Researches regarding the evolution of the surfaces covered with afforestations works at the Region 5-West during 1990-2008

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Abstract Surfaces covered with afforestation works at the national regional level considerably decreased in the period after the communism. In the Region 5-West these abatements were more pronounced as in 2001, areas covered with works of afforestation, reduced to 4.5 times comparing with the first year after the revolution (1990). This reduction has adverse ecological and economical implications at the national and at the regional level.

Region 5 - West (V) occupies 14.3% of the total territory and in terms of forest distribution, on development regions, reporting the surface area owned by 5 - West (Sr = 1.003 million ha-level 2003) to the area of the country (St = 6.368 million hectares in 2003-level), it ranks III, occupying 15.8% of the national forest fond after the region - North - East (1.188 million ha – 18.6%) and the Region 7-Center (1.184 million ha – 18.6%). Looking from this perspective, we reported the forest area in the Region 5-West - reference level 1990 (Sr = 3008 ha) to the area covered with forest (1990) at the national level (St. = 25 489 ha) and it was found that it represents only 11.8%.

In the year 2008 these areas represented only 3.2% (compared with 15.8% that represents the forest fond in the Region 5-West) of the total afforested area at the country level (reference level 1990) because in this region, starting form the early in post-communist period, afforestation was lower than in other regions. In the Region 5-West if the afforestation works were done on 1990 on 3008 hectares (which were still low compared with the stipulations from the forest gardenings). These areas were later significantly reduced, different from year to year, reaching in 2008 only 804 hectares, or 3.7 times less.

Analyzing the situation in terms of proportion of species used for afforestation, it appears that afforestation with resinous species decreased by 3.5 times and 3.9 times those of deciduous species.

The main cause of the afforested surfaces diminution, but especially in some developing regions and in the Region 5-West, is represented by the non-observance of the forest arrangements stipulations amid forest structure changes in terms of the nature of ownership. It should be noted that afforestation of any kind (land covered with cuts of regeneration, empty lands inside the forest, degraded land outside national forests, etc.) anywhere in the country or the planet, represents a particularly important activity for the forestry sector and for the entire national economy, but also for the entire planetary ecosystem.

Material and Method

To study the wooded areas counted in 1990 (first year after the communism period) as reference level (before 1990 development region were not created so no related data were available) compared with the surfaces afforested in 1990, 1992, 1994, 1997, 1998, 2000, 2001 and the entire period 2003-2008. The most significant data were used (the minims and the maxims of some periods) in order to emphasize the ecological activities variation.

A differentiated study was also done for the same levels regarding the afforested surfaces evolution on groups of species as deciduous and resinous. Data used are official and undertaken from the National Statistical Institute of Romania.

The calculated indicators were chosen with the aim of analyzing with objectivity the evolution of the afforested surfaces at the Region 5 West level.

Results and Discussions

In table 1 and rows 1-3, the official data taken from National Statistics Institute of Romania for the period 1990-2008 are given. These data were analyzed and reported graphically in Figure 1. To illustrate the development objective as areas covered with...
afforestation work in this period four indicators (Is tn - pointer on the evolution of the total forested area, Is fn - the indicator on the development of deciduous woodland, Is rn - index area covered with resinous, Ivps - index of variation in the proportion of species used for afforestation) were calculated reflecting the changes in the economic activity from one level to another. It can be seen by analyzing the data in Table 1 and Figures 1-3 that afforestation works were continuously decreased, reaching in 2001 a 4.5 times lower level of afforestation than the area forested in 1990. The decreasing of the surfaces covered with afforestation works has been continuous and very acute during 1990-2001. Between 2002-2004 and 2006 - 2007 a substantial increase was observed that overcome the 2001 level but still lower than in 1990 (area covered by afforestation works were on average 2.3 times lower than in 1990). In 2005 and 2008 the newly forested areas are again decreasing being in average 3.2 times lower than in the reference year.

Table 1

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Total - S_{s1}</td>
<td>3008</td>
<td>1457</td>
<td>1280</td>
<td>891</td>
<td>955</td>
<td>747</td>
<td>671</td>
<td>1156</td>
<td>1314</td>
<td>941</td>
<td>1049</td>
<td>1139</td>
<td>804</td>
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<tr>
<td>2</td>
<td>Deciduous - S_{s2}</td>
<td>1670</td>
<td>581</td>
<td>650</td>
<td>493</td>
<td>532</td>
<td>433</td>
<td>347</td>
<td>790</td>
<td>881</td>
<td>558</td>
<td>642</td>
<td>582</td>
<td>427</td>
</tr>
<tr>
<td>3</td>
<td>Resinous - S_{s3}</td>
<td>1338</td>
<td>876</td>
<td>630</td>
<td>398</td>
<td>423</td>
<td>314</td>
<td>324</td>
<td>366</td>
<td>433</td>
<td>383</td>
<td>407</td>
<td>557</td>
<td>377</td>
</tr>
<tr>
<td>4</td>
<td>I_{s1} %</td>
<td>100</td>
<td>48</td>
<td>43</td>
<td>30</td>
<td>32</td>
<td>25</td>
<td>22</td>
<td>38</td>
<td>44</td>
<td>31</td>
<td>35</td>
<td>38</td>
<td>27</td>
</tr>
<tr>
<td>5</td>
<td>I_{s2} %</td>
<td>44</td>
<td>60</td>
<td>49</td>
<td>45</td>
<td>44</td>
<td>42</td>
<td>48</td>
<td>32</td>
<td>33</td>
<td>41</td>
<td>39</td>
<td>49</td>
<td>47</td>
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<tr>
<td>6</td>
<td>I_{s3} %</td>
<td>56</td>
<td>40</td>
<td>51</td>
<td>55</td>
<td>56</td>
<td>58</td>
<td>52</td>
<td>68</td>
<td>67</td>
<td>59</td>
<td>61</td>
<td>51</td>
<td>53</td>
</tr>
<tr>
<td>7</td>
<td>Ivps %</td>
<td>125</td>
<td>66</td>
<td>103</td>
<td>124</td>
<td>126</td>
<td>138</td>
<td>107</td>
<td>216</td>
<td>203</td>
<td>146</td>
<td>158</td>
<td>104</td>
<td>113</td>
</tr>
</tbody>
</table>

