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PEAT HARVESTING POTENTIAL OF AGRICULTURAL PEATLANDS IN THE SEINÄJOKI REGION IN FINLAND.

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SUMMARY

Peat harvesting from agricultural fields has a smaller impact on nature than traditional peat harvesting. The original mire state has already been destroyed in agricultural fields and the peat is decomposing rapidly. Therefore, it would be wise to harvest peat from agricultural fields instead of pristine peatlands. This is why peat harvesting possibilities of agricultural land in western Finland were studied.

The fields with best peat production possibilities were searched with Geographical Information System (GIS)-analysis and field measurements.

The GIS-analyses alone were not enough to give precise information about the peat thickness but gave information about interesting sites. In total 13 field sites were studied; 3 had good peat harvesting possibilities, 10 had moderate or poor peat harvesting possibilities due to thin peat layer, small harvestable area or high mineral content.

KEY WORDS: agriculture, peat field, peat harvesting, GIS-analysis

INTRODUCTION

There is a growing interest to harvest peat from agricultural peatlands. Peat harvesting from agricultural fields has a smaller impact on nature than traditional peat harvesting. The original state of nature has been destroyed in agricultural fields and the peat is decomposing rapidly. Agricultural peatlands are already dried, so the peat production can be started immediately on suitable sites.

However, only a few studies about finding the best peat harvesting sites on agricultural peatlands have been conducted so far in Finland or elsewhere. Kokkonen (1995) studied agricultural peatlands for peat harvesting by using soil maps and aerial photos. Soil maps and aerogeophysigal gamma radiation data has been used to find agricultural peatlands for peat harvesting in Sweden and in Finland (Berglund & Berglund 2003, Virtanen & Vanne 2008).

The aim of this study was to collect available digital mapped data and use it to find farmland that has good peat harvesting possibilities. Some kind of estimate about the peat thickness was also needed to estimate the volume of peat.

MATERIAL AND METHODS

To find thick peated agricultural fields Geographical Information System (GIS)-analyses were done. In GIS-analyses different kind of mapped data is layered on each others. All layers represent different information about the area. In this study ESRI ArcMap-program was used. In GIS-analyses it is possible to combine information of different layers and get new layers with refined data.

In the GIS-analyses a lot of differerent data sources were used. Agricultural field-, road- and buildings data were received from the Basic map (National Land Survey of Finland 2009). Soil data were received from two different sources. The soil map from Geological Survey of Finland (2008) covers only about half of the study area. In the remaining area the less accurate Soil database from Agrifood Research in Finland (2007) were used. To predict the thickness of peat Aerogeofysical gamma radiation data from Geological Survey of Finland (2010) were used. Some peat core depths from Geological survey of Finland (2010) were used to calibrate the gamma radiation data. Information about protected areas were received from Finnish Environment Institute (2010).

The GIS-analyses were done in several phases. The agricultural peatlands were found by cutting the agricultural fields map with the areas that were indicated as peat in the soil data. In the new peat soil layer the peatland areas were simplified a little bit by merging areas which were divided by roads or narrow obstacles. The gamma radiation data were classified by using the pre measured depht points of agricultural peatlands. Water reduces the amount of gamma radiation that is emitted from the mineral soil. Peat in the research region is known to contain a lot of water. So peatlands and lakes are low radiation areas on the gamma radiation map. All points where the gamma radiation intensity was less than 0.7 were considered as deep peat areas. To get a layer with agricultural deep peatland the deep peated areas were cut from the agricultural peatlands layer. A 400 meter perimeter was made around houses, and it was excluded from the agricultural deep peat layer. The areas on ground water reservoirs also were excluded.

At this point the final layer was ready. It contained the area with 1. agricultural field 2. peatland 3.gamma radiation indicated deep peat 4. more than 400 meters from houses 5. not on ground water reservoir area.

Some of the most promising sites were studied in the field to verify the results of the GIS-analysis. Peat studies were done with a peat borer, and laboratory analyses. The peat was studied at depths 0-10, 10-40, 50-80 and a 30 cm sample from every half meter after 100 cm. The peat type, decomposition degree and moisture content were observed. The location and practical possibilites to start peat harvesting also were studied.

