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Readjusting Romania's Forestry Policy with a View to the Year 2050

Valentin Mihai BOHATEREȚ¹

¹ Romanian Academy, "Gh. Zane" Social and Economic Institute, Iași, ROMANIA

E-mail: icesceris@yahoo.com

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ABSTRACT

At the end of the year 2010, forest and other forest land in Romania totalled 6,757.6 million ha, making up a share of 28.3% of the total land area of the country, ranking at 17th spot in the EU-27, 8.0% below the EU average. Considering that around 200-250 years ago, 40% of the present-day area of Romania was covered by forests and that, during the early Middle Ages, that proportion was approx. 70%, we realise that the deforestation process has been constant and continuous, being driven by the need to capitalise on significant sources of income, both for development and for consumption, but especially for enrichment purposes, due to the excessive exploitative policies of empires that exerted influence over Romania (the Ottoman, Tsarist and Habsburg), major war powers (Germany and the Soviet Union) or irresponsible regimes (the communist and post-1989 ones). The ongoing process of deforestation and expansion of low forest cover, triggered as early as the late 19th century, urgently demands the adoption of an energetic national strategy to stop the irrational exploitation of forests, to eradicate illegal logging and to identify agricultural and non-agricultural land areas suitable for afforestation, aiming to restore the balance of biodiversity among agriculture, forestry and wetlands, at national level.

1. INTRODUCTION

The forest has always been the most valuable natural element, which has determined the development of humanity through the millennia, by being the main source of food such as wild game, wild berries and mushrooms, by offering shelter and safety, in addition to construction and heating materials, by providing a favourable environment for clean abundant water resources, and, in recent centuries, by being the main source for farmland expansion and agricultural development, due to severe deforestation.

Forests used to be one of the major natural assets of Romanian lands, with wooded areas formerly accounting for up to 70% of the total territory of all provinces [1]. The renowned Professor Ion Simionescu, president of the Romanian Academy between 1941-1944, stated that "General deforestation, wherever man becomes a farmer, has taken on a more dangerous form here, intensifying in the latter half of the 19th century

and especially after the Great War. Mountains have been stripped of forests. Torrents sweep across forests, turning them to wilderness" [2].

This destructive process continued at various rates, even to the present era, causing serious anthropic phenomena, diminishing and damaging the forest areas of Romania. The present paper aims to identify forest land trends in Romania and to find viable ways to restore forests by the year 2050.

2. THEORY AND METHODOLOGY

This study of trends in Romanian forest land was based on statistical information of the last hundred years, specifically related to all the Romanian provinces, thus seeking to achieve a historical perspective. The focus was on analysing a series of indicators such as: forest land trends; forest species composition; forest ownership structure in Romania; afforestation trends; forest regeneration by species and region; structure of

forest land by region and county; forest area by species and age classes; the forest potential of the European Union; the expansion of forest covered areas in several European countries; illegal logging nationwide; cutting areas; volume of harvested timber; volume of timber entering the marketplace; the maximum annual timber extraction potential in Romanian forests; changes in volume of timber being processed; the share of trees with severely defoliated crowns; assessment of the vigour of trees based on defoliation; indicative area of forest land of public interest according to settlement types; limiting factors for the production capacity of agricultural land; changes in the share of agricultural land in the suitability class V, i.e. "lowest suitability", through the implementation of corrective measures; trends in Romania's land structure; and provisions for forest land expansion in the National Afforestation Programme. By processing the national-level data on forest land trends and composition and identifying those land resources with very low agricultural potential and non-agricultural land that present opportunities for forestry development, and considering the afforestation and forest development trends in European Union countries with similar potential and geographical, natural and climate features to Romania, we have identified areas of maximum forest land expansion, projecting the average annual rate of afforestation required to expand Romanian forest-covered areas by the year 2050. The study provides the grounding for the

strategic development of national forest land, rebalancing the ratio of agricultural land, forest land, lake environments and other land categories, in order to increase the forest area by over 2 million hectares and to stabilise farm land to about 12 million ha.

3. RESULTS AND DISCUSSION

Through agricultural reforms, in particular the 1921 reform, the State facilitated rapid deforestation. In Transylvania, for example, in 1919 there were 4,211,799 hectares of forest, while 10 years later, in 1928 only 3,305,251 hectares remained, many forests having been converted to pastures [2].

In 1929, in Romania, forest land totalled 7,134 thousand ha, with 6,448 thousand ha of forests and about 9.6% clearings and mountain open spaces, accounting for 22% of total land area (Table 1). By province, forest land varied considerably, covering 43% and 23% in Bukovina and Transylvania and only 18% and only 4% of the Old Kingdom and Bessarabia, respectively, with the bulk of forest areas located in Transylvania and the Old Kingdom (90%). Romania was considered a low-cover country, ranking 14th in Europe, and 11th in terms of forest area per capita, with 0.36 hectares of forest; the low forest cover (22%) placed Romania well below Czechoslovakia (33.2%), Poland (32%), Yugoslavia (31%) and Bulgaria (28%).

Table 1. Romanian forest land in the year 1929 [3].

Provinces	Area (thousand ha)			Structure (%)	
	Total forests	Forest-covered area	Clearings and mountain open space	Of total area of the province	Of the forest-covered area of the country
The Old Kingdom	2,886	2,517	369	18	40
Transylvania	3,535	3,282	253	32	50
Bessarabia	219	199	20	4	3
Bukovina	494	450	44	43	7
Greater Romania	7,134	6,448	686	22	100

As regards the forest species composition, in the same year (1929), we observe that coniferous species accounted for only 25% of the forest area, of which three quarters was spruce and only one quarter was made up of fir tree; meanwhile, deciduous species comprised 75%, principal hardwood species including beech (38%) and oak (24%).

By province, evergreen coniferous species were prevalent in Bukovina (70%) while hardwoods in Transylvania (75%), the Old Kingdom (81%) and Bessarabia (100%); Transylvania ranked first in terms of hardwood forest areas with 2,391 thousand ha, ahead of the Old Kingdom, which had only 1852 thousand ha of hardwood forest (table 2). As to the ownership distribution, we note that in Romania, in 1929, over 50% of forests were state-owned, by central and local

government authorities and public institutions; local authorities (joint ownership, common land and native land owners) held 20% of forest land and private individuals only 29%.

One can notice that Crown domains were located only in the Old Kingdom and included overall 61 thousand ha of woodland (table 3).

By provinces, the share of private forests owned by communities and private individuals was relatively even (ca. 50-52%) in the Old Kingdom and Transylvania, while it was lower in Bukovina (ca. 38%) and especially in Bessarabia (ca. 8%), due to the highly particular historical background of each Romanian province. Taking as reference the interwar situation, we can observe that, in general, the Romanian forest land area has remained relatively constant, with 6,456

thousand ha in 1938 and 6,495 thousand ha in 2009, having reached a low point in 1970 (6,315 thousand ha) and peaking in 1990 (6,685 thousand ha), with certain differences resulting from the calculation method employed (table 4).

