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impacts of native versus non-native forest on water uptake potential of individual tree species throughout their life span.

- Appropriate monetary value for water services in poor communities should be established in order to finance watershed management projects through payments for environmental services.

The **side event** was held to showcase experiences of institutional collaboration on forests and water amongst different stakeholder groups. The pundits stressed the importance of educating and informing local authorities on new methods and approaches that are better understood within the global agenda but less so at the local level. In order to achieve long lasting results, watershed and forest managers must work to coordinate donor groups and national forest and water departments. There has been also recognition of the central role that consumer education plays towards policy and programme effectiveness and of the need for collaboration between public and private sectors, in order to foster mutual trust and understanding.

Water for Forest and People in the Mediterranean



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The Mediterranean Regional Office of the European Forest Institute (EFIMED) is working on a position paper entitled "Water for Forest and People in the Mediterranean: a challenging balance; what science can tell us".

The Mediterranean Region is generally confronted with water scarcity, due to limited and irregular rainfall patterns and increasing water demand, arising from a growing population and expansion of irrigated areas.

Expected climate change will further reduce water availability, through a decrease in rainfall and runoff, and will adversely impact the resilience and even survival of woodland ecosystems, as a result of higher aridity and more frequent extreme events (heat wave, dry spells). This in turn will affect the provision of ecosystem goods and services to society.

The interactions between forest cover and hydrology are rather complex – with regard to variables such as low and high flows, water yield and quality etc – and depend also on many site-specific parameters. However, as these water/forest relationships are poorly perceived because of persisting *idées reçues*, closing the gap between science and public perception is urgently needed.

Mediterranean woodlands, for instance, cover large areas and they often occupy the upper part of watershed in mountainous areas, where they play a crucial role in protecting soil and influencing water regime.

Given the interconnected nature of forests and water,

water cycle and water budget should be considered in an integrated manner, addressing both the **blue water** (i.e. the liquid form, used for the human needs or flowing to the oceans) and the **green water** (i.e. the vapour form, resulting from evaporation and transpiration processes). Innovative knowledge-based policies and strategies should look at both green and blue water, and balance water for man and nature through a real socio-eco-hydrological approach, founded on an integrated land/water/ecosystem management. This requires joint efforts from the scientific community (hydrologists/ecologists/foresters/economists) for organizing and structuring the available knowledge in a comprehensive manner. This is the ambition of the future EFIMED position paper targeting decision/policy makers, managers and society at large.

FOREST EUROPE – Enhancing Communication and Step up Dialogue



Europe's forests are a key factor for sustainable development and wellbeing in the region and across the globe.

FOREST EUROPE is the pan-European policy process for sustainable management of the continent's forests. The ministerial collaboration is officially operating under the name Ministerial Conference on the Protection of Forests in Europe. It develops common strategies for its 46 participating countries and the EU to meet challenges like climate change, protection of biodiversity and freshwater. Outside the forest sector there is little knowledge about the manifold benefits deriving from sustainable forest management and the importance of the pan-European policy tools.

At the latest Ministerial Conference in 2007, the ministers responsible committed themselves to raise visibility of the role of forests at political level, in other sectors and among the public. To support implementation of this commitment, a communication strategy was developed. Both the strategy and an external review identified that effective outreach requires a brand name which makes clear association and profile possible and includes the main message of the process.

For this reason the participating countries decided to replace the brand name MCPFE by FOREST EUROPE.

The new brand name is an essential tool for communicating the importance of Europe's forests and step up dialogue at the national, regional and global level. Follow the ongoing work of FOREST EUROPE by visiting www.foresteurope.org

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Outcomes of Forests and Water Events at the XIII World Forestry Congress



At the XIII World Forestry Congress – Buenos Aires, Argentina, 18-23 October 2009 – FAO, in collaboration with key partner institutions, was responsible for the organization of three main technical sessions and one side event on the subject of integrated management of forests and water.

A short summary of the events' main outcomes and recommendations by session follows.

Session 1: Recent Experiences in Watershed Management introduced the experiences of Japan, Argentina, Pakistan and Turkey. The panel identified the need for a new paradigm and a gradual shift in current watershed management approach, which favors a more integrated, long term planning, focuses on underlying causes and increasingly relies on scientifically tested evidence. The participants also called for more collaborative watershed management.

