

## **BASIS OF FOREST MANAGEMENT PLANNING AND REGULATION OF THE FOREST PRODUCTION PROCESS IN ROMANIA**

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### **ABSTRACT**

The paper presents a short history of the basis of forest planning, what they are and how they were born, which are the main basis of forest planning in the Romania and their importance in determination of forest structure.

Also, the paper approach aspects related to regulation of forest production, the issue of methods of forest regulation - establishment of the allowable cut, the management plans - and the issue of relation between forest management planning and silviculture.

The paper also presents aspects related to the basis of forest planning and the regulation of forest production under conditions of diversification of ownership on forest lands.

**Keywords:** basis of the forest planning, regulation of the forest production, forest management planning, allowable cut, management plans.

### **BACKGROUND**

In order to be able to make it possible for a forest to reach the status most appropriate to its goal, any management planning process requires, first of all, knowledge on or establishing this goal, and then the development of a model of status that will be reached.

Due to the fact that the forest is seen as an instrument for achieving a social, economic or ecologic objective, to establish the purpose means to establish the function that it will fulfill in the achievement of that objective.

The development of the model of the status to be reached actually consists in creating a model for the normal growing stock. The status of the growing stock is defined by the establishment of the optimal conditions for its structural characteristics;

they represent the conditions to be reached and, therefore, they are management goals (forest management planning bases).

In reaching the normal growing stock of a forest, the planning of the wood harvests is the management method for this process, and the allowable cut, the means for attaining the proposed objective.

## **RELATED TO THE FOREST MANAGEMENT PLANNING BASIS**

### **Brief history**

The first management plans for the state forests in the Romanian Provinces outside the Carpathian Range were developed after 1851 by three French foresters brought by the ruler Stirbei Voda as teachers in the first forestry school established in Bucharest and which “made up management planning commissions, in which the students were members and which developed the first management plans in the country” (Tanasescu, 1889). Of course, the students in this school were educated based on knowledge from the French literature and practice, which resulted in the implementation in their works of the French management planning methods and techniques but under a simplified form.

It is unanimously agreed that the concept “management planning basis” is borrowed from the French forest management planning, as most of the terms used in this field, and it has been used at least since 1883.

In his course on forest management planning, Nanquette (1860), as well as in the one from 1878 by Broillard, the term “management-planning basis” is not yet used.

In the Romanian management planning, the expression “management planning basis” was used for the first time, it seems, in the management plan of Schitu-Greci Forest developed between 1882 and 1883, by a commission made up of I.Chihaiia, A.Tântareanu and A.Oneanu, who in their preface to the management plan wrote: 1st Section - „General statistics, dealing with administrative, physical and economic circumstances and general principles which represent the management planning bases”.

Even if these planners use the expression “management planning bases” in the above-mentioned preface, although they do not use it in the text, which shows with certainty that it had not been officially introduced.

The expression „management planning bases” can be found as “bases for management planning” even in 1889, in an official form, used for harvesting studies in forests without management plans. Since then, it was used regularly in management plans developed for state forests. The above-mentioned official form can be considered as a first official attempt to establish the content of a management plan, as a beginning for instructions for forest management planning. It expresses the attitude of the forest administration and it seem it represented a guide for planners until the issue in 1922-1923 of the “Instructions for the development of management plans”, by C.P.Georgescu. Nevertheless, the points of view were not unanimous regarding the con-

tent of the management planning basis; the management plans developed in that period had different management planning basis, as were the ones presented in different publications (Agenda forestiera, 1927-1928), or scientific papers (V.N.Stinghe, Amenajarea padurilor, 1939).

It should be mentioned that Prof. P.Antonescu-Remusi, the author of the first book on Romanian management planning, as well as his followers Th.Pietraru (1903) and P.Antonescu (1924), did not use or mention this expression in their written courses.

The issue of the management planning basis was a concern for the Romanian forestry community also after the 2nd World War. Due to the fact that there were many interpretations on the management planning bases, both on what and which they are, an attempt was made for clarifying these aspects during the Meeting for forest management planning, organized by the Romanian Academy in 1955.

The echoes of the meeting were felt also in the magazine "Revista Padurilor", which published in the next year articles signed by illustrious foresters, like Prof. V.N.Stinghe (1956), Prof. I.Popescu Zeletin (1956), Prof. N.Rucareanu (1956), in which the debates on the management planning basis had a high scientific level, with theoretical and practical clarifications on this issue.

