Peat Resources of Exmoor

Exmoor is regionally important for the extent of its upland and coastal heaths, upland grass moor and blanket bog. National Park Management Plan figures state Exmoor has roughly 190 sq km of moor and heath. This includes some 70 sq km of upland heath; 46 sq km of upland grass moor; 39 sq km of bracken; 15 sq km of lowland heath (including coastal heath) and upto 30 sq km of mosaic of heath or grass and blanket bog.

This paper outlines how this figure was derived from several existing data sets. This is not the only available estimate of upland or blanket peat resources on Exmoor as there is not a single agreed definition of what constitutes peat or blanket bog and the area figures vary according to the criteria used.

What is peat and when is a mire a bog?

In summary the commonly used definitions are as follows.

- Peat (organic soils) are distinguished from non organic soils as those with more than 65% organic matter.
- Depth of peat is used to distinguish mires from non mire areas by organisations such English Nature with peat in excess of 50cm used to define bogs and blanket peat.
- Saturation can also be a defining characteristic and histic (peat) horizons are those saturated with water for at least one month in most years.

Bogs are defined as ombrotrophic (receiving nutrients only from the rain) peatlands, so they are acid and nutrient poor, and if they have not been damaged they have the relevant NVC Mire vegetation types (M17, M18 etc). Damaged bogs can have a whole range of vegetation types on degenerating peat from improved grassland and arable crops to acid grassland and heathland communities.

The separation of blanket bogs from lowland bogs and raised bogs is generally done on elevation but in the west of the British Isles blanket peat can be found right down to the coast as a result of the western climatic conditions. Bog structure or morphology is not reliable as many forms overlap, raised bogs are commonly found in the uplands as lenses of deep peat in wider blanket peatland landscapes for example.

Estimation of the area and depth of peatland on Exmoor

On Exmoor the blanket bog area was mapped by Merryfield in 1977. He estimated that the total area was 65.28 km² but much of this was with peat deposits of less than 30cm and if these are subtracted from his total area of blanket bog peat it leaves only 12.44 km² which is a more reasonable estimate. Merryfield's over 60cm of peat area is much smaller again, only 3.526 km².

Anna Bowes carried out extensive peat depth sampling on the blanket bogs of Exmoor for her MSc in 2005. She sampled a total area of 24.4 km² (4137 depth measurements) and found an average depth of 0.33m of peat. She found peat over 0.5m in 674 of the measurements taken. This is equivalent to 16.292% of her total cores and 3.98 km² of her sample area. This is a slightly larger deep peat area figure than Merryfield's over 60cm peat area estimate of 3.5 km².

Bowes sample area however was considerably smaller than the total blanket peat area mapped by Merryfield. To generate a more accurate and detailed picture of where peat can be found on Exmoor there are some other data sources' which can be drawn upon. These include:

- Soil maps for the Exmoor Forest Area which have mapped categories for organic horizons (peat series), flushes and Peaty podzols.
- OS (Master Map) swamp and marsh areas. This a useful indicator of fens swamps and peaty pools which also includes salt Marsh but it is easy to separate these areas (Porlock Marsh) out of the data set.
- National park site survey and other records.
All of these records together with Merryfield’s areas and Bowes depth measurements are held digitally by the ENPA. When all the records are combined (Figure 1) (not including Merryfield’s), and any overlapping areas accounted for, it generates a total area figure of 33.5 km² of which roughly 3.5 km² is fens, flushes and marsh, the remaining 30 km² can therefore be used as an estimate of blanket peat on Exmoor.

**Peat volume calculations**

The most useful data for the generation of peat volumes is Bowes peat depth measurements. The blanket peat area deeper than 50cm within her sample area can be calculated as 4 km² (3.89 km²). The mean depth of these samples was 0.91m. This leaves a remaining 20.4 km² of her total sample area with peat shallower than 50cm. The mean depth for these sites was 19.9cm.

