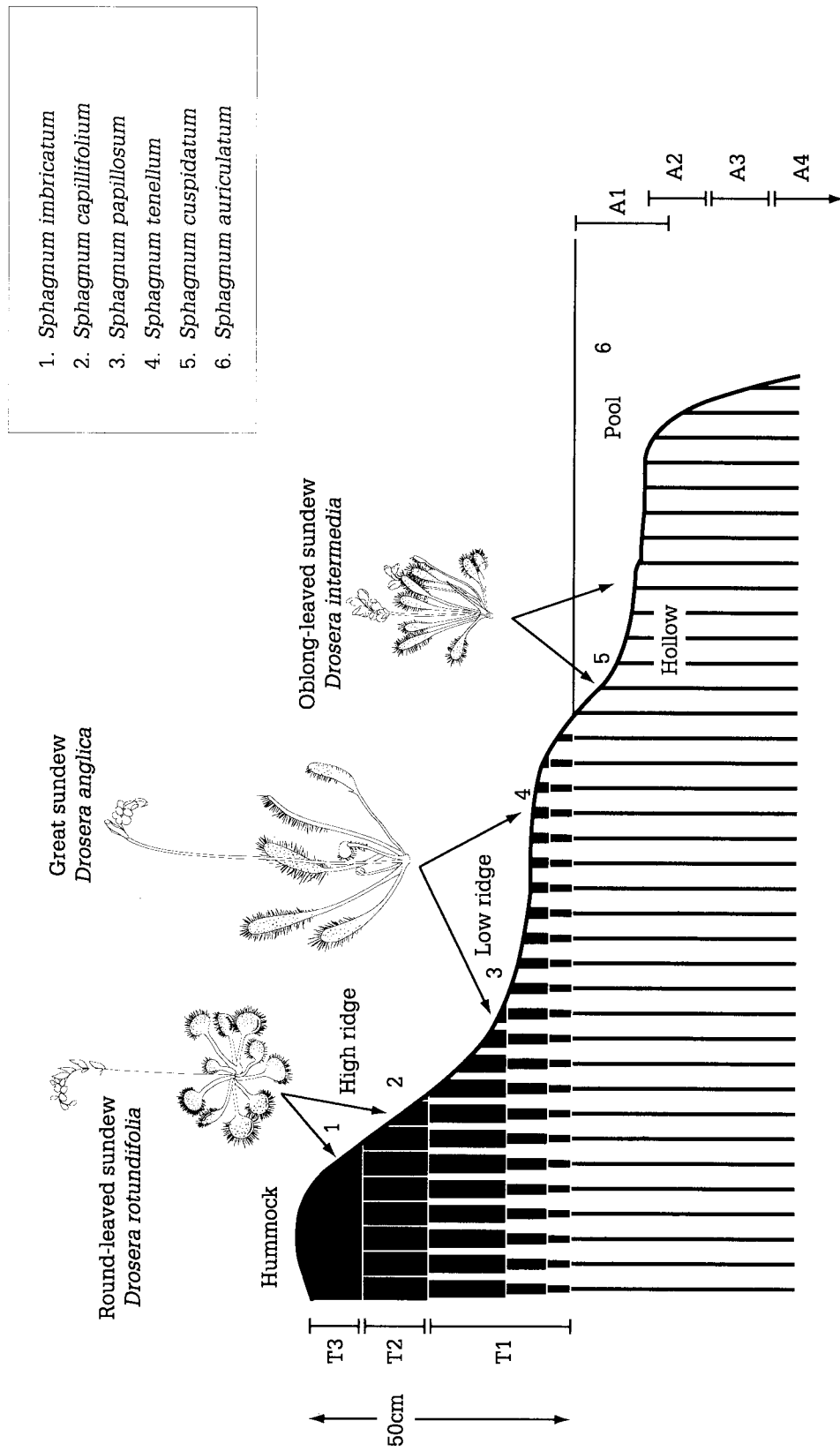
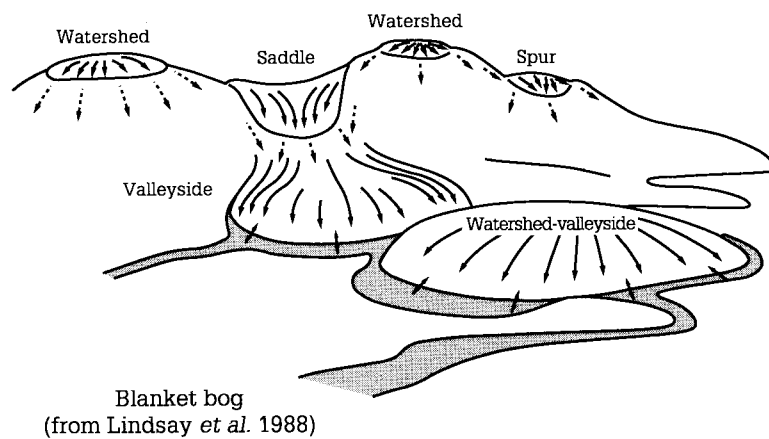
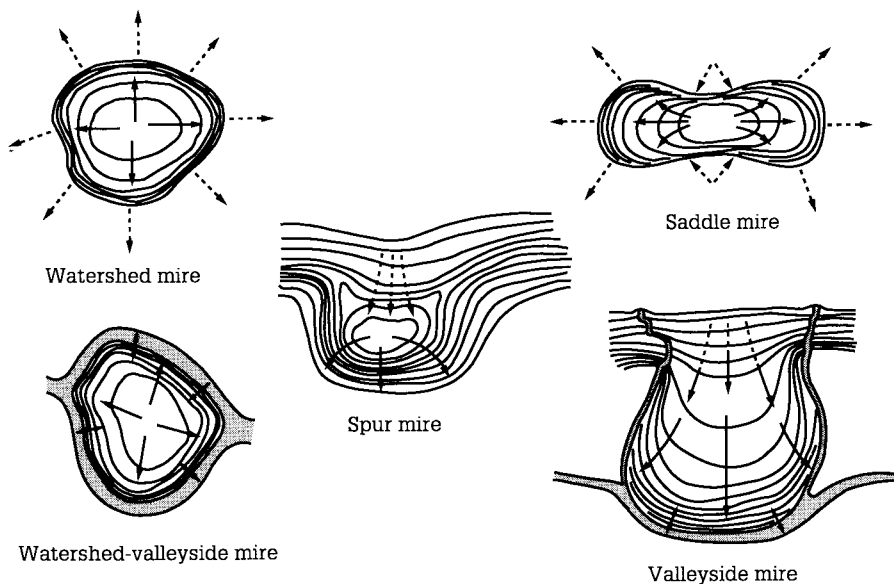


