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RECENT STRUCTURAL EVOLUTIONS IN THE FORESTS OF LOWLAND BASIN OF MOLDOVA RIVER BETWEEN SADOVA AND PRISACA DORNEI

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Key words: structural evolutions, forests, moldova river

Abstract. The considerable expansion of the forests in the mountainous regions of Romania was favored by several factors. The Romanian Carpathians occupy an area of 66300 km², 28% of Romanian territory being represented by mountains of medium height, bordered almost entirely in the boreal forest and nemoral from 400 - 500m at 1600 altitude.

The case study indicates that the function and evolution of forest in the basin depression of Câmpulung Moldovenesc took place in conditions of thermal inversions, and the thermal differences caused by the exposition radically opposed to the two main slopes of the valley Moldova.

The deforestations in low area of the depression were more intense than in the mountains and were mainly made for new grazing land, and for habitat expansion. Agrarian reforms of 1864 and 1920 affected most forests in the hilly area, especially following the allotment and communal pastures extension deforestation. The reduction of forest areas of Romania continued after the political changes of 1989, due to irrational and sometimes illegal mining, which were practiced amid crumbling forestlands through partial repayment of former private property and the lack of enforcement authority and tolerance massive felling of forests.

Preliminary

Recent evolution in the forest of the lowland basin of Moldova river following the general line of Romanian forest dynamics. There is a progressive reduction of forest areas, in changing the species structure in favor of coniferous species, reduced planted areas and encouraging natural regenerations. The analysis of forest

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is needed to establish equilibrium with the environment and the creation of a modern functional structure.

If in the mountain areas the country, the forests are present in high proportions, and they offer protection to the lands, the hills and plateaus areas are more vulnerable because the forests protection is carried out in a much lesser extent because they were cleared in bulk and create intense discontinuities with current processes.

Material and methods

The real appreciation of the difficulties of incomplete statistical data or the ones that do not reflect the real structural dynamics of the forests of Romania was the starting point of the study. The NFA advanced reports or the ministries to which the forests were attached sequentially are not truthful, because in some cases, the statistical data are indetical every four successive biannual evaluations. It is impossible for certain indicators not to suffer any changes of the surface or the percentage share for a period of six years. The data sources that were used are those provided by the NIS, NFA, EFM, Corine Land Cover and refers to the period below 1948, communist period and after 1990 particularly and in particular quantitative assessments for 2003. Inconsistencies between data and reality were raised primarily by comparative analysis method.

Results and Discussions

Property development and forest management before 1948. The forests from the area, were at first common property. Their surface was bigger, but a part of them was divided by rights redemption to different people, the rest remaining in the property of Campulung Moldovenesc, which subsequently led to a differential forests management in relation to the owners' concept and possibilities. The forest area (mostly covered by forest) was less inhabited, the local people being free villagers. After Bucovina's occupation by the Austro-Hungarian empire, most forests pass in the Austrian state administration. In 1785 it was enacted the first "Forestry Regulation", according to which, the forests were divided into brigades and cantons, but timber exploitation was done without being based on some rules, priority having the economic interests of the owners (the best specimens were chosen - those with straight trunks, well built, able to build ships masts, accessible samples, located near watercourses - rafting being the only way to transport timber to great distances).

To readjust timber cutting, the first regulations were developed (regulations) in 1830, when a division of the forest patches was done (there are no data referring to the results of the use of this new territorial organization). Along with the increasing number of people in the area, there starts an antropic, progressive

pressure over the forest, leading to the systematical change (decrease) of the occupied forest area, forest landscape generally. Great clearings were mostly done in the nineteenth century, when the need for wood and especially agricultural land became increasingly pressing. In the early nineteenth century, the Austrian state began selling to various owners, some forest areas, so that the entire forest fund from Pojorâta current forest district jurisdiction, had the following structure:

- The Church fund from Bucovina 59%, the administrative local community 32%, individuals 9%.

The forests, Fund of Bukovina Church were purchased from the Austrian State by contract completed on 13.06.1870 and approved by imperial decree of 06.23.1870. The first forest planning for the Church Fund forests was drafted in 1888. The definitive forest planning comes into force only in 1910 and is based on the principles advanced for the time, the Austrian forestry schools. The basis of organization were:

- *system*: forest;
- *Treatment*: clear cutting;
- *Exploitability*: economic;
- *Cycle*: 120 years;

The possibility was calculated on surface, with volume control. Provide forest planning stipulated for regeneration, restocking in areas with cuts and additions in young stands that presented holes. Special emphasis was given to natural fir regeneration for which, even for clear cutting, leaving alive trees that produce seeds was stipulated. To promote fir there was also provided artificial insemination over the entire surface (under massif) or mesh as seedlings in nurseries and plantations booklets. If full restocking in areas denuded by clear cutting was done mostly with spruce (less fir and *Pinus cembra*), where additions of young stands were done, mixed species were used particularly, and additional: sycamore, elm, ash, pine, larch. For this period afforestation must be mentioned, made in the upper part of *Muncelu*, initially being here a mountain gap, unproductive in the case of beech, used only as firewood, aimed at preventing regeneration through ring shaken of the mature specimens that could fructify. The survey of the church forest management plans were done decennial. The last survey was done in 1947, but the project has never been worked out.

