

**Twenty-fifth Session of the FAO/European Forestry Commission's  
Working Party on the Management of Mountain Watersheds,  
Salzburg, Austria, 23-27 April 2006**

**NATIONAL REPORT POLAND**

**MOUNTAIN FOREST WATERSHED MANAGEMENT**

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### **1. Introduction**

In the period since Twenty- fourth Session in Cracow there has not been in Poland a major natural catastrophe or natural disaster. Local floods were in each year in some region but there were relatively small with comparison of flood in 1997. Due to this facts report presents basic problems connected with forest and water as well actions associated with the protection of environment undertaken in recently years.

### **2. Basic data of polish forests**

The overall national territory amounting to 312,6 thousand km<sup>2</sup> includes 58,7 percent of agricultural land (including 76 percent of arable land and 22 percent of grasslands). Forests occupy about 29% of the national territory, with the acreage approaching 9,2 million ha. They vary considerably in their structure and natural values. A particularly pronounced feature of Poland's vegetation cover is that changes occur along two gradients, i.e. from the west - eastwards, and from the north - southwards. This is reflected in the increased share in the potential natural vegetation of the sub-continental and sub-boreal elements (i.e. mixed coniferous forests and lowland spruce stands), that gain special importance in the north-eastern parts of the country. At the same time, the sub-oceanic elements gradually disappear, i.e. lowland beech woods, acidophilous oak woods that predominate in western and south-western Poland, and are virtually non-existent in the east of the country.

Poland lies in the centre of European Plains with average altitude 173 m, in the climatic zone wherein forest communities could potentially cover almost 90% of the country area. Forest communities are therefore most natural vegetation types which provide shelter for natural richness of living organisms. Within the area of Poland, there are more than 60 thousand species registered including about 35 thousands animal species, more than 12 thousand plant species (in 485 types of plant associations), and about 13 thousand fungi species.

Approximately 80% of the forest area is State owned and about 76% is managed by the Polish State Forest Enterprises in an uniform way regulated by the Forest Law and strictly prescribed management procedures. The State Forest Enterprise manages about 26000 of forest complexes of various sizes from small, less than 1 ha, to large as the Białowieża Forest of about 56000 ha. The private forest ownership is largely fragmented since 1.5 million ha of private woodland is owned by more than 1 million proprietors.

In Poland area with altitude above 300 m and classified as a mountains occupy about 8,9 % area of country. It was one of the reasons undervalue of importance of Polish mountain forests in the past, which despite of small area perform unusually significant functions for all country.

Mountain forests in Poland occupied the northern part of the Carpathian and Sudeten Mountains, extending about 700 km along the southern Polish border. They cover about 950 000 ha in five Polish voivodships. They have maximum elevation timber line about 1650 m. a.s.l. and have diversified climate, soil, vegetation and antropogenic impacts. The proportion of mountain forests in total forest areas in Poland, total volume over 7 cm and stand volume in 1ha is shown on Fig. 1.

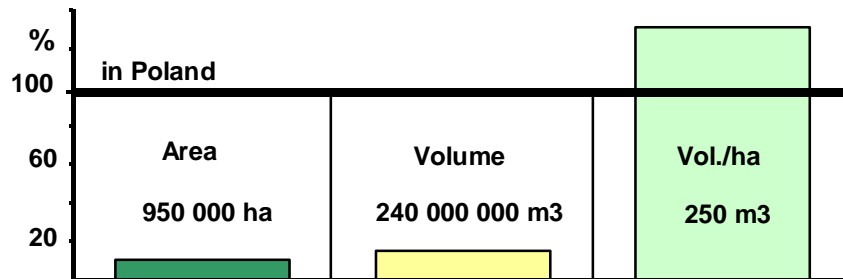


Fig.1 Mountain forests against background of forests in Poland

The forest vegetation form the following elevation zones:

- foothills, up to an altitude of 500 -600 m, vegetation mainly: Galio-Carpinetum and Pino-Quercetum,
- lower mountain zone at an altitude 500-1000 in Sudeten, and up to 1200 m in Carpathians, vegetation mainly: Dentario enneaphylidis - Fagetum (Sudeten), Dentario glandulosae - Fagetum (Carpathians) Luzulo nemorosae - Fagetum and Abieteti - Picetum montanum,
- upper mountain zone at an elevation of 1000-1250 m in Sudeten, and 1200 - 1650 in Carpathians, vegetation: Plagiothecio - Piceetum hercynicum (Sudeten), Plagiothecio - Piceetum tatricum (Carpathians)
- dwarf pine zone at an elevation of 1250-1450 m in Sudeten and above 1500 - 1800 m in Carpathians.

