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ON THE ACCESSIBILITY OF FORESTS WITHIN THE FORESTRY DEPARTMENT OF ARAD

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Abstract
Sustainable forest management and use of its resources is not possible without a permanent transportation network.
In order to have a better view of the degree of accessibility of forests within the Arad Forestry Department in this paper the situation at national and European level are presented firstly. The data is used afterwards for making a relevant analysis.

Keywords: forest accessibility, roads, forest management, Arad Forestry Department, Romania.

INTRODUCTION

Sustainable forest management and use of its resources is not possible without a permanent transportation network. This consists mainly of forest roads that ensure physical access to the timber. The lack or suboptimal network lead to various shortcomings, as following:

- reduced capacity of transportation and exploitation of wood, in case of insufficient network or transportation means, which in turn leads to larger exploitation costs;
- delayed or incomplete implementation of scheduled works of arrangement, engineering and management of the forest;
- limited access of the personnel in charge of the security and management of forest works: wood exploitation, animal feeding, organization of hunt activities a.s.o.;
- inefficient or totally restricted interventions in case of fires within the forest;
- difficult supply of forestation sites with seedlings and labor force in autumn and spring campaigns.

In order to have a better view of the degree of accessibility of forests within the Arad Forestry Department in this paper the situation at national and European level are presented firstly. The data is used afterwards for making a relevant analysis.

FOREST ACCESSIBILITY AT EUROPEAN LEVEL

Countries with forestry tradition in Europe such as Austria, Switzerland, Germany and France have a permanent transportation network of 35-45 m/ha. (Bereziuc et al., 2013). Another source mentions that in some European countries the permanent transport network is larger than 20 (25) m/ha (Giurgiu, 2006). Another author notes that the average index of density in production forests in Austria is 45 m/ha, Norway 9 m/ha, Croatia 7 m/ha, while in certain regions of Switzerland and Germany the medium density index exceeds 60 m/ha (Ciubotaru, 2006). However each country has specific conditions that may influence the degree of collection, therefore these numbers do not represent a goal for the Romanian forests. The average accepted distance of collection as well as the efficiency of the timber collecting equipment may be distinguishing criteria for accessibility policies of each country.

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FOREST ACCESSIBILITY IN ROMANIA

A study conducted in 1959 by the Department of Forestry shows that only 40% of Romania's forests were considered accessible. The average road density was 5.9 m/ha (Giurgiu, 2006). However, two thirds of the forest transportation network consisted of unpaved roads (ground).

As of 2004 the national forest accessibility was 65% for an area of 4,107,530 ha, with a maximum collection distance of 2 km (Bereziuc et al., 2013). The total length of the permanent transport in 2004 was 41710.3 kilometers, of which forest roads 32574.6 km (78%). The rest consists of forest railways (58 km), public roads in the forest (7624.7 km) and service roads used by other economic sectors (1453.0 km) (Bereziuc et al., 2013).

The density of the total transport network, including public roads and other operating roads and excluding forest connection roads and unusable roads is 4.67 m/ha (Bereziuc et.al., 2013). Other sources indicate a medium density index of 6.1 m/ha (Popovici et al., 2006), 6.5 m/ha (Olteanu, 2006) or 6.36 m/ha (Ungur et al., 2006). Regardless of the source and how they were calculated these values are smaller than the European average, which is 14 m/ha and much smaller than 35-40 m/ha, the average of European countries with forest tradition such as Austria, Switzerland, Germany and France (Bereziuc et al., 2013).

For Romania, the optimal density of the transport network that could minimize the cost of collection and transport of timber would be 14-20 m/ha, depending on the landscape and collection technique used (Bereziuc et al., 2013). Another source suggests an optimal density of 14-18 m/ha (Popovici et al., 2006) or 15.3 m/ha (Olteanu, 2006).

STATUS OF FOREST ACCESSIBILITY OF THE ARAD FORESTRY DEPARTMENT

In 1994 the Arad Forestry Department took over the management of the forest road network from the former Works and Transport Operations Arad (Întreprindere de Exploatare şi Transport). The network had a total length of 1229 km. As of 1994 the transport network density was much smaller than today because it was calculated with respect to a larger total forest area of 210,000 ha. Therefore the transport network density was 7.13 m/ha. A study on this issue shows that the Arad Forestry Department was above the national average of 6.1 m/ha (Popovici et. Al., 2006). After the forest road transfer in 1994 the transportation network was extended, but at a slow pace, as shown in Fig. 1.

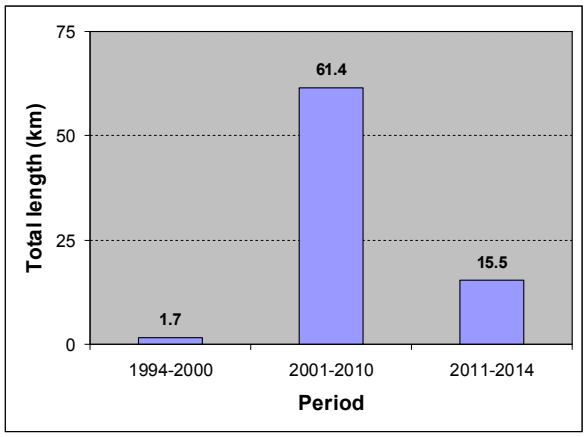

Fig.1 Dynamics of forest road network built during 1994-2014.

