

## ESTABLISHING THE LINKS BETWEEN THE WIDTH OF THE PLATFORM AND THE AREA WIDTH TO THE FOREST ROADS. CASE STUDY

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### **Abstract**

*The paper proposes to establish links between the width of the forest road platform and their area width*

*For this purpose, a number of 72 pairs of values of the mentioned geometric elements were taken into account, in transversal profile.*

*In order to find solutions regarding their design, execution, maintenance and rational operation, in this paper were studied a series of correlative links in order to identify the existence of influences of the width of the road platform on the width of the area.*

*The study was carried out on the forest road Valea Mare-Sohodol, respectively a section with a length of 1158 m, located in Sohodol, in the U.P. III Sohodol, Beiuș Forest District, within the Oradea Forestry Department.*

*The regression equation obtained with the help of the polynomial correlation, which is statistically significant, shows the existence of a close interdependence between the width of the forest road platform and the width of the area.*

**Key words:** forest roads, width of the platform, area width, links;

### **INTRODUCTION**

In order to establish the links between the width of the forest road platform and their extent, 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 H. et al., 2001), the future strategy for expanding road networks must primarily aim at strict compliance with forest management in order to ensure continuity of forest production on the one hand and the exercise of the protective role of forests along with a more 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 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 AE, et al 2000, Lazăr Ș., Et al. 2008), all the more so as it is not recommended at all to start the execution of a single road in the absence of a project for the entire road network in an area (Ungur, 2005, Iovan, 2017)

In order to find solutions regarding their design, execution, maintenance and rational exploitation, in this paper were studied a series of correlative links in order to identify the existence of correlations between the width of the forest road platform and their area width.

For this purpose, a section with a length of 1158 m from a forest road was considered, on which are located a number of 72 pickets, respectively transverse profiles, and as a result a series of 72 pairs of values, which are presented in table no. 1.

The communication routes, which represent the basic ways to open the forest basins, are represented by the forest roads. A rational management of the forest fund must respect the technical, managerial, economic and ecological principles (Murphy, A., 1985, Crețu O., et al.,2006).

#### **MATERIAL AND METHOD**

The study was carried out on the forest road Valea Mare-Sohodol, respectively a section with a length of 1158 m, located in Sohodol, in the U.P. III Sohodol, Beiuș Forest District, within the Oradea Forestry Department (17\*\*\*). The road is located in a mountainous region, with sloping and moderately sloping slopes. The entire route takes place in the forest, forcing a surface to be removed from the production circuit.

The area width of forest roads represents the entire width of the lateral area in cross section. When fixing the road junction, special attention must be paid to the maximum reduction of the occupation of productive lands and the avoidance of 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 road platform consists of the roadway and the two sidewalks (A.C.F., 2006). It has variable widths, depending on the road category (main, main and secondary) as well as other needs or situations in the field.

To obtain a link between the width of the forest road platform and the width of their area in sectional profile, a number of 72 pairs of their values were taken, which are shown below in table 1:

Table 1

The value of the widths of area road and the platform in transversal profile, on the forest road Valea Mare-Sohodol

<b>Crt. no.</b>	<b>Hectometric position</b>	<b>Area width (m)</b>	<b>Platform width (m)</b>	<b>Crt. no.</b>	<b>Hectometric position</b>	<b>Area width (m)</b>	<b>Platform width (m)</b>
1	36+45.00	10.2	7.2	37	41+69.00	8.8	5.5
2	36+55.00	11.4	7.9	38	41+87.00	11	5
3	36+72.00	9.1	4.2	39	42+04.00	15.1	5.7
4	36+87.00	11	7.6	40	42+23.00	14.2	9.2
5	36+96.00	14.7	11.4	41	42+39.00	13.6	6.3
6	37+03.00	11.5	8.7	42	42+51.00	14.9	9.7
7	37+13.00	13.4	9.4	43	42+65.00	21	12.2
8	37+32.00	8.3	5.5	44	42+81.00	8.5	3.3
9	37+51.00	8.7	5.4	45	42+99.00	13.7	8
10	37+69.00	11.6	8	46	43+23.00	8.8	5.3
11	37+76.00	11.7	8.7	47	43+36.00	10.6	7.4
12	37+85.00	11.3	7.8	48	43+52.00	8.6	3.8
13	38+01.00	6.4	5.3	49	43+72.00	6.4	2.2
14	38+13.00	7.4	4.5	50	43+94.00	8.1	3.1
15	38+25.00	4.7	5.4	51	44+13.00	8.3	4
16	38+41.00	6	5.2	52	44+35.00	8	4.1
17	38+58.00	5.7	5.3	53	44+64.00	11.3	3
18	38+72.00	7.4	5.8	54	44+90.00	8.6	6.2
19	38+92.00	5.1	4.8	55	45+09.00	8.4	6.3
20	39+18.00	24.8	5	56	45+29.00	10.1	9
21	39+35.00	24.3	6.1	57	45+48.00	9.5	7.2
22	39+50.00	23.3	7	58	45+66.00	9.1	5.4
23	39+63.00	20.4	6.5	59	45+80.00	15.1	7.8
24	39+73.00	19.4	7.3	60	45+95.00	17.6	10.7
25	39+80.00	12.3	9	61	46+11.00	13.6	6.2
26	39+91.00	18.6	7.5	62	46+29.00	12.1	5.5
27	40+07.00	17.4	5.5	63	46+47.00	12	5.8
28	40+26.00	12.4	5.2	64	46+66.00	9.9	5.6
29	40+47.00	18.4	5	65	46+82.00	10.3	7.3
30	40+66.00	18.1	5.4	66	46+96.00	11.7	6.6
31	40+87.00	17.3	5.4	67	47+14,50	13.5	10.4
32	40+02.00	10.9	5.3	68	47+31.00	10.3	5.8
33	41+17.00	16.4	9.4	69	47+48.00	7.8	4.8
34	41+29.00	16.4	9.9	70	47+70.00	10.7	5.6
35	41+39.00	13.1	8.1	71	47+87.00	12.6	6
36	41+53.00	7.9	5.7	72	48+03.00	13.5	8.5

