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Commercial and non-commercial benefits of Serbian forests

Abstract: *The present paper deals with the commercial and non-commercial benefits of Serbian forests based on officially published data, data available in existing studies, expert opinions and research data collected using one-to-one interviews on a representative sample.*
In the first section of the paper the basic characteristics of Serbian forests are described in terms of general data, which are then used in the second section to estimate the total economic value (TEV) in 2007. To obtain the TEV, the forestry-related values are classified in use and non-use values based on the various sub-groups of products and services. For the product and service valuations either domestic or international prices were applied. The results are shown in three potential scenarios, each yielding a different TEV estimate: 1) based on existing data, 2) based on additional inputs from experts and 3) based on estimates and assumptions derived from existing studies. Undoubtedly, wood is the most important forest product in Serbia, as it contributes between 42% and 90% to the TEV depending on the specific scenario.
The results of the paper are intended to help improve general awareness for the totality of benefits of Serbia's forests. By providing an overview in terms of both commercial and non-commercial value, the authors furthermore hope to assist Serbian decision makers in finding the mix of policies which will best support the nation's forests in the future.

Keywords: *forest, wood, non-wood forest products, use value, non-use value, Serbia*

Characteristics of Serbian Forestry

The Current Status of National Forest Statistics

Data on the forestry sector in Serbia are officially published by the Statistical Office of the Republic of Serbia. The data collection method is based on

reports and estimates. Reports are provided by forestry and other organisations involved in forest management. In addition, for areas managed by private forest owners or by entities which are not obliged to keep book records, estimates are available and these are compiled primarily using a comparative approach.

Data on forestry areas are collected in three-year periods whilst data on roads, means of transportation and mechanisation are collected annually. Statistics on the production, sale and assortment of forestry stocks are gathered via monthly reports. Other types of forestry data are collected annually by way of accounting reports.

Data on hunting are collected bi-annually via a standard reporting method. Reports are provided by hunting associations, entities engaged in hunting as well as entities having their own hunting grounds and game-rearing farms.

Official publications contain the following types of forestry data: general forest data, fallen timber, forest growing and tending, plantation and intensive plantation, statistics on the production and sale of forest assortments, forest damages and hunting data.

A forest is defined as an area larger than 0.05 hectares (ha) covered with stands of forest trees which have a protective function, are intended for the production of commercial forest assortments or have some other special purpose. Tree-lined paths and parks in inhabited areas do not meet the definition of a forest.

In addition to these official statistics, the Institute for the Protection of Nature (IPN 2007; IPN 2008) provided time series on quantities and values of non-wood forest products (NWFP) for our study; whilst the UN-FAO study on forest valuation in Serbia used the official data as well as household surveys and a representative sample of 800 households within the country (Rekola et al. 2007).

For the WATERWEB project, a representative sample of 150 commercial farmers was selected with whom personal interviews were conducted (Zaric 2008).

Socio-economic Importance of the Forestry Sector

Forestry contributes 0.54% to Serbia's GDP and the wood industry 2.47%, thus the contribution of the forestry sector as a whole is approximately 3%. However, official figures likely do not represent the true situation within the forestry sector for several reasons. For one, the official statistics do not register the entire production as there are many small plants which escape the control of state authorities. In addition, prices for wood products are depressed whilst the value of non-wood forest products is furthermore absent from the official records. An alternative, and more complex, value is the contribution of

forestry to the development of other sectors, such as agriculture, water supply and tourism. The direct contribution of the forestry sector to the country's total employment was 3.8% in 2007 and the sector accounted for approximately 1.8% of all Serbian exports (SYS 2007).

According to official statistics, forests covered approximately 25.6% of the country's area in 2007, whilst agricultural land covered roughly 65% of the total area. Therefore, some 90% of the territory is covered by agricultural land or forests. In Serbia there are 816,000 ha of pasture land and approximately 36,000 ha of pools, reed tracts and fish ponds, which are also counted as agricultural land (SYS 2007).

The structure of forest utilisation in Serbia is similar to other countries in the region and in Europe. There is obviously a conflict of interest between forest owners, foresters, nature protection advocates and other stakeholders interested in forest resources. Thus, there are also various lobbies which attempt to influence the decision making process regarding forest in order to promote their own positions.

