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**CONSERVATION OF BIODIVERSITY¹
AS A COMPONENT OF FOREST MANAGEMENT² IN THE STATE FORESTS**

Ryszard Kapuściński

Directorate General of the State Forests National Forest Holding

Introduction

Understanding of the need of active measures for conservation of biodiversity in forest management conducted by the State Forests National Forests Holding has increased gradually since the beginning of the decade of 1980. It was due to several reasons, both internal – resulting from a critical assessment of the forests condition and forest management, and from observations referring to functioning of nature conservation, and external – linked with the society's expectations in reference to forests and their functions.

Mistakes in forest management, alongside with atmospheric pollution and climatic changes, were held responsible for the bad condition of forests at that time. The critical evaluation of forest management referred mainly to the raw material supplier model, which dominated in it until the end of the decade of 1980. Its consequence was, among others, creation of great areas of forest stand with very few species, and even monoculture stands - mainly Scotch pine stands. Schematic actions of those times led to development of areas without taking into consideration the diversity of habitats, and particularly of microhabitats important for the protection of biodiversity. This type of forest stands were very prone to attacks caused by leaf-eating insects, to diseases caused by fungi and to problems caused by abiotic factors (particularly damages caused by wind, snow accumulation on trees, etc.).

Many objections were raised against the preservative type of the nature conservation, which concentrates on areas, which are biologically very rich and covered by various forms of nature conservation. These areas are, actually, small enclaves submitted to strong and continually growing pressure from our civilization,

¹ Biodiversity means the variability among living organisms from all sources, including, 'inter alia', terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems (Convention... 1992).

² Forest Management – means conduction of forest economy according to the principles of common preservation of forests, durability of their maintenance, continuity and balanced usage of all the forest functions and expanding of forest reserves, management of forest animals, and acquiring – with the exception of purchase – of wood, resin, young evergreen trees used for Christmas trees, stumpwood, bark, fallen conifer needles, animals and forest products such as mushrooms, fruits of the forest, herbs, etc., and also sales of these products and accomplishment of non-productive forest functions (Law on forests ... 1991).

and this makes their protection and their external influence difficult. The Convention on biodiversity negotiated during the Earth's Summit, in 1992, brought several new elements to the philosophy and practice of nature conservation, prevailing until that time. One of these elements is the obligation to undertake measures in favor of the protection of biodiversity not only on the protected areas but also outside them, i.e. on areas used for economic purposes, such as the so-called managed forests, agricultural croplands, etc.

The following documents and papers, which originated in the foresters milieu, heavily influenced the change of the forest management prevailing up to that time: *Report on the condition of forests* (1980); *Appeal and memorandum of the Polish Forest Association* (1982), which called for protection of forests and timber; *Resolution of the Polish Forest Association* (1987) on the necessity of further improvement of the ecological basis of forestry; *Polish Policy of the Comprehensive Protection of Forestry Resources* (1994).

The public opinion had big influence on the change of the approach to biodiversity in forest management. The public interest concentrated on multiple functions of forests, on their protective, infrastructure, social and ecological roles in the global context of biosphere interests as well as in the local domestic dimension. The particular role of forests and forestry was linked with the conservation of nature and of the environment in the maintenance of biodiversity and of the conditions indispensable for the life of individual human beings and of the whole society. An increase of the ecological awareness of the society, expressed especially in creation of strong ecological movements, constitutes an important force, capable to enforce political, economical and protective decisions favorable for nature conservation. At the same time, conflicts among the groups representing diverse expectations in relation to forests and their functions, became more acute. It refers, in particular, to representatives of the wood industry and of the ecological organizations.

The particular role of forestry in the protection of biodiversity is the result of the following reasons. Approximate calculations show that we can call as forest animals, i.e. as those which live exclusively in forests or which are only partially linked with forest ecosystems, about 60% of vertebrate animals, more the 80% of Macromycetes (macrofungi), great majority of mosses, ferns, horsetails, club-moss (*Lycopodium*), a great group of floral plants and a great part of the animal group which has the greatest number of species - insects. If we assume, as a temporary expedient, that approximately 65% of species living in Poland are linked with forests, than according to the present state of our knowledge in the field of geography and taxonomy, it would mean that in our forests live over 32,000 of species³. It is obvious, therefore, that the protection of biodiversity in Poland largely depends on the principles of forest management, on restrained – according to the principles of a sustainable development - use of forests in the State Forests, which are the main manager of forests in Poland. On the areas, which are managed by the State Forests, many forms of natures conservation exist. The annexed table presents relevant data.