The present species composition of the forests significantly differs from the primeval (natural) because of centuries of improper management (monoculture plantations, lack of natural tree regeneration, and the type of cutting system). In the Sudeten the coniferous sites occupy 46% of forest area and the current percentage of spruce stands area is about 72% but fir stands only 0.3%. In the Carpathians the coniferous sites occupy only about 3% and the average percentage of spruce and fir stands reaches almost 50% (23 and 27 respectively).

### 3. Water problems

Water resources in Poland are relatively small. On over one third of the country area there a deficit of water occurs, especially in the vegetation period. Due to the high variability of annual rainfall (from 400 to 800 mm) only every 4 out of 10 years are suitable for agricultural production. In the remaining 6 years the rainfall is not sufficient or too abundant for optimal production. Summer rains frequently result in flooding and/or crop damage, while at the same time almost every year, there are some periods of drought. The soils in Poland are mainly of glacier origin and show a significant special variability. Approximately 50% of soils can be classified as sandy with low water holding capacity. The plants grown on these soils are the most sensitive to short periods of drought. Under these climatic and soil conditions the intensive and stable agricultural production requires supplemental irrigation. Only in south of territories of Poland the water balance in this period is positive. The trends of decreasing of water resources are observed in some regions and periods mainly due to increase of air temperature and relatively low precipitation during last 20 years. It has been

stated that the central territories of Poland are especially deficit in water and most threatened with becoming a steppe. Rational water management in forests is important for water relations in all the country.

The water-retaining properties of forests play a great role in shaping water resources and in combating phenomena, such as draughts and floods. Interception, retentive properties of forest litter and relatively high forest soil permeability make it possible to retain part of precipitation and to replace surface runoffs with groundwater runoff. As a result, forests make the underground water resources grow and, at the same time, they reduce the flood wave peak in rivers, thus reducing flood hazards. The significance of forest effect on water circulation in lowlands is slightly different than in mountain forests which, in addition to reducing flood waves, protect very well soil against erosion. The supplying of watercourses with underflow waters during climatic draughts is also considered an important role of forests. Discharges in watercourses outgoing from forests are then much higher than those in watercourses passing through agricultural catchment areas. The role of forests in shaping water quality increases with the growth of environment contamination.

Good example of the influence of forest on hydrology of torrents is the change of outflow in Sudeten due to ecological catastrophe. During On years 1977 – 1981, a gradual increase in the water outflow induced by the poor condition of stands as a result of insect attacks. In the years 1982 – 1984 amount of the water outflow increased in the as compared with the previous years caused by intensive dying of trees and their removal from the watershed. The runoff coefficient value for the small catchments up to 10 km<sup>2</sup> increased by 10 to 30%. In greater catchments the amount of the outflow was estimated at 10 to 30% depending upon deforestation rate and initial forest cover of the watershed. In period 1985 – 1989 outflow was stabilised as a result of stopping the deforestation process and intensive reforestation management. After 1990 up to now slow decrease in water outflow and intensified after the flood of 1997 was observed.

The trends of decreasing of water resources is also observed in forests. It should be prevented by control of outflow, increasing number of small surface reservoirs and improvement of soils properties with use of right silvicultural treatments. To stop depletion of water resources and to restrain the more and more frequent overdrying of habitats, the surface water retention in forest areas should be increased. The programme of retention increase is being implemented in Poland on the basis of agreements made in 1995 and again in 2003 between the Minister of Environmental Protection, Natural Resources and Forestry on the one hand and the Minister of Agriculture and Rural Development on the other hand. Implementation of Programme of Small Scale Retention in Poland (up to 2015) should crucial improve water balance and water condition of natural environment. Commonly, the term “small-scale retention” means different activities aimed increased water resources, but the major role of the small-scale retention measures is to positive influence on the moisture content of habitats by raising the groundwater level, increasing the water content in soils, as well as influence on the microclimate. Small-scale water retention is understood as the ability of plants, forest litter, soil and morphology of a terrain to retain water. Retention ability could be increase through various ways:

- landscape planning,
- technical measures,
- agro- and forestry management.

The increase of retention can be done through the augmentation of forest cover. Afforestation of upper parts of catchments, watershed areas and areas exposed to wet winds is most effective. Afforestations of farmlands should be in line with the spatial management of a given region and environmental conditions. The increase of retentive capacity can be attained by change of surface downflow into subsurface flow into groundwater-bearing layers. The retention measures include small natural reservoirs (water bodies, old riverbeds, lakes), artificial reservoirs

(ponds, excavation pits, impounding reservoirs, dammed lakes), rivers and network of water collecting ditches which delay the water runoff from the catchments area. According to the Programme of Small Scale Retention capacity of reservoirs which can be include to small-scale retention measures should be less than 5 millions m<sup>3</sup> on agricultural area and 1 millions m<sup>3</sup> in forests. The implementation of signed by two Ministers document was planned up to 2015. Total volume of water increase planned up to 2015 is 965 million m<sup>3</sup>. Most of this volume was projected in reservoirs (75 %) and lakes (23,3 %). Others measures (1,7%) were: channels retention, soil retention and afforestation.