The wooded area, however, followed a downward curve from 6,446 thousand ha in 1938 to

6,218 thousand ha in 1970, subsequently increasing to 6,334 thousand ha by 2009.

In terms of species, over the 1938-2009 period, there was a 27% increase in coniferous forests, while beech forest remained relatively constant and oak forests declining by over 21% (table 3).

Table 2. Forest species composition in Romania (1929) [3].

Tree species	The Old Kingdom		Transylvania		Bessarabia		Bukovina		Romania	
	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)
Spruce	263	10	707	22	-	-	218	49	1,118	19
Fir	209	9	109	3	-	-	91	20	409	6
Total coniferous	474	19	829	25	-	-	312	70	1,615	25
Beech	820	33	1,528	47	2	1	103	23	2,453	38
Oak	705	28	724	22	114	57	6	1	1,549	24
Other hardwood deciduous	327	13	139	4	56	28	22	6	544	8
Total hardwood deciduous	1,852	74	2,391	73	172	86	131	29	4,546	70
Softwood deciduous	192	8	62	2	28	14	6	1	288	5
Total deciduous	2,044	81	2,453	75	199	100	137	30	4,834	75
Grand total	2,517	100	3,282	100	199	100	450	100	6,448	100

Table 3. Forest ownership structure in Romania in the year 1929 [3].

Ownership type	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)
1. State	1,965	30.4	1,113	44.2	659	20.1	13	2.9	180	90.0
State-owned forests	1,904	29.5	1,052	41.2	659	20.1	13	2.9	180	90.0
Crown domains	61	0.9	61	2.4	-	-	-	-	-	-
2. Common land, public bodies	1,308	20.3	132	5.2	908	27.6	265	58.9	3	1.5
Common land	746	11.6	-	-	76	21.7	33	7.3	-	-
3. Local authorities	1,309	20.3	455	18.1	832	25.4	22	4.9	-	-
Joint ownership	651	10.1	-	-	636	19.4	22	3.3	-	-
Communities	196	3.0	-	-	196	6.0	-	-	-	-
Natives	462	7.2	455	18.1	-	-	7	1.6	-	-
4. Private	1,867	29.0	817	32.5	883	26.9	150	33.3	17	8.5
TOTAL	6,449	100	2,517	100	3,282	100	450	100	200	100

These trends were driven mainly by three factors: total deforestation, afforestation trends and the inclusion or exclusion in the total forest area of other categories of land, with or without forest cover. It thus emerges that annual afforested areas increased from approx. 35 thousand ha in 1938 to approx. 50 thousand hectares annually from 1970 to 1980, afterwards declining steadily to approx. 11 thousand ha by 2009 (table 5). As regards the planted species, different

afforestation strategies were adopted over the 1938-1960 period, with a higher share of deciduous species being planted compared to coniferous species, with a peak in 1950 when twice the number of deciduous trees were planted; on the other hand, there was shift in favour of conifers in the years 1970-1980, yet subsequently the afforestation ratio again changed, conifers accounting for ca. 43% of newly afforested areas by 2009 (table 5).

Table 4. Forest land trends (1932-2009) (thousand ha) [4].

	1938	1950	1960	1970	1980	1990	2000	2009
Total	6,476	6,446	6,403	6,315	6,337	6,685	6,366	6,495
Forest area	6,446	6,416	6,337	6,218	6,227	6,252	6,223	6,334
Conifers	1,524	1,446	1,457	1,448	1,882	1,929	1,856	1,935
Beech	*	*	2,034	1,965	1,872	1,896	1,951	2,037
Oak	*	*	1,335	1,160	1,180	1,145	1,120	1,077
Various species	*	*	1,511	1,605	1,293	1,282	1,296	1,285
Other land	30	30	66	97	110	119	143	161

Table 5. Afforestation trends (1938-2009) (ha) [5].

	1938	1950	1960	1970	1980	1990	2000	2009
Total	39,780	60,100	57,757	50,453	50,254	25,489	12,701	10,962
Plantations	35,325	50,814	38,624	49,946	49,030	25,345	12,640	10,840
Conifers	14,480	16,484	18,152	30,016	28,655	9,195	5,849	4,667
Deciduous	20,845	34,330	20,472	19,930	20,375	16,150	6,791	6,173
Direct sowing, of which:	4,455	9,286	21,133	507	1,224	144	61	122
Conifers	2,625	1,597	18,703	30	435	67	16	30
Deciduous	1,830	7,689	2,430	477	789	77	45	92

Table 6. Forest regeneration by species and development region in the year 2009 (ha) [6].

Development region	Regeneration	Afforestation			Natural regeneration		
	- total -	Total	Deciduous	Conifers	Total	Deciduous	Conifers
Total	22,853	10,962	6,265	4,697	11,891	10,017	1,874
North-West	3,133	1,305	497	808	1,828	1,298	530
Centre	4,357	2,290	654	1,636	2,067	1,523	544
North-East	4,651	2,336	980	1,356	2,315	1,672	643
South-East	2,855	1,579	1,509	70	1,276	1,238	38
South	2,701	1,388	1,173	215	1,313	1,273	40
Bucharest-Ilfov	182	17	17	-	165	165	-
South-West	2,444	1,041	845	196	1,403	1,395	8
West	2,530	1,006	590	416	1,524	1,453	71

Over the years, one may note that direct plantation of forest species evolved steadily from 4.4 thousand ha in 1938 to 21.1 thousand ha in 1960, subsequently dropping to only 122 ha in 2009, due to declining interest after 1990.

Regeneration projects, through afforestation, have always been completed by natural regeneration, which in 2009 exceeded the total afforested area (11,891 ha compared with 10,962 ha), with a share of 85% deciduous trees and 15% conifers, respectively (table 6).

There is a very interesting correlation between annual percentage of regeneration in the total forest land and share of forest land in the total area of the country, dispersed by development regions. Thus, regeneration projects are more intense in development regions with a lower share of forests, e.g. 0.70% in Bucharest-Ilfov, 0.50% in the South-East and 0.40% in the South, where the share of forest land is 14.3%,

16.0% and 19.7%, respectively, compared to 0.23% in the West region and 0.28% in the South-West, where the forest land accounts for 34.3% and 29.4% of total land area, respectively.

Development regions with already well developed forest land have recorded higher regeneration rates, 0.38% in the North-East and 0.35% in the Centre region, where the forest land share is 33.5% and 36.6%.

The North-West is a special case, because, while it has developed forest land (30.4%) the annual rate of regeneration has reached only 0.30%, below the national average (0.34%).