In Serbia there are essentially two types of ownership: states forests on the one hand, which also include a small proportion of social forests, and privately owned forests on the other. The state manages 56% of the total forest area through dedicated public enterprises (PE) whilst the remaining 44% is managed by private owners. However, private forest owners work under the supervision of the state forest administration and PE (as per PE data).

Public enterprises manage larger areas whilst the majority of the private forests are very small in size. Private forests usually consist of single lots which are of irregular shape, long and in narrow strips. The structure of privately owned forests is similar to the structure of privately owned agricultural land: both types are typically fragmented and "scattered" in the area, which means utilisation costs are high. The small size of privately owned forests is a result of Serbia's inheritance law. Historically, the law permitted land to be physically divided upon inheritance and this frequently happened. Thus, the average area of forest holdings is less than 0.5 ha.

Species and Stand Composition

Serbia's natural conditions and diversity of ecosystems support a wide variety of tree species, which range in growth quality from well-stocked forests to severely degraded or depleted coppices and scrublands. Serbia is situated within the so-called "mixed forest belt" with a high percentage of broadleaf and mixed broadleaf stands.

Broadleaf varieties thus dominate the forest with a 91% share, whilst remaining stands consist of various types of conifers and mixed broadleaf-conifer stands – approximately 6% and 3%, respectively. The main tree species found in natural forests is beech *(Fagus moesiaca*), covering 30% of forest areas, followed

by oak *(Quercus ssp.)* at 27% and various other broadleaf families. Natural stands of conifers are confined to the southern and south-eastern part of the country, with the main species being *Pinus nigra, Pinus sylvestris, Picea abies* and *Abies alba.* In general, the quality of forests in Serbia is not at an optimum level. Only some 44.1% are high forests, another 25.9% are coppice forests and the remaining 30% are variously degraded forests (Srbijasume 2007).

To a great extent, Serbian plantations consist of coniferous species, especially pines, i.e. primarily *Pinus nigra*, and spruce *(Picea abies)*. The bulk of broadleaf plantations are confined to poplar *(Euro-American black poplar clone)* whilst the remainder consist of oak and other hardwood species. Plantations occupy nearly 8.4% of the total forest area or some 160,000 ha, with conifer plantations accounting for roughly 107,000 ha and broadleaf varieties for the remaining 53,000 ha. The major broadleaf species is poplar (33%), followed by oak and other hard wood species. Until the 1990s, the annual plantation rate in Serbia was more than 10,000 ha and there were annual forest operation programmes. During more recent years, however, annual plans were reduced to an eventual level of approximately 2500 ha annually. According to official data, most of the present plantation activities are undertaken by the state forest enterprises (Srbijasume 2007).

Taking into account estimates that 200,000 ha of state-owned land needs to be reforested, not to mention that the forestry ministry is planning to reforest some 1.3 million ha of vacant and abandoned agricultural land in the long term, special attention will need to be paid to the health condition of seedlings and to good management practices. Another precondition for successful reforestation is classification of the land which is best suited for forestry, something that unfortunately has not yet been done. Since part of the vacant land is privately owned, incentives should also be provided to land owners for planting forest trees (Zaric 2008).

Nurseries: The country has 33 forest nurseries, of which 22 are located in central Serbia. The latter are operated by the PE Srbijasume; whilst the other 11, in Vojvodina, are run by the PE Vojvodinasume. Seven of the nurseries specialise in producing poplar planting stock, however none of the private nurseries produce forest tree seedlings and private plantation activities do not amount to a significant level of production. Together, the country's nurseries produce some 30 million seedlings annually, but there are no greenhouse seedlings among them. In addition, there are 2,000 ha of seed orchards and seed stands, from which 400 tons of fruits and cones are collected annually.

The annual plantation area in nurseries usually ranges from 2,000-2,500 ha. Taking into account the possible density of seedlings per ha, annual seedling production levels have remained much lower than the nurseries' potential production capacity. Indeed, based on the current production figures, one must conclude that only approximately one third of capacity is being utilised despite the fact that low-capacity production causes higher unit production costs (Srbijasume 2007; Vojvodinasume 2007).