Presently the major task in the area of water management is implementation of The Water Frame Directive of European Union which should be done up to 2015.

One of the most important priorities of the mountain forest watersheds management in Poland is an inclusion of private forests into the ecologization process and afforestation of a part of post-agricultural areas, specified in the National Programme for the the Expansion of Forest Cover.

#### 4. Forests and protection of environment

In Poland various regimes of nature conservation were extended to protect the most valuable natural or close to natural types of vegetation, such as 23 national parks (315,000 ha), more than 1000 nature reserves, 7 biosphere reserves, 120 landscape parks (about 2.5 million ha) and in more than 350 areas of protected landscape (about 5 million ha).

Forest areas are protected as integral parts of the above forms of nature conservation. Almost 50 percent of the State-owned forests (about 3.5 million hectares) have been included as protective forests: i.e. forests protecting soil and water, constituting valuable resources of indigenous nature, sites of scientific importance, and forests making up protective zones around large towns, and health and recreation resorts (Fig. 2).

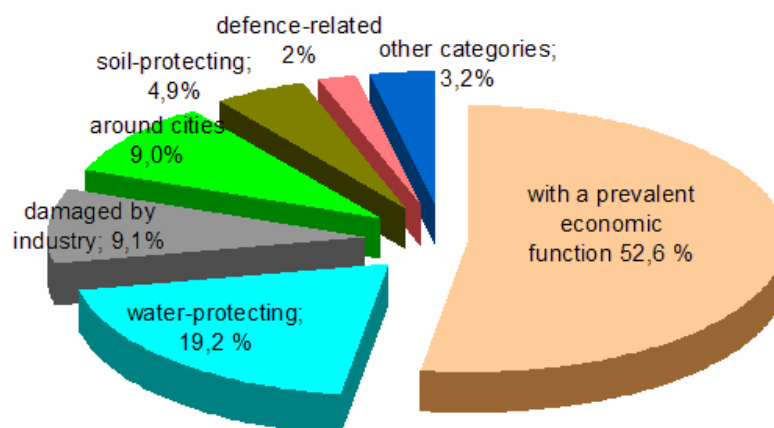


Fig. 2 Protective forest in Poland

Within the State Forest Enterprise a special form of management for protection with the emphasis on the preservation of forest multifunctionality (protection for the physical environment, social functions and economic functions) has been introduced in the form of Forest Promotional Complex. First ten of FPC were established between 1995-1996 and now there is 19 FPC on about million hectares, and six Forest Promotional Complexes have been established by last two years. The FPCs have been implementing programmes within which forest functions may be differently prioritized. In all instances, however, the priority task is to be compatible with the need to protect natural biodiversity what means that certain forest practices will be limited or even abandoned. These forest areas have specific ecological,

educational and social importance in Poland.

In addition, 1880 thousand hectares of forests or about one fifth of the Polish forest surface will be protected within the planned Natura 2000 sites. Special Areas of Conservation in Poland cover the following forest Natura 2000 habitats:

- 9110 acidic beech forests;
- 9130 nutrient rich beech forests;
- 9140 mountain maple forests with high herbs;
- 9150 xerophilous beech forests with orchids;
- 9160 subatlantic hornbeam-oak forests;
- 9170 central European hornbeam-oak forests; 9180 mountain maple forests on slopes and screes;
- 9190 acidic oak forests;
- 91E0 floodplain forest and riparian willow shrub; 91F0 oak-elm-ash floodplain forests; 91I0 subcontinental oak forests;
- 9410 mountain spruce forests.

In line with the Habitat Directive the forest management within these sites shall take into account the maintenance or restoration of the proper protection status of a given natural habitat. At the moment, only overall principles exist concerning the management of the forest natural habitats within Natura 2000 sites but in general there is no essential contradiction between the multifunctional forestry model of management which prevails in the Polish forestry and the concept of protection provided for by the Natura 2000 network.

Protected areas in mountains occupy 47.4% of their surface area (for comparison on a national basis they represent 32.5% of Poland's territory).

