ESTABLISHING LINKS BETWEEN THE AVERAGE WIDTH OF AHEAD AND THE DEFORESTED AREA FOR THE FOREST ROAD. CASE STUDY

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RESEARCH ARTICLE

Abstract
The paper proposes the determination of some links between the average width of ahead and the deforested area of roads for their construction. For this purpose, a number of 12 pairs of values of these elements were taken into account, corresponding to each planning unit through which the studied road passes. In order to identify some solutions regarding their design, execution, maintenance and rational exploitation, in this work a series of correlative links were studied in order to determine the surface that must be deforested for the execution of the road embankment. The study was carried out on the Valea Mare-Sohodol forest road, respectively along of all 6,188 km its length, located in Sohodol, in U.P. III Sohodol, Forest District Beiuş, within the Bihor Forestry Department. The regression equation obtained with the help of the polynomial correlation, which is significant from a statistical point of view, shows the existence of a close interdependence between the average width of the forest roads and the deforested area.

Keywords: forest roads, width of ahead, deforested area, links;
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INTRODUCTION

In order to establish the links between the average width of forest roads and the deforested area, a series of correlative analyzes were proposed between them.

In forest management, taking into account the complexity of the functions performed by forest roads (Gucinski et al., 2001), the future strategy regarding the expansion of road networks must primarily aim at the rigorous observance of forestry arrangements in order to ensure continuity of forest production on the one hand and the exercise of the protective role of forests along with the most efficient accessibility of the forest fund (Ungur et al., 2003, Iovan, 2017).

The need for the construction of forest roads as well as the maintenance of the existing ones is motivated by the need to ensure a transport network capable of serving all the needs of the forestry sector in close accordance with current ecological requirements (Lugoa et al., 2000, Lazăr et al., 2008), since this activity involves deforest or removing from the productive circuit some areas of the forest fund (Ungur, 2005).

In order to find solutions regarding their design, execution, maintenance and rational exploitation, in this work a series of correlative links were studied in order to identify the existence of some correlations between the average width of the forest roads and the surface that must be prepared (deforest) for their execution.

For this purpose, the entire length of 6.188 km of a forest road was taken into account, on which a number of 471 stakes, respectively transverse profiles, are placed, and as a result a series of 12 pairs of values corresponding to the average values on each landscaping unit, which are presented in table no. 1.

The communication routes, which represent the basic physical support for the efficient management of the forest fund, are represented by the forest roads. A rational management for this purpose must respect the technical, managerial, economic and ecological principles (Murphy, 1985, Creţu et al., 2006).

MATERIAL AND METHOD

The study was carried out on the Valea Mare-Sohodol forest road, respectively on a length of 6188 m, located in the town of Sohodol, in U.P. III Sohodol, Beiuş Forest District, within the Bihor Forestry Department (***1). The road is located in a mountainous region, with inclined and moderately inclined slopes, having the initial point at an altitude of

495 m and the final point at an altitude of 790 m, so an average altitude of 642.5 m. The route is classified in the category of crossing from one forest basin in another (Nevečerel et al., 2007), and it takes place for the most part in the forest background (figure 1), this obliges the removal of an area from the productive circuit, but also outside it .

The width of the forest roads represents the entire width of the lateral area in transverse profile. When fixing the width of the roads, special attention must be paid to the maximum reduction of the occupation of productive land and to avoid the demolition of some constructions. Thus, solutions can be adopted to support, sustain and consolidate the slopes of high embankments and deep embankments (Olteanu N, 1996).

The surface to be occupied by a forest road must be deforested of forest vegetation and not only that, as a stage of the preparation of the works that will be executed for its construction (A.C.F., 2006). As a result, the idea must be accepted that although it is undesirable, the operation will in time ensure the optimal development of the forest by ensuring access to the execution of some silvicultural works that must be executed.

Figure 1. **Location of the Valea Mare forest road (processing after www.googleearth.com)**

In order to obtain a link between the average width of the forest road and the deforested area, a number of 12 pairs of relevant values were taken for each management unit covered by its route, which are presented in the table 1.

All types of regression equations were tested to describe the correlative links between the average width of the analyzed forest road width and the deforested area.

As a result, the existence of a correlation between them was obtained, a fact that can contribute to the improvement of the design process of forest roads, following all the aspects related to this activity (Horvat, 1994; Klč, 2005).

Table 1

The value of the average widths of the catchment area and deforested areas, on the Valea Mare-Sohodol forest road

Crt. no.	ua	Total Applicable Distance (m)	Average width of ahead (m)	Surface of ahead (m^2)	Deforested surface (m^2)
1	86A	28,50	7,1	195	195
2	86B	86,00	9,8	1042	1042
3	86A	651,50	15,4	10997	10997
4	85B	316,00	12,9	6371	6371
5	84A	863,00	13,3	16380	16380
6	83	1056,00	11,2	22463	22463
7	82	577,00	16,4	13288	13288
8	81	484,00	11,5	10381	10381
9	80A	466,00	9,7	5037	5037
10	80C	208,00	11,2	2416	2416
11	79A	1237,00	11,8	14617	14617
12	76	148,00	14,9	2430	2430

RESULTS AND DISCUSSIONS

In order to identify the possible correlative links between the average width of the forest road width and the deforested surface, 2 series of values of the two elements were taken into account, which were tested with the help of the best known regression equations, respectively linear, logarithmic, polynomial , to the power and exponential.