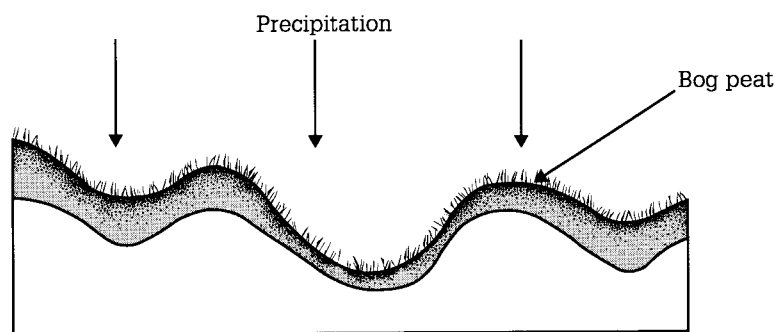
Figure 5 Generalised distribution of structural features (microforms) and the typical distribution of species within the pattern. All natural bogs have some form of pattern, at least across their mire expanse, although in some sites the pattern may consist only of T3 hummocks alternating with T2 high-ridge. Many sites towards the southern and eastern limits of the present bog distribution in Britain have no aquatic (A) zones and consist only of terrestrial (T) zones. (Taken from Lindsay *et al.* 1988)



(a) Blanket bog landscape showing waterflow-lines. Solid flow-lines indicate the flow of water through deep peat; broken lines indicate the flow of water through shallow peat or mineral soil.



(b) Plan views of landscape features showing flow of water through deep peat (solid arrows) and shallow peat or mineral soil (broken lines).



(c) Sectional view of blanket mire (from Steiner 1992).

