Peat mining in Finland in relation to other mire uses and its landscape role

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Introduction:

The purpose of this article is to give some background information on the situation of mire utilization in Finland. In Finland mire are used for agriculture, for forestry, for water reservoirs, and mires have been destroyed also by road network and with different construction activities. Mires have been lost a great deal of their original diversity (Lindholm & Heikkilä 2006). The use and destruction of mires, including the peat mining started actively after the Second World War. Rather early it was noticed that our mires needs more protection (Keltikangas 1955), but at that time the worst was just in future. Finally although, we have lost a great deal of our mire, we have also had active mire protection programmes with some success (Kaakinen & Salminen 2006, Lindholm & Heikkilä 2005).

Because this is not the study of these questions presented here, the purpose is to raise up the need to have GIS based land use analysis on the landscape effects of peat mining as related to other mire use patterns in landscape and to integrate that on environmental assessment and analysis of impacts peat mining and other land use of mires. The case area, presented here, the mire dominated area in Northern Ostrobothnia, in middle part of Finland, east of town Oulu, is urgent, but also ideal for the study.

Mire statistics from Finland

Due to the climate and topography, different mires are widespread in Finland. 26% of the land area of Finland is covered by mires. Based on volume parameters, there is a peat mass over 96 milliard m^3. There is 4.8 milliard tonnes storage of carbon. Some estimates put the amount of peat in Finland alone to be twice the size of North Sea oil reserves. This abundant resource (often mixed with wood at an average of 2,6 %) is burned in order to produce heat and electricity. The contribution of peat to greenhouse gas emissions of Finland can exceed a yearly amount of 10 million tonnes carbon dioxide, equal to the total emissions of all passenger car traffic in Finland. This is not the only harmful problem, which rises from peat mining. It causes biodiversity losses and has many landscape level impacts.

Forestry is an important industrial and land use sector in Finland and pristine mires have regarded as a valuable resource for forestry. Therefore large areas of mires have been drained for forestry purposes, covering a total of 5.7 million hectares of former mires. Thus Finland has carried out the world's most extensive programme of mire draining the agricultural use of mires has reduced the mire area by about 1.2 million hectares. Most of the water reservoirs have been built in mires, covering altogether 60

000 hectares. Peat mining has remarkably smaller proposition in mire utilization so far about 662 000 hectares of mires are reserved for mining and about 100 000 hectares are in mining use. . (Lindholm & Heikkilä 2006) But that is, however, greater ecological, hydrological and local landscape influence, which rather easily remain back of Finnish land use statistics. By different tools a total 1.13 hectares mires have been protected in Finland (Kaakinen & Salminen 2006). All these use pattern have resulted a remarkable landscape change in Finnish mire characterized landscapes (Kallio & Aapala 2001)

Finland as a peat miner

Finland is the biggest peat user and miner in the world. About 35 % of the known commercial energy peat is excavated in Finland other major energy peat users are Ireland, Russia, Belarus, Estonia and Sweden. Most of the mined peat is used locally or regionally, and little is exported. The role of peat has been emphasized as one of few native energy sources in Finland. Also the social aspects are important – peat mining offers work in rural areas of high unemployment rates. In Finland peat is often used as a fuel for heat and power production together with wood fuels. The annual energy peat production amounts to around 20–25 million cubic metres. In fact in last two decades the amount has varied between 5 and 33 million m^3 annually. Peat is produced in summer, and the depth of rainfall, among others, affects it. Mainly milled peat, but also sod peat to some extent, is produced for energy use in Finland. In addition, 1–2 million cubic metres of garden peat are annually produced for both exports and domestic use. Nearly 50,000 hectares of mires and mires are used for peat production. Peat can be produced from 15 to 20 years at the same site.

The annual amount of mined energy peat depends mainly on weather and varies greatly. In general, the amount of used peat has been quite stable in last years. The proportion of peat of all energy sources in Finland is about 6 %. Most mires in Finland are not even technically suitable for peat mining. Mires, which are technically suitable for the peat industry, cover a total area of 1.2 million ha (the peat reserves of Finland in 2000.) (Virtanen & al. 2003). But for practical suitability is remarkably less than this at this moment. This is theoretical maximum, where the effects of nature protection, peatland farming and other practically excluding land use criteria's are in practice limiting the peat mining option. In technical calculation also there is no size limit for the area. According the Ministry of trade and industry GSF estimates that the Finnish peat reserves suitable for production purposes cover around 700,000–800,000 hectares. . In the previous peat resource report, with different criteria's (Lappalainen & al 1993) the GSF estimated the amount of mires suitable for the peat industry total 622 000 ha.

Approximately 10 per cent of this area (Lappalainen & al 1993) is currently in use. So at present, the active production area constitutes 60 000 hectares. Ecologically affected area is, however, remarkably larger, roughly estimated about twice in area. Even if the use of peat was maintained at the current level, the area would however increase further due to industrial peat mining. A new areas of mires is required approximately every twenty years. Over the whole country, an average of 2 000 hectares yearly are mined to be empty. As a whole 30 000 hectares has already been abandoned from use. And whatever happen to the site after mining it will develop to

something else than intact thick peated mire

Normally peat mining is profitable in mire areas, which are more than 2 metres deep and are more than 50 hectares in area. The amount of this kind of mires is estimated to be about 810 000 hectares. In addition, there are about 500 000 hectares different marginal areas of mires and peatland areas drained for agricultural use, which could be used for peat mining.

