

FINAL REPORT

**Oulu,
Finland,
19-22
August
2008**

EUROPEAN FORESTRY COMMISSION

Working Party on the Management of Mountain Watersheds

Twenty-sixth session

EUROPEAN FORESTRY COMMISSION

**WORKING PARTY ON THE
MANAGEMENT OF MOUNTAIN WATERSHEDS**

TWENTY-SIXTH SESSION

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**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2008**

INTRODUCTION

1. The twenty-sixth session of the European Forestry Commission Working Party on the Management of Mountain Watersheds was held in Oulu, Finland, from 19 to 22 August 2008. The session was jointly organized by the Finnish Forest Research Institute (METLA) of the Ministry of Agriculture and Forestry, the Finnish Environment Institute (SYKE) of the Ministry of the Environment, and FAO. The main topic under discussion was “Forests, water and climate change in high altitude and high latitude watersheds”. The agenda and the session programme are presented in ANNEX A and ANNEX B respectively.

2. On 21 and 22 August the hosts of the session organized a study tour. The itinerary, themes and lecturers are presented in ANNEX D and ANNEX E respectively.

3. The session was attended by 37 lecturers, delegates and observers from the following countries and international organizations: Austria, Czech Republic, Finland, France, Hungary, Poland, Romania, Slovak Republic, Sweden, Switzerland, Turkey, FAO, ICIMOD, IUFRO, MCPFE, UNESCO and the European Science Foundation. Germany, Spain and UNECE Water Convention submitted reports and statements but were not able to participate. The relevant list of participants is presented in ANNEX C.

OPENING OF THE SESSION

4. The twenty-sixth session was opened by Mr. Eero Kubin, Director of the Muhos Research Unit of METLA and Vice Chairman of the Working Party, who welcomed all the participants on behalf of the Finnish Ministry of Agriculture and Forestry. Mr. Kubin acknowledged and thanked Mr. Samuli Kemppainen and Ms. Sirpa Kotikangas-Venäläinen of the Organizing Committee. Mr. Kubin also thanked Mr. Thomas Hofer and Mr. Paolo Ceci of the Working Party Secretariat (hosted by FAO) as well as all those Finnish Institutions that made a contribution to the organization of the session. He introduced and welcomed the other members of the Steering Committee: the Chairwoman of the Working Party – Ms. Maria Patek from the Austrian Ministry of Agriculture, Forestry, Environment and Water Management – and the Vice Chairman – Mr. Edward Pierzgalski from the Polish Forest Research Institute. Finally, he invited all participants to introduce themselves and to specify their organization affiliation.

5. In her welcoming address, Ms. Maria Patek thanked METLA and FAO for the preparation of the session. She also thanked Ms. Marketta Juppi (not present at the session) from the Forestry Department of FAO, for having put together the background paper to the session. Ms. Patek introduced the main topic under discussion and stressed the increasing importance of the interrelations between forests, water and climate change, in particular their relevance for the on-going international agenda as well as for national problems and challenges. She wished the organizers and the participants a very successful and fruitful session.

KEYNOTE ADDRESSES

6. Mr. Jouni Pursiainen, Dean of the Faculty of Sciences of the University of Oulu, presented the faculties and disciplines of the University, its geographical area of influence as well as figures related to staff, students and degrees awarded. He introduced the international student exchange programme and the main areas of research: information technology and wireless communications; biotechnology and molecular medicine; northern and environmental issues. Further, he presented in more detail the structure and the departments of the Faculty of Sciences and concluded by highlighting current challenges and future changes in University's set up. He wished the participants an interesting session.

7. Mr. Thomas Hofer, FAO Forestry Department and Secretary to the Working Party, welcomed the participants on behalf of Mr. Jacques Diouf, Director General of FAO, and Mr. Jan Heino, Assistant Director General of FAO's Forestry Department. Mr. Hofer thanked all the participants for

their presence and for their active collaboration and regretted that some countries were not able to participate (e.g. Germany, Norway, Spain, etc.). He expressed appreciation for the high level of participation from Eastern European countries and international organizations and particularly welcomed the Turkish delegation for the first time in a Working Party session. As already pointed out by Ms. Tytti Tuppurainen, the Chairwoman of the Council of Oulu Region, during the informal welcome party the evening before, Mr. Hofer then stressed the fact that since the Salzburg session in 2006 climate change and the linkages between forests and water have been getting more and more attention. The MCPFE Warsaw Resolution 2 on Forests and Water certainly played a key role in this regard. He highlighted the large number of forest and water related events being organized in the course of 2008. The particular location of the 26th session provided the opportunity to choose a very challenging topic for the seminar with contributions from highly experienced speakers and to further enrich the session by the study tour and the country reports on forest, water and watershed management. The connection between the core concerns of the Working Party and the on-going international agenda evidenced the fact that the work of the Working Party was getting more and more important. In future, Mr. Hofer wishes to see a more active collaboration from Mediterranean countries, a stronger linkage with the European Forestry Commission, and the involvement of new stakeholders (e.g. private sector and extra-European countries). Following the model applied for the 25th session, the organization of the 26th session entailed reduced formalities and a greater attention to substance and contents.

Mr Hofer updated the participants on institutional changes which are going on within FAO. He particularly mentioned the follow-up to the Independent External Evaluation and the newly drafted Forestry Strategy, which the attendees were expected to comment on. He concluded by wishing the best of success to the session and by thanking METLA, the Finnish Ministry of Agriculture and Forests, the Council of Oulu Region and the University of Oulu for the outstanding efforts made in the preparation for the event.

8. On behalf of the International Union of Forestry Research Organizations (IUFRO), Mr. Gernot Fiebiger delivered a welcome address to the Finnish hosts, the members of the Working Party's Steering Committee, the Representative from MCPFE and all the attendees. He mentioned the more than 50 years of co-operation between IUFRO and the Working Party in the field of mountain watershed management. In light of the most recent natural disasters and the increasing pressure on mountainous areas, Mr Fiebiger flagged the important role of modern integrated watershed management and forests in relation to sustainable mountain development. He commended FAO for having created once again, on the occasion of the 26th session, a very appropriate platform for knowledge sharing, emphasized FAO's leading role in sustainable mountain development and the management of fragile ecosystems, and acknowledged the mutual collaboration of FAO and IUFRO. Further, Mr. Fiebiger illustrated IUFRO's mission of strengthening science-based sustainable management of forest resources for economic, environmental and social benefits, and provided an overview of the work carried out by the Forest Environment Division, in particular the Research Group on Natural Disasters with its four working parties.

9. Ms. Kjersti Bakkebo Fjellstad, the Representative of the Secretariat of the Ministerial Conference on the Protection of Forests in Europe (MCPFE) in Oslo, delivered a keynote address explaining the history, mandate, structure and activities of the MCPFE. MCPFE is a high-level policy process dealing with sustainable forest management in Europe. Ministerial Conferences, which are open platforms for dialogue, are held every four years gathering 46 ministries from Europe plus the European Commission. So far, five Ministerial Conferences, resulting in nineteen resolutions, were held. Resolutions entail ministerial commitments and follow-up actions. The 5th Ministerial Conference was held in Warsaw, 5-7 November 2007, and resulted in two resolutions: Warsaw resolution 1 "Forests, Wood and Energy"; and Warsaw resolution 2 "Forests and Water". The second Resolution is obviously of particular relevance to the area of concern of the Working Party and to the topic of the 26th session.

ADOPTION OF THE AGENDA

10. The agenda is discussed and adopted. It is presented in ANNEX A.

REPORT ON INTER-SESSIONAL ACTIVITIES FOLLOWING THE 25TH SESSION

11. Mr. Hofer reported on the inter-sessional activities conducted by the Working Party Secretariat and the Steering Committee during the period between the two sessions and in preparation for the 26th session. Seven areas of work were highlighted under this agenda item:

- **Steering Committee Meetings**
 - a. Rome, December 2006, followed by an excursion to the Gran Sasso National Park
 - b. Vienna, January 2008, followed by an excursion to “Buckeliges Land”
- **Communications**
 - a. newsletter
 - b. leaflet
 - c. web site
 - d. logo (submitted by METLA)
- **Contact to countries**
 - a. “revival” of countries (countries which had been active in the past but which have not participated in the last sessions)
 - b. “activation” of countries (countries which have never participated in sessions and activities of the Working Party but which would add significant value and experience)
 - c. call for country pages
 - d. intensified contacts to the European Forestry Commission
- **Publications**
 - a. The new generation of watershed management programmes and projects (in English, French and Spanish) → resource book for technicians and practitioners
 - b. Why invest in watershed management? → policy document for decision makers
 - c. UNASYLVA on forests and water
 - d. Thematic study on forests and water in the context of the last global Forest Resources Assessment (FRA)
- **Participation in international processes and events**
 - a. MCPFE resolution on forests and water
 - b. International Consortium on Landslides (ICL)
 - c. UN Water
 - d. International Network of Basin Organizations (INBO)
 - e. Preparations for the European Forest Week (to be held in October 2008)
- **Preparations for the International Mountain Day (IMD)**
 - a. IMD 2006 on “managing mountain biodiversity”
 - b. IMD 2007 on “facing climate change in mountain areas”
- **Preparation for the 26th session**
 - a. invitation to countries
 - b. follow-up with countries
 - c. background paper
 - d. coordination with METLA

12. Mr. Raino Heino, Ms. Maria Patek, Mr. Thomas Hofer and Mr. Eero Kubin held a press conference with the local press. ANNEX F presents an overview of the coverage in the Finnish newspapers and an analysis of the relevant articles.

