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STATUS OF FOREST RESOURCES OF MONTENEGRO

SUMMARY

The data on the state of the forest resources of Montenegro at the national level in the previous period were obtained by different methodologies (including sublimation of information contained in general and special Forest Management Plans, Forest Management Programmes, Operational Plans, etc.) and thus a lack of harmonization between them and their relative unrealiability in terms of macro-economic planning is understandable for the time being. One of the reasons behind this issue was the absence of National Forest Inventory as the necessary tool that provides a reliable and comprehensive information on the status of forest at national level. The first National Forest Inventory of the forests of Montenegro was undertaken in order to create realistic grounds for quality strategic planning in forestry.

In methodological terms, this Inventory is compliant with the standards used by countries with long forestry tradition, and it involved the application of a systematic sampling in the form of clusters, distributed in the network of 2×2 km throughout the territory of Montenegro, where qualitative and quantitative data (site description, description of stands, and survey of trees) were collected and subsequently processed and analyzed. This paper presents and analyzes the state of forest resources of Montenegro by various characteristics and on the basis of data resulting from the National Forest Inventory such as: areas under forests, ownership, the representation of certain tree species, total standing volume, volume increment, etc. The results of the first National Forest Inventory show substantial differences with these elements compared to previous (available) figures on forests resources of Montenegro. Forests cover 59.9% and forest land

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covers 9.8% (69.7% altogether) of the territory of Montenegro. Standing volume amounts to around 118 mil m³ with current volume increment of 2.8 million m³.

The reliability and comprehensiveness of these and other results of the National Forest Inventory create realistic grounds for macro-economic planning, provide for correspondence with associations performing monitoring of forest ecosystems at regional and global levels, and place Montenegro amongst countries that have established their Forest Policy on reliable and methodologically appropriate grounds.

Key words: National Forest Inventory, forest resource, forest and forest land, the national level, Montenegro

INTRODUCTION

In the past, in Montenegrin forestry we have seen the different, often very discordant data on forest resources at the national level, in terms of their area presence, share of the different origin forests, mixture, height of the wood volume, volume increment etc. Also, by 2005, only the stand (management) forest inventories have been conducted in Montenegro. Information obtained this way were used for preparation of General and Special management plans, Forest management programs for private forests, that is, for preparation of planned documents of lower order - lower planning level (Operational projects, etc.). By resuming and subliming the results of stand-small area inventories we have been creating the informational basis for preparation of planned documents of higher order - Spatial plan of Montenegro by 2020, the National Forest Policy, General forest management plans. Given the disputable nature of such a procedure for obtaining the data in the national level, reliability of the above mentioned planned documents was also relative. The solution for overcoming this situation was the national (large area) forest inventory (NFI), which will provide, in both qualitative and quantitative terms, a reliable and comprehensive database about the forest resources of Montenegro, which can be used as the basis for realistic macro-economic planning in the forestry sector.

Thanks to a well designed plan for the Montenegrin forestry sector reform and numerous international projects[2] supporting it, numerous activities were implemented to that end. Thus, the National Forest Inventory of Montenegro was implemented, for the first time on scientifically grounded bases, implemented in partnership between the Ministry of Agriculture and Rural development (MARD), Forest Administration (FA) and the FODEMO project (project "*Forestry Development in Montenegro*). The National Forest Inventory, with expert assistance of international consultants[3], was implemented in the period from 2009.-2011. Thus, the forestry sector of Montenegro has, in this very important segment of forest management, was placed into an equal position with

[2] In these terms, the support of the Government of the Grand Duchy of Luxembourg will be very significant;

[3] NFI Advisory Team in Montenegro is composed of the experts from Geo FIS, Freiburg-Germany

the forestry sectors of highly developed countries of the European Union and the World. In accordance with the need of realistic planning and requests for correspondence with both local and international organizations, the defined methodology of the national forest inventory shall take into account the wide scope of information on forest resources status, their spatial distribution, structural characteristics, time development, degree of utilization and changes. Within that meaning, the basic and most frequently required information collected by national inventory shall pertain to: the area under forests, volume compared to the tree species and forest types, age, increment and productive possibilities of forests, habitat conditions, and possibilities of multi-functional utilization, plans and recording in the entire territory of the state. Pursuant to the above stated, the central database on Montenegrin forests has been established, which will, along with the permanent updating as per individual inventory cycles, enable its utilization by forestry and other governmental sectors and professional-expert associations, individuals, then correspondence with relevant international institutions and non-governmental organizations. That will create the basic assumptions for successful overcoming of numerous deficiencies that were burdening the forestry sector.