## 5. Review of legislation acts

The protection of forests areas, so important for mountain watersheds, is subject to several recent legal acts including:

- **Constitution of the Republic of Poland, as adopted on 2 April 1997**, includes *inter alia* the provisions on nature conservation and environmental protection to be conducted pursuant to the principle of sustainable development. The Act sets out policies that provide for ecological security for the present and future generations. It imposes on each citizen a general obligation to take care of the environment, as well as the liability for the deterioration thereof.
- **Act of 2003 on the Protection of the Environment** includes *inter alia* general provisions on nature conservation, including the principle of the protection of wildlife and landscape. It includes also essential provisions concerning genetically modified organisms. For nature conservation, particularly important are the provisions that refer to the protection of waters and marine environment as well as to the protection of air in the course of investment activity, and aim at the preservation of natural balance and biological diversity.
- **Act of 2004 on Nature Conservation** is the basic legal act in this field, and its provisions are consistent with the European Union law. According to the Act, nature conservation means preservation, appropriate use and restoration of natural resources and elements. Under the Act, nature conservation has the following aims: to sustain ecological processes and stability of ecosystems, to preserve biological diversity and geological heritage and to safeguard the continuous existence of plant and animal species as well as of their biotopes, by means of maintaining natural habitats and other natural elements in adequate conditions or by restoring them to the original state. Another important goal is to develop appropriate human attitudes towards nature. The Act laid down: nature conservation authorities, nature conservation forms, application of nature conservation, management of natural resources and elements, rights vested to public organisations and to citizens, legal implications of the protection and penal provisions.

- **Act of 1991 on Forests** with later amendments lays out rules for sustainable forest management. Over the last decade several important documents concerning forest management and protection have been elaborated and adopted in Poland. Most of them were prepared before 2003 within the framework of the accession procedures.

In addition to the above mentioned legal acts other political documents have been adopted including:

- **Program of Conservation of Forest Gene Resources and Selection Breeding of Forest Trees (1993)**. The program defines the basis for the conservation of forest gene resources, improvement of the seed base and selection of forest trees. The Bank of Genes in Kostrzyca (Sudety Mts) was established for all Polish forests;

- **Guidelines on the improvement of forest management based on sustainability principles (1995)**. The document lays rules for the introduction of Forest Promotional Complexes and promotes sustainable forest management in the commercial forestry obliging to implement such activities as: protection and restoration of water regime, water and wetland biotopes and biocenoses, and cooperation with land planning in this respect; development of enriched forest ecotones; limitation of clear-cut size; enrichment of species, age, and spatial structure of forest stands; priority for natural methods of forest protection. The Guidelines specify detailed principles regarding the protection of forest genetic resources, silviculture, forest protection and management;

- **National Programme for the Expansion of Forest Cover (1995)**. The country's forest cover increased from 20.8% in 1945 to 28.2% in 1995. According to the abovementioned document the forest cover in Poland shall increase to about 30% by 2000 and to about 33% by 2050;

- **National Policy on Forests (1997)** A document adopted by the Polish Government and highlighting the aims and trends of forestry development in the XXI century. The document calls for the establishment of Forest Regional Operational Programmes and emphasises the need to observe a sustainable development strategy and the importance of forest ecological, economic and social functions. The Policy provides for forest management methods which take account of the specific natural, economic and social conditions. Nature (biodiversity) protection in forest management shall be gradually enhanced by implementing nature conservation plans in individual Forestry Inspectorates (main management units). These plans have already been prepared in the majority of forestry units in Poland. Guidance provided by the new forest policy requires that both public and private forests are subject to similar management methods. Thus, every forest owner and manager is obliged to manage forests following such basic rules as sustainability, responsibility for forest protection and enrichment of forest resources. According to the Policy the permanence of forests and their multifunctionality, will best be achieved by: increasing the country's forest resources, improving the state of forest resources and their protection, introduction of a pro-ecological and economically balanced model of multifunctional forest management, participation of Poland in the international dialogue on global principles of sustainable forestry management.

- **National Forest Program (2002)** - the Program covering among other things the protection of forest areas which play an important role in all activities involved in planning and implementation of sustainable forestry.

## **6. Main problem that must be solved**

Mountains often constitute geopolitical borders and can be sites of potential/current tensions or even conflicts owing to their rich natural resources and strategic relevance. Within countries too, mountain areas can be places of tension and conflict: because of their inaccessibility and remoteness, mountain regions sometimes harbour opposition groups.

However, mountains also offer opportunities for transborder cooperation and promoting peace.

To the main threats of mountain forests still belongs air pollution, change of water condition as well as extreme weather events like floods and droughts, the changes in use of agricultural lands due to economy reasons, the growth of tourism and its concentration in attractive mountain regions.

There are still needs for research on regional level on pollution of air and water, soil erosion, flood protection and the quality of the environment. Major difficulties are connected with the anthropogenic pressure, especially related to water pollution and the prevention against floods. Mountain watershed management requires an interdisciplinary approach. Integrated water management should include hydrology, ecology, forestry, infrastructure, as well as social and a range of other problems.

One of the most important priorities of the mountain forest watersheds management in Poland is an inclusion of private forests into the ecologization process and afforestation of a part of post-agricultural areas.

Long-term tasks are connected with implementation of Water Frame Directive of European Union, National Programme for the Expansion of Forest Cover, Programme of Small Scale Retention and National Program of Municipal Sewage Treatment.