After the act of nationalization from 04/13/1948, all older forests became state property.

There are no data showing that the management of these forests before 1948 was done based on exploitation forest plans or regulations, but the needs and interests of the owners. Uneven cuts were applied, trees were generally extracted according to the interest and some portions of forest were cleared for the purpose

of creating meadows and pastures, thus being explained the numerous enclaves and fringe limits of the current area extent.

Forest management after 1948. After 1948 the forests were nationalized becoming state property and it was passed to the unitary arrangement of the whole forests. The territorial organization was done for the first time in the summer of 1950, on hydrographic basins, on the base of forest planning stipulations from 1949 which mentioned for the first time, the abiding of the principle of continuity and normalization of production fund structure. The first arrangements for the forests from the area, based on the provisions from 1949 were executed in 1951, based on the territorial organization concept on M.U.F. (Large forest units). On the occasion of the first forest arrangements from the studied area, from 1951, the territory was organized on production units and plots, the parceling lines were established, boundary stones were fixed, the parcel was numbered, works which after all the subsequent improvements, have mostly maintained up to now. This first forest planning established as basis for planning - woods regime, technical operability, the treatment of clear cutting and the cycle of 120 years. All the studied stands had as first function, the production function and were constituted in a single subunit of regular forest management.

In 1961 field data were collected for rearranging all the forests and a new arrangement was established with 10 years applicability, from 1962 to 1971 inclusively. It was given up organization on M.U.F., establishments being done on forestry districts and production units. The 1962 edition of the production unit management plan which also included the studied forests brought as innovation forests distribution on the two functional groups and consequently the change in organization of the production process; thus it was included under the first functional group a significant area (about 43% of the total forest of that unit) according to the HCM stipulations 113/1954, the stands from group no. I being a subunit of forest treatment (S.U.P. "G"), and the remaining stands being included in a regular forest subunit (S.U.P. "A"). The adopted forest planning basis were: woods regime, technical exploitability and protection, treatment of clear cutting and of combined cutting for regular forest stands subunits, treatment for gardening stands transformation of (S.U.P. "G"), 100-year cycle S.U.P. "A" (namely the rotation of 10 years for S.U.P. "G").

The first unitary arrangement for the forestry fund from the area mastered by *O.S. Pojorâta* and *Tomnatic* was done in 1969. Hereafter are presented the forest planning basis adopted through provisionals beginning with that from 1951.

Researching forest planning we found the following:

- **System:** for all these arrangements the forest rule was adopted, with seed regeneration;

- **Exploitability**: for stands in which harvesting of main products was standardized, economical exploitability was adopted (for the establishment from 1951), then technical exploitability or protection, the last one for stands from Group I; for stands that do not standardize production [S.U.P. "K" (till the arrangements from 1992 "stands seed sources" were included in the S.U.P. "A") and S.U.P. of type "M" - special conservation] the adopted exploitability was the protection one (mostly physical exploitability);

- **Treatments**: if for the arrangement/establishment from 1951 it was exclusively stipulated the treatment of clear cutting, for the following arrangements there was also mentioned regeneration under shelter cuts (combined cuts, then successive or progressive cuts - some of them in different versions, and even cuts for treatment transformation) to ensure natural regeneration of future stands; - **Cycle**: on production units it had different values, depending on the constituted management subunits, on the forestry knowledge level, forestry policy from that period and on the average ages of the exploitability of each stage analyzed.

Table no.1

Arrangement Year	Age classes (%)						
	I(1-20 years)	II (21-40 years)	III (41-60 years)	IV (61-80 years)	V (81-100 years)	VI (101-120 years)	VII (120 years and over)
1971	17	12	23	25	11	6	6
1982	14	13	17	23	15	8	8
1993	12	17	12	23	27	9	9
2013	10	20	14	14	21	11	10

The forests from the area were until 1948 under the property of different and multiple owners (individuals or legal entities). If the forests of the Church Fund took advantage of forest plannings (the application of which led to the maintenance or creation of valuable forests, with a good structure), "the management" until the nationalization of forests owned by individuals or legal entities, was done according to owners' personal or group interests. Consequences of this "management" are still visible today: the forests surrounding villages are fragmented, fringed and, frequently, not structured (inappropriate composition, consistency, production classes or poor quality). After 1948 (after nationalization), the stands from the area began to be unitary managed on the base of forest plannings done in the years: 1951, 1962, 1983 and 1994.