Forest regeneration is therefore fast in areas with limited forest land (Bucharest, South-East and South), moderate in areas with extensive forest land (Centre and North-East), yet lower in areas with high potential, located to the west (West, South-West and

North-West). These findings may lead to reassessments in regional forest regeneration policies.

Examining the overall situation of Romanian forest land (i.e. forests and other forest land) in 2009, we find that it accounts for 28.3% of total land area, with forests occupying 27.3%, with different levels in the various development regions and counties (Table 7).

By the share of forest land, Romanian counties can be grouped into four categories:

- low-cover areas (under 16%), including 15 counties, ranging from 4.0% for Călărași to 15.7% in Ilfov;

- moderate-cover areas (16-30%), including 8 counties, 17.3% (Iasi) to 29.4% (Mehedinți);

- high-cover areas (31-40%), comprised of 11 counties, ranging from 30.5% for to 39.7% for Bacău;

- very high cover areas (>40%), consisting of seven counties, from Neamț county (43.0%) to Suceava (49.2%).

Obviously, the share of forest is strictly linked to the major types of relief (plains, hills and mountains), with geomorphological features (meadows, mountain open spaces, alpine areas, Danube Delta, lake environments, etc.), the antagonistic complementarities related to agriculture, the climatic and hydrological resources of each area and conservative-traditional nature of various forest areas.

In terms of ownership, following the implementation of land reform legislation (Law no. 18/1991, Law no. 247/2005 and other laws amending and supplementing them, and of regulations, detailed procedures and associated laws), by 2009 61.0% of the wooded land areas were in the public domain while 39.0% were privately owned (table 8). By area of privately-owned forests, development regions rank as follows: Centre (56.9%), North-West (48.9%), West (37.2%), South-West (36.5%), South (31.0%), North-East (28.5%), South-East (23.1%) and Bucharest-Ilfov (7.7%).

A higher prevalence of forest ownership is observed in central, western and southern regions (31.0 to 56.9%) compared to the eastern regions (23.1% - 28.5%), when factoring in the higher forest cover of the latter. One relevant point here is the different forestry regime in Transylvania and Bukovina prior to 1918 and the more active institutional capacity of entities engaged in completing the implementation of restitution laws.

In terms of quality, by taking into account the age, type of forest and forest species, a statistical record from 1965 indicates that at that point 86.4% of Romanian forests were classed as high forest, with the rest (13.6%) being made up of coppice, conversion forests, riverside forest vegetation, osieries.

The high forest category was divided into six age classes, each a multiple of twenty years, up to 120 year-old high forests, divided as follows: class I (1-20 years) 20.1%, class II (21-40 years) 22.2%, class III (41-

60) 17.2%, class IV (61-80 years) 11.7%, class V (81-100 years) 9.7% and class VI (over 100 years) 19.1%, with almost one million hectares of century-old high forest (table 9).

Based on the framework age divisions, and factoring in the progression of each age class over the period 1965-2009, in addition to the average annual rates of forest area regeneration and recovery, we estimate that up to 35% of forests qualify as massive high forests, being exploited in a controlled manner, that correlates the vigour of the forest land with the annual regeneration rate and complies with forest expansion policies while also capitalises on favourable economic opportunities.

Different shares are observed for the various classes of species; beech forests over 100 years exceeding 33%, compared to conifers (14.9%) or oaks (9.3%). Coppice, conversion forests, riverside vegetation, osieries, including only deciduous species, only fall into four classes (1-10 years, 11-20 years, 21-30 years and over 30 years), their respective shares being 41.2%, 32.9%, 16.3% and 9.6%, which indicates rates faster growth rates and early maturity with significant distinctions between wood species (table 9).

In 2007, in the EU context, Romania, with 6,327 thousand ha, ranked 8th in terms of total forest cover area, coming after Sweden (27,550 thousand ha), Finland (22,510 thousand ha), Spain (18,507 thousand ha), France (15,635 thousand ha), Germany (11,076 thousand ha), Italy (10,192 thousand ha) and Poland (9,245 thousand ha), with a share of 4.1% of Community forest land (Table 10).

As regards the share of forest land in relation to the area of the country compared to the EU levels, in 2007 Romania occupied the 19th spot with 26.7%, a share close to that of France (28.5%), Greece (28.9%) and Poland (29.6%).

Examining EU country rankings of renewable resources derived from forest land, as determined by the ratio of agricultural land to forest land, we observe that in eight Member States forest land areas exceed agricultural land areas, indicating high forestry potential (Sweden, Finland, Estonia, Slovenia, Lithuania, Austria, Portugal and Cyprus).

In ten states the ratio ranges between 1.0 and 1.9, indicating balanced agriculture to forestry distribution (Slovenia, Lithuania, Bulgaria, Italy, Spain, Germany, Luxembourg, Czech Republic, Poland and France), within the interval that has always been typical of the Community: EU-12 (1.9), EU-15 (1.1) and EU-27 (1.3).

In four of the Member States there is a ratio between 2.0 and 4.9 in favour of agricultural land, suggesting strong agricultural potential (Romania, Belgium, Greece and Hungary), while in five Member States the ratio is above 5.0, denoting dominant agricultural potential (the Netherlands, Denmark, United Kingdom, Ireland and Malta).

Table 7. Share of forests per region and county (2009) [7].

North-West		Centre		North-East		South-East	
26.9	Bihor	32.5	Alba	39.7	Bacău	4.7	Brăila
35.0	Bistrița-Năsăud	37.1	Brașov	10.9	Botoșani	25.6	Buzău
21.8	Cluj	45.9	Covasna	17.3	Iași	4.8	Constanța
39.4	Maramureș	39.4	Harghita	43.0	Neamț	7.8	Galați
15.6	Satu-Mare	30.7	Mureș	49.2	Suceava	10.7	Tulcea
24.5	Sălaj	35.5	Sibiu	13.3	Vaslui	37.3	Vrancea
South		Bucharest-Ilfov		South-West		West	
39.6	Argeș	15.7	Ilfov	10.9	Dolj	25.8	Arad
4.0	Călărași			43.9	Gorj	46.5	Caraș-Severin
28.3	Dâmbovița			29.4	Mehedinți	43.1	Hunedoara
10.1	Giurgiu			8.9	Olt	11.7	Timiș
5.4	Ialomița			45.5	Vâlcea		
30.5	Prahova						
4.4	Teleorman						

Table 8. Structure of forest land by ownership type and development region (2009) [6].