Source: Data from the rows 1,2,3 were taken over the National Institute of Statistics in Romania

The amount of surface differences that were not afforested, by the year 1990, is 23,692 hectares cumulated over a period of 13 years. Basically, the average annual area, which the forest fond has lost, is 1822 hectares. If we extend this area on the entire period after the revolution (20 years) the loss would amount to 36,440 hectares within regions.

Fig.1 wooded surfaces evolution, at the level of Region 5-West during 1990-2000

Source: National Institute of Statistics in Romania
Referring to afforestation distribution of groups of species, it can be observed a decrease in the surfaces covered with deciduous and resinous forests respectively, relative to the total forest area homogeneous regionally distributed over the period studied. During 1990 - 2001 the total forested area decreased by 4.5 times (in the year 2001 - Fig. 2 and Fig. 3) and also the afforestation works on groups of species have more declined, but significant decreases occurred, especially the resinous species group, which had a continuous downward trend (except 1992) - Fig. 4 - (for deciduous - Fig. 5 - which had a growing trend in this period) until the year 2001.

Fig. 1 Variation of indicators that reflects afforestation works during the period 1990-2008 in the Region 5-West

\[ I_{tn} = \frac{S_{n1}}{S_0} \times 100 \]

\( I_{tn} \) – indicator regarding total surfaces evolution that were afforested which was calculated for each level (n) for the period 1990-2008, based on the data from table 1; 
\( S_{n1} \) – total afforested surface, for the level n, in the period 1990 - 2008; 
\( S_0 \) - reference level surface in the year 1990.

Fig 3. Variation of indicators regarding the total surface covered with afforestation works during the period 1990-2008 in the Region 5-West

\[ I_{tn} = \frac{S_{n2}}{S_{n1}} \times 100 \]

\( S_{n2} \) – total afforested surface, for the level n, in the period 1990 – 2008; 
\( I_{tn} \) – indicator regarding total surfaces evolution that were afforested with deciduous species which was calculated for each level (n) for the period 1990-2008 
\( S_{n2} \) – surfaces afforested with deciduous species, for the level n, in the period 1990 – 2008
Fig. 4 Variation of indicators regarding total surfaces afforested with resins calculated for the period 1990 - 2008 in the Region 5-West

$I_{vps} = S_{n2}/S_{n3} \times 100$

$I_{vps}$ - variation index for the ratio of the species used in afforestations during 1990 - 2008;

$S_{n2}$ – surfaces afforested with deciduous species, for the level n, in the period 1990 - 2008;

$S_{n3}$ – surfaces afforested with resinous species, for the level n, in the period 1990 - 2008;

Fig. 5 Variation of indicators regarding the evolution of the surfaces that were afforested with deciduous species in the period 1990 – 2008 in the Region 5-West

$I_{srf} = S_{n3}/S_{n1} \times 100$

$I_{srf}$ – indicator regarding total surfaces afforested with resins calculated for the period 1990 - 2008;

$S_{n1}$ – total afforested surface, for the level n, in the period 1990 - 2008;

$S_{n3}$ – surfaces afforested with resinous species, for the level n, in the period 1990 - 2008;

Fig. 6 Variation of indicators regarding the ratio of species used for afforestations (lvps) during the period 1990 – 2008 in the Region 5-West
From the Fig. 6 it can be observed that during 1990-2008 the ratio of wooded areas with deciduous species and resinous species remained fairly steady even if the afforestations with deciduous species have dominated continuously excepted the year 1992.

Practically excepting the year 1992, the afforestation works involved especially the use of deciduous species reaching a maximum in the years 2003 and 2004, when the deciduous species proportion was more than two times comparing with the resins. This fact is explained by the fact that the soil and station types that prevail offer optimal conditions for deciduous species evolving.

Conclusions

Analyzing the data it can be concluded that in the Region 5-West during the period studied (1990-2008) the afforested areas decreased drastically reaching in 2001 a level of 4.5 times lower comparing to the year 1990. The areas covered with afforestation works continuously decreased, in average with 1822 hectares/year, accumulating (in 13 years) a deficit of 36,440 ha, with negative effects on the entire forest sector from the Region 5-West and consequently on the entire country.

In terms of proportion of species used in afforestations, the deciduous species, excepting the year 1992, were and remained the majority. This fact could have a positive impact on forest fond structure if it would prove that the deciduous have been not introduced outside their area.

To prevent a major decline in the forestry sector as well as numerous environmental disasters that could occur due to the lack of forest in the near and long term great measures must be taken to implement the plans included in afforestation and forest arrangements and to identify degraded lands unsuitable for agriculture, and their afforestation.

References

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