CONTRIBUTION OF THE TECHNOLOGICAL ENGINEERING AND DESIGN IN THE FOREST RESEARCH INSTITUTE TO ROMANIAN FORESTRY DEVELOPMENT

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ABSTRACT

The paper presents a short history of the technological egineering and investment design in our country and a brief review of their contribution to the sustainable development of Romanian forestry.

Regarding the forest management planning, which represents the main contribution of the technological engineering to the rational management of the forest areas, there are being presented the main characteristics of the forest management planning system in Romania and its evolution as principles, bases, methods and forest management plans.

The activity of developing the studies and investment projects has had, also, a special importance in the forestry development. The afforestation and ecological restoration projects, the ones for regulaiton og torrential watersheds and improvement of degraded lands, for development of tree nurseries, trout farms, pheasant farms, basketry workshops, unit for processing and selling of forest fruits and mushrooms, etc. played an important part in increasing the efficiency of forest management.

Also, the paper presented the present and future priorities of the design department within the Forest Research and Management Institute.

Keywords: technological engineering, design, sustainable development, forest management planning

It is a propitious occasion that the celebration of 70 years since the establishment of the first central institution for scientific research in forestry coincides with the anniversary of 55 years since a central institutional framework was created for forest management planning. After 1948, this activity gathered together all the interests in technolo-gical engineering and design in forestry, originally in the Forest Design Institute and then, starting from 1969, in the present Forest Research and Management Institute.

Therefore, it is possible to say that this anniversary moment is related to the institute as a whole and represents an appropriate occasion for reviewing the achievements in forest management planning, which represents a major contribution of forestry technological engineering and design to the development of the Romanian forest sector, and for reviewing the important results in developing studies and projects on afforestation works, restoration of low productive stands, of degraded lands, torrent correction, etc.

Obviously, within the technological engineering and design sector, the main focus is on forest management planning (more than 85 %). This activity was and still is carried out following the traditional line of the Romanian management planning, but with continuous efforts to renew, modernize and adjust to the always-enhancing requirements for a rational management of the Romanian forests.

It is well known that the first regulations concerning forest management in Romania go back to the 18th century. Nevertheless, a significant practical management planning activity started to develop in the second half of the last century, mainly through the management plans developed for a part of the forests in the provinces which where then under Austrian reign (the forests owned by the Church in Bucovina, forests in Resita and Banat region, aso), as well as through the management plans for some forests in Moldavia and Muntenia developed after 1851 (when the first forestry school was established in these provinces) and especially after 1860, when - after the provinces were united - a general directorate was created for the forest administration (Carcea, Dissescu, 1993).

After the establishment, in 1918, of the Romanian united state, the stipulations of the existing Forest Law were extended to all the forests existing in Romania. In this respect, the first guidelines were issued in 1923 on forest management planning which tried to get a uniform content for the management plans in the former Romanian provinces (P.Georgescu). A draft of the management planning guidelines for state forests was developed only in 1941 by I.Popescu Zeletin, draft that could not be applied due to political-economical circumstances. For the same reasons the practical activity in forest management planning was relatively slow; in 1948 only 39% of the Romanian forests were managed based on management plans.

It can be said with certitude that 1948 was the beginning year for the development of a Romanian system for a unique forest management planning, as well as for starting the practical activity in this field on a national level.

The system, outlined first by the guidelines in 1948, 1949, 1951 and 1953, has been continuously developed and improved by the following guidelines and technical norms (1959, 1969, 1980, 1986 and 2000/2003), considering every time the experience, the results of researches and technological engineering and the new trends existing in the world. Until 1956 all the Romanian forests have been subjected to management planning operations in the above-mentioned system, the revising works being regularly performed afterwards, every other 10 years. At present the 5th revising of the forest management planning is being performed.

The main characteristics of the Romanian management planning system and its evo-

lution related to principles, bases of management planning, methods and plans will be briefly presented in the following paragraphs.

The management planning principles, which express and reflect the main objectives to be attained through management planning, have been developed and adjusted, in time, to the more and more diversified requirements related to forest management. If they referred in the beginning only to issues concerning the production process and trade of forest products, at present they reflect the need for a complex and multilateral use of forest resources, including the employ of the protective characteristics of forests. The aim is to approach the forest management related issues in a systemic concept, as well as the need to integrate forest management planning with more ample and complete actions related to environment management planning, considering all social-economic conditions and requirements. The above-mentioned principles had, even from the very beginning of our management planning system, special ecological and social-economic values, in close correlation with the system for forest functional zoning, introduced in 1954 and in accordance with the sustainable forest management.