In order to describe the correlative links between the width of the forest road platform and the width of their area in sectional profile, all types of regression equations were tested, so that interdependence between them

could be established, which would help to improve the forest road design process. aspects related to this activity (Horvat, 1994).

## RESULTS AND DISCUSSION

In order to identify possible correlative links between the width of the forest road platform and the width of area in sectional profile corresponding to this forest road, 2 strings of values were considered, which were tested using the most known regression equations, respectively linear, logarithmic , polynomial, power and exponential.

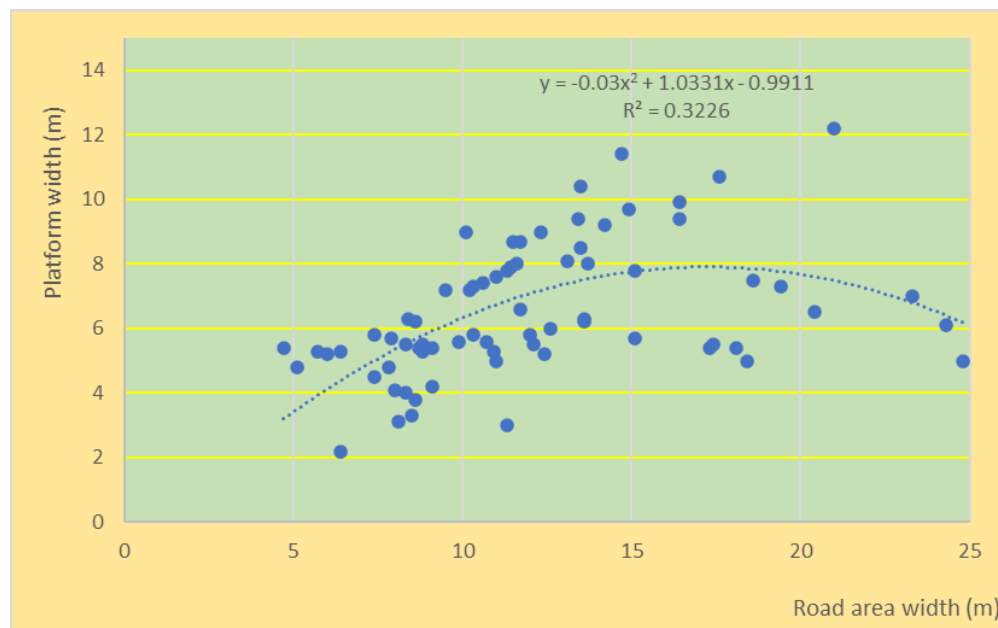


Fig. 1-Graphical representation of the polynomial correlation between the width of the forest road platform and the width of their area

The values of the correlation ratios obtained for these value ranges show the existence of a polynomial correlation, with a correlation ratio  $R^2 = 0.3226$  (figure 1), so statistically significant (Giurgiu V., 1972), in terms of the interdependence between these geometric elements of the forest road.

This polynomial correlation, with the resulting regression equation  $y = -0.03x^2 + 1.0331x - 0.9911$ , shows that there is a very direct link between the width of the forest road platform and the width of their area (figure1).

## CONCLUSIONS

In order to increase the efficiency of the administration in order to practice sustainable forestry, it is necessary a reorientation regarding the design, execution but also the maintenance of forest roads. From the results obtained in this study it can be proposed to use GIS technology in the future, in order to increase the accuracy and quality of design well correlated with the choice of forest roads and then make practical and efficient decisions on the maintenance of these roads (Martínez-Zavala L., et al,2008; Tamaş Ş. 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 width of the forest road platform and the width of the area.

It should also be noted that when determining the width of the embankment, a wider range of factors must be taken into account, not only the width of the platform, such as the area removed from the production circuit, various objectives to be achieved, road stability, ease of operation, etc.

Carrying out much larger studies could significantly contribute to obtaining the most concrete and efficient methods for the long-term exploitation and maintenance of forest roads.

By establishing a significant correlation between the analyzed geometric elements, it can be said that they directly influence the quality of the infrastructure and superstructure of forest roads, (Dodson Coulter E., et al, 2006).

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