SEMINAR: FORESTS, WATER AND CLIMATE CHANGE IN HIGH ALTITUDE AND HIGH LATITUDE WATERSHEDS

13. Mr. Seppo Hellsten, Finnish Environment Institute (SYKE), acted as Chairman of the seminar. To open the seminar, Mr. Hofer summarized the main findings of the background paper, which was compiled by Ms. Marketta Juppi and submitted by FAO with the idea to provide food for thought and to trigger the debate during the session. The main findings can be summarised as follows:

- **High latitudes and high altitudes: a comparison**
 - a. climates characterized by seasonal cycles
 - b. hydrometeorology controlled by processes involving snow and ice
 - c. high altitudes: daily cycles, topography and microclimate highly differentiated → changes are harder to predict
 - d. high latitudes: more homogeneous → even though temperature increase is expected to be higher, impacts are easier to predict
- **Impacts of climate change**
 - a. temperature rise not evenly distributed → high latitudes and high altitudes particularly affected
 - b. overall predicted trends:
 - I. more precipitation during the winter months
 - II. dryer summers
 - III. more extreme weather events and increased unpredictability
 - IV. enhanced evapotranspiration
 - V. up-ward and north-ward movement of treelines → adaptation / extinction of species
 - VI. losses in biodiversity
 - c. high latitudes: extension of growing season (positive), floods, droughts, more storms, pest diseases to trees (negative)
 - d. high altitudes: variation in runoff, glacier and permafrost hazards (landslides, rock falls, outburst of glacier lakes) → consequences are expected to be much worse
- **Adaptation to Climate Change**
 - a. collaborative and integrated watershed management
 - b. policy actions at local, national and global levels
 - c. raising awareness, multidisciplinary and transnational research, communication and cooperation
 - d. ability for mitigation and adaptation depending on a country's level of economic development → strongest negative impacts in mountain regions of developing countries
 - e. well-managed forests → shorter rotation of forest and regular forest management → accelerates the spreading of new, genetically better adapted populations
- **Research gaps**
 - a. better comprehension of hydrometeorological processes
 - b. quantify the role of snow cover
 - c. strengthening of good monitoring systems
 - d. development of better and more reliable climate change models
 - e. need for more elaborated disaster risk management tools (also on a transnational basis)
 - f. case studies → to improve knowledge of climate change impacts on spatial development and economy

14. Mr. Hellsten gave the floor to Mr. Raino Heino from the Finnish Meteorological Institute, a member of the Intergovernmental Panel on Climate Change (IPCC), who gave a presentation on "The influence of climate change at high altitude and high latitude". After having illustrated the work of the IPCC and provided some relevant references (www.ipcc.ch), the Fourth Assessment Report (IPCC

2007) in particular, Mr. Heino explained that the Earth's surface temperature during the latest 100 years is clearly warmer than in the past thousand years. There is evidence that precipitation patterns are changing, that sea level is increasing, that glaciers are retreating world-wide, that Arctic sea ice is thinning, and that the incidence of extreme weather events is increasing in some parts of the world.

Atmospheric concentrations of greenhouse gases are higher now than at any time during the last 650,000 years, the period for which there are reliable ice-core data. Climate models that take into account the observed increases in atmospheric concentrations of greenhouse gases simulate the observed changes in annual mean global surface temperature quite well. This evidences that human activities contribute to the observed changes in the Earth's climate. Most projections suggest that greenhouse gas concentrations will increase significantly during the next century in the absence of policies specifically designed to address the issue of climate change.

Mr. Heino illustrated climate and meteorological data regarding the Baltic area, assessments and scenarios concerning the Arctic and the northern hemisphere, and explained that temperature changes are expected to differ by region with high latitudes projected to warm more than the global average. It has to be kept in mind that predictions at the regional scale are not as reliable as the global ones. The point is how much, how fast and where climate will change in response to human activities. Climate models predict that the global mean surface temperature would increase by about 1 to 6°C by 2100. These changes would occur at a rate significantly faster than observed changes over the last 10,000 years. If decision-makers do not take action to reduce the predicted increase in greenhouse gas emissions, the Earth's climate is expected to change at a rate unprecedented in the last 10,000 years with adverse consequences for society, undermining the very foundation of sustainable development.

15. Mr. Terry Callaghan, from the Royal Swedish Academy of Sciences, Director of the Abisko Research Station, gave the second presentation of the seminar, entitled "Climate change and its geophysical and ecological impacts in the Swedish Sub-Arctic Mountains". The mountainous Abisko area compresses long latitudinal gradients (taiga, forest-tundra and alpine) and much of the landscape is a complex mosaic of plant communities (birch, pine, asp, shrub, heath, etc.). Heaths dominate the area but birch forest is normally the dominant carbon sink. Available data evidence multiple accelerating environmental changes and abrupt temperature changes. Mean annual temperature has risen significantly since the peak of the 1930's; it is warmer now than probably in the last 1000 years. Spring temperatures have increased steadily, summer has become warmer than average for 11 consecutive years since 1995, autumn has become hotter since 1999 as an abrupt change and very cold winters have been absent since 1988. Mean annual, spring and autumn temperatures are accelerating. Also snow conditions are changed and snow depth almost doubled in 90 years, while snow hardness and wetness are changing down the profile. Lake ice cover is decreasing and UV-B radiation increased by 11% between 1950 and 1999. Besides mentioning that permafrost is melting at low altitude in the Abisko area and that the tree line is moving upwards, Mr. Callaghan showed other indicators of climate change and its consequences, among which the fact that increased extreme precipitation events cause infrastructure damage and geomorphological changes. In sub-Arctic Sweden, environmental change is not only happening, it is accelerating. Predictive and observational tools are still insufficient, therefore monitoring is essential and the way ahead includes modelling within the local perspective for adaptation. Local knowledge (e.g. traditional reindeer husbandry) plays an important role because it helps understand natural events. The residents of the north need to urgently develop appropriate adaptation strategies.

16. Mr. Josef Krecek of the Department of Hydrology at the Czech Technical University in Prague gave his presentation on "Climate change impacts on distribution and melt of snow in high altitudes and latitudes". This talk was very important in view of the high socio-economic risks related to these climate change impacts, as more than one-sixth of the world's population live in proximity of glacier or snowmelt-fed river basins. Furthermore, a decreased snow and ice cover resulting from climate change means less Albedo and more radiation being absorbed by the land and oceans, and therefore a faster warming of the Earth. Mr. Krecek then explained the additional stress which mountain catchments are subject to and presented a comparison between the effects of forestry practices on snow accumulation, snow melt and run-off in the high altitude Jizerka experimental catchment (Czech Republic) and the high latitude Paljakka Forest catchment (Finland). Mr. Krecek

concluded by saying that adaptation to climate change in mountain catchments includes maintaining or establishing mixed forests close to native compositions through adequate forestry strategies, embedding timber production in a more integrated sustainable watershed management, and respecting the carrying capacity of ecosystems.

17. Mr. m Kertsz, from the Geographical Research Institute of the Hungarian Academy of Sciences, talked about “The role of conservation agriculture in the management of hilly watersheds”. Conservation agriculture is a holistic approach to crop production, which encompasses conservation tillage, and seeks to preserve biodiversity in terms of both flora and fauna. It also entails reduced mechanical activity, energy consumption and CO₂ emissions as well as eutrophication effects which normally occur due to fertilizers under conventional agriculture. Conservation tillage is understood as a set of practices specifically intended to reduce soil disturbance during seedbed preparation and to improve soil structure and stability.

The three-year, 4 million  SOWAP (SOil and WAtEr Protection) project started in 2003 and is supported by the EU LIFE Programme. The project aims at assessing the viability of a more “conservation-oriented” agriculture, implying analysis of soil erosion, aquatic ecology, biodiversity, soil microbiology, agronomy and economics. The project started on study sites in Belgium, Hungary and the U.K. In Hungary two sites were selected near Lake Balaton, where 4 small plots were installed (2 conventional tillage, 2 conservation tillage) in order to carry out a soil erosion survey. 24 much larger plots (12 conventional tillage, 12 conservation tillage) were selected for a terrestrial ecology survey, which included weeds, soil microorganisms, birds and earthworms-insects-seeds as important food sources for birds. Results show that conservation tillage techniques reduce soil loss and water run-off from fields as compared to traditional ploughing techniques. On some of the conservation-tilled field plots, soil erosion was reduced by up to 90% and water run-off by up to 40%. Nutrient as well as soil loss were remarkably less. Soil moisture conditions were also much more favourable. Rainfall simulation experiments pointed first of all to the protection effect of plant residues under conservation tillage. Yields of winter wheat, winter oilseed rape, sugar beet and maize were similar from both ploughed and conservation-tilled fields. Preliminary results also show improved biodiversity conditions on the conservation plots. Mr. Kertsz observed that conservation agriculture is particularly recommended in hilly and mountainous regions.