Figure 6 The hydromorphological and topographical characteristics of blanket bog

51.1 * Active raised bogs

habitat code : 7110 corine 91 : 51.1
RAISED BOGS AND MIRES AND FENS / SPHAGNUM ACID BOGS

- 1) **Active raised bogs**
- 2) Acid bogs, ombrotrophic, poor in mineral nutrients, sustained mainly by rainwater, with a water level generally higher than the surrounding water table, with perennial vegetation dominated by colourful *Sphagna* hummocks allowing for the growth of the bog (*Erico-Sphagnetalia magellanici*, *Scheuchzerietalia palustris* p., *Utricularietalia intermedio-minoris* p., *Caricetalia fuscae* p.). Typically, pools may be present in western United Kingdom and Ireland. The term "active" must be taken to mean still supporting a significant area of vegetation that is normally peat forming, but bogs where active formation is temporarily at a standstill, such as after a fire or during a natural climatic cycle eg, a period of drought, are included.
- 3) Plants: *Erico-Sphagnetalia magellanici* → *Andromeda polifolia*, *Carex pauciflora*, *Cladonia* spp., *Drosera rotundifolia*, *Eriophorum vaginatum*, *Odontoschisma sphagni*, *Sphagnum magellanicum*, *S. imbricatum*, *S. fuscum*, *Vaccinium oxycoccos*. *Scheuchzerietalia palustris* p., *Utricularietalia intermedio-minoris* p., *Caricetalia fuscae* p. → *Carex fusca*, *C. limosa*, *Drosera anglica*, *D. intermedia*, *Eriophorum gracile*, *Rhynchospora alba*, *R. fusca*, *Scheuchzeria palustris*, *Utricularia intermedia*, *U. minor*, *U. ochroleuca*.
Animals: Dragonflies → *Leucorrhini dubia*, *Aeshna subartica*, *A. caerulea*, *A. juncea*, *Somatochlora arctica*, *S. alpestris*. Butterflies → *Colias palaeno*, *Boloria aquilonaris*, *Coenonympha tullia*, *Vacciniina optilete*, *Hypenodes turfosalis*, *Eugraphe subrosea*. Spiders → *Pardosa sphagnicola*, *Glyphesis cottonae*. Ants → *Formica transkaucaasia*. Cricket/Grasshopper → *Metrioptera brachyptera*, *Stethophyma grossum*.
- 4) Geographical distribution: Belgium, Denmark, Germany, Spain (Pyrenees and Cantabrian mountains), France, Italy, Ireland, Netherlands and United Kingdom. Variations can occur depending on local climatic and geomorphological conditions. In Belgium, this habitat is only present in High Ardennes; a typical site is the Fagne wallone.
Corresponding category in the United Kingdom National Vegetation Classification: "M1 *Sphagnum auriculatum* bog pool community", "M3 *Eriophorum angustifolium* bog pool community", "M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire", "M20a *Eriophorum vaginatum* blanket and mixed mire - species poor sub community".
- 5) In order to support the conservation of this ecosystem over its geographic range and its genetic diversity, marginal areas of lower quality as a result of damage or degradation which abut active raised bogs may need to be included, protected and, where practicable, regenerated. There are very few intact or near-intact raised bogs in Europe
- 6) CURTIS, J.R. (in press). The raised bogs of Ireland: their ecology, status and

conservation. Government Publications, Dublin.

MOORE, J.J. (1968). A classification of the bogs and wet heaths of northern Europe (Oxycocco-Sphagnetea Br.-Bl. et Tx. 1943). In: Pflanzensoziologische Systematik. Bericht über das internationale symposium in Stolzenau/Weser 1964 der Internationale vereinigung für vegetationskunde (R.Tuxen, Ed.). Junk, Den Haag. 306 - 320.

NATURE CONSERVATION COUNCIL (1989). Guidelines for the selection of biological SSSI's. Nature Conservation Council, Peterborough.

SCHOUTEN, M.C.G. (1984). Some aspects of the ecogeographical gradient in Irish ombrotrophic bogs. Peat Congress, Dublin. 1: 414 - 432.

TUXEN, R.; MIYAWAKI, A. & FUJIWARA, K. (1972). Eine erweiterte Gliederung der Oxycocco-Sphagnetea. In: Grundfragen und Methoden in der Pflanzensoziologie. (R.Tuxen, Ed.). Junk, Den Haag. 500 - 520.