Damages to Forests: Damages to forests are a very frequent occurrence in Serbia. Although total damages are decreasing, they amounted to approximately 30,000 m3 of total volume in 2006. An examination of the causes of these damages leads to the conclusion that the majority are man-made. Insects and plant disease account for 10% in each forest on average. However, insect- and disease-related damages have not been very serious, which means protection efforts on both fronts have been efficient. On the other hand, it is very expensive for enterprises to maintain forest protection efforts. Thus, it can be expected that an adequate level of efficiency will be difficult to maintain under the present economic circumstances (SYS 2007).

Protected Natural Areas: In the Republic of Serbia some 5.8% of the total surface area has been declared as a "protected natural asset." The total protected area amounts to some 448,000 hectares. There are different levels of protection and different types of protected assets. The vast majority of protected areas are national parks, natural parks, landscapes with exquisite characteristics, reservations and natural monuments. Most of the country's protected areas fall under the responsibility of the state forest PE, although national parks and a very small number of additional areas of various types are managed by other enterprises (FMP 2007).

Data and Methodology for Estimating the Total Use Value

For our estimation of the total economic/use value of forestry in Serbia, we applied the FAO methodology published in „Forest Valuation for Decision Making" (Kengen 1997). The pertinent classifications of forest values are presented in the following table.

Table 3. Classification of Forest Values

A: Use Values: Direct-use values: Wood Products – all used for the commercial/industrial market, as well as non-commercial wood (timber, fuelwood, pulpwood, etc.). Non-wood Forest Products – wild berries and plants, wild mushrooms, wild animals and honey. Services – hunting and recreation Indirect-use values: use as watersheds and for flood protection, erosion control and carbon sequestration
B: Non-use values: Forest conservation and potential pharmaceutical value

Source: Adapted from Kengen (1997)

The data for calculating our estimates were derived from official statistics, the IPN, existing UN FAO studies and research results from the FP6 Project WATERWEB[9] .

9 WATERWEB (WATER resource strategies and drought alleviation in Western Balkan agriculture).

Results

Our calculations indicate that the total economic value of Serbian forests amounted to € 201.5 million in 2007 based on the official statistics. Factoring in expert opinions, the estimate increased to € 205.9 million, whilst UN-FAO methodology yielded € 385.3 million. Taking into account all forest products and services, the contribution of forestry to overall GDP thus does not exceed 5%.

Table 4. Estimated Total Economic Value of Serbian Forests in 2007

Product/Service Category	Statistical evidence	Expert opinion	UN FAO
A Use values	**m €**	**m €**	**m €**
1 Direct-use values			
1.1 Products			
1.1.1 Wood			
Wood used	69.5	111.5	59.9
Increment in the wood stock	112.6	70.9	100.8
1.1.2 Non-wood forest products			
Wild berries and plants	0.97	1.94	2.0
Wild mushrooms	2.40	4.80	2.5
Wild animals	0.89	1.78	1.0
Honey	1.0	1.1	0.0
1.2 Services			
Hunting	14.1	14.2	13.6
Recreation			80
2 Indirect-use values			
Watersheds/flood protection/erosion control			67.2
Carbon sequestration			40.8
B Non-use values			
Forest conservation			4.8
Potential pharmaceutical value			12.7
Grand Total	201.5	205.9	385.3

Source: Authors‘ own calculations

Explanation of Calculated Values

Officially recorded wood use

According to the official statistics, total annual wood use in Serbia averaged approximately 2.5 million m3 in the period 2002-2006, of which some 1.7 million m3 was produced in state-owned forests by the state enterprises. There were no significant changes in annual wood use during this period (SYS 2007).

Officially recorded wood value

The total value of all assortment types was officially reported as € 69.5 million in 2007. This value shows the stumpage value and is based on reports of the PE for state forests as well as the estimate for private forests. The PE reports contain the volume of wood sales and unit price of various timber assortments at the forest roadside. The cost of cutting and hauling has been deducted from the roadside price. The assortment structure in state forests is 53% technical wood, with the remaining 47% being wood of lower quality.

The same procedure as above was applied for price calculations in private forests. For the latter, the exploitation costs were assumed to be identical to those in state forests, whereas the private forest share of technical wood amounted to only 13%.

Administrative costs were not included in the calculation. Experts estimate that administrative costs in state forests amount to as much as 10% of the total costs whilst they are close to zero in private forests. However, no reliable data on administrative costs could be obtained for our research, and we therefore left them out of the calculation.

