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Romanian forests and forestry: an overview

Valeriu-Norocel Nicolescu

Faculty of Silviculture and Forest Engineering, Transylvania
University of Brasov

Overview

Introduction

(i) Romanian forests: main characteristics

(ii) Management of Romanian forests

Summary

Figures and facts...

(i) Romanian forests: main characteristics

Figures (i)...

- **Area of forestland** (<http://roifn.ro/site/rezultate-ifn-2/>):
7.038 million ha (29.56% of national land), of which
“lands covered by trees” are 6.93 million ha
- **Location** (MAP 2018b, <http://roifn.ro/site/rezultate-ifn-2/>):
 - **Mountains: 59.70%** (*forest cover 65.25% of the mountains*).
 - Hills: 33.80%, forest cover 26.67% of the hills).
 - Plains: 6.50% (forest cover 5.25% of the plains).

Figures (ii)...

- **Species composition** (MAP 2018b):
 - **Broadleaves 74%** (**European beech 31.51%**, oaks – sessile, pedunculate, Hungarian, Turkey, greyish, and pubescent - 16.72%, various hard broadleaves (hornbeam, black locust, ash, maples) 19.06%, and various soft broadleaves (poplars, willows, and linden) 6.22%)
 - **Conifers 26%** (**Norway spruce 19.95%**, Silver fir 4.36%, European larch and pines 2.18%)

Figures (iii)

- **Forest ownership** (MAP2018b):

- a. **Public:** 65.9% of national forestland (4.277 million ha), of which State 48.6% (3.14 million ha) followed by cities, towns, communes 17.3% (1.137 million ha, over 1,500 owners).
- b. **Private:** 34.1% of national forest land (2.239 million ha), belonging to over 4,000 associations, **over 750,000 private individuals** and over 4,100 legal entities.

Mean size of forest holdings:

- **1.1 ha private individuals (of which 99% smaller than 30 ha)**
- 66.8 ha (legal entities)
- 265 ha (associations)
- 735 ha for cities, towns, communes

Figures (iv)

- **Forest functions** (MAP 2018a)

Groups:

- I *Forests with special protection functions*, with *six sub-groups* (1.1 to 1.5.; sub-group 1.6. defined only in 2018)
- II *Forests with production and protection functions.*

Current functional zoning of Romanian forests (MMAP 2021)

Group	Sub-group	%
I. Forests with special protection functions	1.1. Forests for water protection (predominantly <i>hydrological functions</i>)	66
	1.2. Forests for land and soil protection (predominantly <i>pedological functions</i>)	
	1.3. Forests with protection functions against natural or human-induced climatic factors (predominantly <i>climatic functions</i>)	
	1.4. Forests with protection functions predominantly <i>social</i>	
	1.5. Forests of <i>scientific interest</i> , for the preservation of forest gene-pool and eco-pool and of other high-value natural ecosystems	
	1.6. Forests with <i>special functions for biodiversity conservation and protection</i>	
II. Forests with production and protection functions		34

Sub-group 1.5. (*forests of scientific interest*) and 1.6. (*forests for biodiversity conservation and protection*) = **about 10% of Group I**

Group I, sub-group 1.5.:

- Forests part of the Natura 2000 sites (both Sites of Community Importance SCI - cover 16.80% of national land -, and Special Protection Areas SPA – 14.89% of national land)
- Primary and secondary virgin forests (over 70 thousand ha)

Group I, sub-group 1.6.:

- National parks, natural parks, scientific reserves, reserves and nature monuments, Biosphere reserves - MAB/UNESCO Committee.

Figures (v)

Addition: 87 so-called “*functional categories*” are defined and used at sub-compartment level (MAP 2018a).

= *The Romanian system of forest zoning is **the most complicated in Europe** = heavily focused on *protection functions* rather than on timber production.*

At sub-compartment level, depending on these functional categories, six *functional types* (TI -TIV for forests belonging to Group I and TV-TVI for those in Group II) describing the type and intensity of silvicultural interventions have been created.

The level of management ranges from *no silvicultural intervention* allowed (TI) to *all kinds of silvicultural systems* allowed (TVI).