### **The main forest management planning bases and their importance in defining the forest structure**

The management planning bases are those indications given in a management plan before developing the working plan, resulting from the practical need to establish the object to which it refers to and the technical objectives to be attained by the implementation of these plans, or, more shortly, they are the administrative bases of the management plans (Rucareanu, Leahu, 1982).

The conditions to be reached that define the normal status of a forest refer both to stands and forests, that is to all their structural characteristics that can be modified through technical measures:

- a) in stands: silvicultural system, goal composition, tree dimensions at harvesting, type of structure and means to attain it;
- b) in forests: stand distribution by age classes (in even-aged high forest) and the conditions for arrangement in space.

The main management planning bases used in Romania will be presented in the following paragraphs.

### **Establishing the silvicultural system**

The silvicultural "system" means the conditions in which the forest management process will be performed either from seeds, shoots or from seed and shoots. A certain system gives some features to the forest, according to which it gets an own name: high forest, coppice or coppice with standards, and the following expressions come from that: high forest system, coppice system or coppice-with-standards system.

The issue of establishing the system refers only to the forests that can regenerate

both from seed and shoot, but also in this case the system is established, in principle, by official directives aiming at covering the economic needs with products that are as useful as possible.

Therefore, the high forest system is considered: a) as a foregone conclusion, in conifer forests and in the mixed ones with conifers; b) ex officio, in beech, *Quercus* and floodplain forests.

Also, the high forest system is specific to the cottonwood plantations.

The coppice system is considered: a) as a foregone conclusion, in locust stands and poplar and willow forests; b) for economical reasons, in forests with a special purpose (for which the coppice is the most appropriate system).

The coppice-with-standards system is not recommended in the Romanian practice.

It can be concluded that the silvicultural system is a management condition resulting, in general, from the species nature and the economic objective and that it should be established before the distribution of forests by functions.

### **Establishing the goal composition**

The goal composition means the species combination within a stand, which harmonize, both as shares and category, the biological requirements of the forests with the socio-economic and ecological requirements, in any moment of its existence

As a management goal, it is established in stages, considering the most specific moments in stand evolution.

One of the decisive moments in stand composition is its creation, to which it corresponds the regeneration goal composition.

Another important moment is the maturity, to which it corresponds the harvesting goal composition. It is not, or at least it is not necessary to be, identical to the reforestation formula. As the share of species is modified in the process according to needs, the reforestation formula is usually richer, and the main species are represented in a more balanced way.

In establishing the goal composition, the starting point is represented by the site conditions. The goal composition is established by site types, respectively by forest types. It is expressed by a prescription, in which the species to be cultivated and their shares are shown, to which indications on the grouping method are added.

For the selection high forest managed according to the survey method, the goal composition establishing is limited to the adjustment, from one period to another, of the species combination, according to the information collected during surveys on the opportunity of changing the composing species.

### **Selecting the regeneration treatment method (stand type and structure)**

In forest management planning, it should be established the best structure towards which the stands can and must be guided under the given conditions (taking into consideration their purpose and composition), so that their functional efficiency is as high as possible. Therefore, first is should be established the structure type: selection, even-

aged, quasi-selection or layered and then certain structural characteristics will be detailed within the selected type.

As a system of measures to be applied consistently for many years, the system indicated by the management plan is, stable generally. This stability can be ensured only by a scientific substantiation, considering, first of all, the natural production conditions, then the social-economic and ecologic conditions and, last but not least, the local forestry experience.

Because the silvicultural operations vary by sites in order to have a certain impact, it is obvious that the systems are established by functional types, and within these types by forest types and forestation, according to the established goal-composition.

### **Exploitability (establishing the mean stand diameter or their age at exploitability for the even-aged high forest and the coppice, respectively the diameter of the harvestable trees for the selection forest)**

Exploitability is the quality of being exploitable/harvestable of a tree or stand when the harvesting is needed, in order to achieve with maximum efficiency the goals pursued in the management of the forest they belong to.

The criterion for identifying this moment is the age, in general, in even-aged stands and tree diameter in selection forests. That is why it is necessary to establish them as precisely as possible. The main requirement for being able to establish them is to know the economic goal. Because it is established by species or mixture types and yield classes, the harvesting age is established, as the limit diameter, by species and yield classes.

In the case of even-aged forests and coppices, the exploitability is expressed in the harvesting age. The Romanian forest planning is using: age of the technical exploitability, established according to the mean volume increment of the assortment taken as a production goal, which is defined by the moment when this increment is maximal, for stands in the 2nd functional group; age of the protection exploitability, which corresponds to the moment of decrease in the average of the maximum of stand protective effects, for stands in the 1st functional group.