18. Mr. Mats Eriksson, from the International Centre for Integrated Mountain Development (ICIMOD), gave the fifth presentation of the seminar on “Integrated watershed management and adaptation to climate change in the Himalayan region”. After an introduction on natural and demographic features of the Hindu Kush Himalayan region as well as on the structure and mandate of ICIMOD, he stressed that temperature increase is higher in the Tibetan plateau and, more in general, in high altitudes than on average. As evidenced by the Imja Glacier in Nepal, Himalayan glaciers are shrinking more rapidly than elsewhere. In terms of climate change adaptation, both short term challenges (water hazards and flash floods) and long term challenges (seasonal droughts and floods) must be taken into account. In the long term perspective, the increasing variability of water resources as a result of glacier volume reduction is expected to affect the already unbalanced ratio between unpolluted water demand and supply, eventually resulting in social conflicts. Taking as an example the Tsho Rolpa glacial lake in Nepal, Mr. Eriksson demonstrated the short term, climate change induced natural hazards in the region. The case of Brep in Pakistan, where in 2005 houses and livelihoods were destroyed by a huge wave of a glacial lake outburst, exemplifies the importance of indigenous knowledge: no lives were lost in that event because the local people used their observation skills of environmental change to predict the catastrophe.

Mr. Eriksson also provided an overview of current challenges and degradation problems in high altitude watersheds in Tibet and Afghanistan, and illustrated the social reasons that trigger inappropriate watershed management. Through further examples from the field Mr. Eriksson presented good adaptation practices and the approach promoted by ICIMOD to respond to high grazing pressure, scarce vegetation, sealed surfaces, poor infiltration, high runoff and soil erosion. In particular he stressed the importance of implementing technology packages that combine structural and bioengineering works, agronomic systems and management practices, which need to be low cost

and locally relevant. People living in high altitude watersheds have rich traditional knowledge for the management of resources, which might prove to be very important for adaptation to climate change. A shift is required from climate change “sensitive” technologies to climate change “tolerant” technologies. Furthermore, Mr. Eriksson illustrated the project entitled “People and Resource Dynamics in Mountain Watersheds of the Hindu Kush-Himalayas” (1996-2006), which addressed the issue of increasing water demand for domestic and irrigation purposes, and the concept of Integrated Watershed Management (IWM), which implies addressing farming systems and natural resources management in a holistic manner leading to sustainable and improved livelihoods.

The ways forward include knowledge sharing through networks for filling gaps of data, monitoring, and predictions, research on best use of scarce water resources, documentation of best practices, capacity building of institutions dealing with collaborative watershed management, and designing of institutional mechanisms for payment for ecosystem services.

19. The sixth presentation of the seminar was given by Ms. Angela Michiko Hama, ESF/EUROCORES Communications Officer, Institute of Geography of the University of Innsbruck (Austria), on “Communicating aspects of global change in mountain watersheds by means of environmental education”. Due to a significantly increasing human impact and climate change processes, Alpine watersheds are more strongly affected by natural hazards. Creating awareness, understanding and responsibility for issues of global change and its consequences is fundamental for a sustainable future of the Alps. Risk communication is to be made a top priority in Alpine societies. Agenda 21 (1992), the World Summit on Sustainable Development (2002), the UN Decade of Education for Sustainable Development and Hyogo Framework for Action (2005-2015) call for improving the knowledge base on disaster prevention and mitigation as one of the keys to sustainable development, and address risk communication as one of the future challenges associated with knowledge management.

Due to its integrative and interdisciplinary character, education for sustainable development is an ideal tool for effective communication about risks in mountain watersheds. The environmental education project for the community of Galtür in Tyrol aims at empowering people and creating a sense of stewardship by developing action- and decision-making competences. The approach, which incorporates geographical, sociological as well as pedagogic and didactic methods, is split into three integral parts. These comprise analysing the educational potential of the Alpine environment, recording the educational interest in the Alpine environment, and, finally, developing implementation strategies for environmental education programmes. The presentation gave insight into the approach of the project and discussed the results obtained by the studies with regard to risks related to headwaters and glaciers. Furthermore, possibilities of transferring the concept to other mountain regions were illustrated.

20. Mr. Björn Klöve, from the University of Oulu, talked about “Hydrology of headwater peatlands: how are these ecosystems connected to and dependent on groundwater?” Peatlands are essential habitats for birds, have important hydrological functions, act as water filtering systems, and have recreational and economic values (harvesting, agriculture, forestry). Peatlands are closely connected to and dependent on groundwater. Peatlands form where moisture surplus exists. They consist of water for some 90% and play an important role in the water cycle and the hydrology of catchments. The main water sources are rainfall, catchment runoff and groundwater. Usually peatlands depend on groundwater in several different ways that are not yet fully understood. They are vulnerable to changing hydrology, climate and land use.

According to the EU Ground Water Directive, wetlands which depend on groundwater must be protected. Groundwater should remain unaltered in order not to affect wetlands, whose quality and quantity must be monitored and maintained to preserve diversity and complexity. As peatlands and wetlands depend on groundwater in a multiple manner that still needs to be clarified, the GENESIS EU 7th Framework Project (2009-2014) was established in order to improve the scientific understanding related to the Ground Water Directive in 25 countries. Wetlands and groundwater call for more attention and, to this regard, new legislation frameworks are being developed.

21. Mr. Jukka Laine, from the Finnish Forest Research Institute, presented a paper on “Peatland ecosystem and global change”. Globally, peatlands represent a major store of soil carbon, sink for carbon dioxide and source of atmospheric methane. Climate change scenarios predict that northern peatlands will experience lowered water tables, leading to increased dryness, unsaturated oxic conditions at their surface, aerobic decomposition and larger releases of CO₂. On the other hand, development of vegetation towards shrub-dominated communities may lead to higher primary production, compensating soil C losses. The larger unsaturated zone will lead to reduced CH₄ emissions and some dry sites may become small CH₄ sinks.

Agriculture, forestry and peat extraction for fuel and horticultural use require intensive drainage. This causes peat oxidation and alteration of greenhouse gas balance of peatlands. The processes behind greenhouse gas production in peat soils are highly dependent on temperature, and consequently emissions may increase in a warming climate. In many European countries, greenhouse gas emissions from agricultural peatlands are much higher than from other peatland uses. Drainage of peatlands for forestry purposes changes the plant community to one dominated by tree stands and forest flora. Biomass and primary production increase during stand development, which thereby increases the C input to the soil. Simultaneously the organic matter decomposition rate increases, primarily because of increased soil aeration, and enhances outflux of C from the system.

CO₂ is the main greenhouse gas released as a result of peat fuel extraction and burning. In the process of peat extraction, the greenhouse gas sink function of peatlands is lost. Emissions arise not only from extraction of peat, but also from its storage, transportation and combustion. Some of the lost CO₂ sink functions can be returned by using proper after-extraction treatments in the cutaway areas. The most efficient method for reducing greenhouse gas emissions from peatlands is to prevent future land-use changes although this is not always economically, socially or politically feasible. Where applicable, land management strategies should focus on preventing degradation of ulterior peatlands, and on improving management practices of drained peatlands in order to reduce greenhouse gas emissions.

PRESENTATION OF NATIONAL REPORTS

22. Ms. Maria Patek, who chaired this session, invited Mr. Florian Rudolf-Miklau, from the Federal Ministry of Agriculture, Forestry, Environment and Water Management, to present the Austrian report entitled “Impact of climate change on natural hazards in Austria”. In the last years, frequent extreme events like storms and heavy rainfall have increasingly caused debris flows and floods in the Austrian Alps which resulted in considerable damage. Scientific studies, which are based on different assumptions of emission levels, predict further significant climatic changes for the future. The most likely increase of global temperature is between 1.8°C and 4.0°C by the end of the century (IPCC 2007). A decrease of 20% of the mean summer precipitation is expected in the Alps, while regional changes between -10% and +20% have been computed for winter precipitation.

Recent research results (ClimChAlp) indicate that climate change has a paramount impact on natural hazards in the Alpine environment and the following changes are expected to happen:

- increase of the frequency and amplitude of floods
- increase of the frequency and run out distances of avalanches
- extreme low water periods and droughts in the southern part of the Alps resulting in lowering of the water table
- risk of rock falls and slides caused by melting permafrost (melting permafrost is already being observed)
- risk of forest fires.

