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THE BALANCE AND UTILIZATION OF FINNISH NATIONAL PEAT BIOMASS RESOURCES

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SUMMARY

4.8 mill. hectares of Finnish peatlands have been ditched for forestry, leaving 4.1 mill. ha of unditched peatland including 1.1 mill. ha of mires for conservation. Peat production amounts to 25 TWh/a (0,063 mill. ha). A total of 6.7 mill. ha of mires are actually engaged in binding carbon, which may be taken to bind a total of 3.44 mill. metric tonnes of carbon a year. Energy generation by means of peat will release about 3 mill. tonnes of carbon. While the annual mean increment in peat thickness for all virgin mires is 0.38mm, which in a repaludified peat production area is as much as 6.6 mm.

KEY WORDS: carbon, peat, peatland, energy, biomass

FINLAND'S PEATLAND AREA AND ITS DISTRIBUTION BY MODE OF USE

According to the Geological Survey of Finland the country has a total of about 9.3 million hectares of peatlands, i.e. areas where the mineral soil is overlain by a peat horizon and/or at least 75% of the area's vegetation consists of mire plants. Within this figure about 5 million hectares can be regarded geologically as mires, having a surface area of over 20 ha and a peat depth of more than 0.3 m.

Of the above 9.3 mill. ha of peatlands, some 4.8 mill. ha have been ditched to promote forest growth, leaving 4.1 mill. ha of unditched peatland, including 1.1 mill. ha of mires protected under conservation orders. About 0.33 mill. ha of peatlands are in use for agriculture and about 0.063 mill. ha for peat production (GTK 2010, Fig. 1.), comprising 5000 ha used for the production of sod peat and 58 000 ha for milled energy generation peat, as of 2009 (VTT 2010).

According to the national strategy for the utilization of peatlands, about 1.6 mill. ha of ditched peatland is estimated to be in need of further ditching to maintain it in a productive condition. While some 830 000 ha of ditched peatland may be regarded as unsuitable for forestry purposes, about 8-11% of this area is suitable for peat production. Thus Finland possesses about 700 000 ha of ditched peatlands that could be actively restored to a natural condition or simply be allowed to become paludified once more.

The area of protected mires in Finland is almost 20 times as great as the area actively subject to peat production measures at the present time. Additionally 100000 ha or so has been

recommended be added to the mire conservation programme in the national strategy for the sustainable utilization of mires and peatlands (MMM 2011).

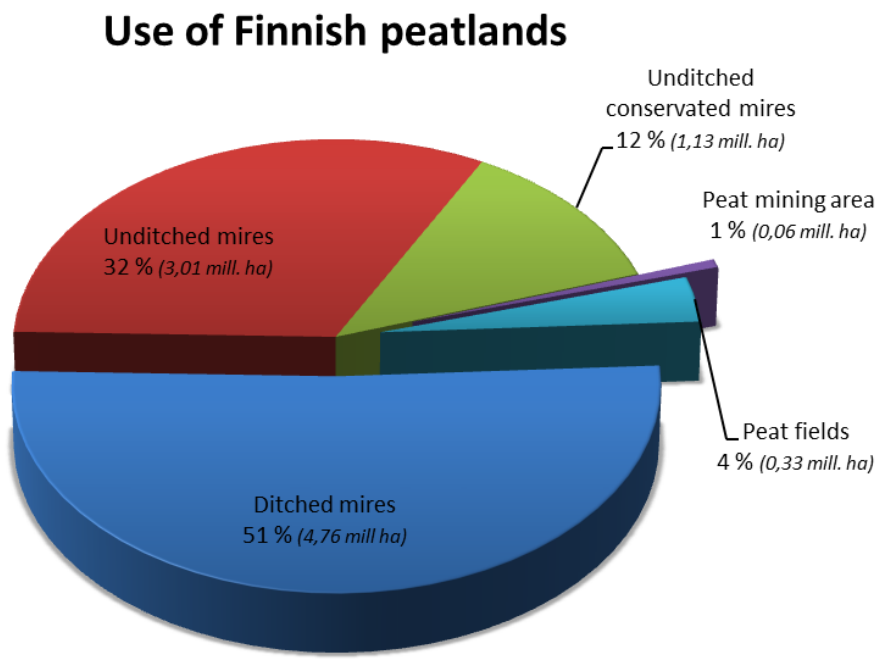

Fig. 1. Use of Finnish peatlands.