A total of 78.6 km of roads were built during 20 years (1994-2014), while only 1.7 km during 1994-2000. Moreover, eight roads with a total length of 53.2 km were rehabilitated during the same period 1994-2014. The funding sources for the construction and rehabilitation of these forest roads (divided in categories) are presented in Table 1.

Table 1. Sources of funding for forest roads between 1994 - 2014, the Forestry Department Arad

Nr. crt.	Source of funding	Length, km	
		new roads	rehabilitated roads
1	European funding - Measure 125b	3,6	15,5
2	European funding - Program Forestry		7,5
3	Budget		14,7
4	Accessibility funds - Law 56/2010	74,7	11.5
TOTAL		78,3	53,2

Table 1 shows that during the 20 years period the decision makers have accessed funds from all possible resources. It is worth noting that the periods 2003-2007 and 2012- 2014 were better exploited in this respect.

Some of the roads taken over in 1994 or built in the last 20 years were transferred to the former owners together with the corresponding forest areas, on the basis of restitution laws. At the time of the analysis (2014) the Arad Forestry Department has a remaining network of forest roads of 1165 km. Moreover, following a government decision, a total of 211 km of forest roads that no longer serve the state forest portfolio will be transferred to the corresponding local councils. Therefore, the total length of forest roads drops to 954 km. Another 335km of public roads and 5.7 km of service roads used by other economic sectors complement the road network and contribute to forest accessibility.

Table 2. Overview of the transport network of the Arad Forestry Department in 2014

Nr. crt.	Specification	Value
1	Total forest surface - Forestry Department Arad, ha	102118
2	Existing forest roads, km	1165
3	Roads that no longer serve the state forest portfolio, km	211
4	Public roads serving the state forest, km	335
5	Service roads used by other economic sectors (in forest), km	5,7
6	Total transportation network, km	1505,7
7	Total transportation network usable (line 6 - line 3), km	1294,7
8	The average density, m/ha (row 7, meters / row 1)	12,67

Table 2 shows that the total length of the permanent transport network that ensures forest accessibility within the Arad Forestry Department is 1294.7 km. This network provides accessibility to an area of 87,451 ha which represents only 86% of the total forest surface of the Arad Forestry Department. It is noted that accessibility is calculated for an average collection distance of 1.2 km. Current density of the permanent transport network is 12.67 m/ha. This is well above the national average of 4.67 m/ha and close to the optimum for Romania, which is 15.3 m/ha (Olteanu, 2006).

STRATEGY FOR FOREST ACCESSIBILITY FOR THE PERIOD 2014- 2020 WITHIN THE ARAD FORESTRY DEPARTMENT

In order to increase the accessibility of forests managed by the Arad Forestry Department, a program for building new roads based on priority levels will be implemented in stages until 2020, in the limit of available funds.

The analysis of this program shows that the length of forest roads to be built by 2020 is 68.3 km. This provides accessibility to another 6429 ha and thus the accessibility percentage increases to 92%. For the remaining 8% representing inaccessible forest there is no proposal for road construction.

The forecast for 2020 for the density of the permanent network of transport is therefore 13.35 m/ha.

CONCLUSION

Based on the facts presented in this paper one can draw some conclusions about the degree of forest accessibility within the Forestry Department of Arad, as follows:

- the current level of accessibility is 86%, with prospects in the next six years to reach 92% if the 68.3 km that are proposed in the accessibility program are built;
- the average density corresponding to a collection distance of 1.2 km is 12.67 m/ha, which is very close to the average target calculated for Romania of 15.3 m/ha (Olteanu, 2006). This density lies within the limits established as an optimal average for the country, ie between 14 and 20 m/ha (Bereziuc et al., 2013);
- it should be considered that the forest accessibility is related to the average collection distance, which depends on the performance of the machines used in forestry activities;

- a very important issue is the allocation of necessary funds for the construction of new roads and rehabilitation of those destroyed by disasters; it should be noted that in some cases the construction of new roads was stopped in order to direct funds towards rehabilitation of roads affected by calamities;
- for the construction of the 68.3 km of forest roads the following fund sources are available:
  - European funds for the 2014-2020 program;
  - funds from the state budget;
  - funds for accessibility, according to Law 56/2010;
- in case financing is secured through forest accessibility funds over the next six years, another 68.3 kilometers could be constructed, which in turn increase the average density to 13.35 m/ha; this enables the opening of additional 6429 ha of exploitable forest basins; this length might appear large for the area they cover, but these areas are isolated and difficult to access, being at a greater distance from existing roads.

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