Recommendations:

- Local communities, both upstream and downstream, must be integrated in a comprehensive planning exercise, in order to ensure the long-term sustainability of watershed management projects.
- Collaboration among stakeholders is essential and should be an integral part of the watershed management approach.
- The capacity of existing interdisciplinary institutions for watershed management should be strengthened.
- Policies must be developed to ensure a holistic approach to watershed management programmes. The backing of local initiatives is crucial in effectively implementing watershed management policies.

Session 2: The Hydrological Impacts of Plantations in a Changing Climate focused on tree plantations in drought prone regions and their conceivable effects on reduced

water availability. Drawing from the experience of Australia, a country beset by water shortages yet planning to triple planted forests by 2020, the panel raised some points also applicable to other countries facing the difficult trade-off between expanding tree plantations and scarce water availability. Although the direct relation between water uptake by tree plantations and water supply is recognized, there is still a lack of scientific research – due to high costs of gathering data and collecting methodologies.

Recommendations:

- Alternatives to high density, water consuming monocultures, also taking into account alternative species, methods of harvesting and management practices are needed.
- Further research on the effects of plantations on water supplies in different landscapes, environmental conditions and climate change scenarios is essential. New financing mechanisms are required to spur research activities and encourage the inception of new projects.
- Rethinking the strategic development of forest plantations and relevant regulations is also necessary.

Session 3: Forests for Water, Water for Forests addressed the relationship between forests and water and how this varies according to climatic zones, time of year, geology, tree species composition, plant density and forest management practices. The cases of Sri Lanka, Argentina, America, Mexico and India were analyzed.

These are the main take-aways:

- Lack of long term monitoring data on the impacts of afforestation projects on water supply hinders effective management of projects and thus fails to inform policy makers.
- Bioremediation alternatives to water treatment technologies should be considered where feasible, such as bioremediation of surface water using leaf litter debris.
- More research is needed to adequately assess the





Forestry and Watershed Management in Slovakia: Past, Present and Future



Many Slovaks consider their country a typical mountainous country. However, this is not entirely true since most of the Slovak territory is actually covered with rolling hills and lowlands.

The Gerlachovský Peak of the High Tatras – with its 2 655 m of altitude – is both the highest Slovak peak and the highest mountain of the Carpathians. Apart from the High Tatras, there are only two other ranges with peaks exceeding 2 000 m a.s.l. By Slovak standards peaks above 1 200 - 1 500 m of altitude are considered high mountains. The Carpathians are young mountains and thus their slopes are often steeper than one could expect given their heights. The upheaval process in the Carpathians is still in progress and lowlands are sinking. This geological development has resulted in continued deepening of valleys and undercutting of slope bases, which partially increased soil erosion and landslide risks. However, due to favourable climate, serious erosion or landslides are exceptional phenomena in Slovakia.

On average, precipitation in Slovakia exceeds evaporation by one third, thus the country's water balance is positive. The majority of national rivers merge with the Danube, emptying into the Black Sea. Only a small part of the water originating from Slovak catchments discharges into the Baltic Sea. The Danube represents 72 percent of the entire country surface water resources. Also the country's most important aquifer, in *Žitný ostrov* (Rye Island), is recharged by the Danube and its tributaries. Slovak mountain

watersheds are of regional importance and their management significantly impacts on catchment areas of large rivers in Central Europe.

In ancient times, Slovak mountains were covered with vast, dark and dense forests. By early Middle Ages, the civilisation centres were mostly located in lowlands.

Only around the 13th Century the need for raw materials and metals pushed settlers to relocate into the highlands, thus increasing pressure on forests.

Mining and smelting consumed a great amount of timber, which in turn resulted in massive plundering of forests. Additionally, gradual population increase raised the demand for farmland, which further intensified clearing of forests and their extensive conversion to fields or grasslands. Soon, shortage of timber forced decision makers to address the issue of forest protection. The first measures aimed at increasing the sustainability of timber production and did not involve soil or water issues.

In the 15th Century, some mountain areas of Slovakia were invaded by the Wallachians, pastoral groups coming from Romania. They introduced highly destructive deforestation practices and methods for livestock grazing, including illegal tree-cutting. The Wallachians assimilated rather quickly with the Slovaks,

thus influencing agricultural practices in mountain regions, although competition between herdsmen and foresters survived for a long time.