Peat miners own about 144 700 hectares, which is about 1.6 % of the total amount of mires in Finland. Peat is recently mined in an area of 60 000 hectares. In addition, about 100 000 hectares have been prepared or are reserved for peat mining. This is 1,6 % of Finnish mire area. The main problems of peat mining are increased CO^2 emissions, loss of large pristine mires, and decline in water quality, dust and noise. Environmental impact assessment is required if the peat mining area is bigger than 150 hectares, and permission from Environmental Permit Authority is required.

In Finnish energy policy, accepted by Finnish government the domestic origin and the related security of energy supply, as well as employment particularly in the northern and eastern Finland have been the primary criteria for supporting the energy use of peat. Today peat is a competitive fuel in its natural areas. Technically it is an excellent fuel to be used together with wood in particular, which when used by it often causes technological problems and its availability is not as stable as that of peat.

Peat mining for industrial purposes constitutes the only remaining problem of significance for non-protected mires which remain in a natural condition and uphold natural values of in spite of ditching.

Peat mining organisations and authorities supporting mining often argue that peat mining affects such a small area that it has no substantial influence on the ecosystem. However, although the statistics suggest that the area cut is less than half a per cent of the present area of mires, the mining of peat is no inconsequential mode of land use.

One third of the peat resources which are technically suitable for use are located in Lapland. These would provide peat for 2000 years (Virtanen & al. 2003), but the exploitation of Lapland's peat resources is at present economically non-profitable. Further south, in the main areas of peat use, the reserves are already in intensive use and, at the present rate of use, are sufficient for a period of several decades to a couple of hundred years.

A case: Peat mining in Northern Ostrobothnia

The most significant environmental impact caused by peat mining is its effect on the locality. Peat is a local fuel, and its transportation over long distances is not sustainable. In areas where it is used to a substantial extent for energy production, peat mining constitutes an intensive mode of land use. There is several environmental problems in peat mining and ministry of environment in Finland has tried to mitigate the problems by environmental guidelines (Ympäristöministeriö 2003)

Mining of fuel peat has concentrated in a central area in Northern Ostrobothnia. In

addition, new, extensive areas of mire are continuously required, since the peat layer of one mire is exhausted in approximately 20 years. Peat mining has a critical effect on the remaining mire nature, since northern peat mining fields are mainly established on mires which are in a natural state. In the area to the south of the River Oulujoki, peat mining fields are established mostly on areas with a higher percentage of ditched mires. However, also in cases, peat mining fields has established on mires in which the central areas are often remained unditched

Since Northern Ostrobothnia is a core area for peat mining, it was to be expected that peat mining would receive special consideration in regional planning, with particular attention paid to the ecological sustainability of the land use. The Planner investigated and compared the quantitative options for peat use: declining, current level and increased production.

More south, in Central Ostrobothnia, where peat use is also extensive, and an inquiry on sustainable use has been undertaken to regulate the scale and location of peat mining. Practices vary, however, in different parts of Finland, although peat is utilised in the majority of the provinces. Nevertheless, only the North Karelia Environment Centre has produced a status of mires report for the region (Ohtonen & Kotanen 2003).

On a local scale, the destruction of mire nature is exacerbate by the fact that, for reasons of economic viability, the mining of fuel peat is concentrated on mires which lie in the proximity of the consumer, so that the smaller mires in the area may also be then mined. This type of concentration of peat mining, involving as much as thousands of hectares, destroys all the mire nature in the area completely. Moreover, it causes a significant impact on the water system, since water pollution controls work efficiently only during fine weather in summer.

Sedimentation basins or overland flow areas, which are the most typical water protection systems in peat-mining areas, are not able to prevent the leakage of nutrients and solid matter during spring floods or summer downpours. These are inevitably flushed into the waterways downstream. The impact on the water system is worsened by the fact that the waters in the peat-mining areas are generally already subject to an environmental load as a result of other human activities. For example, in the larger peat-mining areas of North Ostrobothnia, there is an emerging need for intensive treatment of the waters. In this area, several watercourses are already under treatment. The restoration of eutrophicated and silted waterways is time-consuming and expensive.

Some future tools in mire protection work

The Ecosystem approach to mire ecosystems

Support for legislation reform may be forthcoming in the next Biodiversity Programme, which is the Finnish strategy and action plan for the conservation of biodiversity and sustainable practice for the years 2006-2016. The Programme proposes a move to emphasise the conservation of biodiversity in the preparation of new legisla-

tion governing the use of natural assets and land use of areas, as well as in the enforcement of new community legislation. The ecosystem approach and different tool to get more connectivity between different habitats are important also for the wise use of mires, when the goal is to preserve also species and habitats. This is also European approach (Kettunen & al 2007)

In the planning of land use and other projects, the aim is to take ecosystems into better consideration as functioning entities which provide ecosystem services and ecological relationships. The intention is to focus on planning models which put the emphasis on global assessment of the conservation, maintenance and sustainable use of natural assets. Thus, emphasis can be placed on the perpetuation of the natural structures of environments and the activities of organisms which provide benefits for human beings, or the so-called assurance of the ecosystem services.

Further Conservation Measures for Mire

Finland has set the goal of halting the impoverishment of biodiversity in Finland by the year 2010. In addition, the country aims to establish positive developments in the state of the environment by 2010-2016.

There is an ongoing project on the assessment of threatened habitats in Finland (Kokko & al 2005). Mire habitats in different scale are assessed separately by mire scientists. Peat mining is considered as a threat factor among several other factors. But this is not straight a landscape approach, which would also be needed. In areas, where there is a concentration of peat mining units, and where peat mining is in the course of time widening to new areas, the landscape is changing dramatically. Even simple map and image censuses reveal that phenomenon. And finally studying landscapes, their structure, ecological status and changes in time the landscape photography can be valuable approach (see Heikkilä 2007).

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