

**Working Party on the Management of Mountain Watersheds
26th Session, 19-22 August 2008, Oulu, Finland**

FINLAND NATIONAL REPORT

1. Finland

Finland is situated in the boreal coniferous zone being the most extensively forested country in Europe. Total area of Finland is 330 000 km² being the seventh largest country in Europe and the second most northern country in the world. Finland is not a mountainous country; the area 300 metres asl. is only 5 percent of the total area. Its climate is, in spite of the northern location, very favourable to living conditions due to the warming effect of the Gulf Stream. The climatic balance is evidently very sensitive and thus it is important to understand the environmental effects of the predicated man-made changes in the climate. According to the estimates on the future climate change in Finland, by 2080 the average temperature could rise by 4 - 6°C and the average precipitation would grow by 15 - 25 %.

2. Climate change and water

Climate change will have many adverse impacts in forested catchments in Finland. The most important effect of climate change on hydrological regimes in Finland is the change in seasonal distribution of runoff. Winter runoff is expected to increase considerably due to an increase in snowmelt and rainfall, while spring floods are estimated to decrease in southern Finland. In winter, excess water from snowmelt and rainfall can cause winter floods.

Extreme runoff events are projected to be more frequent due to increasing maximum precipitation. High flows and intense rainfall increase soil erosion, chemical leaching, urban and livestock wastes and nutrients from catchments into watercourses and coastal waters. On the other hand, the possibility of dry periods is also expected to increase, due to a lengthening of the summer. During low flows, increased concentrations of bacteria, harmful algae and toxins are common. The report ¹⁾ describes impacts and adaptation to these effects in relation to the hydrological cycle. Multiple use and related environmental problems has been investigated especially in the Oulujoki River Basin ²⁾.

It is probable that the efficiency of the water protection measures commonly used at present in diffuse pollution control will be decreased. In order to be able to decrease the environmental impacts of these changes in water bodies, new adaptive mitigation measures should be rapidly developed and implemented. Especially synergies between sustainable forestry and environmental objectives of the Water Framework and the Flood Directives (WFD, FD) should be increased. New national and international projects are needed to be able to ensure adaptation of river basin and forest management to the adverse environmental impacts of climate change.

3. Climate change and forests

Problems in silviculture and management associated of the environment within high-elevation sites begin to be felt at the topographic elevation of 250 m asl. The impacts become more emphasised the further north the location is. The Finnish Government

has taken the decision to monitor the changes occurring in the regeneration of protection and high-elevation forests in periods of 10 years.

Climate change may in the near future have a totally new impact on the growth and regeneration of high-elevation forests and on the environmental effects of forestry. The frequency of extreme weather events like heavy rainstorms and prolonged hot, dry spells will increase and the winter periods of snow cover and groundfrost are likely to become shorter. More ecologically diverse forests are better able to adapt to changing climatic conditions.

Finland's forests absorb a significant share of the country's carbon dioxide emissions. Changes in total volumes of timber are the most important factor in the forests' carbon balance. When the amount of wood removed during harvesting is less than total forest growth, forests serve as net carbon sinks absorbing carbon from the atmosphere. Drained peatlands contrastingly release greenhouse gases overall, and thus act as net carbon sources. In future as fellings increase in line with the National Forest Programme, net carbon absorption will decline temporarily until young forests start to grow and bind up carbon again. The increased use of residual wood for energy will not greatly affect the overall balance, as litter on the forest floor would otherwise rapidly decompose and emit carbon. Finland's total carbon dioxide emissions averaged 78.4 million tonnes of CO₂ equivalent over the years 2002–2006, while the forests absorbed an average of 35.4 million tonnes annually.

In Finland, the amounts of timber logged in the forests each year are lower than the total annual growth of all their trees. So forests act as a net carbon sink, binding more carbon than they release into the atmosphere. Over the last 30 years the total amount of wood in Finland's forests has increased by about a quarter. Choosing to use wood or related products to replace fossil fuels or products derived from them can help to combat climate change. The share of wood energy in total energy consumption is higher in Finland than in any other EU country, at about a fifth. Using such renewable forms of energy greatly contributes to Finland's efforts to mitigate climate change ³⁾.