Distribution of Romanian forests by functional types (MAP 2018a)

Functional type	Share of forests (% of area)
TI: NO silvicultural interventions allowed	3
TII: no silvicultural systems allowed; only conservation cuttings* allowed	21
TIII: only intensive silvicultural systems - group selection, irregular, group, uniform shelterwood - based on natural regeneration are allowed. Small-scale (maximum 3 ha) clear-cutting allowed only in the case of even-aged Norway spruce, pine, poplar, willow, or black locust stands	8
TIV: only intensive silvicultural systems (group selection, irregular, group, uniform shelterwood), based on natural regeneration are allowed. Small-scale (maximum 3 ha) clear-cutting allowed only in the case of even-aged Norway spruce, pine, poplar, willow, or black locust stands	21
TV: ALL silvicultural systems are allowed, depending on species composition, stand structure (regular vs. irregular) and functional type	5
TVI: ALL silvicultural systems are allowed, depending on species composition, stand structure (regular vs. irregular) and functional type	42

** Conservation cutting: intervention applied in stands fulfilling special protection functions that aims to allow for the establishment of a new cohort using low intensity cuttings, from the one specific to sanitary/hygiene cutting to maximum 10-15 percent of standing volume per decade*

Figures (vi)

Total standing volume: 2,355 million m³

Mean volume per ha: **340 m³** = from 250 m³ in soft broadleaves, 279 m³ in oaks, 416 m³ in European beech, 424 m³ in conifers

Current annual increment: **8.46 m³ ha⁻¹ yr⁻¹** = one of the highest in Europe (7.24 m³ ha⁻¹ yr⁻¹ in oaks, 8.98 m³ ha⁻¹ yr⁻¹ in European beech, 10.86 m³ ha⁻¹ yr⁻¹ in conifers)

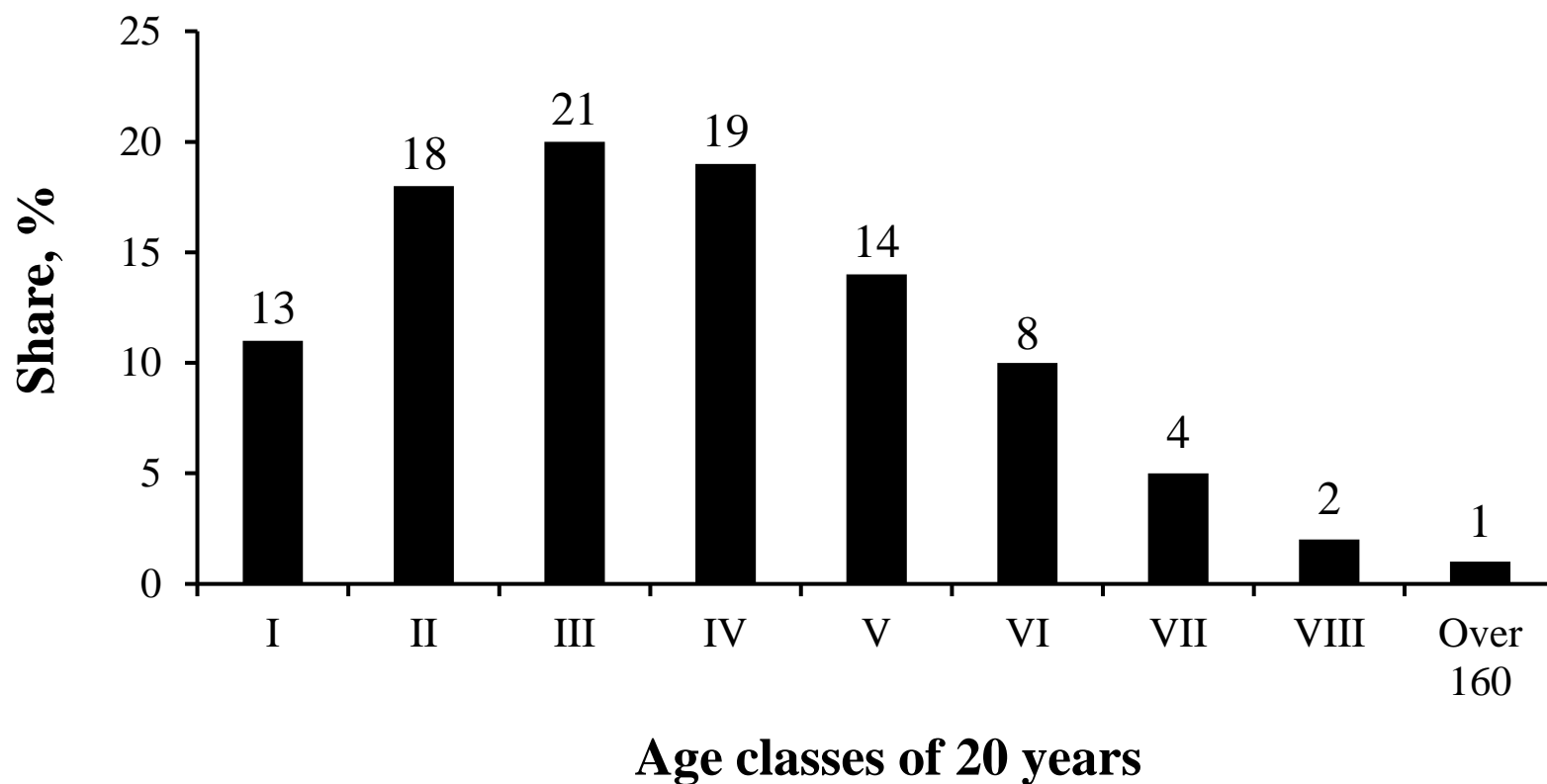
Current total annual increment: **58.62 million m³**, of which 67 per cent in broadleaves and 33 per cent in conifers