Activities performed in the recent years by the State Forests in favor of the active protection of biodiversity have concentrated on the following:

³ Grzywacz A., 1995: The introduction to: Ochrona różnorodności biologicznej w zrównoważonej gospodarce leśnej. PTL, IBL Materiały z Sympozjum, Warszawa, 6-7.04.1995. (The protection of biodiversity in a sustained forestry. PTL – Polish Forestry Association, IBL – Institute of Forestry Research, Materials from Symposium, Warsaw, 6-7th April 1995).

- Conducting forest management basing on ecologic principles, subordinated to accomplishment of the multifunctional role of forests with preservation of the principle of sustainable development;
- Integrating forest management with the active protection of nature;
- Improving management practices as well as organizational, technical and technological solutions oriented towards nature conservation.

Forest management conducted on the base of ecological principles, subordinated to accomplishment of the multifunctional role of forests with preservation of the principle of sustainable development.

The base for the modern forest management in Poland, based on ecological principles, is constituted by the Law on forests (1991, with the subsequent amendments). The gist of it was to balance the basic functions of a forest: ecological, economic and social. The owners of forests were obliged to maintain forests and to guarantee continuity of their functions. Besides the maintenance of forest plants in forests, the Law established the legal duty of protection of natural marshes and peat bogs, among others.

To the important internal regulations of the State Forests, which implement the provisions of the Law on forests, the premises of the 1st Ecological Policy of the State (1991), the 2nd Ecological Policy of the State (2000), and the Forest Policy of the State (1997) belong the following regulations: regulation no. 11 of the general Director of the State Forests of 14th February 1995 on improvement of forest management carried out on ecological basis (with the subsequent amendments – regulation no. 11A of 11th May 1999); regulation no. 30 of the general Director of the State Forests of 19th December 1994 on Promotional Forest Complexes (with the subsequent amendments); regulation no. 47A of the general Director of the State Forests of 30th September 2005 on amendment of recommendations referring to recognition, assessment and recording of natural renewal, introduced for implementation in forest management and in the forest inspectorates of the State Forests; regulation no. 7A of the general Director of the State Forests of 7th April 2006 on protection of forest genetic resources for the needs of seed production and growing of forest trees; regulation no. 31 of the general Director of the State Forests of 19th July 2006 on the issue of determination of the system of periodical general inventory of the species of plants, animals, other organisms and biological habitats, which are important as indices for assessment of the condition of forests and for forecasting of changes in forest ecosystems; decision no. 61 of the general Director of the State Forests of 25th July 2006 on the issue of conducting, in the years of 2006-2007, of a general inventory of biological habitats and wild fauna and flora – mentioned in the Directive on Habitats, and on the issue of completion of the inventory of the black stork, golden eagle (*Haliaeetus albicilla*), eagle of the genus *Aquila*, eagle owl, crane and black grouse populations.

Among the above-mentioned regulations, the one with the crucial importance in the approach to forest management was the regulation no. 11 of the general Director of the State Forests of 14th February 1995 on improvement of forest management carried out on ecological basis. It states, inter alia, that the basic condition for conduction of forestry on ecological principles is maintenance and restoration of compatibility of the forest biocenosis (i.e. organisms) with the biotope (i.e. with the environment of their habitat). The assessment of compatibility between

biocenosis and biotope requires conduction of properly directed works in the area of soil and habitat and a modern inventory of forest conditions, which constitutes the base for proper determination of the short term and long term objectives of forest management, including determination of economic division of a forest according to unified or similar economic and protection objectives. It is possible to mention, inter alia, the following activities directed at the protection of biodiversity, indicated in the regulation:

- Preservation, in the state close to natural, and restoration of water reservoirs and water courses existing inside forests;
- Preservation, in the valleys of the rivers, of marshy forests, alder swamps, and other natural formations as refuges for rare species of plants and animals and as regulators of humidity of habitats and of the local climate;
- Preservation, in the intact state, of inside-forest wastelands, such as: marshes swamps, morasses, peat bogs, preserves, heaths, dunes, deforested areas and outcrops, together with their flora and fauna in order to provide full protection of biodiversity by recognizing them as ecological lands;
- Initiation of natural forest renewal in all habitats – taking into consideration the requirements of quality and origin in relation to the main species and of indispensable participation of admixture and biocenotic species adapted to the character of habitats;
- Leaving, in the stands ready for tree cutting, and – if possible – also in younger ones, of some old trees until their physiological old age and even biological death and of selected dead trees and trees with hollows scooped out in the trunk – as the habitat for numerous plant and animal organisms, which determine the nature's richness and self-regulation processes;
- Giving priority to prophylactic measures and to biological and mechanical methods of the forest protection against chemical methods, which should be treated as final measures when there is no other alternative available.

The type and scope of the accomplished works and introduced solutions were the following:

In 1997, the General Director of the State Forests approved for implementation the "Principles of planning and execution of small-scale impounding in the state forests". As a result of this, in the years 1998 – 2005 1,124 impounding reservoirs were created, with the total area of 1,358 ha and the capacity of 8.4 millions of m³. These are small reservoirs with the average capacity below 10,000 m³. Furthermore, 2,216 damming up water structures were made, such as sluice gates, chutes and small weirs and rapids. Financial resources allocated for small-scale impounding in the years 1998 – 2005 amounted to approximately 39 million Polish zlotys (mainly resources from the State Forests and partially from the National Fund for the Protection of the Environment and for Water Management (NFOSiGW), EcoFund and Phare). In 2006, the General Management Board of the State Forests, with the collaboration of scientists, elaborated program and spatial concepts for two projects:

1. Increasing retention possibilities in forest ecosystems and counteraction to droughts and floods causes in forest ecosystems on lowlands.
2. Combating water erosion in highlands caused by precipitation water outflow, preservation of infrastructure and torrent control.

These projects were submitted for the investment plan within the *Operational Program*

– “*Infrastructure and the Environment for the years 2007-2017*”. The value of the planned works exceeds 300 million Polish zlotys.

Due to great importance of hydrogenic habitats, including marshy woods, marshy forests and fen forests, the decision was taken not to use them – as the forests, which are the valuable fragments of the national nature’s resources, they are treated as special category of farming. The participation of natural reforestation increases in the total reforestation figures. The average figure of the last 18 years is of 7%, and in 2007 it was of approximately 10%.

The area and the volume of wood of the older stands clearly increases. According to data on 1.01.2006, the total area of older stands was of 456,868 ha, and their volume of wood was over 186 million m³. The volume of wood of the dead trees, standing and lying, increased as well, and on 1.01.2007 was of approximately 40 million m³.

Qualification criteria for stands were heightened for treatments eliminating occurrence of insect pests. More and more attention is given to prophylactic measures, which include increase of biodiversity in forests. As an experiment, 445 ha of a forest destroyed by hurricane were excluded from forestry, creating the so-called reference area (Piska Forest). The objective of observations and exams conducted there is to follow up natural processes accompanying wood decomposition and forest renewal.

The base of a rational forest management, which takes into consideration the needs of the protection of biodiversity, is the knowledge of the quality and natural values of forest ecosystems. The traditional inventory taking referred mainly to wood resources, characteristic of stands (distribution of age classes, participation of individual species of trees) and identification of soils and forest habitats. From the beginning of the 1990 decade, systematically increases the scope of forest and forest resources identification. In particular, much attention was devoted to the inventory taking of natural habitats and of plant and animal species for the protection of which it is necessary to determine areas called Nature 2000. The progress is slower in works of fitosociology inventory taking and of inventory taking of forest and non-forest communities.