Notwithstanding, because of insufficient precision of climate models and forecasts, there is no way to prove that the expected changes are likely to materialize and that climate change will be the main driver of extreme events in the future. Adaptation to a changing environment overall and not only to climate change must be the framework of natural hazard management in Austria, because also the human environment is changing dramatically. Since large parts of Austria are located within the Alpine arc, the country is at considerable risk of being affected by floods, debris flow, landslides, rock fall and avalanches. During the last decades, floods turned out to be the most important natural hazard. Large areas of Austria were severely hit by exceptional floods, which caused casualties and damage to settlements and infrastructure amounting to several billion Euros. Floods are natural phenomena that

can neither be prevented nor fully controlled. However, modern flood protection can reduce the effects of floods to an acceptable extent. Integrated flood risk management builds on the entire cycle of prevention, protection and response. All flood prevention strategies, including both structural and non-structural measures, are based on hazard mapping. This tool records and provides all necessary information about the intensity and frequency of flood events and displays the areas affected by floods, thus serving as basis for land use planning.

Austria undertook several projects related to climate change, such as Flood Risk I and II for improving strategies of integrated flood management, ClimChAlp (Interreg III B) for developing adaptation strategies, the research programme StartClim, CIRCLE (EraNet) with the objective to align national research programmes, and the data information system for meteorological extreme events in Austria “MEDEA”.

The Austrian report lists the following recommendations for effective future action:

- transnational cooperation in the Alpine region should be further intensified to exchange experiences, knowledge and methods amongst administrators, technicians and scientists
- a common transnational terminology concerning the assessment of risks and harmonization of different approaches to hazard mapping should be elaborated
- the knowledge on climate change and its impacts in the Alpine region should be broadened and deepened and should represent the basis for the elaboration of sustainable adaptation strategies
- monitoring of slope deformations and other natural hazards (e.g. avalanches, glaciers, etc) should be used for identifying critical areas as well as for protecting already existing settlements
- historic data are very important for the retrospective analysis and should be included in all kinds of monitoring and scenario development activities
- the development of hazard maps, which are still lacking in many municipalities, should be promoted
- a “risk dialogue” should be initiated between experts and different stake-holders.

23. Mr. Josef Krecek presented the national report of the Czech Republic, which was entitled “Managing mountain watersheds in the Czech Republic”. The territory of the Czech Republic consists of rolling plains, hills, and plateaus surrounded by low mountains (Sudeten). Elevation extremes are 115 m a.s.l. (Elbe River outlet) and 1 602 m a.s.l. (Giant Mts.). Mountain watersheds cover almost 40% of the country’s territory and the timberline is considered to be at 1 300 m a.s.l. The recent water supply system in the Czech Republic is oriented mainly to the exploitation of surface waters (80%). The water availability per person and year is about 1 450 m³ while the considered safe water availability is 1 700 m³. However, the potential water resources in the Czech Republic are nowadays exploited only to some 50%. Water supply is mainly ensured by water reservoirs.

Since the end of the 13th century the forest area (34%) did not change significantly. Nevertheless, as a consequence of commercial forestry, the composition of native species in the mountains (mixture of common beech, common silver fir, and Norway spruce) shifted to spruce plantations (during the 18th and the 19th century) and the ecological stability decreased. As a result of air pollution, acidification of ecosystems and emissions from fuel combustion, forests experienced dieback during the 80’s and only recently recovered.

Watersheds in the Czech Republic are threatened by potential climate change impacts, such as reduced snow-pack (around 30%) and water yield, increased flood-probability, and endangered spruce stands exposed to the stress from dry episodes. The management of mountain watersheds is controlled mainly by the Water Act (254/2001). 16 % of the country’s territory is in the category of Protected Headwater Regions (governmental decrees 40/1978 and 10/1979), where clear-cut, drainage, forestry preparation and peat harvesting are forbidden. Small headwater streams are ruled also by the Forest Act (289/1995), applying to categories of Protective Forests (steep slopes or wetland forests) and Special Forests (with hygienic buffering functions for drinking water supply schemes). The Law on the Environment (17/1992) introduced in the Czech Republic processes of Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA). Finally, wetlands (peat-bog spots) and processes of revitalization of watercourses are controlled by the Act on Nature Protection

(114/1992). As regards protected areas and national parks there is an open debate between the Ministry of the Environment and the Ministry of Agriculture about the management strategy to be put in place. Recent progress and outlook include decreased emissions of sulphur (even though nitrogen deposition and acidification continue to be threats), revitalization of mountain watersheds (NATURA 2000), increasing stability of mountain settlements (Countryside Renewal Program 2006), forest planning to support retention capacity of mountain watersheds (Czech National Forestry Program), and possible subsidies for forest owners based on environmental services provided.

24. Mr. Eero Kubin, of the Finnish Forest Research Institute, presented the Finnish national report, which focused on forests, water and climate change. Finland is mainly situated in the boreal coniferous zone where the ecosystems are sensitive to environmental changes. Thus it is important to understand the environmental impacts of man-induced climate change. The most important effect of climate change on hydrological regimes in Finland is the alteration of the seasonal distribution of runoff. In winter, excess water from snowmelt and rainfall can cause winter floods, which are new phenomena in Northern Finland. In order to be able to alleviate the environmental impacts of these changes, new mitigation and adaptation measures should be rapidly developed and implemented. In particular, synergies between sustainable forest management and environmental objectives of the Water Framework and the Flood Directives must be sought.

In future, climate change might have a totally new impact on growth and regeneration of high-elevation forests and on environmental effects of forestry. The frequency of extreme weather events like heavy rainstorms and prolonged hot, dry spells is expected to increase and periods of snow cover and soil frost in winter months are likely to become shorter. More ecologically diverse forests are better able to adapt to changing climatic conditions. It must be stated that climate change impacts on forestry can even be positive, like for instance increased growth, faster regeneration and more reliable seed production.

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 carbon balance of forests. As fellings will augment in line with the National Forest Programme, net carbon absorption will temporarily decline until young forests will start growing and binding carbon. The increased use of residual wood for energy will not greatly affect the overall carbon balance. The Finnish Government has created a National Strategy for Adaptation to Climate Change. According to the National Forest Programme, Finland's official forestry guidelines will be duly revised to help forests thrive in changing circumstances.

25. Mr. Olivier Marco (Directeur technique RTM, Délégation Nationale aux risques naturels, Office National des Forêts), conveyed personal greetings from Mr. Antoine Hurand, former French representative to the Working Party, and presented the French national report. He pointed out that he had noticed many similarities with the Austrian report, therefore he would add some peculiarities related to France and not repeat contents already stated.

The management of mountain watersheds and mountain forests is very important in the French Alps and the Pyrenees, as it serves four basic functions: to ensure environmental protection, to maintain economic values and production, to preserve the landscape values for tourism, and to protect against natural disasters. Mountain areas in France are areas of development, of economic importance, and even of population increase. In terms of impacts of climate change, Mr. Marco highlighted the issue of forest fires, which is particularly relevant in the Mediterranean area. Forest fires damage the vegetation cover and potentially lead to secondary hazards such as avalanches, rock falls, floods, etc.

France still experiences uncertainty concerning action to be taken in relation to climate change impacts. The current strategy follows two lines of action: a) continue observing the changes which are taking place and b) get prepared for the adaptation measures that will reveal necessary. The National Forest Service was assigned the responsibility to continue monitoring specific areas subject to avalanches for which records over 100 years already exist, in order to identify indicators of changing patterns which could be attributed to climate change. The National Forests Service also continues to feed a database with major events such as floods, rock falls, etc., which have occurred since the 19th century and which continue happening. Currently the database counts nearly 35 000 entries and will be kept up-to-date in future. The analysis of the database highlights the need to prioritize those

interventions which ensure the protective functions of forests. France initiated to map all those forests which have a protective function and also to identify areas that, in case of hazards, would not benefit from protection forests and would suffer economic impacts on a large scale. In the context of rehabilitation of protective forests, guidelines and manuals for forest practitioners were updated in order to reflect management practices related to natural hazards of different types in the Northern and the Southern Alps.

It is obvious that forest management by itself is not sufficient to protect the populations of mountain watersheds and mountain valleys. Therefore, France made significant efforts to sensitize people with respect to natural risks and risk management. The current law makes it compulsory to involve the local people and to make them participate in the mapping of hazards and of areas at risk. It is also fundamental to make people aware that disasters may happen in areas which were not affected in recent times but for which there is evidence of major events in historical records.

Mr. Marco concluded his report by stating that most probably more and more countries will take measures to make people aware of future climate change impacts and to promote sound forest management practices. It is essential that these measures and sensitization campaigns are developed in collaboration with different countries and regions, in order to allow for an exchange of information.

26. Mr. Ádám Kertész presented the national report of Hungary. He described how land use changed in Hungary over the past century, with decreased areas of agricultural land and increased areas of forests. Concerning the environmental management of forested areas, Mr. Kertész stated that forest policy in Hungary not only considers production but includes nature conservation and environmental protection, socio-economic and cultural benefits (recreation), ecology and biodiversity. The National Forest Program was elaborated in 2004 to ensure long term sustainability and to meet both consumption demand and environmental protection. The forested area amounts to 19.8 percent, 20 percent of which is under protection regime. Forests are not only located in mountains and hills but also in the Hungarian plains. Mr. Kertész illustrated afforestation trends between 1920 and 2005 and provided an overview of the mountain ranges (moderately elevated ranges) and the highest peaks of Hungary.