(roifn.ro/site/rezultate-ifn-2/)

Figures (vii)

Total annual increment = *58.62 million m^3* , but the *annual allowable cut* is only *maximum 23 million m^3* = two main reasons:

- (i) The *unbalanced age-class distribution*, dominated by stands between 21 and 80 years old
- (ii) The *low accessibility of forest land*.



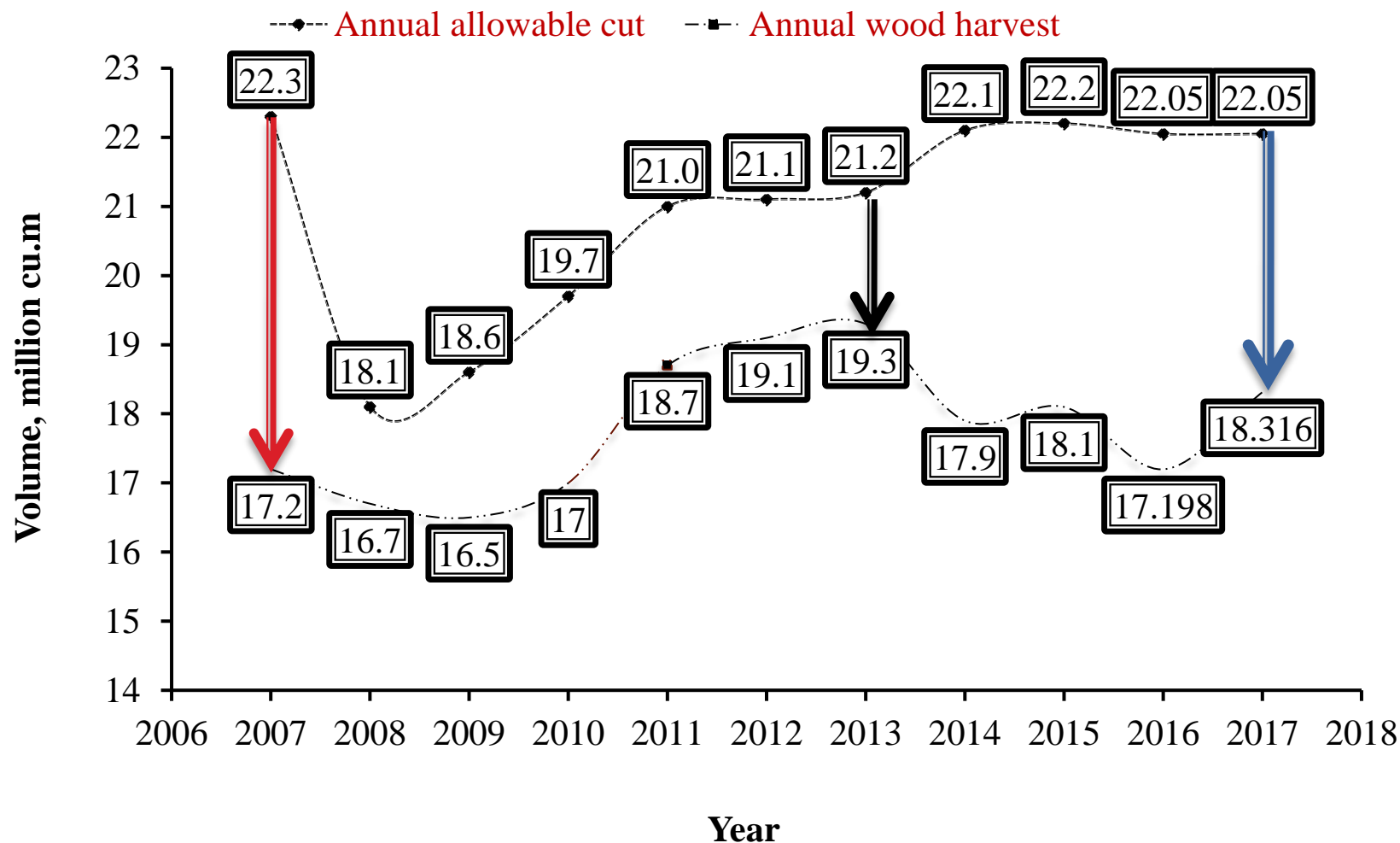
Current age-class distribution of Romanian forests
(www.mmediu.ro/app/webroot/uploads/files/2016-06-08_Rezultate_IFN.pdf)