MATERIAL AND METHODS

In methodology meaning, the National Forest Inventory of Montenegro is harmonized with standards of European countries having a long tradition in implementation of large area inventories. The same as the majority of modern national inventories implemented in Europe, it uses the elements of systematic sample in the form of clusters[4] on which the surveying and evaluation of different attributes shall be performed. In addition to international recommendations, defining the methodology of the National Forest Inventory (NFI) has also taken into consideration some ecologic and historical particularities, as well as practical experiences in collecting data in Montenegro itself. Comprehensive description of the national forest inventories in Europe and beyond, given by Tomppo *et al.*, 2010 *confirms this statement*. In the part pertaining to the type and structure of information that had to be collected we also took into account the requests defined by the FAO *(Forest Resources Assessments)*, FOREST EUROPE–MCPFE *(Food and Agriculture Organization of the United Nations)*, UNECE *(United Nations Economic Commission for Europe) and European Commission*, as well as the national requirements.

The clusters grid with the sample plots is distributed in the entire territory of Montenegro and is based on a regular 2x2 *km* square raster (basic raster), set up by *Gauss-Krüger's coordinate system and projection* - zone 6. On each section of the 2x2 *km* square raster there is the cluster consisting of four sample plots, positioned in the tops of the square whose leg length is 200 *m*. The sample

[4] Cluster implies the set of sample plots where recording is done, for purposes of identifying the status of forest resources and perceiving tendencies of its development in time.

plot consists of 4 concentric circles, whereat the radius of the first circle is r_1=5.64 *m* (p_1=1 *acre* on plain terrain), of the second circle r_2=7.98 *m* (p_2=2 *acres*), of the third circle r_3=12.62 *m* (p_3=5 acres) and the radius of the fourth circle r_4=17.84 *m* (p_4=10 *acres*). Diameter measurement was performed on the first concentric circle, on all trees above 10 *cm at* high forests, while taxation limit for coppice forests was 5 *cm*. On the other concentric circle diameters were measured on all trees above 15 *cm*, on the third circle diameters on all trees above 30 *cm* and on the fourth circle diameters of trees above 50 *cm*. The spatial position of each tree was also defined in the plot area, that is, their distance and azimuth were recorded in relation to the centre of the circle, which gives the permanent character to the same. In addition to the diameter measurement according to the stated principle, the height measurement of all the trees was also performed, then evaluation of their health status, biologic position, technical quality, sample and level of damage, etc. Except for the taxation values, assessment of the entire spectrum of information covering the area characterizing habitats and stands was also performed on each cluster or sample area. Simultaneous to execution of the forest inventory we also performed the field works control, aiming at testing the compliance of the collected data, and consistency in enforcement of the defined methodology, and in order to provide the qualitative, reliable and objective results. We have established a high level of compliance between the controllers and the field teams in collecting the data, and the control process was supervised by the international advisory team. Data processing was performed by the software developed for that purpose.

RESULTS AND DISCUSSION

Possibilities of using the established database, in terms of making the different recapitulations (status overviews as per one or more attributes simultaneously), are extremely high. Due to the spatial restrictions, this work shall only present some of the entire spectrum of quantitative indicators of the forest resources status. Far more comprehensive and analytic status of forests in Montenegro shall be presented in the Final report that is going to be available end of the 2012.

3.1. Forest coverage of Montenegro

Although Montenegro has a relatively small area, it is considered a very much forest covered state. Out of its total area, taking into account the statistical data stated within the National Forest Policy adopted in 2008. (Table1), total of 45% of the territory (621.609 *ha*) is covered by forest. Forest land, which under the international definition also includes brushwood, bushes, maquis and stone steppes, covers the 9% (123.000 *ha*), which all together is 54% (743.609 *ha*) of the whole territory of Montenegro.