At the end of 1994/ the beginning of 1995, an extraordinary natural valuation of forests and non-forest lands was made on areas covered by individual forest inspectorates. The base for elaboration of valuation constituted mainly the analysis of source materials and knowledge of the field workers. The valuation consisted in separation and marking on the general maps of forest inspectorates of particularly valuable tree stands, of geological features and of flora and fauna. The main objective was to distinguish and localize structures important from the point of view of biodiversity, e.g. tree stands with the structure and types of species similar to natural forests and to marshes, swamps, small ponds. The results of this valuation were submitted to analysis by the Institute of Forestry Research. On this base was elaborated a map of biodiversity of the Polish forests, in the scale of 1:500 000. Information collected in this way were used, first of all, for elaboration of nature’s protection programs for forest inspectorates (a part of the forest management plan).

In the years 1997 – 2007, were practically finished works on soils and habitats in all forest inspectorates. Only 0,6% inspectorates are left before the work is done

(i.e. 3 of 430). In the result of these work we observed – in relation to 1978 – percentage increase in participation of the following habitats: mixed woods, mixed forests, “at the expense of” woods, the participation of which decreased.

The general inventory taking of natural habitats and of wild flora and fauna, made in the years 2006-2007, provided many interesting data. It referred mainly to natural habitats and species mentioned in the annexes to the Directive on Habitats. In total, 76 types and subtypes of natural habitats were registered, 48 species of animals (6 species were not found) and 23 species of plants (4 species were not found). The most interesting discoveries include the confirmation of new standings of rare and endangered species, and of species, which were considered before as extinct on a given territory. The results of the inventory constitute the base for updating of the nature’s protection programs for forest inspectorates. They will be used to complement proposal of areas of the Nature 2000 network, submitted by Poland to the European Commission.

Works begun on elaboration of the fitosociologic inventory taking in the forest inspectorates, which make part of the Promotional Forest Complexes, including elaboration of maps showing localization of plant communities.

Integration of forestry activities with the active protection of nature.

The base of forest management in a forest inspectorate is the forest management plan. The nature’s protection program constitutes its integral part. This program includes information on habitats and species protected by law, and on forms of the nature’s protection occurring in a given forest inspectorate, such as reserves, landscape parks, areas of the Nature 2000 network, areas of protected landscape, nature monuments, ecologic lands, documentation stands, nature and landscape groups, protection zones for animal refuges and standings of plants included in species protection program. The program determines the type and scope of works, which have to be undertaken in order to preserve habitats and species. Reserves are not included since they have separate protection plans.

Tasks resulting from the plans of reserves protection (it includes also landscape parks and the areas of Nature 2000 – the latter do not have protection plan yet) are fulfilled by the local forest inspector. According to the Law on forests in force these are tasks ordered by the government administration and financed from the state’s budget.

Important contribution to the protection of biodiversity in the State Forests is made by the Forest Genes Bank in Kostrzyca (RDLP Wrocław) and by Forest Arboretum in Sycow (RDLP Poznań). Research conducted in these institutions includes the following:

- Collection and long term storage of genetic resources of forest trees and shrubs and monitoring of the quality of the reproductive material in the form of seeds of the most valuable species from the State Forests and national parks, reserves and natural monuments;
- Foundation and maintenance of a collection of endangered and protected plants, including over 100 taxons;
- Planting of produced cuttings in preservation areas. A considerable part of the produced plant material allows preservation of endangered species in the *ex situ* conditions, but it allows also their planting in the original environments or in replacement (surrogate) environments. Besides the generative and vegetative reproduction also *in vitro* methods are used;

On the initiative of the State Forests, programs of rare and endangered species protection, such as yew and wood grouse, have been elaborated and executed

Improvement of management and organizational, technical and technological solutions

Requirements put to forest workers by the society during the recent years became very extensive and high. This is the result of a significant increase of the role of forests and forestry, of the environment's protection issues and of acceptance of the principles of sustainable growth. With the increase of social awareness and knowledge, more and more people are interested in participation when ecology issues are debated, especially those referring to forestry and the nature conservation.