When implementing these principles, a special attention was given to the appropriate selection of the bases of management planning, which was essential in the defining the optimal stand structures and the growing stock, imposed by their ecological, social and economic functions.

Regarding the goal composition, the emphasis was put on promoting the local species with a high ecological and economical value and appropriate functional characteristics, considering the most appropriate regeneration schemes and technologies and avoiding, in a high extent, the expansion of the forest species outside their natural range. This explains the cautious and precautious implementation of some directives on expansion of fast-growing conifers and broadleaves.

Harvesting age, which together with the rotation, is highly important to compute the growing stock in even-aged high forests, was correlated from one case to another to the results of the last researches in this field, without reaching to a differentiation that is well scientifically substantiated for forests with different protection functions.

Ecologically and social-economically, it is remarkable that, in a time when there is a trend in the world to decrease the felling age and the rotation, our management planning has not given in to these trends, constantly promoting higher ages and longer rotations, which proved to be efficient, both related to the production of highly valuable assortments, and to environment protection.

In selecting the treatment used, our management planning aims mainly at promoting natural regeneration by applying accelerate systems, with regeneration periods suitable to maintaining the permanent soil cover with forest vegetation. In stands where the aim is composition improvement, the management plans aimed at having an operation intensity that lead to no unbalance in the ecosystems. In most of the forests in the 1st functional group, the aim is to maintain and develop structures that are as close as possible to the natural ones, either by complete protection or by conservation operations, or by applying mainly felling for transformation into a selection forest or other treatments with a long regeneration period. In all situations, the stipulations included in the

management plans aimed, by an appropriate application of treatments, at ensuring not only the regeneration of the stands, but also the ability of the seedlings to take over as much as possible the functions of the mature stand.

Obviously, for the appropriate application of the treatments, the management plans have stipulated the implementation of transportation network, which, unfortunately, could be achieved only partially.

Generally, in selecting the bases for management planning, it is aimed at reaching a high stability of the stands and the whole forest through the structures to be created. For the forests with special purposes (production of resonance wood, veneer, etc) preparation studies have been developed to allow the application of different solutions in accordance with the vegetation conditions and management goals.

In the regulation of the production process, it should be mentioned the issuing and application of the first Romanian management planning methods, like the "functional selection method" for the selection high forests (Popescu Zeletin, Amzarascu,1953) and the "indicating/representative increment" for the even-aged high forests (Carcea, 1959, 1968, 1978, 1986).

The idea to differentiate the selection structure, through borderline diameters, in accordance with the stand functions - differentiation with a direct impact on the optimal volumes - was from the very beginning strongly connected to the functional zoning system, developed and promoted by the author of the method.

Related to the indicative increment, it is worth mentioning that, both as concept and practice, it is a part of the modern trends, especially due to the use of the modeling and enhancement of the possibilities to optimize the technical solutions, creating through control, the conditions to consider the management planning as a cybernetic system; a more flexible framework created by the planning of the forest culture and broadening of the fundaments for implementing a functional management, by stand (Ianculescu, 1986, Leahu, 2001, 2002, Carcea, Seceleanu, 2003).

Also other procedures have been developed in the management planning: computation of the allowable cut for coppice forests based on continuity by volume (Carcea, 1959); computation of the allowable cut for quasi-selection high forests, based on the revocable periodic block (Carcea, Dissescu, 1984), later extended also for the even-aged high forests, within the method by age classes, used together with the indicative increment method; methods using simulation for optimizing management planning solutions (Seceleanu, 1998) etc.

Forest management plans have been improved in the same way, aiming, through the content and nature of the measures included, at providing the freedom for the forestry staff to apply intensive and differentiated cultures in accordance with the stands status and the established management goals.

The researches in dendrometry and forest auxology had a significant contribution in the substantiation of the bases of management planning. These researches, performed for decades, have provided scientific information needed both in establishing ages for stand felling and rotations, and in the appropriate implementation of the forest management planning methods (Giurgiu, 1993).

The contributions in improving the management planning techniques, concerning naturalistic substantiation of management planning solutions, description and inventory of stands, development and editing of plans and topographic maps etc. are also remarkable in content. There should also be noticed the big efforts which started already in the ‘60s to introduce and improve the systems of automatic data processes (I.Seceleanu, C.Munteanu s.a.), creating an informational and promotion framework for the modern systems for optimizing the management planning solutions, efforts that contributed substantially to the enhancement and systematization of information, as well as to the enhancement of the technical nature of the resulting documents.