The main problems and threats experienced by mountain watersheds are: soil erosion, mining activities, karstic water, water quality and pollution, and some influence from the neighbouring countries. Many regulating activities (e.g. river bed stabilization and construction of dams) are put in place in order to cope with these challenges, eventually resulting in conflicts between water management and ecological aspects. Climate change impacts result in additional problems, such as extreme droughts, high intensity rainfall events, changing proportion of evaporation, runoff and infiltration, changes in primeval vegetation and soil dynamics as well as ecological imbalance due to lack of water. The main objectives and challenges of water management for the future include reducing flood probability by keeping rainfall water in situ, water supply for settlements, groundwater subsidence in the Danube-Tisza Interfluve as well as the effects of tourism on the state of thermal waters.

27. Mr. Edward Pierzgalski presented the Polish national report entitled "Forest and water management in mountain watersheds". In the recent past the Carpathians, the Silesian Beskid in particular, were affected by forest decline. Air pollution is one of the main causes of forest decline. Even though air pollution level decreased over the last decade, wet and dry toxic deposition still threatens forest ecosystems. In addition, changes in annual precipitation and temperature patterns influence the water cycle and the balance of forest watersheds. Anomalous weather conditions, caused by climate change, result in floods, landslides and degradation of ecosystems. In the Carpathians the present species composition of forests differs significantly from the primeval composition, because of centuries of improper management. Lack of conformity of stands and forest sites negatively influences the vitality of trees and makes them susceptible to insects, fungi and root system disease. Deforestation and soil erosion add to this list of problems.

Between the 70's and the 80's of the last century, a process of forest decline in the Sudeten reached the size of an ecological disaster. Acid rains, which led to the weakening of trees and as a result to damage of trees by pests, were the main cause of the forest decline. The hydrology of mountain river

catchments was also affected. This ecological disaster triggered the search for effective methods to preserve and protect endangered forest species and ecosystems.

There are a number of projects which aim at the protection of mountain watersheds and the mitigation of climate change impacts on forest and water. According to the National Programme for the Expansion of Forest Cover, the country's forest cover will increase from 29% up to 33% by 2050, while at the same time preserving meadows and pastures as traditional and ecologically-sound elements of the landscape. The implementation of Natura 2000 in Forests is going ahead without encountering particular problems. In the framework of the Infrastructure and Environment Operational Programme (2007-2013), aimed at responding to increasing forest fires, drying up of water bodies, and sudden thaws and floods, the State Forest General Directorate is implementing the project called "Mitigation of water erosion in mountainous areas and maintenance of torrents and connected infrastructure in good state" (35 million Euros). The project entails small ponds and reservoirs in mountain forest areas, protection of slopes against surface water erosion, conservation of torrents against bank and bed erosion and building of skidding paths.

Over many years the Forest Research Institute has carried out research in the Carpathians and the Sudeten, investigating the influence of forest decline and restoration on the water cycle of mountain watersheds. Main topics and objectives are:

- assessment of critical loads of air chemical pollution deposition impacting on forest health
- role of humus decomposition for the greenhouse gas balance
- studying of hydrological and erosion processes in experimental torrent catchment areas
- research on nutrient cycle in artificial mountain spruce stands in the Silesian Beskid, in relation to conversion and degradation of sites

The legislation framework for water and forest management in Poland is given by the Water Law (2001) and the Forest Act (1991), which the Environmental Protection Law Act (2001) refers to. The National Water Management Authority was recently established and a new national strategy for water management was prepared. Poland also greatly contributed to the MCPFE's Warsaw resolutions (November 2007).

28. Mr. Mihai Olaru, from the Ministry of Agriculture and Rural Development, presented the national report of Romania, entitled "Fight against soil erosion and watershed management". Watershed management in Romania is very close to the forestry sector, contributes to the ecological restoration of the environment and provides economical and social benefits. In the last few years, climate changes heavily affected the territory of Romania, causing severe droughts, floods, and snowmelt in spring, and putting in motion processes of desertification in the southern part of the country. In 2007 the Forestry Research and Management Institute Bucharest implemented a study in ten hydrographic basins on how the fight against soil erosion and the improvement of degraded lands could be performed within the forestry sector. This study focused on large rivers and their affluents, and in some cases on the slopes of the Danube River. The inventory of torrent correction works as well as the recommendations of the National Forest Administration Romsilva were taken into account in order to assess the works to be implemented. The proposed works have two main objectives: a) make the existing infrastructures (e.g. channels and dams), which were damaged by floods and normal usage over the time, secure; b) implement further measures of torrent control. To this end, the amount of maintenance work, stone masonry, gabions and concrete, along with the length of the torrent hydrologic network to be consolidated, were estimated. Also the intensity of torrential phenomena and the past damage to the infrastructure were taken into account. Reducing and stabilizing triggers of alluvial deposits on the river banks through afforestation, engineering works and measures to slow down runoff water proved to be very important actions to be taken. Works are currently progressing in a proper manner. The beneficiaries of this watershed management programme are the administrators of water courses, hydropower plants, railways, public roads, municipalities and forests. 142 objectives will be implemented through national and EU funds. Further opportunities will arise with the implementation of the National Rural Development Program (2007-2013), item no. 125 in particular, which targets infrastructure development.

29. Mr. Ľuboš Jurík, from the Slovak University of Agriculture, presented the Slovak national report, entitled “Water management in the Slovak Republic”. The Slovak Republic is part of the Carpathian region and most of the country is mountainous, except for the eastern and the western parts. Agricultural land in the Slovak Republic represents half of the total land use surface, while forested areas cover 41 percent. Average rainfall varies a lot from the lowlands to the highlands. The total volume of rainfall per year is around 37 km³ of water, while the annual water use is estimated at 12 km³.

In 2003 Slovakia signed the Carpathian Convention and committed, together with all the Parties, to pursue a comprehensive policy and to cooperate for the protection and sustainable development of the Carpathians, in particular in relation to sustainable and integrated water/river basin management. The Water Management Plan, which was prepared in 2008 to match the Water Framework Directive, assigns to six river basin districts the responsibility to govern the eight sub-basins of the Danube and Wistula river basins. The plan does not yet address issues of climate change since this debate is still ongoing in the Ministries.

A long legislative tradition ensures the protection of water and groundwater resources. Since 1993, different competences related to water management are under the responsibility of the Ministry of Agriculture (which is also responsible for forest management) and the Ministry of the Environment. Further, the Slovak Water Management Enterprise is entitled by the Ministry of the Environment to implement practical works, such as reservoirs for protection against floods and for industrial water supply.

The work carried out by the Water Research Institute serves mainly the planning of water use and water supply. This is particularly sensitive in light of the fact that the mean annual precipitation is decreasing as a consequence of climate change. Under several scenarios, the mean annual temperature is forecasted to rise in next years, eventually resulting in increased evapotranspiration and reduced outflow (up to -35%). The Slovak Hydro-meteorological Institute carries out many measurements across the country and provides daily information that is of great importance for addressing issues like wildlife in forests, water reservoirs in forested areas, forest fires and floods. Finally, the Slovak University of Agriculture is an important asset to scientific research and, by means of modelling, actively collaborates with the aforementioned institutions to develop integrated river basin management plans.

30. Mr. Harald Grip, from the Swedish University of Agricultural Sciences, presented the national report of Sweden, entitled “Potential management of forested headwaters in Sweden”. Predicted climate change will influence growing conditions for many forest species in mountainous areas and in northern latitudes, therefore it is important to monitor changes with an efficient measurement network that allows for the calculation of trends in space and time. An inventory of environmental monitoring in northern Sweden was conducted on behalf of the Swedish Committee for the International Polar Year (IPY) to find variables of potential relevance for arctic monitoring. The variables suggested by the Arctic Observing Network (AON) were classified according to the extent they were being monitored. The Cultural diversity variable was found not to have any regular monitoring program.

A potential measure in the boreal forests to counteract atmospheric CO₂ increase would be to apply forestry management practices that enhance forest productivity, and therefore carbon dioxide sequestration. A first step in this direction is to determine the potential forest productivity under optimal conditions.

More than twenty years ago, two optimum nutrition experiments on Norway spruce started at Asa (Southern Sweden) and Flakaliden (Northern Sweden). Treatments included balanced nutrient addition, combined with or without irrigation. Balanced fertilisation displayed to be effective on stem wood production. Taking into account the production rate in the experimental stands, where nutrients and water were optimal, the potential production in Swedish forests was calculated on the base of climate data (PAR and humidity during the growing season). Results show that optimal nutrition could increase the production of Norway spruce by three times in Northern Sweden. Further, a large girdling experiment was conducted at Flakaliden. By girdling 0.1 ha plots of fertilized and non-fertilized 40-year-old Norway spruce stands and by measuring soil respiration, the autotrophic and heterotrophic components were identified. Results indicated that the total soil respiration on non-fertilized plots was

double the respiration on fertilized plots. Consequently, balanced fertilization of Norway spruce also decreases soil respiration and should be tested on a larger scale.