A different insight into the forest coverage of Montenegro we can see in the reports of FRA *(Forest Resources Assessments)* and FAO *(Food and Agriculture Organization of the United Nations)* per individual periods, and were

obtained by analysing the data in the interval 1990.-2010. (Table2). According to this source, the forests cover 39.3%, forest land 12.7%, and together 52% of the area of Montenegro.

Table 1. Forest coverage of Montenegro

Type (method of utilization) of land	Area	
	ha	%
Forest	621.609	45.0
Forest land	123.000	9.0
Forest and forest land	**744.609**	**54.0**

Source: National Forest Policy 2008

Table 2. Forest coverage of Montenegro (the reports of FRA and FAO)

Type (method of utilization) of land	**FRA**			**FAO**		
	Area (1000 *ha*)					
	1990.	2000.	2005.	2010.	2010.	
Forest	543	543	543	543	543	39.3%
Forest land	175	175	175	175	175	12.7%
Total	**718**	**718**	**718**	**718**	**718**	**52.0%**

Based on the results of the first National Forest Inventory 2009-2011 (Table 3) the forests cover 59.9% (832.900 *ha*), Forest land 9.8% (135.800 *ha*), and together 69.7% (968.700 *ha*[5]) of the territory of Montenegro. The other categories (urban areas, water areas, agricultural soil, barren land, etc.), that do not belong to forest and forest land, cover 30.3% of the state's area.

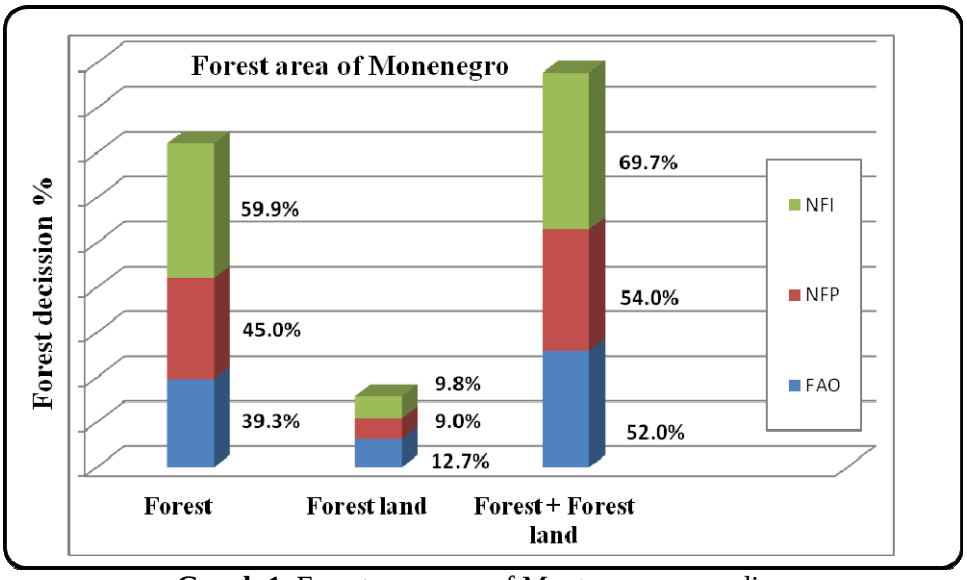
Table 3. Forest coverage of Montenegro according to the data of the National Forest Inventory 2009-2011

Type (method of utilization) of land	Area	
	ha	%
Forest	832.900	59.9
Forest land	135.800	9.8
Forest and Forest land	**968.700**	**69.7**

When the results of the national forest inventory are compared with the results published in the National Forest Policy and then in the Spatial Plan of Montenegro by 2020 of 2008 and in the report on the European forests status in 2010., prepared by the ***Forest Europe – MCPFE*** (based on the information provided by the MARD) the area under forest[6],[7] is different by 14.9 % (Graph 1).

[5] Results of National Forest Inventory of Montenegro – *Resume.*

[6] Forest is a land spanning more than 0.5 ha with trees higher than 5 meters and a crown cover of more than 10%, or trees able to reach these thresholds *in situ*.