Exploitability age that is agreed it should not be lower than the absolute exploitability age, which corresponds to the moment when the mean timber production becomes maximal.

### **Establishing the rotation**

In the case of even-aged high forests and coppices, the rotation determines the forest structure and size as a whole, in relation with the stands ages. It is determined based mainly on the mean stand exploitability in the management unit for which it is established, by excluding the ones that are derived, sub-productive, and inapt, etc.

The rotation can deviate from this average, with plus or minus, because in establishing it several management aspects should be taken in consideration, aspects that could not be taken into account when establishing the stand exploitability age (providing for good conditions for stand regeneration, possibility to apply the most

appropriate systems, the maximum use of the protective ability of the stands, etc.).

Because the normal growing stock can be achieved only in several decades, by constantly implementing a management plan, the rotation that is the fundament for this plan should have a stable nature.

For practical reasons, the rotation is established every ten years for the high forests and every five years for the coppice forests.

The rotation is the illustration of the production goal, and therefore, its limits should be established by instructions.

## **ISSUES ON THE PRODUCTION PROCESS**

### **Management planning methods**

The first official Romanian documents on the regulation of forest exploitation have been issued in 1843 in Moldavia, when the “Decision for sparing the forests on the monastery estates and others”, which established the fixed yearly cut method; high forest system for oak and conifer forests that had to be divided into 80 coupes and the shelterwood coppice for the other species when the forests had to be divided into 40 coupes; clear-cutting system with 56 holdovers per hectare. The so-called concentrated selection system was applied in the mountain region.

Starting with 1847 these regulations have been applied in Muntenia also, and in time they have been modified in number of coupes or number of holdovers per hectares, which increased to 80.

Because these regulations did not include a certain felling age, no clear distinction could be made between the coppice and high forest systems. The method lead to unsuitable results, which were brought to light after 20 years by the forester Scarlat Trasnea.

This forest exploitation method has been applied until 1881, when the first Romanian Forest Law was enforced. It stipulated that the management planning is compulsory and it should be applied in all forests subjected to forestry rules and methods, which at the end of the 20th century accounted for about 2.34 million hectares (over 84% of all the forests in Muntenia and Moldavia).

Many debates occurred at that time, which lead, under the influence of the French school to the direction toward the even-aged high forest with successive regeneration felling and toward the permanent period block method with allowable cut by area.

After 1918, prestigious Romanian foresters promoted the idea of regulating and ensuring the continuity of crops, including based on the forest management plans by forest watersheds. Also the magazine “Revista Padurilor” presented aspects related to planning methods: the disadvantages of the permanent period blocks and of the allowable cut by area, the taking over of the allowable cut by standing wood and a higher flexibility of the management planning to provide for the conditions favorable to natural regeneration.

In his work “Evolution of the management planning methods. Current aspects in our

country”, issued in 1937, Prof. V.N.Stinghe made a lucid analysis of the Romanian management planning, as it used to be applied at that time. He started from two general statements on the Romanian forestry: 1. the unusual high share of the coppice system in the forests with pedunculated oak, sessile oak, Hungarian oak, and beech; 2. beside the clear cutting and the progressive felling, almost no other methods were applied in our forests.

Related to the management planning of the coppice forests, Prof. V.N.Stinghe noticed that the method used was outdated, and the established rotation was sometimes too high, and sometimes “by interpretation .... it decreased under the admissible level”. The fixed yearly cut “with Romanian characteristics” how was called by Prof. Stinghe, was used only on paper and not in the field. The coppice with standards, imported from the French, but “applied in Romanian style”, has “ruined the beautiful Romanian oak forests”.

Regarding the high forests, Prof. Stinghe noticed that the management planning method applied in our country, the permanent periodic blocks, based on Hartig and Cotta’s concepts, has evolved in countries like France and Germany, where it has not been applied since the 19th century.

Also, Prof. Stinghe emphasized the negative role of the special plan of cuttings in the Romanian management planning “which completed in our oak forests the damaging work started with the implementation of the coppice with standards in the stands with high forest ages”, as well as the lack of a definite goal “which should be followed for decades and should be always the same”.

Other debates occurred in yield continuity and sustained yield, as well as on the issues related to management planning commissions and plane-table survey commissions.

These problems were mostly overcome once the forests were nationalized and a campaign was implemented for their full and single management planning and management-planning methods more appropriate to a functional management were developed by the Decision of the Minister Council 114/1954.

In the first planning period after 1948 it was used the method of age classes for even-aged high forests, the yearly fixer cut for coppices, and the increment method in the selection high forests, which was a satisfying method at that time.