Development region	Forests and other forest land								Share of the total area of the country
	Area (thousand ha)			Structure (%)		Land structure (%)			
	Total	State public domain	Private property	Public	Private	Total	Public	Private	
Total	6,753	4,117	2,636	61.0	39.0	100.0	100.0	100.0	28.3
North-West	1,039	531	508	51.1	48.9	15.4	12.9	19.3	30.4
Centre	1,248	538	710	43.1	56.9	18.5	13.1	26.9	36.6
North-East	1,233	881	351	71.5	28.5	18.3	21.4	13.3	33.5
South-East	571	439	132	76.9	23.1	8.5	10.7	5.0	16.0
South-Wallachia	678	468	210	69.0	31.0	10.0	11.4	8.0	19.7
Bucharest-Ilfov	26	24	2	92.3	7.7	0.4	0.6	0.1	14.3
South-West	860	546	314	63.5	36.5	12.7	13.3	11.9	29.4
West	1,098	689	409	62.8	37.2	16.3	16.7	15.5	34.3

This particular ranking of EU Member States, based on the ratio of agricultural land to forest land reflects the position of the Romanian economy in relation to the renewable resources derived from agriculture and agriculture-forestry. It accurately indicates the countries Romania must compare with (Belgium, Greece and Hungary) and the target group it must aim to join (Slovenia, Lithuania, Bulgaria, Italy and France). Based on these data, development strategies can be outlined, focusing on expanding the forest land, not at the expense of agriculture, but by stimulating the growth of agricultural production through increased yield, productivity, efficiency and

profitability of agriculture overall, by reducing utilised agricultural lands with low production potential, and expanding forests.

It is worth noting that, on average, the annual rate of expansion of forest-covered areas in some EU countries is slow, due to the existing high levels of forest area, and to conservation policies geared towards regeneration and reassessment rather than expansion (table 11).

France stands out among Member States, with a 680 thousand hectares expansion of forest land over 8 years, or 0.15% of the country's forest potential, an average annual growth rate of 85 thousand ha.

Table 9. Forest area by species and age classes in the year 1965 (thousand ha) [8].

Type of forest area	Total	Conifers	Beech	Oak	Various hardwood species	Various softwood species
Total forest area	5,836	1,419	1,986	1,178	911	342
Framework	5,042	1,419	1,913	917	619	174
Class I (1-20 years)	1,013	278	209	267	203	56
Class II (21-40 years)	1,121	254	342	247	219	59
Class III (41-60 years)	865	309	290	139	101	26
Class IV (61-80 years)	592	218	213	102	44	15
Class V (81-100 years)	488	149	223	77	29	10
Class VI (> 100 years)	964	211	636	85	24	8
Coppice, conversion forests, riverside vegetation, osieries	695	-	73	261	292	69
Class I (1-10 years)	286	-	21	101	136	28
Class II (11-20 years)	229	-	20	88	98	23
Class III-a (21-30 years)	113	-	16	45	41	11
Class IV-a (31-40 years)	67	-	16	27	17	7

Although not a EU member, Switzerland is a special case, with an extremely dynamic forestry policy, resulting in a 0.64% average annual growth of forest land, or an expansion by 68 thousand hectares of forest in the space of a decade. One cause for the higher rate of forests expansion in Switzerland is the high proportion of mountain areas and the existence of vast areas with open spaces, mainly Alpine. The analysis of the average annual rates of forest area expansion, correlated with the average annual rate of regeneration through afforestation, reforestation and natural regeneration, indicates the consideration for forests at a given time, in a particular state. Unfortunately, past experiences are sometimes very painful. Thus, the prominent silviculturalist Marin D. Drăcea, argued in 1938 in *“Considerations on forestry in Romania”* that: *“Forest history teaches us that in the development of forests and forest industry of a country there comes a time, more or less long, when the local people, plunder and lay waste to their own forest heritage”* [3].

For Romania, the experience of the last two centuries experience in forest conservation has been fateful, overlapping some key moments in national history. Thus, after the Peace of Adrianople (1829) when the two Romanian Principalities gained economic autonomy, oak forests were reduced to expand arable land for cereal crops, increasingly in demand for export; the 1864 land reform included the conversion of certain wooded areas to fallow land or grazing land; the land reform of 1921 triggered a 1.3 million ha decline in forest area; the post-war period, in the early stages of communism, saw increasingly irrational exploitation of forests to repay war debt and support the forced industrialisation of the country [4].

After 1990, the change of political regime, the restoration of private land ownership and amid the challenges of transition, all determined a failure to rein in planned cuts and the drastic decrease in reforestation

and afforestation and regeneration and, on the other hand, led to a significant increase in illegal logging across the nation (table 12).

Over the 2000-2005 period, the Romanian Ministry of Agriculture, Forestry and Regional Development estimated that illegal logging amounted to 100,000 cubic meters of timber volume. In reality, given the high incidence of unprofessional and mismanaged forestry sector businesses, we estimate that the volume of illegally extracted mass may have been higher, by as much as 3 to 4 times. In support of this assessment, we point to the inadequate security and surveillance of the forest ranges, whether private or public, the high risk level of forest guarding and crime investigation, and the high incidence of corruption and even organised mafia. The downward trend in illegal logging recognised by the ministry, by as much as a half in the period 2000-2005, does point to a slow return to order in the forests of the country, driven by the visible reduction in the number of sawmills that proliferated after 1990. Areas subject to cuttings reported in the Statistical Yearbooks of Romania, reflect large differences over time, by cutting types, with an overall trend towards the stabilisation of regeneration cuttings to approx. 70 thousand hectares annually, accompanied by a steady decline in tree sanitation, pruning and tending, which has been determined by the shift in ownership from public to private (table 13).

Correlating the dynamics of the volume of harvested timber (1986-2009) with the area subject to felling, we observe that over 50% of wood extracted derives from auxiliary sanitation, pruning, tending and accidental operations, at the opposite spectrum of regeneration felling which, at least hypothetically, provides a much lower production of timber production compared to the real economic potential, in the context of conservation efforts, regardless of forest land ownership type (table 14).

Table 10. Forest potential of the European Union in the year 2007 [9].