52.1 and 52.2 Blanket bog (* active only)

habitat code : 7130 corine 91 : 52.1 and 52.2
 RAISED BOGS AND MIRES AND FENS / SPHAGNUM ACID BOGS

- 1) Blanket bog (* active only)
- 2) Extensive bog communities or landscapes on flat or sloping ground with poor surface drainage, in oceanic climates with heavy rainfall, characteristic of western and northern Britain and Ireland. In spite of some lateral water flow, blanket bogs are mostly ombrotrophic. They often cover extensive areas with local topographic features supporting distinct communities [*Erico-Sphagnetalia magellanici*: *Pleurozio purpureae-Ericetum tetracilis*, *Vaccinio-Ericetum tetracilis* p.; *Scheuchzerietalia palustris* p., *Utricularietalia intermedio-minoris* p., *Carcetalia fuscae* p.]. *Sphagna* play an important role in all of them but the cyperaceous component is greater than in raised bogs. The term "active" must be taken to mean still supporting a significant area of vegetation that is normally peat forming.
- 3) Plants: 52.1 → *Calluna vulgaris*, *Campylopus atrovirens*, *Carex panicea*, *Drosera rotundifolia*, *Erica tetralix*, *Eriophorum vaginatum*, *Molinia caerulea*, *Myrica gale*, *Narthecium ossifragum*, *Pedicularis sylvatica*, *Pinguicula lusitanica*, *Pleurozia purpurea*, *Polygala serpyllifolia*, *Potentilla erecta*, *Racomitrium languginosum*, *Rhynchospora alba*, *Schoenus nigricans*, *Scirpus cespitosus*, *Sphagnum pulchrum*, *S. strictum*, *S. compactum*, *S. auriculatum*. 52.2 → *Calluna vulgaris*, *Diplophyllum albicans*, *Drosera rotundifolia*, *Empetrum nigrum*, *Erica tetralix*, *Eriophorum vaginatum*, *Myrica taylorii*, *Narthecium ossifragum*, *Rubus chamaemorus*, *Scirpus cespitosus*, *Vaccinium myrtillus*.
Animals: *Pluvialis apricaria*, *Calidris alpina*.
- 4) Geographical distribution: France, Ireland and United Kingdom.
 Sub-types of the British Isles: 52.1 → Hyper-Atlantic blanket bogs of the western coastlands of Ireland, western Scotland and its islands, Cumbria, Northern Wales; bogs locally dominated by sphagna (*Sphagnum auriculatum*, *S. magellanicum*, *S. compactum*, *S. papillosum*, *S. nemoreum*, *S. rubellum*, *S. tenellum*, *S. subnitens*), or, particularly in parts of western Ireland, mucilaginous algal deposits (*Zygogonium*). 52.2 → Blanket bogs of high ground, hills and mountains in Scotland, Ireland, Western England and Wales.
 Corresponding category in the United Kingdom National Vegetation Classification: "M1 *Sphagnum auriculatum* bog pool community", "M15 *Scirpus cespitosus-Erica tetralix* wet heath", "M17 *Scirpus cespitosus-Eriophorum vaginatum* blanket mire", "M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire", "M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire", "M20 *Eriophorum vaginatum* blanket mire".
- 5) In the United Kingdom discrete areas of raised bog and blanket bog may occur in some districts, showing their characteristic differences. In many other areas, however, peatlands which may have begun as raised bog have become merged in a general expanse of blanket bog, losing their distinctive marginal features. Within these blanket bogs, there are other peat-forming systems which, strictly speaking, form part of various biotopes of aquatic and amphibious zones, fens and moorland.

- 6) DOYLE, G.J. & MOORE, J.J. (1980). Western blanket bog (*Pleurozio purpureae-Ericetum tetralicis*) in Ireland and Great Britain. *Colloques Phytosociologiques*. VII: 213 - 223.
- MOORE, J.J. (1968). A classification of the bogs and wet heaths of northern Europe (*Oxycocco-Sphagnetea* Br.-Bl. et Tx. 1943). In: *Pflanzensoziologische Systematik. Bericht über das internationale symposium in Stolzenau/Weser 1964 der Internationale vereinigung für vegetationskunde* (R.Tuxen, Ed.). Junk, Den Haag. 306 - 320.
- NATURE CONSERVATION COUNCIL (1989). Guidelines for the selection of biological SSSI's. Nature Conservation Council, Peterborough.
- TUXEN, R.; MIYAWAKI, A. & FUJIWARA, K. (1972). Eine erweiterte Gliederung der *Oxycocco-Sphagnetea*. In: *Grundfragen und Methoden in der Pflanzensoziologie*. (R.Tuxen, Ed.). Junk, Den Haag. 500 - 520.