The subunits in which the harvesting of main products was regulated were: S.U.P. "A" - regular forest and S.U.P. "G" - treatment forest. At the analyzed arrangements, the subunits where the harvesting of main products was not regulate

were S.U.P. "M" (S.U.P. "H" till the arrangement from 1982) - "special conservation" S.U.P. "K" - "seed reserves" and S.U.P. "E" - entire nature protection.

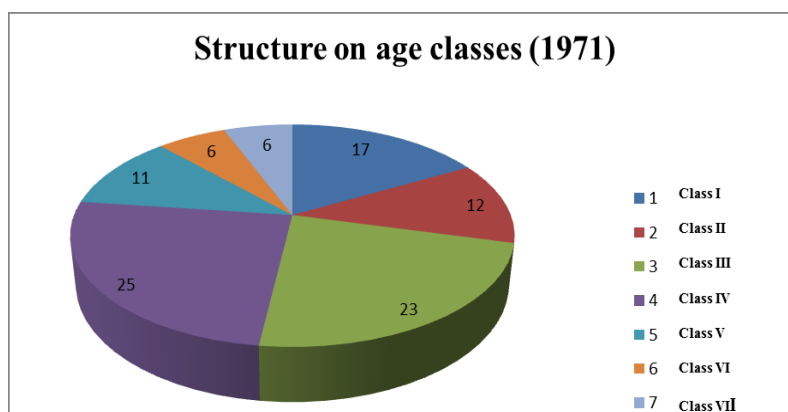


Figure no. 2

The rhythm of cuts reflects in the stands age class situation, for the stands where harvesting of main products was regulated (even if their surface was a lot different from an arrangement to another), it was noticed a growth in the surfaces occupied by stands that were in growth process until the year 1990, after which a strong decrease was noticed which can be seen even nowadays.

Table no. 2 The dynamic of stands density

Arrangement year	Consistency category/class			Average consistency
	0,1-0,3	0,4-0,6	0,7-1,0	
	%	%	%	
1982	1	6	93	0,77
1993	1	5	94	0,78
2013	4	8	88	0,75

High pressure on the forests from the area (excessive cutting) occurred in the late nineteenth century and in the periods that followed the two great world wars.

Great wood requests (especially for construction) that appeared after the Second World War - after nationalization, influenced, even if partially, the provisions of some forest plannings. Sometimes the calculation manner of the

possibility of main products, proposed treatments, etc., had unfavorable repercussions on stands structure.

Forests densities (for stands in production) recorded at the last three arrangements (for which data were disposed of) reveals the stands state at different stages of their development, offering as well an image of the treatments applied.

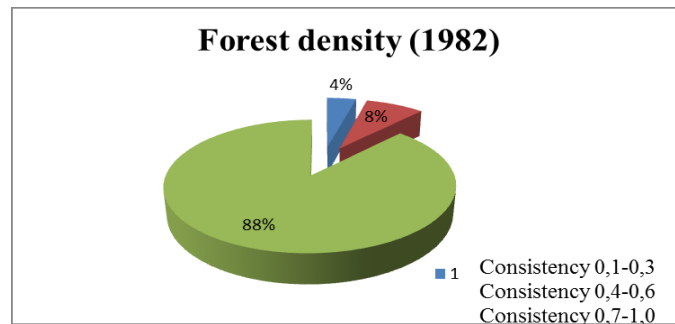


Figure no.3

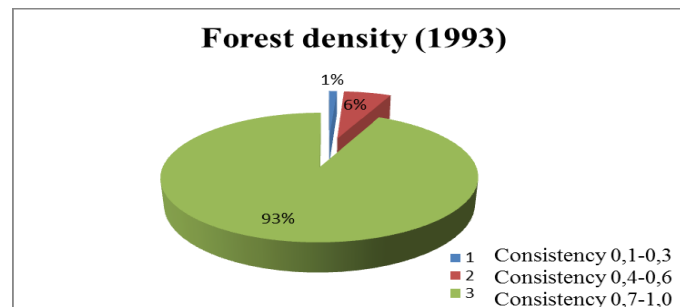


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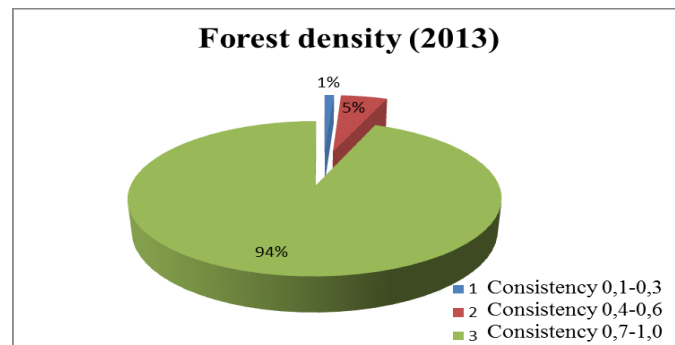


Figure No. 5.

