

# THE "IZVOARELE NEREI" SCIENTIFIC RESERVE - SHORT PRESENTATION - Daniel TURCU<sup>1</sup>

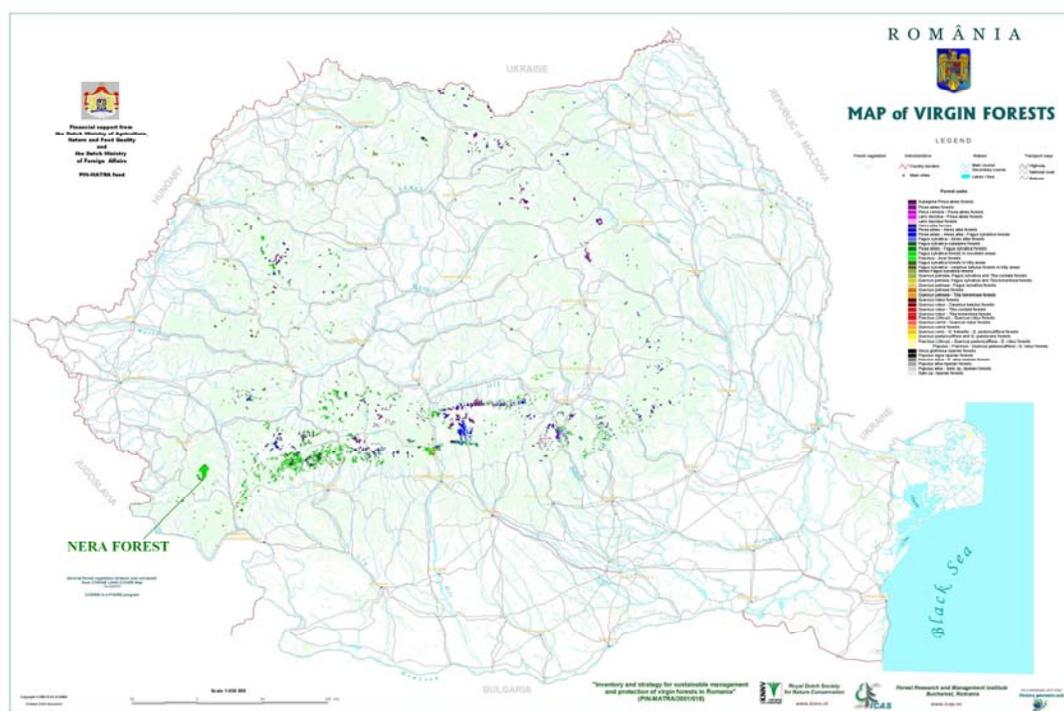
## 1. INTRODUCTION

Romania is one of the European countries which still has important surfaces of virgin forests – over 200 000 ha, according to the 2001-2004 inventory, 40% of which are represented by pure and mixed beech (*Fagus sylvatica* L.) mountain forests.

The "Izvoarele Nerei" Scientific Reserve, covering approximately 5000 ha, is one of the largest remnant virgin forests in Europe. This forest has a highly diversified structure along a 700 m altitudinal gradient, a nearly monospecific composition – dominated by beech with very few exemplars of silver fir, elm and sycamore, impressive tree dimensions (the largest trees have diameters over 1 m and heights over 50 m) and large standing volume (frequently over 1200 m<sup>3</sup> / ha).

This forest has the most restrictive protection status according to the Romanian legislation, the „scientific reserve” status corresponds to the IUCN category “1 A”. The reserve was established in 1975 by the forest management plans, first as a „forest reserve”, and in 2000 came to the current status as a „scientific reserve”.

The "Izvoarele Nerei" Scientific Reserve is part of the „Semenic – Cheile Carasului” National Park which covers 36 200 ha in the middle of the Caras-Severin County (South-West of Romania, fig. 1). The National Park was also established by law in 2000 and it has an own Administration since 2002. As almost all of the Romanian National Parks, it integrates many smaller reserves of different protection status (in this case, 8 reserves); the National and Natural Parks are administrated by the National Forest Administration (RNP – ROMSILVA). The forests of the Reserve are also guarded by the Nera Forest District, Caras-Severin County Forest Directorate.



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## 2. GEOLOGY AND GEOMORPHOLOGY

The „Izvoarele Nerei” forest is geographically located at 45°5' - 45°10' Northern Latitude and 22°2'30" - 22°6'40" Eastern Longitude. The 5000 ha Reserve covers a large altitudinal gradient of over 700 m, from 620 m on the lower part to almost 1400 nearby the Semenic and Piatra Goznei Mountains.