At the Rosaby Centre of the Swedish Meteorological and Hydrological Institute (SMHI), regional climate change scenarios were modelled (up to 2100) starting from the global scenario SPRES A2 (business as usual) and SPRES B2 (decrease in population and economic growth). According to these scenarios, air temperature would increase by 4-5 °C, precipitation by 20-30%, and the vegetation growing season by 40-80 days, while the duration of snow cover would decrease by 60-100 days. To simulate a warmer climate in a young Norway spruce stand, a soil heating experiment was started at Flakaliden in 1995. Heating cables were placed each 20 cm below the humus layer and increased the temperature by 5 °C above ambient. The experiment included four different treatments: irrigation, irrigation plus soil heating, liquid fertilization, and liquid fertilization plus soil heating. Heating moved and made available deeper soil nitrogen, eventually resulting in increased stem wood production and, by consequence, in enhanced CO₂ sink capacity of the ecosystem.

31. Mr. Peter Greminger, from the Swiss Federal Office for the Environment, presented the national report of Switzerland, entitled “Watershed management in mountain areas”. Switzerland, Austria, Bavaria, France, Italy and Slovenia have the same problems to resolve, and the culture of solving problems is nearly the same. Switzerland pursues sustainable forest and watershed management with a special view to protect human beings. A revision of the Swiss Federal Forest Act was initiated based on the Swiss National Forests Plan but, as the agreement between the stakeholders was not reached, the politicians decided not to change the law. The existing law is respectful of the concept of sustainability.

In the past, the Federal Government used to finance projects by allocating subsidies to the Cantons, the mountain areas in particular. With the new financial equalisation, watershed management is carried out under programmes, which give more responsibility to the Cantons and funds go directly to the regions which need more money. These programmes may include forest management, revitalization of rivers, ecological compensation and biodiversity, and conservation areas. Once a Canton comes up with its four year programme, the Federal Government finances it up to 30-40%. This financial scheme has an influence on the organizational level, assigning more operational responsibility to the Cantons, while leaving the strategic competence to the Federal Government. Prevention works related to watersheds are of high level in Switzerland, notwithstanding the country is still learning. During the storm events in 2005, 900 out of the total 2 000 communities experienced floods and damages mainly in the pre Alps. To recover damages and to reduce risks of natural disasters, which are primarily referable to changes in human environment and not to effects of climate change, Switzerland spent 9 billion Euros in 36 years. Policy-makers and insurances have to bear in mind that risk-related costs are expected to increase in the coming 20 years.

Whether taking climate change into account or not, risks are increasing at the global and local level. As a prevention measure, the Federal Office for the Environment published guidelines for the compilation of hazard maps, the delineation of hazard zones and the issuing of building codes. Hazard mapping is the basis of risk management and will be completed by 2011. The storm events in 2005 clearly evidenced to all relevant stakeholders in Switzerland that investment in preventive measures is worthwhile. Integrated natural hazard risk management can be further optimized by refining land use planning, hazard and intensity mapping, and prioritization of interventions and investments (for both insurance and state finances).

Modern risk analysis seeks answers to the following questions: what could happen? What is not allowed to happen? What could be done to make the risk not materialize or at least to reduce its probability? How much money can be invested? Risk-appropriate planning and action requires knowledge of risks that exist in an area along with information about their nature, scope and likelihood of occurrence. The knowledge of local people is usually underestimated, while it is an asset for risk dialogue.

In order to minimise the cost of risk analysis, Swiss expert agencies developed a software tool which is intended to enable the evaluation of risks and of relevant protective measures. The bases for the analysis are freely selectable two-dimensional (x-y) matrices with the input parameters “likelihood of occurrence” and “scenario”. Mr. Greminger also mentioned transboundary cooperation, environmental education and communication as sound risk management practices.

32. Mr. Ibrahim Biroglu, from the General Directorate of State Hydraulic Works, presented the Turkish national report, entitled “Watershed management activities in Turkey”. Turkey is a typical Mediterranean country and it has 7 different geographical regions with distinct climates. The average altitude of the country is slightly more than 1 000 m a.s.l. and there are more than 9 000 plant species, 3 000 out of which are endemic. Forest areas occupy around 26.6 percent (21.1 million hectares) of the country and are generally located in coastal and peri coastal zones. Productive forests represent 50% of the total forested area. Seasonal droughts, floods and forest fires are quite common in Turkey. Each year 500 million tons of soil are carried to the sea by water flows.

Turkey is divided into 25 hydrological basins and the average annual total water flow is 186 billion m³. In 2003 the Ministry of Forestry and the Ministry of the Environment were merged and there are now five state agencies in charge of watershed management with different competences. The long term strategy for watershed management in Turkey addresses planning, management and use of natural resources and forests, and boosts integrated rural development starting from the watershed scale. The following categories of activities are planned and implemented: livelihood improvement, human resources development, participatory approaches and sustainability. Watershed management activities are meant to provide economic, social and cultural benefits while respecting the main principles of ecology. They regard afforestation, erosion control, rangeland rehabilitation, flood control, tree nurseries, environmental education and training.

Mr. Biroglu illustrated causes and effects of land degradation in watersheds and achievements related to watershed rehabilitation in Turkey up to end 2007. He talked about integrated watershed management projects implemented in the country and in particular about the Eastern Anatolia Watershed Rehabilitation Project. He listed the lessons learned from these processes:

- a committee should be set up to coordinate institutions dealing with watershed management
- international cooperation is necessary for combating rural poverty and forest degradation
- watershed management is an important means for mitigating desertification processes and impacts of climate change

He concluded by showing photographs of watershed management and land rehabilitation activities (soil erosion and flood control, afforestation, etc.) from several localities in Turkey.

PRESENTATION OF OBSERVER REPORTS

33. Ms. Kjersti Bakkebø Fjellstad presented the first observer report, entitled “MCPFE Forests and Water”. The Ministerial Conference for the Protection of Forests in Europe is a platform for pan-European cooperation at the policy level and a framework for global-regional interface. It cooperates with several UN Agencies and Conventions, and gathers about 27 observers. Step by step, it developed a conceptual frame for sustainable forest management in Europe through the identification of general guidelines, criteria and indicators, and operational recommendations.

MCPFE’s commitment to forests and water began in 1990 (Strasbourg), with the Resolution on “Adapting the Management of Mountain Forests to New Environmental Conditions”, which dealt with water management, floods and disaster control. In November 2007, the Resolution on “Forests, Wood and Energy” and the Resolution on “Forests and Water” were adopted. Each resolution demands a lot of follow-up work at both the national and the Pan-European levels. The follow-up work to the Resolution of Strasbourg was conducted in collaboration with the Working Party. While the national governments commit to implement each heading of the resolutions, the Pan-European cooperation is fundamental for filling gaps of knowledge and for addressing cross-sectoral issues, i.e. forests and water.

The Warsaw Resolution on Forests and Water is divided into four chapters:

- Sustainable management of forests in relation to water (it deals with protective functions of forests, assessment programmes for afforestation and reforestation, etc.)
- Coordinating policies on forests and water (it concerns cooperation and interaction of policies, synergies with the UNECE Water Convention in particular)

- Forests, water and climate change (climate change impacts on water resources, desertification, and biodiversity)
- Economic valuation of water-related forest services (payments for ecosystem services).

The MCPFE work programme related to the Resolution on Forests and Water at the Pan-European level includes: two scientific conferences (Poland, 14-17 September 2008, and Barcelona, 30-31 October 2008), one workshop on "Water related ecosystem services and implications for forest and water policies" (Turkey, 2009), and one workshop on "Pan-European approaches for development of measures to secure multiple forest ecosystem services" (2010).

The Warsaw Resolution 1 "Forests, Wood and Energy" foresees the following main activities: a workshop on sustainable forest management and climate change "Optimising the contribution of the forest sector" (spring 2009), an open-ended ad-hoc working group on sustainability criteria for forest biomass production including bioenergy (2008-2009), and a drafting meeting on the elaboration of the pan-European afforestation and reforestation guidelines (2008).

34. Mr. Shahbaz Khan, from the Sustainable Water Resources Development and Management Section of UNESCO, presented the second observer report, entitled "International Hydrological Programme, Management of Mountain Watersheds". UNESCO has been dealing with water since 1965 and the major water related programmes led and animated by the Organization are: the International Hydrological Programme (an intergovernmental programme), the World Water Assessment Programme (an interagency programme led by UNESCO), the UNESCO-IHE Institute for Water Education, and, finally, 17 water related centres under the auspices of UNESCO. The International Hydrological Programme (IHP) was created in 1975 after the International Hydrological Decade and is executed by the Member States (there are 164 IHP National Committees). It is divided into phases, each one lasting for six years. The sixth IHP, which was dealing with systems at risk and with social challenges, concluded in 2007. The understanding of the water cycle is important, but it is linked to distresses within the society. This is in a nutshell the core of IHP VII (2008-2013), which deals with water dependencies, systems under stress and societal responses, and is broken down into five themes. Each theme is sub-divided into a number of focal areas, themes I and II (Adapting to the impacts of global changes on river basins and aquifer systems, and Strengthening water governance for sustainability) are most relevant to the issues discussed in the session. Mr. Khan is responsible for Theme V "Water education for sustainable development".