As it can be noticed in the analyzed periods there were stands with low and very low consistency (0.1-0.6). This aspect is due especially to cut - downs and blow - downs caused by strong winds and heavy snowfalls, but also to practicing treatments with average regenerative periods and sometimes to plantation and natural regeneration supplemented or not, which have not yet reached the stage of massif. It must be also mentioned the fact that stands with low and very low consistency exist also in forests subject to special conservation (S.U.P."M") and even in some reservations (S.U.P."K"), all these forests following to be maintained, until their completion with conservation cuts with the purpose of regeneration.

Made - up degree of stands structure is also reflected in their composition at the analyzed moments, situation that highlights even if partially, forest policy from those periods.

Table no. 3 Record of specific composition

Arrangement year	Species (%)					
	MO	BR	FA	ME	DM	DT
1982	82	11	4	1	1	1
1993	83	11	4	1	1	
2013	84	9	4	1	2	

The next forest planning entered into force on 1st January 1972, being issued on the base of the 1963 forest planning instructions; on this occasion it was reviewed the functional zoning of forests according to the instructions of the Ministry of Forests no. 3134/1963, stands located on land with slopes over 30 degrees and those with erosion phenomena were assigned special soil protection functions. Consequently, changes were brought also to the formation of management subunits, stands that were attributed special soil protection functions were rejoined in a special protective subunit (S.U.P."M") whose surface represented 41% of the total production area surface.

The other two management subunits were maintained from the previous arrangement (S.U.P. "A" – S.U.P." G" regular forest and treatment forest) but their surface was significantly reduced. The forest planning basis were generally the same as for the previous arrangement: woods regime, technical and protection exploitability, treatment of clear cutting and successive cutting for the regular forests subunit stands, treatment for transformation stands from S.U.P."G", the cycle of 100 years for S.U.P. "A" (namely the rotation of 10 years for S.U.P. "G").

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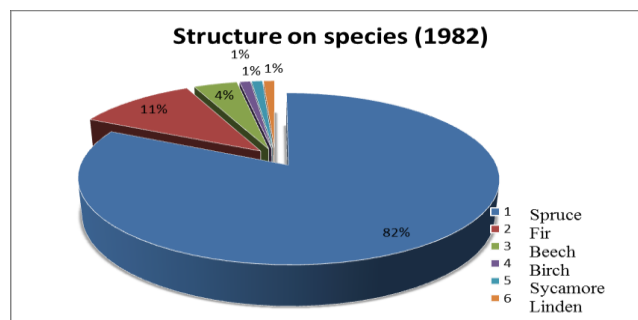


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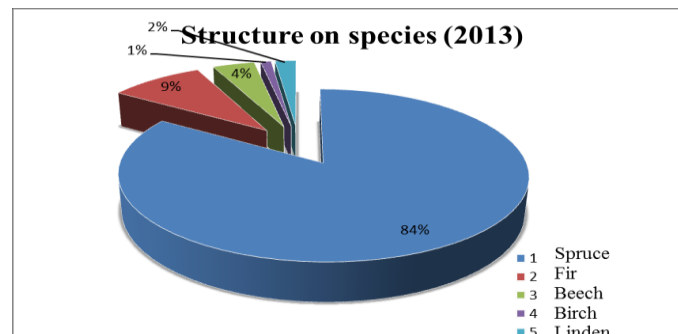


Figure no.7

arrangement. After the foundation of *Tomnatic* experimental Forestry District/Ward, on 1st July 1977 as a subordinate district to the Institute of Forestry Research and Management Bucharest, the forests of the production unit *Tomnatic* VI went into the administration of O.S.E *Tomnatic*. The first forest planning of *Tomnatic* Forestry Ward as independent ward was done in 1982, consisting of the production unit I *Demacusa* and VI *Tomnatic*. The forest planning U.P. VI *Tomnatic* 1982 Edition, which included nowadays forests of Moldova's left flank brought as change giving up to regular forest, the organizing of the production

process being done on two forest management subunits (S.U.P. "G") and a subunit S.U.P. "M" - of special protection. Forest planning basis from the previous arrangement/planning were mainly maintained also for the arrangement/planning from 1982: forest regime system, goal consistency in accordance with the natural forest type, technical and protection exploitability, cutting treatment for S.U.P."G" stands, 10 years rotation for S.U.P. "G".