Due to the huge database and the prognosis element they contain, forest management plans have represented the data source for many studies that substantiated actionshighly important for forestry, forest economy and other economic sectors. It is worth mentioning, among them, functional forest zoning, set up of a seed source database, restoration of degraded or low productive stands, road building, watershed management, creation of protected areas, aso. Also, the information included in management plans has represented the foundation for the national forest inventory and for all the future plans and development programs in forestry.

The activity related to projection of investments, although with a lower share (about 15 %), has been highly important for forestry development.

In afforestation, it should be mentioned the studies based on site mapping developed over the period 1961-1965 for an area of 300 thousand hectares, as well as the framework-afforestation studies for a five-years period, developed after 1976. Such studies analyzed and discussed the regeneration of forests to be felled, the share of the natural seedlings, size and structure by species of the afforestation operations, size and nature of restoration works, possibilities for creating special cultures, working methods, needed afforestation material.

In ecological rehabilitation, the Institute has developed, starting with 1960, restoration studies for about 120 thousand hectares in 180 forestry districts and has inventoried the low-productive stands or unfit in accordance wit their functions. These works had a special role in the orientation and substantiation of the practical operations for restoring and improving the stand structure.

In order to improve the production and quality of the afforestation material, an important step was the mapping of the seed sources and the establishment of 2,200 forest seed orchards. Other operations have been developed for seed processing and conservation equipment, as well as for 75 forest nurseries, whose size and needed equipment had been evaluated according with the need to apply modern technologies, including for the production of seedlings in greenhouses.

A highly important action was carried out for development of design documentation for torrent correction and improvement of degraded lands.

Over the period 1950-2002, based on the projects developed by the Institute more than 1856 km of bedrock have been consolidated in the torrential watersheds and 220 thousand hectares of degraded lands have been forested, lands which were unsuitable

for other uses. In cooperation with the forest research, different work types have been conceived and implemented that were adjusted to various field conditions, and afforestation compositions, schemes and technologies have been developed for degraded lands improvement, which were differentiated in accordance with the degradation degree and with the site conditions.

Even if after 1990, this activity has experienced an unfortunate decline, there have been signs lately of a revival due to the growing demand related mainly to the afforestation of degraded lands, unsuitable or inefficient for agriculture.

Expert teams have developed silvicultural-wildlife management studies and management plans, studies on the honey-bearing and mushroom potential in the forest areas, as well as plans for many pheasant and trout farms, basketry workshops, units for processing and trade of forest fruits and mushrooms, for soft drinks and others units for the trade of non-wood forest products. Although they represent only auxiliary things to the forest administration, they have contributed, at that time, to the strong enhancement of the efficiency of forest management. Moreover, even nowadays the production of the above-mentioned products has a significant input to the income of forestry. Obviously, this contribution will decrease due to the transition towards a use and trade of wood according to a market economy and when the forestry expert interest will involve mainly the major activity which is silviculture.

In the future activity of the technological engineering and design within the Institute, forest management planning will be a major component, even if, as compared with the previous periods, its working power decreased to about 68%. The priorities in this field should be the following: providing, through specific regulations, for an appropriate framework for promoting the sustainable forest management, with emphasis on biodiversity conservation and rational and continuous use of the multiple ecological, social and economic functions of the forest ecosystems; naturalistic and economic substantiation of the solutions and decisions in the management planning and their optimization by applying methods and procedures resulting from operational research; improvement of the technical norms for forest management planning of private forests; upgrading of the forest management plan with new technologies for plane-table survey, inventory by trees, development of plans and maps, etc.

The priorities for the studies are the following: performing the national forest inventory in a modern manner; implementing GIS for the forest area; reviewing of the forestry development strategy; development of the national forest program; monitoring of the sustainable forest management through management plans, in accordance with the recently approved criteria and indicators etc.

These guidelines will lead to the functioning, within the Institute, of a permanent core for development of studies, synthesis, national forest programs, vital in the informing of the decision-making factors and in the endorsement of major decisions for Romanian forest management.

A problem which still needs to be solved is the one of the investment-related studies and projects in forestry. One of the causes is the low level of the investments,

and the establishment of many forest design companies, dealing more or less with investments in forestry. We hope this will be solved with the increase of the investments in this sector, especially in torrent correction and degraded land improvement, forest road building etc., with the implementation of the national forest shelterbelt system. It is most unfortunate that the waiting period we are now experiencing leads to the strong decrease in the working force, because well-trained experts in this field are leaving.

In those activities that are sure to continue, our Institute will continue to function, with appropriate measures for hiring and training the staff, optimization of the working conditions etc.

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