Graph 1. Forest coverage of Montenegro according to the data from various sources

This phenomenon is a part of the general process following the surrounding area in which for the last 20–30 years it came to an increase in the area covered by forests, in average from 3-5%. When speaking about the forest coverage of Montenegro, based on the results of the National Forest Inventory, the reasons for its increase we should seek in different factors. One of them is prominent in the trend of reducing the number of population, primarily in rural areas of hilly and mountainous areas, which led to the spontaneous spreading of forest vegetation on agricultural land that is not being cultivated. Also obvious is the increase of forest covered area as a result of afforestation and reduced volume of logging in the whole area. A part of the mentioned increase of forested area originates in the fact that the information on the forest resources status in the past period have been obtained in methodologically different and disputable manners-most often by summarizing the data from various planning documents. An important reason for current forest status is the definition of forest and forest land itself, harmonized with the FAO criteria and used during the data collection within the first national inventory.

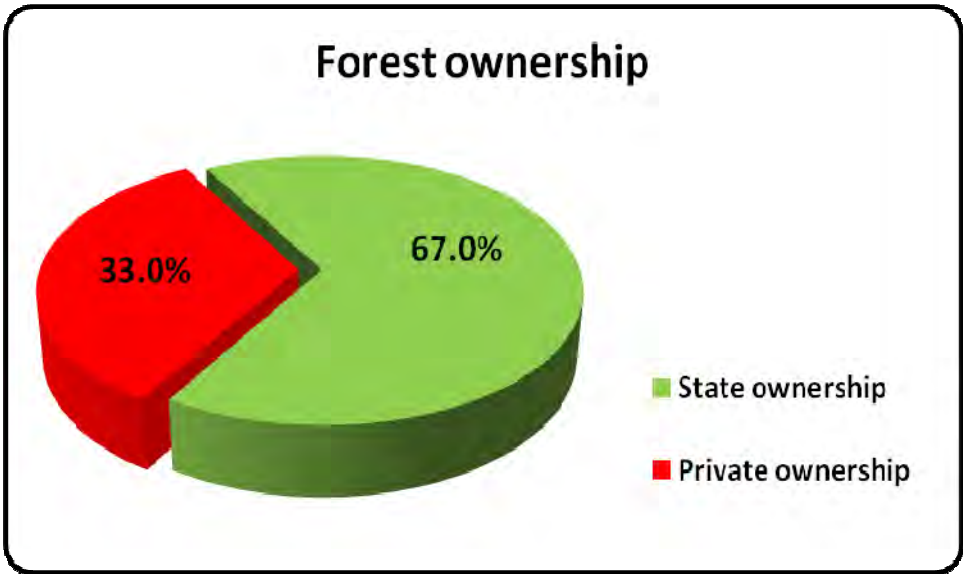
Based on the relevant data obtained from the national inventory, it can be seen that according to their ecological, social and economic value, diversity and environmental impact, and taking into account the areas damaged in the past, the

[7] Land not classified as "forest", spanning more than 0.5 hectares (minimum area for forest land) with trees higher than 5 meters and a canopy cover of 5- 10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent (includes trees not able to reach a height of 5 meters in situ).

forests of Montenegro are among the most qualitative ones in Europe. We can state that according to the forest coverage Montenegro is far above the average of European and world's forest coverage. If we take into account the number of population, we come to the level of forest coverage of 1.3 *ha/inhabitant*, which classifies Montenegro, along with the Scandinavian countries, into the European top when speaking about the forest coverage. If we know that world forest coverage is 30%, and European 46% (TBFRA-*Temporal Boreal Forest Resource Assessment*, 2000) then , according to its forest coverage(59,9%), Montenegro takes the third position, immediately after Finland (86%)-4.5 *ha/inhabitant* and Sweden (67%), and before Slovenia whose forest coverage is 58% (0.6 *ha/inhabitant*), Croatia 37% (0.47 *ha/inhabitant*), Serbia 29.1% (0.3 *ha/inhabitant*), Bosnia and Herzegovina 41%, Spain 30% and Austria 38%.

3.2. Forest ownership

According to the National Forest Policy from 2008 data a substantial part of the forests and forest land is in private ownership-33% or 244.000 *ha*, while the state ownership share is in total area of 67% or 500.000 *ha* (graph 2).