The following arrangement for forest area entered into effect on 1st January 1993, field work being performed in 1992, and was applied 10 years until 31 December 2002. Preparing the 1993 management plan was executed in the spirit and provisions of the new "technical norms for planning forests" 1986 edition, the provisions of these norms requiring primarily reconsideration trees' functional classification, the consequence being the considerable increase of the surface stands with special protection functions and corresponding significant increase in surface subunit special protection, so that the surface S.U.P. "M" represents 49% of the total area of the production unit, compared to only 11% in the arrangement of 1982, while the total area of the production unit remained relatively constant. In 1993, planning regulation and protection of the production process was done in two management subunits: S.U.P. "G" - forest gardening and S.U.P. "M" - forests under special protection.

The basics of landscaping adopted were broadly the same as the previous arrangement: forest regime, goal composition according to fundamental natural forest type, technical exploitability (diameter-end) and protective treatment for gardening transformation stands in S.U.P."G", rotation 10 years S.U.P. "G". For some forest stands belonging to subunit subjected to special conservation were proposed conservation works. Thanks to the new functional zoning stands, appeared a significantly reduced area for which it can regulate the production of timber and therefore the possibility of main products was much lower than the previous editions of the management plan, and due to the reduction of young trees cuts, due to wind, significantly decreased the possibility of by-products. Analyzing the management plan provisions and achievements during 1993 - 2002 for all former UP VI Tomnatic forests, was found that in that period, the possibility of main product was made in 97%; total volume of timber extracted in the 10 years of implementation of the stands and pre-exploitable exploitable due to wind cuts (accidental I) represents approximately 176% of the principal decennial products adopted throughout the arrangement.

The total volume extracted as main products (main + accidental I) exceeded 173% value of main product possibility adopted by arrangement, noting that the volume of products accidental I pre-compatible, largely influenced treatments, meaning that many stands included in the collection of the possibility decennial main products, were not covered by the treatments provided. Regarding care cuts,

there were executed releases in some areas resulting from storm damage, there were significant overruns surfaces covered with cleansing works (58%) and thinning (196%) compared to areas provided, the volumes harvested were lower than expected, except that the volume extracted incidental II, due to wind damage were high enough. Also, the volume extracted by hygiene cutting exceeded by 54% the amount estimated to be collected through such works. Consequently, the total volume extracted from the stands of the former U.P. VI Tomnatic between 1993 – 2001, exceeded 68% total volume provided in arrangement, harvest index obtained was of $2,7\text{m}^3$ /year/ ha, compared to total estimated harvest rate of 1.6m^3 / year / ha, the main cause being windfalls and snow breaks' production.

The surface on which was made afforestation, was less than prescribed, being in accordance with the unfulfilment of treatments' application, with windfalls which took place, but with the proper development of natural regeneration in stands ,where there were set additions. In terms of species used in afforestation work, there is the continuing trend of excessive use of spruce, although cuts produced in the analyzed decade, affected pure spruce stands. In the last year of the management plan -1993 edition, production unit forests were affected by huge storm damage of 6-7 March 2002, disaster that at the Suceava county level has caused damage of millions of m^3 of wood. That disaster has also hit the studied forests, due to the high intensity of wind there was stripped more than 10% of the unit, and in many other stands, consistency was significantly reduced. In conclusion, it can be considered that the management stands for the duration of the management plan in 1993 was influenced by the large volume of falls produced in this period of time.

Last arrangement for the forests studied, as part of the former U.P. VI Tomnatic from Tomnatic Experimental Forest District, entered in effect since 1st January 2003. At the end of 2003 by the decision no.16/28.11.2003 of the Romsilva- Forest National Board, Tomnatic Forest District passed from administration I.C.A.S. Bucharest to Suceava Forestry Department management, so that forests from production unit VI Tomnatic (left side of the river Moldova) were administered during the period December 2003 - June 2007 by the Forestry Division of the National Forest ROMSILVA, through various forest districts subordinated by D.S. Suceava.

According to a 2007 law of the Board of Directors of National Forest – regarding to return to I.C.A.S. property management and experimental bases of the assets transferred to the Forestry Department Romsilva, following the delivery – reception protocol, signed in June 2007, between the Forestry Division and I.C.A.S. Bucharest, from 1 July 2007 reestablished that Tomnatic Experimental forest and Tomnatic forests U.P. VI unit which included forests studied, went back into administration of Tomnatic Experimental Forest District and after the

implementing the possession, forests studied, became public property of Câmpulung city, Sadova village public property, state property of Frasin Forest District, or they remained in the administration of Tomnatic Experimental Forest District, under a management contract.

In 2003 management plan, remained largely functional classification trees from the previous arrangement of 1993, all forests in UP VI Tomnatic being assigned to Group I 2003 Functional - forests with special protection, 47% of which are included in type II functional categories, and the rest in the type III of functional categories.