Figures (viii)

Accessibility of Romanian forests: only 65 per cent, for a mean skidding distance of 1.2 km and a maximum one of 2 km.

Density of forest road network: only 6.5 m ha^{-1}
= much lower than in West-European countries = between
 26 m ha^{-1} (France) and 45 m ha^{-1} (Germany).

Optimum density of forest road network in RO: $12\text{-}20 \text{ m ha}^{-1}$



Annual allowable cut and annual wood removal in Romania between 2007 and 2017
(sources: *Starea pădurilor României* (annual allowable cut) and *Anuarul statistic al României* (annual wood removal))

(ii) Management of Romanian forests

Background

- All Romanian forests are managed following **forest management plans** (FMPs):
 - revised every 10 years
 - produced solely by authorized and specialized forest management planning companies;
 - compulsory for forest holdings larger than 10 ha
- *All management activities are based on the current legal framework: Forest Law (Codul silvic, released in 2008, but revised many times since then), specific Technical Norms (no. 1...7/2000), Ministerial Orders, etc*
- All Romanian forests, regardless of the ownership state, must be (1) either managed, or (2) must provide various ecosystem services. All forest activities are performed only by (1) state or (2) “regime” forest districts

Regeneration methods/systems:

- Are **imposed** by the Forest Law (Codul silvic 2008) through FMPs and consist of *high forest*, which should be applied to most forests (over 90 percent currently, compared to 70 percent in 1948), as well as *coppice* (only for native poplars, willows, black locust stands; currently it is used on 5% of national forestland, compared to 30% in 1948).
- The *coppice-with-standards* system was forbidden in 1948 and it has never been applied since.

Regeneration cuttings/silvicultural systems: are imposed by the specific Technical Norms through FMPs, depending on tree species, stand structure (regular vs. irregular), productivity level (high, average, and low) and functional type (TI-TVI).

- The *dominant silvicultural systems* are those specific to *high forests*: group and uniform shelterwood cuttings (on over 60% of annual logging area), single-tree and group selection cuttings (ca. 5-7% of annual logging area), and clear-felling (ca. 4-5% of annual logging area; used only in even-aged stands of Norway spruce, pines, hybrid poplars, and willows). The maximum size of clear-felled areas: 3 ha and can be up to 5 ha only in hybrid poplar and willow stands, when site preparation is carried out mechanically.
- Marginally, *coppice systems* (both low and high) are also applied to ca. 4-5% of annual cutting area.

Artificial regeneration: all specific issues (e.g. species composition, planting schemes, stocking/density, etc.) are **imposed** through the FMPs, based on the current Technical Norms.