PEAT PRODUCTION

Large-scale peat production began in Finland in the 1970s, in response to the energy crisis, and nowadays production amounts to some 25 mill. m^3 in storage, which corresponds to the current level of use for energy generation purposes of about 25 TWh/a. By 2020 this latter figure is estimated to be around 28 TWh and the resulting peatland area required for production some 71 000 ha (VTT 2010). Taking into account the 37 000 ha that will no longer be in production by that time, this means that about 50 000 ha of new peatland will be needed for energy generation. It has been estimated that at this rate of utilization the country's peat reserves in areas suitable for peat production will suffice for around 500 years (VTT 2010). About 3 000 ha of peatland is released from production every year, most of which is taken over for forestry and agricultural use. In the parts of the country where there are few mires remaining in a natural state it is nevertheless possible to succeed fairly quickly in creating a new environment resembling a natural mire or a small lake in the process of filling in to become a mire (Vasander & Roderfeld 1998).

PEAT GROWTH AND THE CARBON BALANCE

While the annual increment in peat thickness on a mire in its natural condition is at most less than 2 mm and the mean for all mires in Finland is only 0.38mm, that in a spent peat production area is 17 times this figure, as much as 6.6 mm. The dry density of the peat in rapidly growing horizons is very low of course, only 27 kg/m^3, whereas the mean for all Finnish mires is 106 kg/m^3. In spite of this, just as much dry matter and carbon per unit area is

bound in this peat as in the growth of forests in Finland on average, i.e. 4–5 times that the mean amounts bound in peat. Still more efficient, about twice the rate achieved with natural restoration of mire conditions, is the binding of dry matter and carbon on spent mires restored by means of active cultivation of *Sphagnum* mosses (Uosukainen 2011).

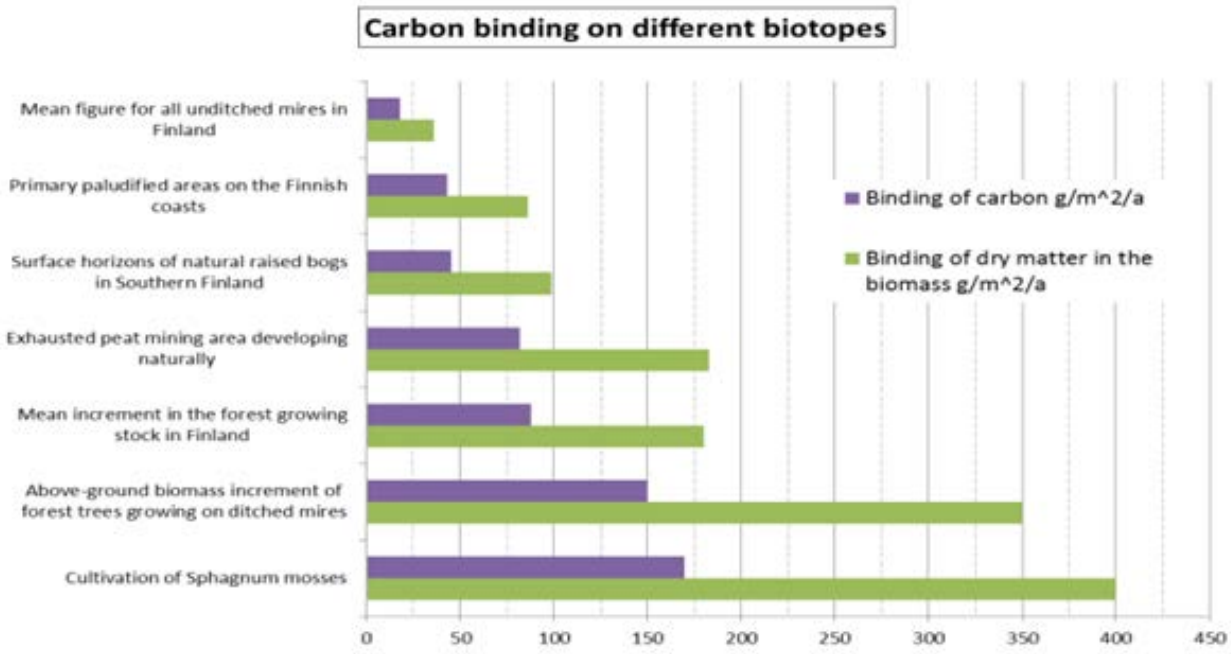

Fig. 2. Carbon binding on different biotypes in Finland.