Country	EU structure**	Total area - thousand ha -	Of which (thousand ha):		Structure (%)		Agricultural/forest land ratio
			Agricultural land	Forest land	Agricultural land	Forest land	
Austria	EU-15	8,387	3,240	3,872	38.6	46.2	0.8
Belgium	EU- 6	3,053	1,370	667	44.9	21.8	2.1
Bulgaria	EU-27	11,000	5,116	3,725	46.1	33.6	1.4
Cyprus	EU-25	925	157	175	17.0	18.9	0.9
Czech Republic	EU-25	7,887	4,249	2,652	53.9	33.6	1.6
Denmark	EU- 9	4,309	2,663	506	61.8	11.7	5.3
Estonia	EU-25	4,523	823	2,300	18.2	50.9	0.4
Finland	EU-15	33,842	2,295	22,510	6.8	66.5	0.1
France	EU- 6	54,919	29,418	15,635	53.6	28.5	1.8
Germany	EU- 6	35,712	16,950	11,076	47.5	31.0	1.5
Greece	EU-12	13,196	8,280	3,812	62.7	28.9	2.3
Hungary	EU-25	9,303	5,807	2,004	62.4	21.5	2.9
Ireland	EU- 9	7,028	4,276	693	60.8	9.9	6.1
Italy	EU- 6	30,134	13,888	10,192	46.1	33.8	1.4
Latvia	EU-25	6,459	1,839	2,963	28.5	45.9	0.6
Lithuania	EU-25	6,530	2,695	2,131	41.3	32.6	1.3
Luxembourg	EU- 6	259	131	87	50.6	33.6	1.5
Malta	EU-25	32	9,3	0,3	29.1	0.9	32.3
Netherlands	EU- 6	4,153	1,914	367	46.1	8.8	5.2
Poland	EU-25	31,268	16,177	9,245	51.7	29.6	1.7
Portugal	EU-12	9,212	3,496	3,863	38.0	41.9	0.9
Romania	EU-27	23,839	13,546	6,372	56.8	26.7	2.1
Slovakia	EU-25	4,903	1,930	1,932	39.4	39.4	1.0
Slovenia	EU-25	2,027	500	1,275	24.7	62.9	0.4
Spain	EU-12	50,537	28,660	18,507	56.7	36.6	1.5
Sweden	EU-15	45,029	3,136	27,550	7.0	61.2	0.1
United Kingdom	EU- 9	24,361	17,647	2,866	72.4	11.8	6.1
	Total EU-27	432,927	190,212	156,976	43.9	36.3	1.2
	Total EU-15	236,873	137,364	122,201	42.4	37.7	1.1
	Total EU-12	236,873	128,693	68,270	54.3	28.8	1.9

Table 11. The expansion of forest covered areas in several European countries [10].

Country	Period (years)	Total area (thousand ha)	Average annual rate** (thousand ha)	Annual share of total forest land** (%)
France	1982-1990	680	85.0	0.15
England	1979-1989	246	24.6	0.10
Finland	1980-1989	150	16.7	0.05
Portugal	1973-1983	138	13.8	0.15
Hungary	1980-1989	91	10.1	0.11
Bulgaria	1980-1990	88	8.8	0.08
Poland	1980-1989	84	9.3	0.03
Switzerland	1979-1988	68	7.6	0.64
Czechoslovakia	1980-1990	58	5.8	0.05
Spain	1980-1990	49	4.9	0.01
Austria	1980-1990	25	2.5	0.03

Table 12. Illegal logging nationwide [7].

Year	Volume of illegally logged timber (- cubic m. -)
2000	142,899
2001	141,091
2002	101,992
2003	80,853
2004	70,479

Table 13. Areas subject to felling (ha) [8].

	1986	1990	1995	2000	2005	2009
Total area covered by regeneration felling	78,779	72,915	50,179	54,543	83,564	92,377
In high forests:	65,572	66,493	42,168	48,966	68,718	68,455
- successive felling	45,691	8,805	14,487	11,064	7,118	4,472
- progressive felling	4,976	26,677	19,468	29,640	49,721	53,660
- selective felling	9,261	28,324	6,242	5,688	7,568	6,507
- clear felling	5,644	2,687	1,971	2,574	5,310	3,816
In coppice with standards:	4,197	3,109	5,320	4,097	3,608	3,665
Substitution felling – recovery of low-productivity and degraded stand	9,010	3,313	2,691	1,480	1,771	1,175
Conservation felling	-	-	-	-	9,467	19,082
Tree pruning and sanitation	1,822,864	1,502,188	826,857	658,122	526,405	696,511
Tending of young forests	335,993	286,902	280,134	226,127	161,818	129,939
Accidental felling	129,640	512,268	333,723	479,893	583,035	412,570

Table 14. Volume of harvested timber (thousand m³, gross volume) [8].

	1986	1990	1995	2000	2005	2009
Total volume of harvested timber	22,803	16,649	13,813	14,285	15,671	16,520
Conifers	6,781	5,813	4,973	5,346	6,061	6,635
Beech	8,547	4,958	4,215	4,509	4,794	5,489
Oak	2,595	2,045	1,551	1,333	1,586	1,403
Various hardwoods	2,657	2,071	1,774	1,731	1,852	1,845
Various softwoods	2,223	1,762	1,300	1,366	1,378	1,148

In general, the volume of timber harvested annually, as reported in statistics, expressed in thousand m³ gross volume is correlated with the maximum volume of standing timber approved each year by Government Decision.

For example, in 2007, Government decision 1548/1 Nov. 2006 (Official Gazette 912/09.11.2006) approved the harvesting of a maximum volume of 18 500 thousand m³ standing timber, the harvest totalling 17,238 thousand m³, of which 14,608 thousand m³ were processed by logging companies. The two sources indicate the following aspects:

- the maximum volume of standing timber approved for logging in 2007 was comprised of: 56.2%, state-owned forests, 15.4% publicly-owned forests of central and local government, 12.2% forests owned by private individuals, 11.6% forests owned by private

entities, and 4.6% forest vegetation growing on land outside the national forest land;

- by species, the volume of harvested timber was as follows: 43.6% coniferous, 30.1% beech, 9.7% various hardwood, 8.6% various softwood and 8.2% other various softwoods species;

- 84.7% of total logged wood was processed by specialised logging companies.

The volume of wood entering the marketplace varies based on the forestry potential of each development region, on the forest species composition and on the share of each county's forest land.

In 2000, for instance, the volume of wood entering the marketplace was 14,285 thousand m³, gross volume, in variable proportion from region to region: North-East 26.4%, 23.9% Centre, 11, 7% West and North-West, 8.3% South-West, 7.7% South-East and 0.6% in the Bucharest area (table 15).

Table 15. Volume of timber entering the marketplace in the year 2000 (thousand m³, gross volume) [8].

Region	Total	Coniferous	Beech	Oak	Various hardwoods	Various softwoods
1 North-East	3,771	2,057	932	115	350	317
2 South-East	1,100	148	346	75	212	319
3 South	1,379	192	401	222	245	319
4 South-West	1,190	94	445	284	202	166
5 West	1,674	169	850	281	273	101
6 North-West	1,670	663	598	165	198	46
7 Centre	3,408	2,023	936	165	206	78
8 Bucharest	92	-	-	26	45	21
Total	14,285	5,346	4,508	1,333	1,731	1,366

Table 16. Current maximum annual timber extraction potential in Romanian forests (thousand m³) [11].