Carbon sequestration is promoted in forest management and protection and preparations are made for responding to the impacts of climate change. Climate change can also have positive impacts, such as increased growth, faster regeneration and more reliable seed production. There is as yet not enough information about climate change and its impacts on forest ecosystems.

Climate, forests (and other plants) and water are all linked together and understanding the interconnections between the three themes is one of the prerequisites for success of both mitigation and adaptation measures of climate change. As mentioned above sound forest management and protection has an undeniable role in mitigation. In addition, adaptation to climate change will be more difficult and more costly, if forest and water ecosystems are not sustainably managed and protected. Loss of ecosystems would decrease the resiliency of societies, for example, to the more frequent flooding and drought.

4. National agreements, projects and research programmes related to Climate Change

The Finnish Government has prepared to climate change creating a National Strategy for Adaptation to Climate Change ⁴⁾. Several ministries and research institutions

participated in its preparation, coordinated by the Ministry of Agriculture and Forestry. In high elevations and altitudes such as Lapland, multiple use of forests is enhanced. Demand for nature tourism and recreation are increasingly taken into account in forest management, landscape planning and overall land use.

According to the Finland's National Forest Programme 2015 ⁵⁾, Finland's official forestry recommendations will be duly revised to help forests thrive in changing circumstances. Climate change can have great impacts on growth, health and biodiversity of boreal forest ecosystems, and the positive and negative effects will have influences on the whole society. Therefore, it is important to take actions also to adapt the forest sector to the anticipated changes. The mitigation and adaptation actions will reflect on the international policy and the course of the forest sector, with increasing needs in future to combine the forest policy decision making as part of climatic issues. The Metla Research Programme "Functioning of forest ecosystems and use of forest resources in changing climate" aims in producing information of the impacts of climate change on forest ecosystems. Studies will be conducted to understand the forest and environmental policy actions and means that help in mitigating and adapting to climate change. The program also produces information in support of the greenhouse gas reporting dealing with forests.

In its development policy, The Finnish Government has acknowledged that sustainable use of natural resources and climate change issue are essential elements in promoting social stability, crises prevention and supporting peace processes ⁶⁾. A new development policy programme was adopted in 2007 and the programme adduces that poverty can be effectively and permanently eradicated only through sustainable development. Hence, it is expected that Finland's development cooperation will more and more include projects, which are aiming to sustainable and environmentally sound management forest and other natural resources.

¹⁾ *Silander, J., Vehviläinen, B., Niemi, J., Arosilta, A., Dubrovin, T., Jormola, J., Keskisarja, V., Keto, A., Lepistö, A., Mäkinen, R., Ollila, M., Pajula, H., Pitkänen, H., Sammalkorpi, I., Suomalainen, M. and Veijalainen, N.* 2006. Climate change adaptation for hydrology and water resources. FINADAPT Working Paper 6, Finnish Environment Institute Mimeographs. 336, Helsinki, 52 pp.

²⁾ *Hellsten, S., Korhonen, P., Rintala, J., Hokka, V., Heikkinen, K., Markkanen, S-L., Alahuhta, J., Karjalainen, S.-M., Kuoppala, M., Kyykkä, L., Marttunen, M., Ulvi, T. & Visuri, M.* Multiple use and related environmental problems of the Oulujoki River Basin. Finnish Environment Institute. Research programme for Integrated River Basin Management.

³⁾ New brochure Biodiversity in Finnish Forests: http://wwwb.mmm.fi/metso/international/Biodiversity_in_Finnish_forests_brochure_2008_ENG.pdf

⁴⁾ Finland's National Strategy for Adaptation to Climate Change, http://www.mmm.fi/attachments/5enfdAPe1/5kghLfz0d/Files/CurrentFile/MMMjulkaisu2005_1a.pdf

⁵⁾ Finland's National Forest Programme 2015. More Welfare from Diverse Forests. Government Resolution. Publications of the Finnish Ministry of Agriculture and Forestry, No 3b/2008.

⁶⁾ Development policy programme 2007. Towards a Sustainable and Just World Community. Government Decision-in-Principle 2007. Ministry of Foreign affairs of Finland.