Expert estimate of wood use

The official statistics (SYS 2006) do not include any form of illegal production, yet experts estimate that illegal timber production amounts to some 1.5 million m^3 annually. Assuming the same assortment structure as officially recorded and the same average price of 28 €/m^3, the stumpage value of illegal production amounted to € 42 million. Thus, according to expert opinion, our calculated use value of total wood production in Serbia is € 111.2 million.

Estimate according to UN-FAO methodology

Using official data for 2006, the UN FAO estimated the use value of wood stumpage at € 59.9 million for all timber assortments sold. A UN-FAO survey for Serbia determined that fuel wood consumption from forests amounted to some 8.7 millions m^3, which is significantly higher than officially recorded. Using the weighted average price, the value of wood production in Serbia would be 153.5 million € (Rekola et al., 2007).

Increment in the wood stock

The wood stock increment is measured as the difference between total wood growth and total wood actually used. According to official statistics (SYS, 2006), annual increments amount to an average of roughly 3.3 m^3/ha, thus yielding an approximate total increment of 6.5 million m^3. It must be noted that this figure is based on old data and may be outdated. The latest forest inventory in Serbia was completed in 2007, but the data are not yet available. Nevertheless, applying our calculated average prices yielded a total wood

stock increment of € 112.6 million. In comparison, the expert-based calculation was € 70.9 million whilst the UN FAO-based estimate was € 100.8 million.

Production of non-wood forest products (NWFP)

With its natural diversity and multifarious flora and fauna, Serbia has preferable conditions for the sustainable production and trade of NWFP. Production of NWFP, such as berries, edible mushrooms, fruits, medical plants, game, etc. could thus contribute to the development of the national economy.

In Serbia, the Ministry of Science and Environmental Protection[10] is the regulatory body for NWFP and sets the annual quotas governing the collection of protected species. In addition, the IPN is responsible for implementing and monitoring the applicable regulations as it is the official state organisation responsible for nature protection.

In terms of quantity and value, the economically most important plant and animal species are: the boletus mushroom *(Boletus edulis)*, fox mushroom *(Cantharellus cibarius)*, bilberry *(Vaccinium myrtilu),* dog rose *(Rosa canina)*, elder *(sambucus nigra)*, snails *(Helix pomatia, Helix aspersa, Helix leucorum)* and beluga caviar *(Huso huso)*. These seven groups of products contributed 93% to the collected value of NWFP. All other NWFP categories accounted for only 7% together, whereas their combined share of the total NWFP value is less than 1% (IPN 2008 and personal interviews).

Using official data, the total value of Serbian NWFP amounted to € 5.26 million. The UN FAO study estimates the total amount at € 5.5 million, of which € 4.4 million is for commercial market use and the remaining € 1.1 million is for personal consumption. Expert estimation leads to a value of € 9.62 million.

In calculating NWFP values, the extraction costs were not taken into account. When extraction costs are considered – calculated by including the value of time for collection and picking at the average Serbian wage rate (2.25 €/ha) – the in situ (or "stumpage") value of NWFP would be negative.

This result can be explained from two different points of view. Firstly, the collection of NWFP in Serbia is an activity generally performed by persons who are officially unemployed or persons who have a part-time job. In both cases the opportunity costs are close to zero and this amount can be assumed to be the cost of extraction. The UN-FAO study assumed a wage rate of 25% of the average Serbian wage and a total time of approximately 7.8 million hours. The extraction costs were thus estimated to be € 4.4 million. In the second approach, the collection of NWFP is interpreted as a social activity and as recreation time. For example, in some parts of Serbia, NGOs organise

10 In the current government Ministry of Science and Environment Protection is divided in two ministries, Ministry of Science and Technological Development and Ministry of Environment and Spatial Planning. The latest is nowadays responsible for NWFP.

practical seminars on collecting mushrooms and the participant are persons interested in social contacts and recreation. However, these activities have a minor impact on overall NWFP collection.

According to the official data, it can be concluded that the quantity of collected and commercially traded protected species decreased during the past several years, with only the bilberry quantity increasing. However, the IPN has estimated that a large quantity of these species is also collected without registering (IPN 2007). With respect to the total market volume, it is estimated to be at least on the quota level, with the total consisting of a partial share for the domestic market and a share for export. The personal interviews conducted with farmers further supported the institute's figures.