As an Agency of the UN System, UNESCO is driven by the Millennium Development Goals. As far as water is concerned, the reference framework is given by MDG 7 "Ensure environmental sustainability" and its Target 10 "Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation". Other important initiatives are the UN Decade of Education for Sustainable Development and the UN International Decade "Water for Life".

Mr. Khan continued his presentation by showing the geographical distribution of UNESCO water-related centres and chairs. In particular, the centres in Beijing and Kuala Lumpur are relevant to mountains. He provided an overview of the programme "Hydrology for the Environment, Life and Policy" (HELP), which aims at delivering social, economic and environmental benefits to stakeholders through sustainable and appropriate use of water by directing hydrological science towards improved integrated catchment management. Other relevant programmes were briefly presented, such as FRIEND (a global hydrological research program), G-WADI (Water and Development Information for Arid Lands), GRAPHIC (Groundwater Resources Assessment under the Pressures of Humanity and Climate Change), ISARM (Internationally Shared/Transboundary Aquifer Resources Management), PC/CP (from Potential Conflict to Co-operation Potential), ISI (International Sediment Initiative) and IFI (International Flood Initiative).

Finally, Mr. Kahn talked about experimental hydrology in mountain watersheds highlighting the complexity of the mosaics and the difficulty to have predictions and models starting from point scale measurements. He took the example of an experimental catchment in NE Queensland, where the interrelations are so complex that traditional hydrology does not apply and environmental isotopic analysis of stream samples is used to understand how water is actually generated. Other techniques, the nested design approach in particular, which can help cope with the complexity and draw climate change impact models, were briefly presented.

DELIBERATION OF THE COMMUNICATION STRATEGY

35. Mr. Paolo Ceci, from the Forestry Department of FAO, presented the progress made since the 25th session concerning the Working Party communication tools (newsletter, web site, leaflet and logotype) and animated a discussion on their appropriateness, effectiveness and ways of improvement. The outcomes of the discussion as well as the recommendations for future improvement are listed below. It must be noticed that some of the proposed modifications were not analyzed from a technical point of view and therefore their feasibility will have to be weighed on the basis of further technical reflection and technology made available by FAO (FORIS, Internal Printing).

- **Newsletter**
 - a. it is a good thing to have the newsletter and it should be kept alive
 - b. the newsletter is useful, in particular for the work with students
 - c. each issue of the newsletter should include a good example of adaptation to climate change
 - d. each issue should include an attractive story
 - e. Mr. Peter Greminger will send a story for the next issue
 - f. the newsletter could be more environmentally friendly, printed on recycled paper and with black and white lay-out
- **Leaflet**
 - a. the design could be modernized and A5 format, folded together, could be adopted
 - b. there could be a cover with a nice picture and the logo
 - c. the section “What can the Working Party offer?” should clarify that the listed items refer to the expertise of the institutions and the partners who belong to the Working Party’s network
 - d. it should be clarified who the target audience of the leaflet is
- **Web site**
 - e. the web site could have a interactive and moderated section, as an electronic forum
 - f. the template of the country pages could be more open and free and less standardized
 - g. the web site should be more easy to find in the internet through key word search
 - h. Really Simple Syndication (RSS) Feed could be added to the Working Party’s web pages
 - i. the home page could be linked to the web sites of the Member Countries
- **Logotype**
 - a. the logo is necessary
 - b. the proposal from METLA is to be used as the basis for the creation of the logo
 - c. the mountains contained in the logo should have a more modern design
 - d. the acronym of the Working Party should be included in the logo instead of the full name

PROGRAMME OF THE WORKING PARTY UNTIL 2012

36. The deliberations during the 26th session clearly evidenced the need for a better understanding of the topic at stake (forests, water and climate change in high altitude and high latitude watersheds). Mr. Hofer stated that it is important, particularly for policy making, to identify and understand the main drivers of change in water related issues. Is really climate change one of the greatest drivers or are other aspects of globalization equally important? The 26th session clearly requires follow-up work in terms of dissemination of findings, deepening of the understanding and collection of case studies. Ms. Patek chaired the discussion on the activities to be implemented between the 26th and the 27th session and the participants agreed on the following:

- continue with the communication products and apply to the possible extent the

AGENDA

1. Opening of the session
2. Keynote addresses
3. Adoption of the agenda
4. Report on inter-sessional activities following the 25th session of the Working Party (Salzburg, Austria, 2006)
5. Press conference
6. Seminar on: *Forests, Water and Climate Change in High Altitude and High Latitude Watersheds.*
7. Presentation of national reports
8. Presentation of observer reports
10. Deliberation of the communication strategy
11. Programme of the Working Party until 2012
12. Date and place of the 27th session
13. Election of officers of the Steering Committee
14. Any other matters
15. Closing of the session
16. Study tour

PROGRAMME**Monday 18th August**

Arrival of participants
Lodging at the Hotel Lasaretti

20:00 Informal Welcome Party. Restaurant Lasaretti.
Welcome to Oulu. *Tytti Tuppurainen*. Chair of the Regional Council

Tuesday 19th August

08:00 - 09:00 Registration of participants (Hotel Lasaretti, Aurora-Hall 1)

09:15 - 11:00 Opening of the Twenty-sixth Session of the European Forestry Commission's Working Party on the Management of Watersheds (Aurora Hall 2)

Welcoming words by the organizers

- *Eero Kubin*. Chair of the local organizing committee
- *Maria Patek*. Chair of EFC's Working Party on the Management of Mountain Watersheds

Keynote addresses

- *Heikki Granholm*. Forestry Counsellor. Ministry of Agriculture and Forestry
- *Jouni Pursiainen*. Dean. Faculty of Sciences. University of Oulu
- *Thomas Hofer*. *Secretary of Working Party*. The Food and Agriculture Organization of the United Nations (FAO)
- *Gernot Fiebiger*. International Union of Forest Research Organizations (IUFRO)
- *Kjersti Bakkebo Fjellstad*. Policy Adviser. Ministerial Conference on the Protection of Forests in Europe (MCPFE)

Adoption of the agenda

11:00 - 11:30 Report on inter-sessional activities following the 25th Session of the Working Party (Salzburg). *Thomas Hofer*. FAO

11:30 - 13:00 Lunch break (Restaurant Lasaretti)
Press Conference (Aurora Hall 2)
Maria Patek, Thomas Hofer, Raino Heino, Eero Kubin, representative of The Ministry of Agriculture and Forestry

13:00 - 15:00 Seminar: "Forests, water and climate change in high altitude and high latitude watersheds"

- **Opening the Seminar.** *Thomas Hofer*. FAO
- **The influence of climate change at high altitude and high latitude.** *Raino Heino*, a member of the IPCC. Finnish Meteorological Institute
- **Climate change and its geophysical and ecological impacts in the Swedish sub Arctic mountain.** *Terry Callaghan*. Royal Swedish Academy of Science, Abisko Research Station
- **Climate change impacts on distribution and melt of snow in high altitudes and latitudes.** *Josef Krecek*. Czech technical University
- **The role of conservation agriculture in the management of hilly watersheds.**

Ádám Kertész. Hungarian Academy of Sciences, Geographical Research Institute

15:00 - 15:30 Coffee break (Aurora Hall 1)

15:30 - 17:00 Seminar continues

- **Integrated watershed management and adaptation to climate change in the Himalayan region.** *Mats Erikson.* International Centre for Integrated Mountain Development
- **Communicating aspects of global change in mountain watersheds by means of environmental education.** *Angela Michiko Hama.* Institute of Geography. University of Innsbruck
- **Hydrology of headwater peatlands: how are these ecosystems connected to and dependent on groundwater?** *Björn Klöve.* Department of Process and Environmental Engineering. University of Oulu
- **Peatland ecosystem and global change.** *Jukka Laine.* Finnish Forest Research Institute

17:30 - 18:00 Access walk time. Hotel Lasaretti - The Oulu City Hall

18:00 - 19:30 Reception in the City Hall
Jouko Arranto. Deputy Chair of the City Council
Pekka Vuononvirta. Director of Environment. City of Oulu

Wednesday 20th August

09:00 - 10:30 Progress in integrated watersheds and environment management in relation to the seminar topic (Aurora Hall 2)

- Presentation of National and Observer Reports

10:30 - 11:00 Coffee break (Aurora Hall 1)

11:00 - 12:30 Session continues

- Presentations of National and Observer Reports

12:30 - 14:00 Lunch break (Restaurant Lasaretti)

14:00 - 15:00 Session continues

- Presentations of National and Observer Reports
- Discussion / Break

15:00 - 16:00 Programme of Working Party until 2012 – defining long term programme, inter-sessional activities
 Collaboration and linkages between the Working Party and the European Forestry Commission
 Presence of the Working Party at the 34th Session of the European Forestry Commission in October 2008