Graph 2. Forest ownership according to the National Forest Policy from 2008.

Preliminary data of the NFI indicate that private forests share is significantly higher compared to the previous reference years. Bearing in mind that the process of Montenegrin cadastral data restitution executed by the Real Estate Administration is not done yet, the ownership assessment on sample plots is not fully defined.

Bearing in mind the former method of their identification and collection, method of defining the ownership structure, problems due to the cadastral delay

in updating them, current restitution problems etc., the detailed data on ownership structure of forests and forest land should be available by end of 2012.

The ration between the state forests and private owned forests in some European countries is as follows: Austria 17,5%:82,5%, Bosnia and Herzegovina 78,4%:21,6%, Croatia 75,5%:24,5%, Check Republic 84,1%:15,9%, France 26,2%:73,8%, Romania 94,6%:5,4%, Slovenia 30,0%:70,0%, Finland 28,9%:71,1% (TBFRA, 2000).

3.3. Representation of tree species in Montenegrin forests

The National Inventory has registered 68 tree species (57 broadleaved and 11 coniferous), which indicates a huge diversity of Montenegrin forests. Share of individual species in forest resources is unequal. Observed according to the area, the beech dominates with 19.8% (Table 4), then bitter oak with 7.3% and sessile flowered oak with 2.0% on forest covered area. Hardwood broadleaves cover 10.4% of land under forest, softwood broadleaves cover 2.9%, with substantial share of precious broadleaves of 8.3% of the total territory of Montenegro under forests. Beech forests are widely distributed on altitudes of 700 to 1.800 *m*. Out of coniferous species, the most represented is spruce with 8.5% of forested area of Montenegro, fir with 4.1% and black pine with 1.6%. Substantial share falls to the Balkan endemic forest species of Macedonian pine and white bark pine. Macedonian pine (*Pinus peuce* **Griseb.***) is present on* Prokletije and to a smaller extent on other Montenegrin mountains (Bjelasica). White bark pine (*Pinus heldreichii Christ.) appears* in the zone of Prokletije and on the mountains in the central part of Montenegro (Štitovo, Komovi etc.). White bark pine covers the area of 1.1%, Macedonian pine 0.6%, white pine 1.0%, while other coniferous tree species cover around 0.3%. Coniferous forests mainly dominate in higher altitudes and cover a wide mountainous area in the north of Montenegro.[8]

Table 4. Share of the most represented tree species per area

Tree species	Share per area (%)	Tree species	Share per area (%)
Abies alba Mill.	4.1	*Fagus moesiaca Maly*	19.8
Picea abies L	8.5	*Quercus petraea Matt*	2.0
Pinus silvestris L	1.0	*Quercus cerris L.*	7.3
Pinus nigra Arnold	1.6	Other Quercus species	5.4
Pinus heldreichii Christ	1.1	Precious hardwod	8.3
Pinus peuce (Griseb)	0.6	*Softwood broadleves*	2.9
Other conifers	0.3	*Hard wood broadleaves*	10.4

[8] National Biodiversity Strategy with the Action Plan for the period 2009 – 2014

The above values are significantly higher compared to the previous assessments published in the National Forest Policy, Spatial Plan of Montenegro by 2020 from 2008 and in the Report on the State of Europe's Forest 2011, prepared by the FOREST EUROPE – MCPFE (based on the data submitted by the MARD).

According to the *International Union for Conservation of Nature* (IUCN) classification, in Montenegrin forests there are 46 endemic plant species, while 51 plant species are under the state protection. For illustrative purposes, in 1968 there were only 6 plant species under the state protection. Surely the diversity of tree species in the territory of Montenegro substantially enriches the forest eco systems and it shall be necessary to pay them special attention for purposes of conservation and protection of biodiversity

3.4. Volume and volume increment

According to the data of the National Forest Policy from 2008 the total standing wood volume in Montenegrin forests was estimated at 72 mil m^3, with share of conifers of 41% and broadleaves of 59%, while average volume was 110 m^3/ha[9]. Current volume increment was estimated at 1.4 mil m^3.