Species or species group	Main products, including conservation felling	By-products of:			Total	(%)
		Thinning	Clear felling	Sanitation felling		
Coniferous	2,205	1,064	110	772	4,151	24
Beech	5,400	1,695	126	677	7,898	45
Oak	986	321	60	440	1,807	10
Various hardwoods	900	843	165	352	2,320	13
Various softwoods	830	379	65	122	1,396	8
Total	10,382	4,302	526	1,363	17,572	100
%	60	24	3	13	100	-

In 2000, counties with very high and high timber harvest levels included:

Total gross volume: Suceava (1,577,000 m³), Harghita (1,132,000 m³), Neamț (957,000 m³), Bacău (697,000 m³), Mureș (571,000 m³), Caraș-Severin (512,000 m³), Brașov (500,000 m³), Maramureș (475,000 m³), Argeș (475,000 m³), Covasna (467,000 m³), Hunedoara (460,000 m³), Arad (451,000 m³), Năsăud (440,000 m³), Vrancea (388,000 m³), Sibiu

(378,000 m³), Vâlcea (372,000 m³) and Alba (361 000 m³);

Coniferous: Suceava (1,310,000 m³), Harghita (1,209,000 thousand m³), Neamț (548,000 m³), Mureș (336,000 m³), Bistrița - Năsăud (285,000 m³), Covasna (212,000 m³), Bacău (195,000 m³), Maramureș (169,000 m³), Alba (161 000 m³), Cluj (159,000 m³), Brașov (147,000 m³) and Sibiu (138,000 m³);

Beech: Bacău (368,000 m³), Caraș-Severin (360,000 m³), Hunedoara (292,000 m³), Neamț

(290,000 m³), Maramureş (261,000 m³), Braşov (250,000 m³), Argeş (229,000 m³) and Suceava (206,000 m³);

Oak: Arad (138,000 m³), Timiş (96,000 m³), Argeş (81,000 m³), Mehedinţi (63,000 m³), Dâmboviţa (63,000 m³), Dolj (60,000 m³), Vâlcea (60,000 m³), Sibiu (56,000 m³) and Satu-Mare (52,000 m³).

In terms of forestry potential, i.e. harvesting potential and actual harvests, counties are divided as counties with very high potential (Suceava, Harghita and Neamţ), high potential (Bacău, Mureş, Caraş-

Severin, Braşov, Maramureş, Argeş, Covasna Hunedoara, Arad, Bistriţa - Năsăud, Vrancea, Sibiu, Vâlcea and Alba), counties with low potential and with no potential.

It noteworthy that in general under the current conditions, the potential maximum annual wood extraction from the forests of Romania is about 17-18 thousands m³, with 60% resulting from main products, including from conservation felling and the remains derived from thinning (24%), sanitation (13%) and clear felling (3%) (table 16).

Table 17. Dynamics of the average potential of timber extraction [11].

Period	Forest potential (mil. m ³)	Volume of harvested timber (mil m ³)	Yield (%)
1961-1965	20.5	24.6	120
1966-1970	20.5	26.2	128
1971-1975	21.9	24.8	113
1976-1980	19.2	22.1	115
1981-1985	19.3	24.8	128
1986-1990	16.8	20.0	119
1991-1995	19.3	14.2	94
1996-2000	16-17	14-15	87

Table 18. Changes in the volume of timber being processed by forest industry businesses (thousand m³ gross volume) [8].

	2004	2005	2006	2007	2008	2009
Total processed timber	13,324	11,780	11,739	14,608	13,977	13,571
Total round wood	11,915	10,497	10,455	13,005	12,472	12,142
Timber logs	6,568	5,973	6,021	7,859	7,349	7,023
Veneer logs	506	369	6,021	7,859	7,349	7,023
Logs for musical instruments	16	10	9	16	5	4
Pulp wood	805	621	662	828	392	357
Engineered wood boards (chipboard+ fibreboard)	378	192	160	196	143	129
Mining timber	57	46	31	42	51	22
Timber for rural construction	594	515	413	409	500	503
Distillery timber	-	1	12	-	-	-
Wood for tanning	3	-	-	-	-	-
Wood charcoal	82	79	31	26	24	16
Wood for other purposes	37	29	17	35	44	59
Firewood	2,869	2,662	2,742	3,199	3,760	3,838
Volume	950	869	873	1,078	720	711
Other by-products	459	414	411	525	785	718

The species distribution of the maximum volume of exploitable wood is 45% beech, 24% softwood, 13% various hardwood, 10% oak and 8% various softwood species. The current potential has been determined by specialists in the field (Giurgiu,

2004) and signals limited availability, setting a warning level for protecting, strengthening and further developing the national forest land. Viewed dynamically, the average potential wood extraction has declined by 15% over half a century, from 20.5 million

m³ in the years 1961-1965, to 17.5 million m³ at present (table 17). Potential annual extraction levels were constantly exceeded by 15-30% of during the 1961-1989 period, which may be viewed as excessive logging activities with significant negative effects on the steady decline of Romania's forestry potential. After 1990, harvested timber volume decreased significantly, to 5-10% below the maximum annual operational level, however less controlled logging, sometimes falling outside the legal operation boundaries, including illegal unprofessional logging, compromised large forest sections, whose recovery will require decades of efforts.

Unfortunately, due to the dismantling of the wood processing industry, out of the total volume of

timber processed in 2009, 51.8% was used for logs of timber, rising by 6.9% compared to 2004.

Other uses included: 28.3% firewood, a 33.8% increase from 2004 levels, 3.7% timber for rural construction, down by 15.3%, 2.6% pulp wood, down 55.7%, 1.4% for veneer logs, down 62.3%, 0.95% engineered wood boards (chipboard+ fibreboard), down 65.9% and 0.16% mining timber, down 61.4%, 0.12% wood charcoal, down 80.5%, and logs for musical instruments, accounting for only 0.03% of the volume of wood being processed, down 75% from the year 2004 (table 18).

Table 19. Share of trees with severely defoliated crowns (over 20%) in Romania, due to lack of precipitation [5].

Years	Species						Total species
	Oak	English oak and Downy oak	Turkey oak	Hungarian oak	Black locust		
1990	19.0	24.0	14.0	19.0	21.0	13.0	
1992	24.0	32.0	25.8	41.6	27.2	16.7	
1994	30.5	42.6	30.6	45.5	39.0	21.3	
1996	28.4	-	22.4	31.3	-	16.8	
1998	22.4	31.2	17.8	28.7	20.4	12.3	
2000	20.4	28.5	23.0	40.3	28.9	13.5	
2002	23.6	31.1	22.9	42.5	28.9	13.5	
2004	21.8	27.5	21.2	34.8	34.7	11.7	

Table 20. Assessment of the vigour of trees based on defoliation [5].

Damage class	Defoliation rate (%)	Damage intensity
0	0-10	Vigorous tree
1	11-25	Minimally damaged tree
2	26-60	Moderately damaged tree
3	61-99	Severely damaged tree
4	100	Dead tree

Table 21. Indicative area of forest land of public interest according to settlement types [12].