Because they did not fulfill the requirements for a more flexible planning of the crops and functional management, new methods have been developed to calculate the allowable cut.

Therefore, it was proposed a method for establishing the allowable cut and to provide for the continuity in the production areas with several operations (Carcea,F, 1952).

For the selection high forest a methodology was developed based on the concept of differentiating the structure in accordance with its functions (functional selection) forest, on the classification of the uneven-aged stands according to the productivity; on the characteristics of the balanced selection structure and on establishing the cutting intensity in relation to the structure and size of the real growing stock “in a stage close to the balanced selection structure” (Popescu-Zeletin, Amzarescu, 1953, Rucareanu,

1953). Researches have been carried out in natural uneven-aged stands that allowed the development of an original system of balanced selection structures by functional groups and subgroups for spruce, fir and beech, in order to offer guidelines in selecting the goal structures and the optimal growing stock in the transition period of the natural uneven-aged stands into selection stands (Popescu-Zeletin, 1960). The researches on the structure and size of the optimal growing stock have continued (Dissescu, 1978,1989,Giurgiu, 1988), because it is essential in calculating the allowable cut. The planning into selection high forest will remain a variant of the method of control, adjusted to the functional-structural forest management.

For the even-aged high forests a new planning method was developed, based on normal structure of age classes and a specific index, the representative increment, which together with a modifying factor provides for a slow regularize of the growing stock (Carcea,1969, 1978, 1986). The method of ensuring the continuity of the crop size for at least 60 years, eliminates the scheme of the general plan and facilitates the control of the growing stock productivity, being one of the modern trends in the management planning by: using and enlarging the possibility to optimize the technical solutions, considering the evolution of the production conditions in calculating the allowable cut, flexibility of the framework created by the management plan for the cultivation activities and enlargement of the application of a functional management, differentiated from one stand to another.

In order to have viable results, the indicator obtained through the representative increment method is compared with the allowable cut indices resulting from the age classes and the successive approximation methods.

The allowable cut in the quasi-selection high forests is established based on a method that uses the revocable periodic block. (Carcea ;Dissescu, in Technical norms for forest management planing 1984/1986) .

The allowable cut in the coppice forest was calculated based on a method called “the fixed yearly cut with continuity by standing wood volume” and on the restrictions for protection.

Also, for the forests in transition from coppice to high forest, it was developed a method to establish the allowable cut based on areas, volumes and representative increment (Carcea, Dissescu, Munteanu,1984/1986). They are not applied anymore in planning due to it rigid management framework it created.

It was proposed to calculate the allowable cut for selected poplars and willows by using the minimal areas at harvesting (Giurgiu,V,1 988).

The technical norms for forest management planning (2002) stipulated the use of the successive approximation method in regularization of the production process in coppice forests, which will be used also in the computation of the allowable cut for selected poplar and willow cultures.

### **Forest management plans**

The first works with a management planning nature were very brief, and the ones written at the end of the 19th century were very heterogeneous in content and structure:

from simple studies on harvesting methods to the forest management plans for some state forests.

A first attempt to systemize the content of the management plan was made in 1890 by T.Patrascu in his course. Over the period 1922-1923, C.P.Georgescu developed the first management planning guidelines, with a summarizing content, restricted only to certain aspects on the content of the management plan.

The guidelines for state forest management planning by I.Popescu-Zeletin in 1941 developed the system for management planning, stipulating the development of the following plans: a general and a special harvesting plan, plan for afforestation operations and a plan for construction works.

Because the general harvesting plan could not be applied for different reason, it was replaced by the guidelines for forest management planning in 1959 with an “evidence of the stand evolution during the rotation”, indicating the creation of the first two periodic blocks and the method of establishing the allowable cut.

The special harvesting plan was replaced by a “decade-production plan” which included the distribution of the harvesting wood by stands, in accordance with the nature, emergency degree and intensity of felling.

The plan of the improvement work, called later the works for stand tending, referred to: seedling tending, releases, cleaning, thinning, and sanitary works prescribed for each stand.

A decade plan and a scheme with the conversion plan were developed to organize the production process in conversions.

The management planning guidelines developed after 1959 maintained, with the necessary improvements, the same system.

The last two versions of the “Technical Norms for Forest Management Planning” added: an important chapter for functional forest management, with emphasis on the forest with special protective functions and a chapter on forest fund protection.

## **RELATION BETWEEN THE MANAGEMENT PLANNING AND FORESTRY**

Forest management planning has, among others, the task to regulate in time and space the forestry operations for attaining the economical, social and ecological objectives of the forest management. That is way, in a certain extent, gives the impression that it crosses over the forestry field.