The National inventory obtained the data that total standing volume of wood in the forest and forest land is 118 mil m^3, of which 40.2% belongs to conifers and 59,8% to broadleaves. According to the same source, the volume per hectare for forests and forest land is 123.2 m^3. Current volume increment was estimated at 2.8 mil m^3, Out of the broadleaved species, beech dominates in total volume with 42.8%, then bitter oak with 3.9%, sessile flowered oak with 2.0% while other hardwood broadleaves participate with 4.5%, softwood broadleaves and precious broadleaves participate with 2.5%. When speaking about the conifers, the most represented is spruce, whose share in the total volume is 20.0%, then fir with 12.5%, while white and black pine together have a share of 4.2%. When speaking about data related to volume increment, the share of beech is 34.2%, while conifer tree species are represented by spruce whose share in volume increment is 24.5%, followed by fir and its share of 14.3%. The above shows that beech is the dominant species, both in terms of area representation (Table 4) and the share in total volume (Table 5).

The National Inventory data, with regard to the other sources, definitely present a new dimension when speaking about the production level of Montenegrin forests. Significant increase of total volume and current volume increment summarizes many causes- starting from the realistic ones including the forest coverage increase as a result of the natural succession of forest vegetation and afforestation, to purely arithmetic ones reflected in the fact that these information in the national level had formerly been obtained by summarizing the data from various planning documents, only for 30% of the area under state forests, then in utilization of different volume tables and tariffs etc.

[9] *Osnovi rezerve šumarstva Crne Gore 1995 godine": Ekonomski fakultet, Podgorica*

An important parameter for evaluation of the potential assortment structure of forests is volume distribution per diameter classes (Table 6).

Table 5. Share of the most represented tree species per volume (V) *and volume increment (iv)*

Tree species	**Share per V (%)**	**Share per i*v* (%)**	**Tree species**	**Share per V (%)**	**Share per i*v* (%)**
Abies alba Mill.	12.5	14.3	*Fagus moesiaca Maly*	42.8	34.2
Picea abies L	20.0	24.5	*Quercus petraea Matt*	2.0	1.8
Pinus silvestris L	1.4	1.8	*Quercus cerris L.*	3.9	4
Pinus nigra Arnold	2.8	2.7	Other Quercus species	1.5	1.8
Pinus heldreichii Christ	1.9	1.4	Precious hardwod	2.5	2.8
Pinus peuce (Griseb)	1.3	1.5	*Softwood broadleves*	2.5	3.2
Ostali četinari	0.3	0.3	*Hard wood broadleaves*	4.5	5.8

Table 6. Distribution of total volume per diameter classes

Diameter class	**I**	**II**	**III**	**IV**	**V**	**VI**
	≤10 *cm*	11–30 *cm*	31–50 *cm*	51–70 *cm*	71–90 *cm*	>91 *cm*
% of share	2.8	34.6	37.3	16.7	6.1	2.5

The majority of volume of Montenegrin forests is concentrated on thin to medium strong trees, while share of the strong dimensioned trees, especially those above 70 *cm* is only 8.6%.

CONCLUSIONS

The first National Forest Inventory of Montenegro was done in the period from 2009-2012 The forest resources database was established, characterized by comprehensiveness and high level of information reliability. Montenegro has thus classified itself into a series of European countries that set up their National strategy of forestry development on methodologically correctly obtained basis. Utilization of the database shall enable the professional associations of the forestry sector, nongovernmental organizations, local and international associations dealing with forest eco systems monitoring, individuals and primarily to the Government of Montenegro, to create the macroeconomic policy. When defining and designing the strategic goals of forestry development (in

space and time), and measures for their implementation, we have to start from the forest resources status. In addition to the information on origin, level of conservation, mixture, structural development, functional zoning of forests etc., that are going to be presented in the final NFI Report by the end of 2012 Characteristics of the status of Montenegrin forests considered in this documents shall not be less important.

With the forest coverage level of 59.9% of total territory, that is, 1.3 *ha/inhabitant*, Montenegro falls into the group of highly forested European countries. Increase of the forest coverage by 14.9% is partially realistic and came as a consequence of forest vegetation succession to the agricultural land in mountainous areas and of afforestation, and partially caused by the different definition of forest within the NFI, and because of the methodologically disputable procedures which in the former period were used for obtaining these information.