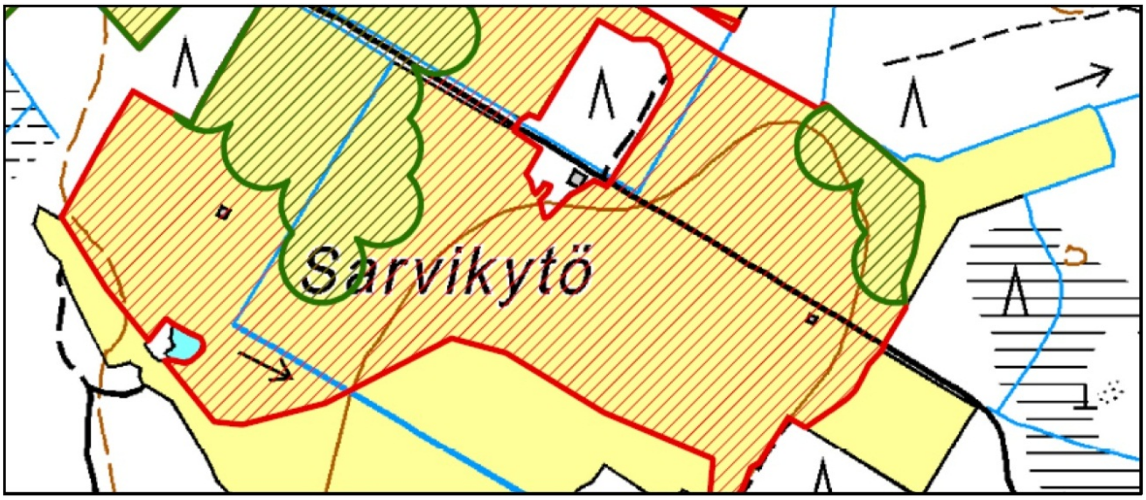

Fig. 1. An example of the GIS-analyse. Peatland according to soil maps are marked with red. The area where low gamma radiation intensity indicates deep peat is marked with green. There is a basic map in the background, in which agricultural fields are marked with yellow colour.

RESULTS

From the total study area 720 376 ha, 168 070 ha (23 %) was agricultural land. From the agricultural land 28 447 ha (17 %) was on peat. Taking out the areas near houses and groundwater reservoirs the peatland area was reduced to 13 620 ha (48 %). Finally the amount of thick peated agricultural areas was 3 703 ha (13%). Thick peated agricultural areas based on GIS-analyses represent thus only 0.5 % of the whole study area.

Table 1. Land areas in different phases of the GIS-analyses.

	Area hectars	% compared to previous
Research area	720376	
Agricultural fields	168070	23.3
Peat fields	28447	16.9
Peat fields not close to houses	13620	47.8
Thick peated fields not close to houses	3703	13.0
Thick peated fields not close to houses represented 0.51 % of the whole research area.		

The harvestable peat volume in the 3 best sites were approximately 300 000 m^3 each. The peat was clean and the drainage possibilities were good. There were 100 000 – 190 000 m^3 of peat in 5 sites. The rest 5 had less than 65 000 m^3 of peat.

The GIS-analyses alone were not enough to give precise information about the peat thickness. But they did give information about interesting sites to be studied more closely. In total 13 field sites were studied; 3 had good peat harvesting possibilities, 10 had moderate or poor peat harvesting possibilities due to thin peat layer, small area or high mineral content.