After subtracting the areas of cultivated peatlands, peat production sites and forested drained peatlands from the total area of peatlands in Finland, we obtain a figure of 6.7 mill. ha for the mire area actually engaged in binding carbon, which may be taken to bind a total of 3.44 mill. metric tonnes of carbon a year. If energy generation by means of peat reaches 28 TWh/a by 2020, this will release about 3.28 mill. tonnes of carbon (Mäkilä 2009), which implies that the figures will be in approximate equilibrium.

The majority of carbon binding takes place in Northern Finland. Although the carbon figure per hectare is lowest of all in Lapland, most of untouched peatlands are in Lapland and therefore it is there that the majority of the country's peat growth is located. In Western and Southern Finland carbon binding does not equal the amount released by the use of peat for energy generation.

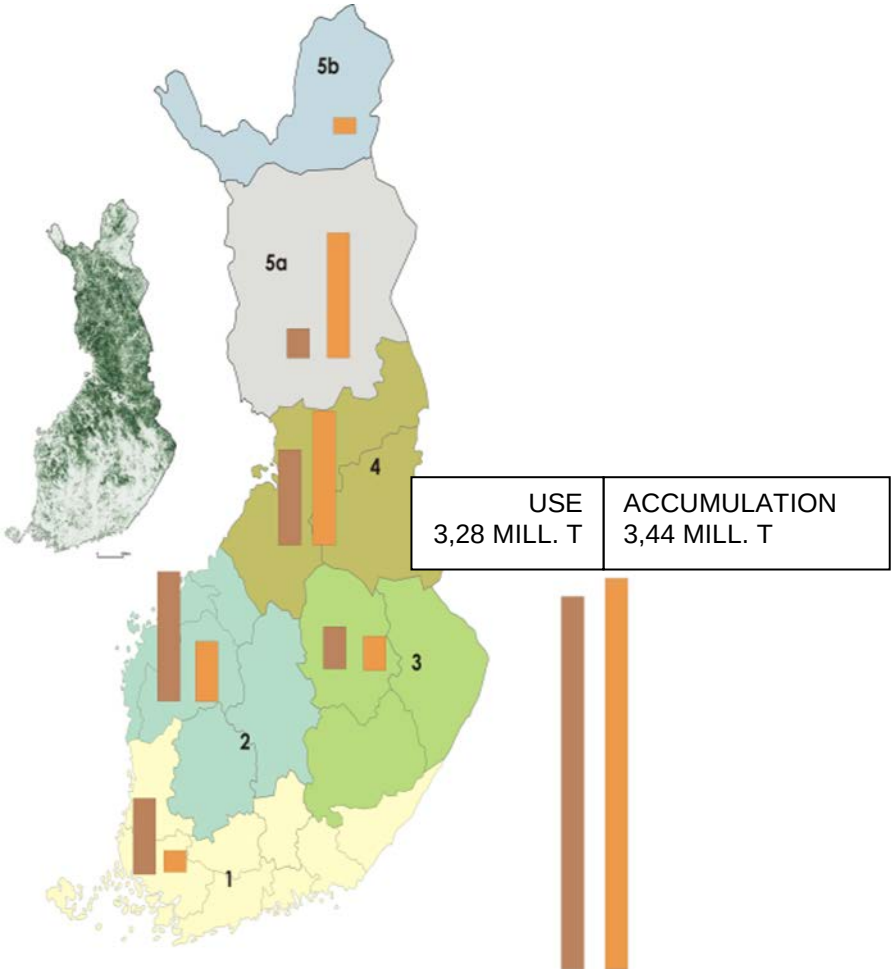

Fig. 3. Fig. 3. Estimated use and accumulation of carbon in Finnish peatlands in 2020.

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