New expectation in relation to forests and forest workers require a method of staff formation different from the traditional one. We have great needs in the field of forest education of the society. The State Forests collaborate in this field with forestry faculties of the Universities in Cracow, Poznan and Warsaw, with the Institute for Forestry Research in Warsaw and with such organizations as the Polish Forestry Association (PTL) or the Association of Forestry and Arboriculture Engineers and Technicians (SITLiD).

Promotional forest complexes, created in all regional management areas of the State Forests, contribute to a large extent to the education of the society in forestry issues. They have properly equipped education centers or forest rooms and they have a series of didactic paths and well prepared staff.

In order to address the needs of coordination of activities in the field of the nature conservation, and especially to address new challenges presented by the creation of the Nature 2000 areas, a separate Department for the Nature's Protection was created in the Directorate General of the State Forests

Among the technical and technological solutions introduced in the State Forests, which promote biodiversity, the following are worth mentioning:

- SILP – IT system of the State Forests;
- GIS – Geographical Information System, represented in the form of the “Forest Digital Map”;
- Modern, multifunctional equipment for cutting, handling and transport of wood and for shredding cutting leftovers (the State Forest do not burn them anymore).

Summary and conclusions

The protection of biodiversity has today in the State Forests its adequate place. During the last 17 years many legal, organizational and economic actions have been undertaken, which have already given practical effects. They include the following:

- Equaling the protective (ecological) functions with the remaining functions in the forest legislation;
- Creation of an independent Department for the Nature's Protection in the Directorate General of the State Forests and creation of jobs dealing with the nature conservation in regional offices of the State Forests and in a part of forest inspectorates;

- Increase of the area of various forms of the nature conservation, which – together with the protective forests occupy approximately 48% of the total area managed by the State Forests;
- First, in many years, inventory of valuable natural habitats and protected species;
- Determination of protection tasks in the forest development plans (in the part called 'Nature Conservation Program');
- Improvement of water management in forests through execution of the program of the so-called "small-scale impounding" (construction of thresholds on water courses and of small ponds and impounding reservoirs);
- Continuation of activities in order to reconstruct deformed tree stands;
- Protection given to natural reforestation;
- Increase of participation of older tree stands and of the volume of deadwood;

The results of works accomplished in forest management in favor of the nature conservation are covered by the monitoring of the nature's issues. The results of this monitoring will give an answer of how efficient are our actions and what else should be changed in these actions. The nature conservation in the State Forests still faces many questions and doubts. In order to protect nature we have to answer first the three basic questions: what should we protect and where?, How should we protect?, And why should we protect? The answer to the first and the third questions does not make any problem today. But the most difficult is the answer to the second question – How should we protect? Usually, there is no simple answer, and therefore– also in the nature conservation – the principal ethical rule in force in the medicine "*Primum non nocere*" - First Do No Harm - is still valid.

More and more critical voices against the management of forestry can be reduced to the requirement that the production of wood should be decreased. These are mainly voices of representatives of some ecological organizations. No argument presented by the State Forests, e.g. that the volume of production is controlled by the state – is convincing (the volume of production, determined in the forest development plan, is approved by the Minister of the Environment). In practice, every cutting in the forest is criticized, and actually we do not deal with a closely watched nature reserve, where such prohibition is in force. It is still difficult to convince that nature conservation also includes actions undertaken in favor of preservation of biodiversity within rational use of the existing resources.

Looking for an agreement, on how to balance the basic functions of a forest, constitutes today an important problem and challenge. Civil society in Poland is still too weak to articulate a common and rational position and to get through, with arguments, to decision makers. For the time being, this role is being played by well organized ecological organizations. The attitude of a part of them, however, does not favor collaboration and looking for rational solutions in the spirit of understanding. It is rather a source of tension and conflicts'. One of the "hottest" – in this sense – areas in Poland is Bialowieska Forest. The dispute, which has been going on for year, does not refer *de facto* to the most important question – what and how should we protect in it?, but, instead, this is the dispute on who should manage it?

A possible extension of the limits of the national park in order to cover the whole area of the Bialowieska forest belongs to the Government's competences. According to the law in force in Poland, any creation of a national park or a

change of its limits is made on the base of a Regulation of the Council of Ministers.

Warsaw, on 31st May 2008.