16:00 - 16:30 Coffee break (Aurora Hall 1)

- 16:30 - 17:30** Communication (Working Party website, newsletter, leaflet, logo)
Election of officers of the working party
Date and place of the 27th Session
Any other matters
Adoption of the draft report
Closing of the 26th Session of the Working Party
- 18:15 - 19:00** Bus Hotel Lasaretti - Muhos Church
- 19:00 - 19:30** Visit to the oldest wooden Church in Finland (1634). *Eila Tillman-Sutela*, Chair of the Parish Council. *Pekka Kyllönen*, Chaplain.
- 19:30 - 19:45** Bus Muhos Church - Research Unit
- 19:45 - 20:15** Introduction to the Muhos Research Unit. *Eila Tillman-Sutela*
- 20:15 - 22:00** Conference dinner in [Muhos Research Unit](#). Courtesy of the Ministry of Agriculture and Forestry.
- 22:00 - 22:30** Bus Muhos - Hotel Lasaretti

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Vice Chairmen	Eero Kubin (Finland) Edward Pierzgalski (Poland)
Secretary	Thomas Hofer (FAO)

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PROGRAMME OF THE STUDY TOUR

Thursday 21st August

08:00 - 08:45 Bus: Hotel Lasaretti - Kuikkasuo (40 km)

08:45 - 10:30 **Theme 1. Conservation and utilization of peatlands**

- Land uplift and development of peatlands after the Last Ice Age. *Mirva Leppälä*. [Metla, Muhos Research Unit](#)
- Energy use of peat and after-use of cutaway peatlands. *Pentti Åman*. [Turveruukki Oy](#)
- Bus: Kuikkasuo - Hirvisuo (10 km)
- Peatlands in their natural state. *Pentti Åman*. [Turveruukki](#)
- Coffee break

10:30 - 11:45 Bus: Hirvisuo - [Taivalkoski Forestry College](#) (110 km)

11:45 - 13:30 **Theme 2. Forests in a local economy**

- Harvester simulators. *Jouni Kortetjärvi*
- Lunch
- Taivalkoski Forestry College. *Kalevi Hirvonen*. Head of the School
- Forests in a local economy. *Hannu Virranniemi*. Managing Director [Pölkky Metsä Oy](#)

13:30 - 14:15 Bus: Taivalkoski - Oijusluoma, Kuusamo (60 km)

14:15 - 15:15 **Theme 3. Boreal forest environment**

- Usefulness of integrated drainage basin approach in water protection. *Kaisa Heikkinen*. Finnish Environment Institute. [Oulu office](#)
- Environmental effects of the recovery of logging residues and stumps. Presentation of the research project. Oijusluoma catchment areas. *Eero Kubin*. [Metla, Muhos Research Unit](#)

15:15 - 16:30 Bus: Oijusluoma - Kuusamo - Ruka - Oulanka National Park, [Visitor Centre](#) (80 km). On the bus: The importance of Ruka in Kuusamo tourism. Representative of the [City of Kuusamo](#)

16:30 - 18:00 **Theme 4. Northern transboundary cooperation**

- Coffee break Transboundary park cooperation [Oulanka National Park](#) - Paanajärvi National Park (Russia). *Kari Lahti*. Park Superintendent. [Metsähallitus](#)
- Oulanka National Park slide show. Pictures: [Hannu Hautala](#) (11 min)

18:00 [Oulanka Research Station](#)
Accommodation

18:30 Voluntary outdoor route: Roaring rapids of Kiutaköngäs (2,5 km walking trail, round trip)

20:00 Dinner. Hosted by Pauli Saapunki, [Council of Oulu Region](#)
Barents Euro-Arctic Region. *Pauli Saapunki*. Chair of the [Barents Regional Council](#)

Friday 22nd August

- 08:00 - 08:30** Breakfast. Oulanka Research Station
- 08:30 - 09:15** **Theme 5. Tourism and environmental values of landscape**
- Nature-based tourism, nature protection and local communities. *Pirkko Siikamäki*. [Oulanka Research Station](#)
- 09:15 - 09:30** Packing
- 09:30 - 10:45** Bus: Oulanka Research Station - Mourusalmi (85 km)
- 10:45 - 11:15** **Theme 6. Ultimate watersheds - lakes, rivers and forests**
- Kitka lakes - Example of unique clear water lakes of Finland. *Seppo Hellsten*. Finnish Environment Institute. [Oulu office](#)
- 11:15 - 11:30** Bus: Mourusalmi - Posio (15 km)
- 11:30 - 12:45** [Pentik Oy](#). Interior design retailer.
Coffee break
Hand made ceramics & exhibition
- 12:45 - 13:00** Bus: Posio - Livojärvi
- 13:00 - 13:30**
- Lake Livojärvi - short introduction to timber floating and its consequences. *Seppo Hellsten*. Finnish Environment Institute.
- 13:30 - 14:15** Bus: Lake Livojärvi - Iso-Syöte, [Syöte Visitor Centre](#) (65 km)
- 14:15 - 16:30** **Theme 7. Forest management and environmental protection**
- Lunch. Syöte Visitor Centre
 - Land-use history in Syöte National Park, especially slash-and-burn cultivation and the exhibition of Syöte Visitor Centre. *Jouni Aarnio*. [Metsähallitus](#)
 - Developing multifunctional forest planning and best forestry practices as means of watercourse protection in Finnish state forests. *Juhani Karjalainen*. [Metsähallitus](#)
- 16:30 - 17:15** Bus: Hotel Iso-Syöte. Iso-Syöte fell.
Coffee. End of the Study Tour.
- 17:15 - 19:00** Bus: Hotel Iso-Syöte - Oulu, Hotel Lasaretti (140 km)

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MEDIA COVERAGE

The Working Party session held in Oulu, Finland, received significant attention in the Finnish press. A press conference was organised during the Working Party session and national, regional and local newspapers as well as web-based news forums reported about it. Due to the northern location of this year's session in the city of Oulu, especially the press of Northern Finland showed great interest.

The press that published articles about the Working Party session includes the web portal of *MTV3* which is the most popular commercial TV channel in Finland; the WebPages of *Helsingin Sanomat*, the biggest national newspaper in Finland; the WebPages of *Ilta-Sanomat* which is the second biggest national newspaper in Finland; *Pohjolan Sanomat*, a regional newspaper in Northern Finland; *Kaleva*, the newspaper of the city of Oulu; *Lapin Kansa*, the newspaper of the city of Rovaniemi (worldwide this is the most northern newspaper that is issued seven days a week); *Tervareitti*, the local newspaper of the Oulujoki Riverbasin and *Maaseudun tulevaisuus* which is the newspaper of the Central Union of Agricultural Producers and Forest Owners.

There were four main headings with which the press tried to capture the interest of their readers. The most common heading was that, while winter tourism still has a future in Northern and Eastern Finland, the ski resorts in the south of Finland will disappear. The press frequently cited **Raino Heino** from the Finnish Meteorological Institute and Chairman of the Finnish group of the Nobel Peace Prize awarded Intergovernmental Panel on Climate Change. "*I wouldn't put even one cent into the ski resort business in Southern Finland*" was, for example, one of his most frequently cited statements. The emphasis of the Finnish press was on the impact of climate change in Finland. However, it was also mentioned that the effects of climate change have drastically reduced the number of tourists in the Austrian Alps (a statement made by the Chairwoman of the Working Party, **Maria Patek**).

Another frequently discussed issue was the fact that climate change is a reality now, it can no longer be prevented or reversed and, therefore, we need to adapt to it. However, it was also noted that some of the observed changes occur naturally and are not caused by humans as it is the case for some of the recent mild winters and rainy summers experienced in Finland. Furthermore, the press cited **Thomas Hofer** from the Food and Agriculture Organisation of the UN and the Secretariat of the Working Party on the Management of Mountain Watersheds. He especially stressed the importance of integrated sustainable watershed management and highlighted the need for more scientific research about the actual impacts of climate change in the different regions of the world, since current predictions are still unreliable. He also mentioned that the effects of climate change are indeed more visible in high latitudes and high altitudes. He also pointed out that mountain regions in developing countries face the most severe difficulties, both in terms of impacts and adaptation.

Especially in newspapers of Northern Finland, another common heading was that the winters in Lapland will still be white, even whiter than before. It was explained that if temperatures remain below zero, the increase in rainfall which is expected due to climate change, will mean more snow and ice. The changes in seasonal cycles as well as the melting of glaciers and permafrost were other examples of global evidence of climate change illustrated during the press conference.

Lastly, the press emphasized that the changes caused by climate change are already visible in nature. **Eero Kubin** from METLA, the Finnish Forest Research Institute, was cited regarding the results of the monitoring research project he is carrying out in Northern Finland. Some newspapers wrote in their heading that the budding of birch leaves in Northern Finland already happens two weeks earlier than usual. Other reported changes were tree seedlings growing above the upper tree line and increased pests as well as plant diseases in forests.