The forests in the study area were included in the 2003 arrangement in following functional categories of priority:

- Forests situated on rocks, debris and land with erosion depth, with active landslides and land with steep slopes (T-II) - 43% of the forests;
- Forest land located on the slides (T-II) - less than 1% of the total;
- Forests located on lands with permanent marsh (T-II) - less than 1% of the total;
- Forests around the city Câmpulung, as well as those located within its structural perimeter (T-III) - 57% of the forests studied.

The management planning in 2003 for the stands studied in type II of functional categories remained inclusion in a subunit of forests subjected to special conservation regime (S.U.P. "M") and the remaining trees were placed in a subdivision of "A" - regular forest. In the former area S.U.P. "G" - forest gardening, the main reasons of this change in the formation of the sub-units were that in the previous three decades there has been no sub gardening of severe cutting processing applied to the gardening and only in very few stands, and especially major negative effect falls of wind in the spring of 2002 in the area that have significantly affected the structure of many of the stands, drastically reducing the possibilities to achieve their transformation into gardening. Moreover, although the technical and specialized work permits or recommends applying gardening in natural spruce forests is questionable the setting, a few decades ago, of a such subunit of forest gardening in spruce forests in the area, the spruce from the area being in the past of Austrian provenance, introduced artificially in favorable mix stands in an area exposed to windfalls. Basics of fitting set at the previous arrangement are:

- Regime for all forest stands; a composition-purpose according with fundamental natural forest type; an exploitability, a protective exploitability expressed by age exploitability protection of group I functional stands that have been taken into account in the regulation of the wood process production; for stands framed in S.U.P. "M" was not determined the age of the exploitability, these

being subjected to great conservation cycle of 120 years in accordance with the stand structure and functions assigned to them;

Treatments applied were: treatment of progressive cutting of conifers and beech mixtures and spruce-fir category; treatment of clear cutting in pure spruce and in the restored stands.

The current character of forest type identified was established depending on regeneration and productivity of major element in each stand structure, taking into account the composition of the stands as well. It is noted the forests with spruce forest participation are characteristic of the study area, which shows the great potential of the resorts in the area (for growth and development of species with valuable, economic and ecological characteristics) potential well capitalized, as indicates low percentage of tree underproduction and derivatives. There has to be mentioned the preponderance of fundamental natural stands (the indicated both economically and environmentally for the development of forest vegetation in the conditions of Moldova contents left slope), reflecting a proper management of the forests in previous decades.

The derivatives and underproduction stands, although represents a small share in the total stands, should work in the future as an object of forest management, improperly exploiting the station potential, making small timber assortment coming from less valuable species .

Table 4 Evidence of forest productivity

Year of production planning	Classes production (%)					Class average production
	I	II	III	IV	V	
1982	7	66	26	1		2,2
1993	6	68	25	1		2,2
2013	2	66	31	1		2,3

Although there has been found data only for the last three facilities (to whom the surface production trees is very different), there is still an increase in the percentage of participation in the composition of spruce, fir and various detrimental countries. Aspect is not very positive taking in consideration the fact that the area is very vulnerable to storm damage and ruptures caused by snow, spruce being the species most affected by these destabilizing factors. It is, however, beneficial the systematic introduction in the composition of future stands of different coniferous (larch, pine, etc..) which, by specific features, increase the spruce woods' strength at the main destabilizing factors in the region – wind falls and breaks caused by wind and snow. By gradually diminishing participation in the composition of spruce stands, it will be created intermediate structures that, will gradually lead the forest from the area, to a normal structure in terms of specific compositions to

fundamental - natural existing forest types, being obtained forests with high durability at wind falls and breaks caused by wind and snow.

In terms of forest productivity, dynamics is difficult to analyze because, especially in the first arrangement, the reference data were different (competing values that determine production classes were others). At the same time, as in the previous cases, the covered area in which crop was main produced was very different, even for analyzed periods. However, average production class per total stands, has very close values. Given the previously presented, where productive forest, public state property will not be affected by large changes in surface, state forest productivity in future stages will not register significant variations.

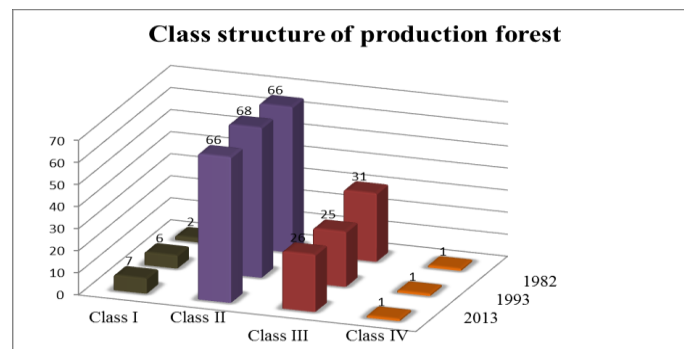


Figure no.8

For all analyzes (age class development, the categories of consistency, composition and forest productivity), the last recorded planning (2003) can be compared only partially with the previous (1971, 1982 and 1993), because, by operation of law 18/1991 and 1/2000 were returned, those entitled, large areas of forest previously under Pojorâta and Tomnatic forest districts. So as percentage "variations" positive or negative, recorded every situation for the remaining forests managed by NFA, and did not reveal an increase, respectively a decrease, but the resultant of diminishing forest public state property production. Forest area located between the existing territorial limits in 1950, recorded changes from one stage to another in the size of the forest as a result of the surfaces' determination method of the base map used and exchanges, takeovers or disposals of land that were made.