The above reasons shall be valid even when speaking about the increase of total volume and current volume increment. In total volume, which is now estimated at 118 mil/ m^3, share of broadleaves is 59.8%, and of conifers 40.2%. Significant share of conifers, bearing in mind the prevailing structural forms of the forests they make, is extremely positive from the aspect of functional value of the forests of Montenegro.

There are 68 tree species registered in the forest fund (57 broadleaves and 11 conifers), which is indicating their dendrology richness and prominent diversity. However, the largest portion of area belongs to beech, oak and sessile flowered oak when speaking about the broadleaves, that is, to spruce, fir and pine when speaking about conifers, which makes the former statement relative and imposes the need for active protection and increasing the share of species with current minimum share in forest fund, first of all from the category of relict, endemic and endangered species.

If we take into consideration the composition of forests, significantly important share of conifers, surely the average volume of 123.2 m^3/ha is far below the potential possibilities of habitat and is a consequence of historical circumstances and often not rational relationship to this potential in the former period.

In confirmation of the previous claim is the fact that Montenegrin forests are dominated by thin and medium thick trees, with far less share of the strongest dimensions trees. This statement indicates the potential assortment structure and certain economic analysis and plans in the forestry sector.

Characteristics of Montenegrin forest resources stated in this document, in combination to those that are going to be presented in the Final NFI Report, shall enable the comprehensive and analytic review of the current forest status and realistic and rational assessment of further forestry development, as well as the selection of adequate measures that are going to provide accomplishment of the set out targets.

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STANJE ŠUMSKOG FONDA CRNE GORE

SAŽETAK

U dosadašnjem periodu u šumarstvu Crne Gore podaci o stanju šumskog fonda na nacionalnom nivou dobijani su na metodološki različite načine (između ostalog i sublimiranjem informacija iz opštih posebnih osnova, programa gazdovanja šumama, izvođačkih projekta itd.), te je u ovom trenutku razumljiva njihova međusobna neusklađenost i relativna nepouzdanost s aspekta makreoekonomskog planiranja. Jedan od uzorka navedenog problema bio je i odsustvo nacionalne inventure šuma, kao neophodnog instrumenta koji obezbjeđuje pouzdan i sveobuhvatan informacioni osnov o stanju šuma na nacionalnom nivou. Da bi se stvorila realna osnova za kvalitetno strateško planiranje u šumarstvu, sprovedena je prva nacionalna inventura šuma Crne Gore. U metodološkom smislu ova inventura je usklađena sa standardima evropskih zemalja u kojima šumarstvo ima dugu tradiciju, a podrazumijevala je primjenu sistematskog uzorka u vidu klastera, raspoređenih u mreži 2×2 *km* po čitavoj teritoriji Crne Gore, na kojima su prikupljane kvalitativni i kvantitativne informacija (opis staništa, opis sastojina, premjer stabala), njihova obrada i analiza. U ovom radu prikazano je i analizirano stanje šumskog fonda Crne Gore po različitim obilježjima na bazi dobijenih podataka nacionalne inventure šuma kao što su: površina pod šumom, vlasnički odnosi nad istom, zastupljenost pojedinih vrsta drveća, ukupna dubeća zapremina, zapreminski prirast itd. U odnosu na dosadašnje (raspoložive) podatke o šumskom fondu Crne Gore, rezultati prve nacionalne invenuture pokazuju značajne razlike u navedenim elementima. Šume pokrivaju 59.9%, šumsko zemljište 9.8%, (zajedno 69.7%) ukupne površine Crne Gore. Dubeća drvna zapremina iznosi oko 118 mil m^3, sa tekućim zapreminskim prirastom od 2.8 mil m^3. Navedeni i drugi rezultati nacionalne inventure, svojom pouzdanošću i sveobuhvatnošću, predstavljaju realan osnov za makroekonomsko planiranje, omogučuju korespodenciju sa asocijacijama koje se bave monitoringom šumskih ekosistema na regionalnom i globalnom nivou i svrstavaju Crnu Goru u red država koje imaju utemeljenu šumarsku politiku na pouzdanim i metodološki korektno dobijenim osnovama.

Ključne riječi: Nacionalna inventura šuma, šumski fond, strateško planiranje, Crna Gora.