To calculate peat volume in the deeper peat areas multiply 4 km² by the mean depth of these cores (0.91m). This figure is 3,640,000 cubic metres.

To calculate the peat volume in the shallow peat areas; take 4 km² from the 30 km² of blanket peat I calculated and it leaves 26 km² of thin peat (under 50cm) on Exmoor’s uplands. If the mean depth calculated from Bowes under 50cm cores of approximately 20cm (19.9cm) is used it gives a figure of 5,200,000 cubic metres.

The two figures added together gives a total Blanket peat volume estimate of 8,840,000 cubic metres.

To calculate the peat volume in the 3.5 km² of fens and flushes is more problematic as it is such a variable and unrecorded resource and therefore difficult to give a mean depth for. Some fens have very deep peat deposits some have virtually none. If an average of 25cm is applied the volume figure is 875,000 cubic metres. This is a rough estimate and data is...
required to support this. If this fen peat figure is added onto the blanket peat volume the grand total is 9,715,000 cubic metres.

There are many inaccuracies in the data and it is likely that there are many small deposits and thin peat areas unaccounted for. If this is true the figure above is more likely to be an under estimate rather than an over-calculation. As a rough guide the rounded up figure of 10 million cubic metres (or metric tons) is suggested as an estimate of the peat resources of Exmoor.

**Carbon storage on the peatlands of Exmoor**

Accumulation rates in non-drained peatlands can be from less than 0.1mm/yr to more than 3mm/yr in the fastest growing bogs. Exmoor's Molinia covered uplands are not thought to be depositing much peat, particularly those area which are regularly burnt, but the areas with healthy blanket or other mire vegetation communities will be laying down peat.

World wide peatlands contain about 35% of the global terrestrial Carbon store (IPCC figures). The carbon content of peat is variable dependant upon factors such as age, type of source material, degree of humification, etc, but roughly 50% of the dry organic matter is Carbon. The International Peat Society book "Wise use of Mires and Peatlands" states that: Per Metre cube of extracted peat (if burnt or left to dry and oxidise) some 50kg of CO2, 11.4g of methane and 4.3mg of N2O is emitted (this assumes the peat has a bulk DW density of 100kg m3 and a Carbon content of 50%).

The carbon content of wet un-drained peatlands is considerably less than 50% as most undisturbed peat deposits are more than 80% water. The distribution of peatland in Europe was mapped for the IPCC by L. Montanarella, R.J.A. Jones and R. Hiederer and they found that peat generally contains >12% organic carbon (OC), equivalent to >20% organic matter (OM) by Weight (the other 80% is water) The widely accepted ratio for OC:OM of 1:1.72 was adopted in their study.

If there are approximately 10 million cubic metres of peat on Exmoor as calculated, roughly 80% of this is water, 20% organic matter and only 10 to 12% organic carbon. Using the lower 10% figure this gives a total estimate of 1 million cubic m (1 million tons) of carbon on Exmoor.

**How much CO2 is stored in peat on Exmoor?**

- A carbon atom has a weight of 12, and each oxygen atom has a weight of 16, giving each molecule of CO2 an atomic weight of 44.
- Therefore, to calculate the amount of CO2 produced from a ton of peat, the weight of the carbon in the peat is multiplied by 44/12 or 3.7.
- If all this peat was to be removed from Exmoor by Oxidation erosion, peat cutting or other means this would release 3.7 million tons of CO2 into the atmosphere.

Compared to the total UK annual CO2 production of 156.9 million tons in 2004 (Defra figures) this is a small amount but on regional scale it is of grater significance. It is for example approximately 10 times the annual emissions from the whole of West Somerset District area.

**References**


Defra, UK - News - News releases 2004 UK climate change sustainable development indicator and greenhouse gas emissions final figures


Montanarella, L. Jones, R.J.A and Hiederer, R. (2006) The distribution of peatland in Europe Mires and Peat, Volume 1, Article 01,

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