Compared to the previous arrangement, forest area decreased by 1601.7 ha. The cause being especially the restitution to former owners of forest areas under laws 18/1991 and 1/2000, currently being of 2521.2 ha. Total wood fund and wood

volume per hectare have recorded variations in the different phases, due to the area occupied by stands, composition, structure and production classes characteristic of forests in those periods, in close agreement with the age class structure and the forestry productive capacity of the stations. In general, it can be noticed an increase of the values of the two indicators from a facility to another. Increasing the total current, and thus, the current growth rate, experienced large changes over time, due to both the existing trees surface, vitality, age, consistency, production and composition of the forests classes in those periods and also due to the method and precision of the calculations, etc. Noting that the current net increase was considered as representing 92% of total current increase, 8% being as losses.

As a result of the review, we conclude that, *the provisions of some of the earlier plannings, and also the management in their application periods, had some adverse effect on the structure of forest stands and on the whole forest*, situation that, during the application time of the last two arrangements - especially the last one, shows a favorable orientation.

Structure evolution of the age classes. The age class structure have been suffered some changes due to both aging and stands falls due to wind, some areas, particularly the former stands from the Vth and VIth age grades, being stripped after falls and subsequent forested, so that currently they can be found in Ist age class, this situation together with afforestation of former older bare land, explaining the increased by 5% of the first age class stands towards the situation from the previous arrangement.

Evolution of age classes structure, was not influenced by cuttings or progressive cuts provided in arrangement works mentioned in the previous application, because have not been made cuts in the main product stands.

The situation presented in management planning concerning the evolution of the structure of all age classes of former stands VI Tomnatic, of which were the studied stands, indicating to all spatial editions, evident imbalances in the age class structure of forests, situation due to mass wind fall produced during 1969 - 2002, but also due to the inconsistency in terms of maintaining continuity in time, while establishing uniform management measures, the productive fund being initially constituted in regulary productive forest subunits, then consecutive decades were formed subunits of forest gardening with attempts to transform towards gardening, in order that since 2003 to return to the regular forest subunit solution.

At the current production planning, as well, the fund has an age class structure obviously unbalanced, characterized primarily by the low percentage of young trees, the total area of tree age up to 60 years, from the first three age classes, being only half of the normal area, and above the optimum proportion of older trees, especially those from the classes IV and VI of age.

Significant surplus exploitable stands is demonstrated by size class VI age, which is almost double than the area of the normal age class. The works application proposed by the current management planning, will lead to the end of the decade, to a substantial reduction of surplus stands in the age sixth grade, nearly 60% of the current stands aged above 100 years and will be completed in the decade of implementing definitive regeneration cuts or clear cutting followed by reforestation and substantial increase in surface age stands the first class, which will help the regeneration and afforestation current classes.

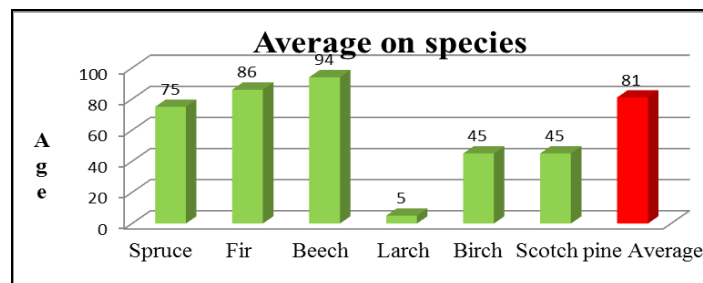


Figure no.9

Dynamics of production classes. Evolution of the productivity category stands calculated for all studied stands of forest, reflects some differences, meaning the reduction by 10% of the share of high productivity stands (classes I and II production) and the increase by 10% of the proportion of medium productivity stands. There are not stands of production from class V and the class IV were insignificant as share, representing less than 1% of all trees. Today the average production class studied stands decreased from 2.2 to 2.3.

The main cause of the negative evolution of the structure on the categories of productivity in recent years is the negative influence of falls due to wind and snow on the studied woods and especially on those aged, large spread of this phenomena being amplified by the fact that almost half of the unit stands are stands with age over 80 years, employed in age classes V and VI.