This problem was often debated in the specific literature and even in some papers on forest management planning.

Forest management planning and culture are parts of the forestry management; interactions occur between them, which are needed for the normal functioning of the management system. Considering the nature of forest management planning, which has the task, based on information on the forest status and the tasks of the forestry management, to establish the social, economical and ecological objectives, to develop, based on these objectives, management goals (models of functional structure both for

stands and forests) and to plan the necessary operations and the way they are applied in order to achieve the above-mentioned goals and objectives, it may be easily noticed that the management plan does not stipulate the way to operate in the stand for creating the established structure. This is exclusively the task of forestry/silviculture, which has to solve a series of ecological and technical problems related to the application of those operations.

The forest planner changes nothing in the forest. He collects information, processes them, and based on the results and options he develops the management plans, as tactical decisions.

#### **BASES FOR FOREST MANAGEMENT PLANNING AND REGULATIONS UNDER THE CONDITIONS OF DIVERSIFICATION IN FOREST OWNERSHIP**

By enforcing the laws on the recovery of the ownership over agricultural and forestlands, an area of about 2 million hectares has been transferred from state ownership to private ownership or public ownership of territorial-administrative units.

The size of the forestlands returned to the private owners varies very much, from a few thousands (sometimes hundreds) of square meters of lands owned by natural persons, to thousands (sometimes tens of thousands) of hectares owned by other entities.

For forest properties which are large enough, both the establishing of the bases of management planning, and the regulation of the production process are performed in accordance with the stipulations presented in points 2 and 3.

For the small forestlands the situation is completely different.

Considering their small area and the fact that, in many cases, they are made up of a single stand, only the management planning bases for stands are established for those forests: the silvicultural system, goal composition, treatment method and exploitability.

The regulation of the production process is performed, in accordance with the Technical Norms for Forest Management Planning (2002), by using simplified methods to compute the allowable cut, by high forests or coppice forests, with the recommendation for applying, where possible, of operations with long regeneration period, which to provide for the continuation of the forest and of its functions, including of the wood yield and by developing management plans presented in point 3.

#### **REFERNCES**

- CARCEA, F., 1969: Metodă de omogenizarea pădurilor, Ed. Agrosilvică. București  
CARCEA, F., 1978: Modalitate de calcul pentru stabilirea posibilității prin intermediul creșterii indicatoare. Revista Pădurilor nr. 1.  
CARCEA, F., 1986: adaptarea modului de stabilire a posibilității specific metodei

creșterii indicatoare la cerințele privind mărirea și diversificarea perioadelor de regenerare a arboretelor. În: Metode și tehnologii moderne în cultura și exploatarea pădurilor. Universitatea Brașov, 1990. pp 61-66.

DISSESCU, R., 1978: Le niveau du capital - bois dans les forêts jardinees. In: Bulletin scientifique ASAS, nr. 9.

DISSESCU, R., 1989: Contribuții la determinarea fondului de producție optim în codru grădinărit. Revista Pădurilor nr. 1.

GIURGIU, V., 1988: Amenajarea pădurilor cu funcții multiple, Ed. Ceres.

LEAHU, I., 2001: Amenajarea pădurilor, Ed. Didactică și Pedagogică, București, pp 616

POPESCU- ZELETIN, I., 1956: Apariția și componența bazelor de amenajare, Revista Pădurilor nr. 8.

POPESCU- ZELETIN, I., 1956: revista pădurilor în sprijinul amenajistului, Revista Pădurilor nr. 11.

POPESCU-ZELETIN, I., 1960: principiile metodei pentru amenajarea pădurilor pluriene de protecție și producție. În: probleme actuale de biologie și științe agricole. Academia RPR, pp. 571-579.

POPESCU-ZELETIN, I., Amzărescu, C., 1953: Schița unei metode pentru amenajarea în codru grădinărit. Revista Pădurilor nr. 12.

RUCĂREANU, N., 1953: Amenajarea codrului grădinărit. Revista Pădurilor nr. 195, nr. 10,11,12.

RUCĂREANU, N., 1956: Ce sunt și care sunt bazele de amenajare, Revista Pădurilor nr. 5

RUCĂREANU, N., Leahu, I., 1982: Amenajarea pădurilor, București

STINGHE, N., V., 1939: Amenajarea pădurilor, București.

STINGHE, N., V., 1956: În problema bazelor de amenajare, Revista Pădurilor, nr. 6.

TĂNĂSESCU, M., 1989: despre amenajamentelor pădurilor din țară. revista pădurilor pp 342-354.