Category of locality	Recreational forest area per 1,000 inhabitants (ha)	Maximum span of recreational forest area (km)
Bucharest city	30	50
Municipalities, towns, villages:		
- over 100 thousand inhabitants	20	40
- between 20 and 100 thousand inhabitants	17	25
- under 20 thousand inhabitants	15	15

The significant shift to the raw material category of harvested timber, generally for export (as timber logs) and firewood, highlights a dramatic decrease in domestic wood processing, neglecting key industrial processing materials, such as veneer, wood for musical instruments, wood pulp and charcoal.

Therefore, the national forest land over the past 20 years has undergone multiple and extensive

changes caused by: the change of ownership structure; the dismantling of the timber industry; the continual development of sawmills and the push towards increasing legal and illegal wood extraction; the shift in wood product utilisation to low grade processing; ongoing crisis in forest management and exploitation and in legal compliance, regardless of ownership class; and the slow pace of reforestation, rehabilitation of

degraded forest sections and the expansion of forests into areas unsuitable for forestry and other areas inadequate for agricultural use.

Consequently, Romania's forestry policy must be urgently readjusted and adapted to emerging

demands of conservation, development and efficiency in silviculture and logging activities by taking into account the national interest and by complying with EU legislation aimed at increasing and strengthening the national forest land.

Table 22. Limiting factors for the production capacity of agricultural land (2002) [2].

Limiting factor	Affected area (thousand ha)		Share of total agricultural area (%)
	Total agricultural area	of which: arable	
Drought	7,100		48.6
Regular excess humidity	3,781		25.9
Water erosion	6,300	2,100	43.1
Landslides	702		4.8
Wind erosion	378	273	2.6
Excessively stony soil	300	52	2.1
High salt content of soil	614		4.2
Extremely low soil humus reserve	7,485	4,525	51.2
High and moderate acidity	3,424	1,867	23.4
Low and very low mobile phosphorus supply	6,330	3,401	43.3
Low and very low mobile potassium supply	787	312	5.4
Low nitrogen supply	5,110	3,061	35.0
Deficiency of trace elements (zinc)	1,500	1,500	10.3

Table 23. Changes in the share of agricultural land in the suitability class V, i.e. "lowest suitability", through the implementation of corrective measures, in the period 2000-2003 [2].

Year	Class V agricultural land		of which:					
			Arable		Pastures and hayfields		Vineyards and orchards	
	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)	thousand (ha)	(%)
2000	4,055	27.3	1,570	16.7	2,288	46.5	196	37.4
2003	1,950	13.4	658	7.1	1,231	25.6	61	11.2

Table 24. Trends in Romania's land structure during the 1980-2007 period (%) [8].

Land use categories	1980	1985	1990	1995	2000	2007
Arable land and permanent crops	100	101	95	94	94	93
Pastures and hayfields	100	99	106	109	110	109
Forests and other forest land	100	100	102	103	100	104
Other land	100	96	105	101	107	102

An important aspect of streamlining wood processing includes the technical assumptions which underlie the establishment of processing facilities, which must consider:

- the recommended mature age cycles of forests in Romania, by forest species, main industrial use and priority function;
- the age of absolute exploiting capacity of some species, by production class;
- the qualitative classification trees;- the average maximum production of pure and even-aged coppice of different species and classes of production;

- height variations by diameter and maximum diameter for fir and beech by production class;
- indicative height linked to comparative productivity assessment indicators;
- the maximum, indicative production under optimal conditions, in selective framework, linked to species and comparative productivity assessment indicators;
- indicative harvesting indexes for moderate thinning, by type of ecosystem.

Obviously, technical assumptions are not sufficient for establishing wood processing facilities, as they involve linkages with:

- regulatory levels setting the maximum volume of standing timber which can be harvested annually, as established by Government Decision and enforced by the National Forest Management Agency (Romsilva) on forest ranges and awarded through tender procedures for wood procurement and processing in strictly defined parcels;

- the existence of infrastructure enabling logging operations;

- the existence of an engaged and incentivised business environment for wood exploitation and primary processing;

- restoring the local wood processing, furniture manufacturing, pulp wood and paper industry;

- stimulating the export of highly processed wood products.

Another crucial side to consider is the degree of forest vigour, directly influenced by climatic changes and damaging anthropogenic factors.

Changing weather conditions, low multiannual rainfall, increased acid rain incidence, and the proliferation of predatory species and diseases, every

year constantly leads to increased defoliation, to varying degree depending on species and climatic conditions of each year.

Thus, over the 1990-2004 period, the average crown defoliation of trees of various species in Romania ranged from 11.7% in 2004 to 21.3% in 1994 (Tables 19 and 20).

In this context, severely damage occurs increasingly frequently, with damage by defoliation on ever more extensive compact areas, pointing to the need to intensify measures to protect and sanitise forests and reduce the impact of factors that lead to increased pollution in pastoral forest areas in Romania.

Recently, a worldwide interest has emerged in the social function of forests, which hold an increasingly obvious role in restoring living conditions in urban areas. In Romania, specialists estimate that recreation forest areas per 1,000 urban residents vary, depending on the size of localities, between 30 and 15 ha and maximum span of the forest recreation ranging between 50 and 15 km from the boundary of the built-up area of the locality according to its size (table 21).

Table 25. Provisions for forest land expansion in the National Afforestation Programme (2010-2035) [13].

Category of land allocated for afforestation	Period							Total 2010-2035
	2010 - 2012	2013 - 2016	2017 - 2020	2021 - 2024	2025 - 2028	2029 - 2032	2033 - 2035	
1. Degraded land owned by:								
- Romsilva Forest Management Agency	1,200	4,000	8,000	8,000	8,000	8,000	6,000	43,200
- private individuals and local councils	600	4,000	8,000	8,000	8,000	8,000	6,000	42,600
2. Agricultural land	24,600	24,700						49,300
3. Degraded agricultural land owned by:								
- owners' associations;								
- local government authorities;	21,000	40,000	40,000	40,000	40,000	40,000	30,000	255,000
- joint ownerships;								
- educational bodies;								
- religious institutions,								
4. Windbreaks	600	2,300	4,000	6,000	8,000	8,000	7,000	35,900
Total afforestation	48,000	75,000	60,000	62,000	64,000	64,000	49,000	422,000
Average annual afforestation rate	28,000	25,000	20,000	20,677	21,333	21,333	24,500	16,880

Furthermore, the living environment, the local microclimate and inhabitants wellbeing are shaped and improved by the attention and protection afforded to urban green areas, parks, species living alongside traffic routes, trees and scattered shrubs in yards and gardens of individuals and legal entities, whether public or private, lake areas, lower river basins, with their typical herbaceous and tree vegetation, or forests serving as windbreaks and other dendrological and landscaping purposes.