Another reason of increase in the proportion of middle productivity stands, to the detriment of those superior ones is the substantial increase of the first age class stands, as a result of plantation done in the last six years on bare land, mostly plantations that have not reached yet the final success and are conventionally classified as class III production.

Differences between the two phases of planning, largely justified from the reasons above, but are due, in some cases, to some elements of subjective judgment on the differences between the two editions of the management plan, resulting in a possible overestimation of tree height and of the production planning classes put on

some stands. It is expected that along with increasing age of first class stands, of a very young age, and the completion of cutting and regeneration works of present stands, with very low consistency with the windfalls, to increase the average production class stands in the area as well.

Evolution of forest composition. Currently there have not been significant changes in the average composition of the studied stands. A positive aspect is represented by the reduction of the spruce's proportion with 2% and an increase of 1% in the composition of tree stands, a trend that will be emphasized in the future by the application of appropriate management so as to reap the stationary conditions of the unit production, to increase the share in fir tree, larch and mixed deciduous species at the expense of spruce, whose current weight is significantly higher than optimal.

Significant improvement of the structure stands on the species, can be achieved even in the next decade by following formulas set out in the arrangement afforestation and completion to be performed, the quantities of such afforestation works being big, will significantly influence the average composition of unit stands; otherwise, reducing pure spruce stands weight and creation of mixed stands is one of the effective measures taken to increase resistance stands to destructive action of the wind.

The evolution of density stands. Zonal stand structure on consistency categories recorded significant changes in the last 15 years, meaning the consistency reduction of many stands, average consistency of studied forests recording a decrease from 0.69m in 1993 to 0.63m today. The cause of reduced consistency of stands are the falls due to wind and ruptures produced by snow from the analyzed period, followed in some cases by *Ipidae* attacks; extraction of large volumes of product accidentally, due to the above mentioned phenomenon, results in the decreasing of consistency.

Large proportion of stands with consistency between 0.1 to 0.33 is due to the drastic reduction of consistency aged stands because of accidental products extractions from falls and improper density of some of the plantations made in previous years in the lands previously bared from wind action.

Moreover, can easily be mentioned that the evolution of the average consistency stands in the former production unit VI Tomnatic, from which come studied forests decreased continuously from a facility to another, from 0.92 at 1972 planning to 0,75 in 1982, to 0.69 in 1993 and ulterior 0.66 at the arrangement in 2003, mainly caused by frequencies falls of wind and breakage produced by snow.

Surface distribution by altitude category. According to the recorded altitude, we find that the slopes are generally moderate towards fast. Altitude and geographical position favor the spruce's development and mixed stands where the main share is spruce. Slopes sides can influence productivity stands as high sloping

lands have shallow soils or high in the skeleton, while in straight areas the amount of humus and soil depth increases, thereby developing high productivity stands.

The distribution of surface on slope categories

The distribution of surface on land slope categories is as follows:

- 4% of the unit's surface has land's slope lower than 16 degrees;
- 54% of the unit's surface has land's slope between 16 to 30 degrees;
- 42% of the unit's surface has land's slope between 31-40 degrees.

We note the large share (42%) of land with slopes over 30 degrees in the production unit.

The distribution area of exhibition categories. General exhibit of forest fund in the area is determined by the relief, is sunny (41%) and partly sunny (58%), as dictated by the direction of the Moldova River drainage and the main streams which cross the territory studied, meeting all detailed exhibitions determined by micro-relief terrain .

Conclusions

Recent developments in the basin lowland forests of Moldavia, between gorge Pojorâta _Sadova and Prisaca Dorna has been analyzed from several points of view.

According to altitude recorded, we find that the slopes sides are generally moderate to fast, noting the large share (42%) of land with slopes over 30 degrees in the area. Altitudes and geographical position favor the development of spruce forests and mixture stands in which the main share is spruce. Slopes sides can influence productivity stands because high sloping lands have shallow soils or high in the skeleton, while in linear areas the amount of humus and soil depth increases, thereby developing high productivity stands.

The study is complemented by an analysis of the forest through the ownership and management mode. We also developed a dynamic area of the occupied forest, so cutting rate is reflected through the situation of age classes analyzed stands, forest density, an analysis of species structure, production classes, age classes.

Average consistency of forests studied registered a decrease from 0.69 in 1993 to 0.63 today. The cause of reduced number of stands is the falls due to wind and snow ruptures within the analyzed period, followed in some cases of *Ipidae* attacks; extraction of large volumes of accidental products, due to the above phenomenon, result in decreasing of consistency. Forest composition analysis reveals the need to reduce the weight of pure stands of spruce and mixed stands creation, which is one of the effective measures to increase stands resistance to the destructive action of the wind.

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