The values of the correlation ratios obtained for these series of values show the existence of a polynomial correlation, with a correlation ratio R^2= 0.4392 (Figure 2), therefore significant (Rob, 2006) from a statistical point of view, as regards the interdependence between these geometric elements of the forest road in transverse profile and in horizontal plane.

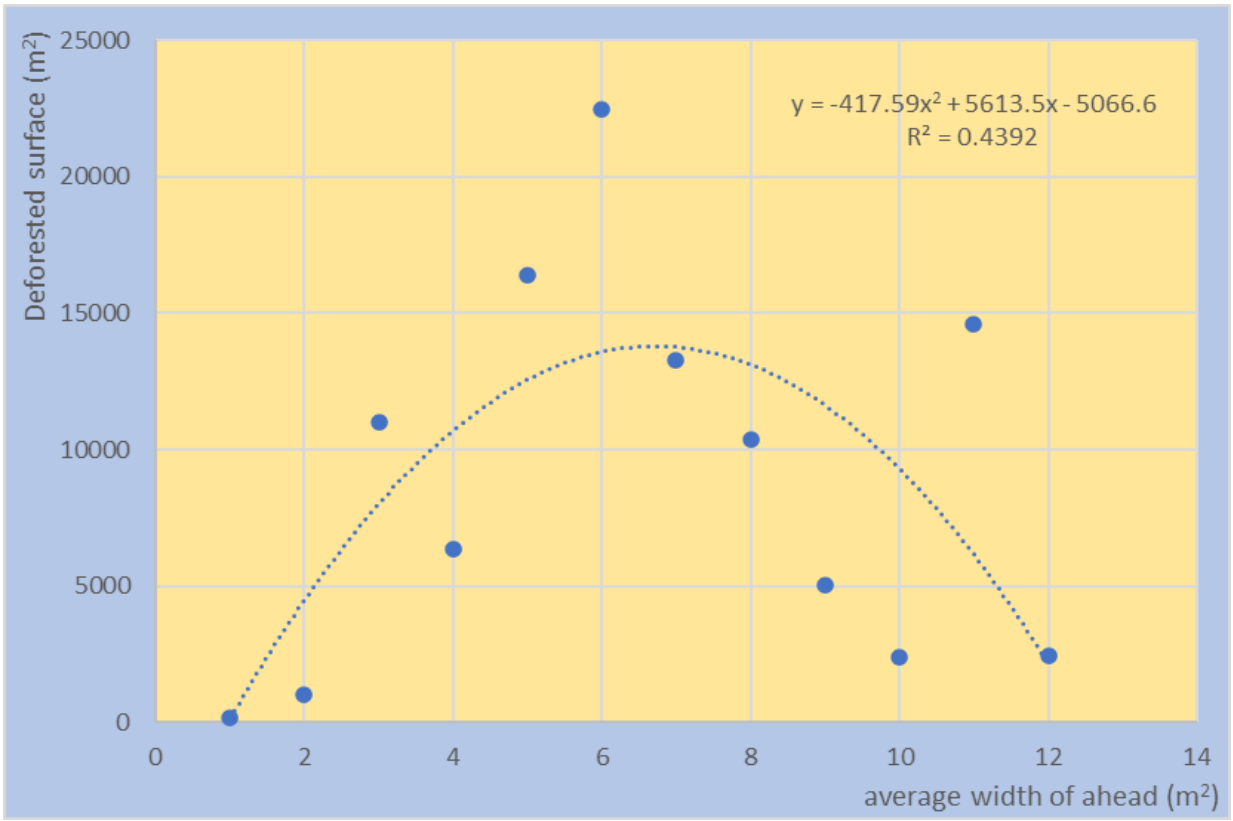

Figure 2. **Graphical representation of the polynomial type correlation between the average width of the forest road width and the deforested area**

This polynomial correlation, with the resulting regression equation y = -417.59x2+5613.5x-5066.6, shows that there is a very direct relationship between the average width of the
road width and the width of the deforested surface (Figure 2).

CONCLUSIONS

In order to increase the efficiency of the administration in order to practice sustainable forestry, a reorientation regarding the design, execution and maintenance of forest roads is necessary. From the results obtained in this study, it can be proposed to use GIS technology in the future, in order to increase the precision and quality of the design well correlated with the choice of forest road routes and subsequently making practical and efficient decisions regarding the maintenance of these roads (Martínez-Zavala et al., 2008; Tamaş et al., 2006).

The regression equation obtained with the help of the polynomial correlation, which is significant, shows the existence of a close interdependence between the average width of the forest roads and the width of the deforested area.

The existence of some variations in the width of the road width can be explained by the fact that along the road the need to expand it appears due to factors such as the crossing of permanent or non-permanent watercourses, the nature and configuration of the land, the existence of obstacles that must be avoided, etc., having as effect ensuring road stability, ease of operation, long-term maintenance of forest roads.

By establishing a significant correlation between the geometric elements studied, it can be stated that they directly influence the activity of choosing and designing the route of a forest road (Dodson Coulter et al., 2006).

Carrying out much larger studies can contribute substantially to the improvement and obtaining the most effective methods of choosing and establishing forest road routes in order to ensure a sustainable management of the forest fund.

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