The total annual production of honey in Serbia amounts to approximately 4,000 tonnes and shows an upward tendency, despite a relatively low and stagnant level of productivity. The predominant selling price is approximately 2.5€/kg whilst the farm production costs are estimated to be as high as 2.0€/kg. Subtracting marketing costs of approximately 0.25 €/kg results in a net value of 0.25€/kg. According to official statistics, the gross value of honey production thus amounts to € 10 million and the net value to € 1 million, whereas the UN-FAO determined a gross value of € 7.4 million and the net value close to zero.

Neither of the above figures includes the value of honey's production derivatives, such as wax and medications. However, experts estimate that these derivative products add approximately 10% in value. As a result, the total value of honey increased to € 11.0 million gross and € 1.1 million net when taking into account expert opinions.

Services

Hunting is probably one of the best organised subgroups in the NWFP sector, especially in fenced areas. However, most hunting areas currently operate at a low level of profitability, or even at a loss.

Under provisions of the national hunting law, Serbia is divided into 321 hunting areas. The Hunting Association of Serbia (HAS) manages forest hunting areas as well as all of the other land categories used – even those lands which are state or privately owned property.

All game in Serbia is considered state property and thus is only managed by the various hunting units, all of whom are HAS members. Hunting units do not pay taxes to the state, but they are responsible for the proper management of wild animals. In the event that wild animals damage private agricultural property, the units must pay compensation to the owners for the damages.

Units which manage hunting areas provide annual reports on their activities, income and expenses. Using the available official data, we calculated the use value for hunting to be approximately € 14.1 million in 2007.

Experts estimate that illegal hunting exists for both large and small game. The value of illegal hunting should be at least € 0.1 million, and thus the value of hunting amounts to € 14.2 million. The UN FAO estimate is € 13.6 million.

Recreation value

In practice, a wide variety of recreation activities are available for consideration. The total estimated value for recreation was taken directly from the UN-FAO study and amounts to € 80 million. This figure includes only the direct costs for any equipment used in recreation activities as the time costs are not taken into account.

Indirect-use values

Indirect-use values can be taken from the existing literature or be based on other countries' estimates. Specifically, indirect-use values include the role of forest areas in watersheds, flood protection and erosion control, as these functions contribute to increasing the value of agricultural land. Comparative values in the UN-FAO study were provided for Croatia (10 €/ha) and Greece (45.2 €/ha). For Serbia, the UN FAO calculated a value of € 67.2 million.

In the UN-FAO study, the carbon sequestration estimate is based exclusively on available incremental data for wood from forestry land under the assumption of a 20 €/t unit price to arrive at the carbon sequestration value. For Serbia, the study thus calculated a total carbon sequestration estimate of € 40.8 million.

Non-use values

There are different reasons for non-use values. In principle it is difficult to break down all non-use values into categories. The UN FAO estimated the forest conservation value at € 4.8 million (2.0 €/ha unit value). To calculate the potential pharmaceutical value, a unit price of 5.3 €/ha of total forest land was applied, yielding a total value of 12.7 million €.

Conclusion

Serbian forests cover approximately 25.6% of the country's area. State-owned forests make up 56% of the total forest area whilst the remaining 44% is privately managed. The direct contribution of forests to the Serbian GDP amounts to 0.54%. Importantly, official statistics do not include all benefits of forests and forestry. For example, existing data indicate an annual increment of 3.3

m^3/ha in the wood stock, which appears relatively low. The latest forest inventory in Serbia was completed in 2007, but the data are not yet available.

Our estimate of the total economic value (TEV) of Serbian forests was calculated using various data sources and expert opinions. Depending on the specific assumptions and unit prices that were taken into consideration, the TEV of Serbian forests amounted to a minimum of € 201.5 million in 2007. However, with all potential benefits factored in, the TEV increased to € 385.3 million. The category contributing most to the TEV was wood production (42%), followed by the sum of the indirect-use benefits, namely watersheds, erosion control and carbon sequestration (28%), and then services (24%) including hunting and recreation; whereas NWFP are only of marginal importance. In conclusion, in terms of total economic value the contribution of Serbian forests and forestry to GDP amounts to approximately 1.3%.

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