That is why the reconciliation between man and nature can begin by a reconsideration of the man-forest relationship and expanding it to agriculture, society, man-made environments and lake areas.

The examination of the numerous limiting factors for the production capacity of agricultural land in Romania, suggests that large areas of farmland are subject to degenerative processes or by serious or adverse meteorological and climatic influences, such as drought or excess moisture, erosion or landslides, high

soil acidity and low humus reserves, low supply of phosphorus, potassium and nitrogen and trace elements (table 22).

Due to the above factors, we observe that, every year, consistently, a high percentage of agricultural land in the country is gridlocked in suitability class V, i.e. "lowest suitability", despite ameliorative agricultural measures, land reclamation, irrigation, use of fertilisers and other corrective interventions. Such areas account for 2 million hectares of agricultural land every year, of which approx. 700 thousand ha of arable land and 1,200-1,300 thousand ha of pastures and hayfields (table 23).

Generally, such land has a very low agricultural potential, ranging between 20 and 30 points in soil quality assessment scorecard, with extremely high improvement and enhancement costs, offering limited prospects for increased yields in relation to the increased natural or chemical nutrient allocation. A shift in land utilisation has been observed over time, from 1980-2007, with farmland and fruit-growing plantations areas decrease to 93% while grasslands (pastures and hayfields), increasing to 109% compared to the baseline, obviously an increase only in the low-productivity suitability class V, which is unsuited for field crops or plantations and minimally productive for pastures (table 24).

Fortunately, over the same period, we note the increase in the share of forests and other forest land to 104% compared to the baseline value, a trend which may be indicative of the future trends in the development of Romania's forest land.

This claim is based on the fact that, in terms of production capacity, agricultural land scoring below 25 points in soil quality assessments is neither of economic interest for agriculture, nor attractive for businesses, while related production costs far exceed any potential agricultural yields; agriculture practiced under such adverse conditions would impoverish the population using produce for own consumption and would also cause further fragmentation of agriculture.

Current statistics show that in late 2009, Romania had 6752.6 thousand ha forest and other forest land, of which 6334.0 thousand ha were forests, accounting for 28.3% of total land area; as previously emphasised, Romania ranks 17th in EU-27 based on the share on total area under forests and other forest land, the European Union average being 36.3%. Furthermore, considering that on average, 200-250 years ago, forest covered 40% of the territory, and approx. 70%, in the Middle Ages, it emerges that deforestation was a constant process, determined by the need to secure substantial revenue both for development and for consumption. Deforestation was compounded by exploitation policies, as Romania laid at the confluence of empires (the Ottoman, Tsarist and Habsburg empire), and in the path of belligerent powers (Germany and the Soviet Union) or was under

the rule of irresponsible regimes (the communist and post-1989 regimes).

Therefore, the continuing process of deforestation and ever expanding low-cover conditions since the late 19th century demand the urgent adoption of a national vigorous long-term strategy to halt the irrational exploitation of forests, to eradicate illegal wood extraction and to identify of land that is best suited for afforestation, in order to ultimately restore balance of biodiversity by establishing an optimal ratio of forest and other land areas to the agricultural land across the country.

Along these lines, the Ministry of the Environment and Forestry has designed the National Afforestation Programme which projects an expansion of forest-covered area by 422 thousand ha by the year 2035 (table 25). Of these, 20.3% are degraded forest land now part public or privately owned forest land, 8.5% will be windbreak forests and 7.2% degraded agricultural land unsuitable for agriculture. Based on these figures, the afforested area will total 340.2 thousand hectares, with the forest cover of the country rising to 29.3%, at an average annual growth rate over 25 years of 0.04%, which is a completely unsatisfactory rate.

4. CONCLUSION

If we set as a distant horizon the year 2050, by which time approximately 2.3 million hectares of degraded and low productive agricultural land may be afforested, national forest land and other forest land may reach 9.05 million hectares, or a share 37.9% of the total land area of the country, for an increase in the EU ranking to the 9th spot, provided that other countries do not have brisk national forest estate expansion policies. In this context, the average annual increase in the national forest estate would be 0.25%, as opposed to the 0.04% rate proposed by the Ministry of the Environment and Forestry, with an average pace of 59 thousand hectares afforested each year. This target is achievable should by leveraging optimal financial and organisational resources and ensuring that National Programme of Afforestation of Degraded and Low-productivity Agricultural Land is converted into a Strategic National Priority.

The benefits would be significant and wide-ranging. They would include:

- a considerable increase in Romania's forest assets, by around 34%, with forests restored as traditional natural habitats;
- the increase and consolidation of the economic potential of forest and wildlife;
- the improved quality of the environment, with positive effects on biodiversity conservation and diversification, mitigating the destructive effects of major climatic changes, improved agricultural and meteorological conditions owing to higher precipitation

and optimized parameters, including a considerable increase in the evapotranspiration index;

- the restoration of country's hydrological potential owing to the increased flow rate of all internal waterways;

- the boost to Romania's landscapes resulting in greater attractiveness for recreational, leisure and health tourism;

- the positive impact on human habitats, creating conditions for rehabilitation of settlements in hilly and mountain areas.

- the strengthening of Romania's agricultural land resources, stabilised at around 12.4 million hectares, or approximately 52% of the total land area, by preserving commercially viable and self-consumption crops, under profitable and efficient conditions;

- focused investment on land reclamation and irrigation only of agricultural land that may be suited for ameliorative investment and additional supply of nutrients and irrigation;

- the fair value assessment of production potential of farmland, factoring in the social and economic conditions;

- providing important, accurate data on the commercial availability of timber and agricultural products based on actual processing and production conditions.

We believe that the far-reaching issues related to Romanian silviculture, alongside agriculture, provide key strategic milestones for the future of the primary sector, as they serve national security purposes in the field of habitation, food, environment and rural economy, with particular emphasis on agriculture, forestry, fisheries and tourism.

Returning to the theme of our dissertation, *Readjusting Romania's Forestry Policy with a View to the Year 2050*, we would like to conclude with a quotation from the distinguished and renowned scientist, academician Victor Giurgiu, who argued that “*Only a specifically national forestry policy, both forward-looking and cautious, grounded on environmental concerns, supported by Romania's historical, psychological, socio-economic, and land realities of Romania, can help solve the crisis of water resources, clean air, wood and energy; it will prevent flooding, erosion and the formation of torrents; it will be able to create forest ecosystems capable to*

withstand wind, snow, diseases, pests, drought, global climate changes and pollution; it will exclude environmental deregulation action; and by virtue of the conservation of the exceptional biodiversity of our forests, it will deliver ecological stability and the progressive development of all natural ecosystems of forests, within the geographical boundaries of our ancestors' land” [5].

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