Due to political instability, gradual exhaustion of mineral resources and delayed Industrial Revolution, people in the mountains stood by their pastoral lifestyle, with close ties to forests and timber. Towns were small and modern infrastructure was slow to develop. Moreover, low soil fertility and the heavy reliance on agriculture, led to intensive exploitation of the available landscape for agricultural purposes. This resulted in mowing, grazing or terracing of steep slopes as well as in artificial expansion of alpine meadows.

In the early 20th Century, those increasing pressures accounted for the lowest forest coverage probably ever registered in Slovakia. Despite being traditionally prohibited, grazing in forests persisted, along with other harmful practices such as litter raking. These activities further aggravated soil erosion – leading to the formation of badlands in some instances – while lowering of tree line and overexploitation of alpine meadows increased avalanche hazards.

Since water resources were adequate, water management and protection were not top priorities for forestry policy. Water was seen as something to be utilised, not as something requiring protection.

Slovakia has a long tradition of timber transportation in watercourses. Large watercourses allowed timber to be moved bound in rafts, while smaller streams were used for single logs. Insufficient discharge was complemented by water released from small dams built for this purpose. However, these environmentally friendly means of transportation have somewhat damaged riverbeds and banks.

It is only after World War II that the economic development



Photo: Forest road and stream embankment in Ticha Valley



Photo: Spruce dieback in Koprova Valley

of Slovakia really took off. People started to move to the cities and centuries-old hunger for land gradually disappeared. Forest began to take back areas previously deforested. Afforestation of many badlands and restoration of forests around the natural tree line were undertaken. The largest afforestation project was also directly linked to water management.

In the 1960s and 1970s, the source area of the Ipeľ River was afforested to reduce the risk of flooding, which required a partial resettlement of local inhabitants. In the 1990s, water quality improvement linked to this afforestation project made possible to build the drinking-water reservoir of Malinec.

Natural forest succession on abandoned agricultural land took place so quickly that, at present, national cadastre records do not correspond to reality. In the first National Forest Inventory (2005 - 2006) forest cover amounted to 2.17 million hectares, displaying an increase of 12.4 percent (275 000 hectares) compared to the previously estimated figure.

However problems remain. In this period, the mosaic of small fields divided by hedges was converted to vast land management units, which made them more vulnerable to soil erosion. Narrow floodplains of main valleys were turned into transport corridors, where roads and transmission lines competed with vegetation, many forest roads and landings were built directly on stream banks and many water streams were canalised.

After World War II, a number of small and middle-sized hydropower plants were also constructed, which posed some problems in terms of sediment deposition in dams and channels. In 1990 for example, the Orava Dam, one of the largest in Slovakia, had to be completely emptied and cleaned. To decrease sediment load, several debris retention basins were planned along mountain streams. Other dams are in dire need of the same treatment.

Additionally, spruce dieback caused by bark beetle infestation is accelerating due to climate change. As a result, affected forest areas must be cleared and harvested. Road construction, use of pesticides, and nitrogen leaching from deadwood and decomposing

humus have increased the severity of harvesting-related soil disturbances and ultimately impaired water quality.

Forest management can indeed contribute to solve many of these issues and help improving the current situation. To minimise sediment load in rivers and streams, a better understanding of the role of riparian buffer zones in water protection is needed. The establishment and proper management of forested strips along stream banks represent probably the easiest way to improve water quality in rivers. Stricter legislation related to the construction of forest roads is also needed. Implementation of these important changes would require new financial resources and introduction of suitable awareness-raising and promotion tools. Slovakia has a long history of forest management and preservation; however, the national forestry approach is more concerned with soil protection against erosion, while the importance of forests for water-related functions is often neglected.

The importance of water protection forests is generally recognized, although only forest belts protecting drinking water reservoirs are officially listed in this category. Similarly, Slovak forestry guidelines acknowledge the water regulation function of forests, yet with no practical implications for forestry practices. This function is assigned to subalpine forests, presumably only because of their low productivity and difficult terrain conditions.

For additional information see: www.nlc.sk and www.land.gov.sk



Photo: Lack of riparian buffer zones in managed forests