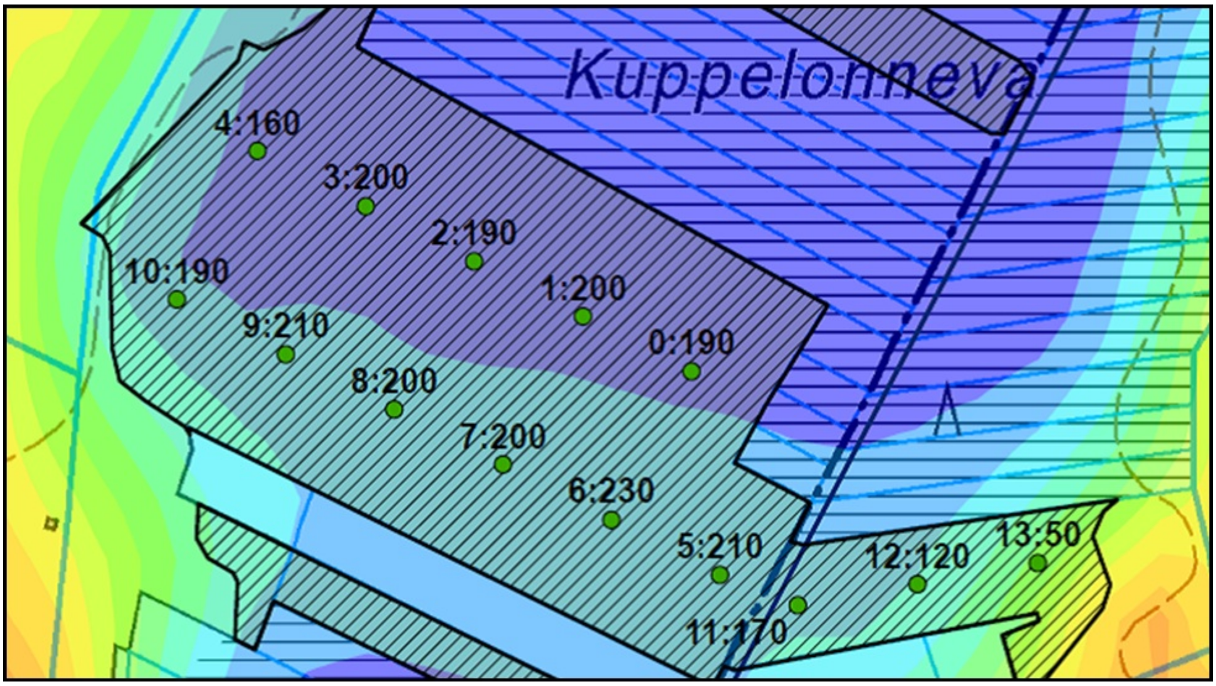

Fig. 2. A site with thick peat. The dots represents boring points. The number of boring point is displayed first and the depth of peat in centimeters next. The fading colors shows the amount of emitted gamma radiation. Red colour means: a lot of radiation, and dark blue means: almost no radiation at all.

CONCLUSION

There are some agricultural peat fields for peat harvesting in the Seinäjoki region. GIS helps to find sites to study more closely, but on-site studies are needed. The agricultural peatlands are easy to find using soil maps. But determing peat thickness only by the gamma radiation data is not enough to receive precise results. Also areas which are poor peat harvesting sites due to landuse in the past years have to be recognized on-site. More peat borings should have been done. It would be important to do a similar study on forested peatlands, because there are more of them than agricultural peatlands. However, the area of agricultural fields with peat harvesting potential was small when compared to the traditional peat harvesting area in drained peatland forests and undrained peatlands.

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REFERENCES

Agrifood Research in Finland. (2007). Soil database.

Berglund, Ö & Berglund, K (2003). Kartering av organogena jordar med hjälp av digitaliserade databaser - ett pilotprojekt. Swedish University of agricultural sciences.

Finnish Environment Institute (2010). Protected areas.

Geological Survey of Finland. (2008). Soil map.

Geological Survey of Finland. (2010). Aerogeophysical gamma radiation data.

Geological survey of Finland (2010). Peat core depths.

Kokkonen, J. (1995). Oulun läänin pohjoisosien ja Lapin läänin eteläosien turvepohjaisten peltojen soveltuvuus turvetuotantoon, Oulu University.

National Land Survey of Finland. (2009). Basic map.

Virtanen, K & Vanne, J. (2008). Selvitys todennäköisten turvepeltojen sijainnista Keski-Suomessa GTK:n gamma-aineiston perusteella. Geological Survey of Finland.