Certain provisions (e.g. almost exclusive use of native tree species; high planting densities - 4000-5000 plants ha⁻¹ for Norway spruce, 5000 plants ha⁻¹ for Silver fir, 2000-2500 plants ha⁻¹ for European larch, 5000 plants ha⁻¹ for European beech, 5000-6700 plants ha⁻¹ for oaks) ***are compulsory regardless of the ownership type.***

Tending operations (i.e., release cutting, cleaning-respacing and thinning): the type, intensity, and cycle are **imposed** by the specific Technical Norms through FMPs and are compulsory.

The intensity of thinning, regardless of the dominant tree species, is low-moderate (maximum 18% of standing volume) and decreases with age.

Forest formations or groups of forest formations	Stand age, years									
	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Over 100
Norway spruce		16	11	10	9	8	7	6	6	5
Silver fir		16	12	10	9	8	7	7	6	5
Mixed European beech-conifers		15	12	10	9	8	7	7	6	5
European beech		15	14	13	12	10	9	8	7	5
Mixed European beech-sessile oak		15	13	10	9	8	7	6	5	4
Sessile oak and pedunculate oak		14	12	10	8	7	6	5	4	4
Mixed oak-dominated stands in the plain and floodplain areas		14	12	10	8	7	6	5	4	4
Linden	18	12	12	10	7	6				
Hungarian oak, Turkey oak and their mixtures		12	11	9	7	6	5	4	3	
Black locust	15	10								
Alder	15	12	10							
Willows	16	12								
White poplar, black poplar and their mixtures	16	7								
Pines	18	15	12	10						
Douglas-fir		16	12							

The last **thinning**:

- when the stand reaches $3/4$ of rotation age (generally maximum 80 years);
- - afterwards, until the rotation age, only application of salvage (sanitary) cuttings is allowed.

Rotation ages: are imposed by specific Technical Norms and applied through FMPs. In stands fulfilling *production and protection functions*, the rotation ages can reach values of up to 140 years (sawn timber) or of up to 200 years (veneer logs).

Species	Target wood assortment	Rotation age, years
Norway spruce	Sawn timber	100-120
	Resonance wood	150-180
Silver fir	Sawn timber	100-120
	Resonance wood	150-180
European beech	Sawn timber	100-120
	Veneer wood	140-150
Sessile oak	Sawn timber	120-140
	Veneer wood	160-200
Pedunculate oak	Sawn timber	110-130
	Veneer wood	160-180
Black locust	Sawn timber, construction timber	25-35

In stands fulfilling special protection functions (**Group I**), the rotation ages are 10-20 years longer than in the case of those mentioned above for stands belonging to **Group II**.

Conclusions on forest management

- All management measures carried out in Romanian forests are part of FMPs and *mandatory to all forests, regardless of the ownership type.*
- *Romanian forest owners* (public or private) *do not play any role* in choosing forest management measures, such as regeneration methods, tending operations, silvicultural systems, rotation ages, etc.

Consequence: *Romania is one of the most restrictive countries in Europe in terms of ownership/property rights* (Nichiforel et al. 2018), leading to a blockage of wood resources, especially in small-size forest holdings.

Wood harvesting

= Carried out by about 4,800 private logging companies, the majority with an annual logging potential below 10,000 m³.

The wood harvesting sector:

- (1) Low investment in new machinery and technology
- (2) Low productivity which makes the costs of logging per m³ higher than the European average cost.

Two major problems:

- (i) *Chronic shortage of labor* (especially qualified personnel, mostly for logging activities, but also for forest nurseries or tending operations in young stands)
- (ii) *Continuous growing costs of labor.*

Summary

- Romanian forests, (i) mostly publicly-owned and (ii) dominated by European beech and Norway spruce, are (iii) located predominantly in the Carpathian Mountains and (iv) have a high production and productivity.
- Historically, Romania has performed a *close-to-nature forestry*, based on (i) establishment and management of mixed stands, predominantly with native tree species, through (ii) natural regeneration of forests using (iii) silvicultural systems specific to high forest system, (iv) long rotation ages, and (v) a small-scale use of clear-cuttings.



**Thanks for your
attention**