The geological ground is dominated by one type of rock: the Micashists, which generated favourable soils for the forest.

The geomorphology of the site reveals a high fragmentation of the territory, due to many small springs, which leads to a multitude of small surfaces with different slopes. The surface of the Reserve can be divided in the following slope categories:

- under 16<sup>g</sup> 2%;
- 16 – 30<sup>g</sup> 49%;
- 31 – 40<sup>g</sup> 46%;
- over 40<sup>g</sup> 3%.

## 3. SOIL CONDITIONS

The underlayer mentioned above – Micashists – developed one soil type for the entire surface of the Reserve – Dystric-cambic soils (forest brown acid soils). This type of soil is very favourable for the forest vegetation and it is one of the key factors for the high stability of this forest. The very steep slopes are covered in a subtype of this soil type – the Lithic subtype – which has more rock content, but has the same general characteristics of the typical soil type.

## 4. HYDROLOGY

The territory of the Reserve is intensely fragmented by many small springs, all of them tributaries of the two main rivers of the Reserve: Nergana (on the Western side) and Nerganita (on the Eastern side). It is mandatory to mention the fact that the name of the Reserve, „Izvoarele Nerei”(= the Springs of Nera river) comes from the multitude of the small springs encountered all over the Reserve.

The lowest end of the Reserve is situated at the confluence of these two rivers, in the place called „Botul Calului”; from this point on, the river is called Nera.

## 5. CLIMATE

The general climate is temperate-continental, with some Mediterranean influences (moderate winter, warm and rainy summer). The mean annual temperature is 7.5 °C in the Reserve and 4 °C on the top of the Semenic Mountain. The precipitations are 750 – 900 mm in the hilly – low mountain zone, 900 – 1050 mm in the middle mountain zone and over 1250 mm on the Semenic peak. The wind is very active (89 %), most of the time from West and North-West; the average wind speed is 8 m/s. The annual de Martonne Aridity Index is 71.43.

All the site conditions are very favourable for beech, especially the climate, which leads to a „*climatic climax*” situation for this species. This is the most plausible explanation for the monospecific composition (pure beech) of this forest and it's specific structure and dynamics.

## 6. FLORA

The dominant vegetal association in the Reserve is *Asperulo-Fagetum*. Due to the very good site conditions for beech, this species is dominant and has a very high concurential power which excludes almost completely the herbaceous and shrub layers (with a few exceptions: the pre-vernal flora and some *Rubus hirtus* spots). Being a virgin forest, the natural cycles are undisturbed, which explains the large number of fungi species present.

In the lower part of the Reserve several exemplars of trees from other species than beech can be seen. The most impressive is an elm (*Ulmus glabra* syn. *U. montana*) with a dbh of almost 2 m. There are also a few other exemplars of elm, field maple (*Acer platanoides*), mountain maple (*Acer pseudoplatanus*), aspen (*Populus tremula*), birch (*Betula pendula*). The field maple, the aspen and the birch, located nearby the limits of the Reserve, are not present normally in the composition of these kind of mountain beech forests; most probably they migrated in the past decades from the outside of the Reserve (where the forests were harvested, their composition changed and these species are present).

An interesting exception from the pure beech forest is represented by the presence of several exemplars of silver fir (*Abies alba*). Normally, these two species –beech and silver fir– are complemetary in the succesional dynamics of the natural forests in the Romanian Carpathians; they substitute each other in the dominant layer of the forest during the forest succesion (the explanation is that they use different fractions of the light spectrum during the photosynthesis process). In the Nera forest, beech is dominant also in time – and the presence of a few exemplars of silver fir (on the valleys) is exceptional.

One of the major human impacts on this forest is the presence of three spruce (*Picea abies*) plantations (two at the upper limit of the forest and one in the large gap called „Poiana Mare” inside the Reserve). They were made in the 1970s and were used as a shield against grazing – the plantations from the upper limit literally stoped the cattle from entering in the forest, but the plantation in the „Poiana Mare” large gap stopped farmers from temporarily settle there with cattle.

## 7. FAUNA

Many species of insects were spotted in the Reserve. Birds were also observed here, including protected woodpeckers, owl, hawk and eagle species. Seasonly, the small mammals’ (like mice species) populations increase and they can be seen easily.

Large herbivores are also present, like red deer (*Cervus elaphus*) and roedeer (*Capreolus capreolus*), but in small number (due to the poor food sources of the beech forest – they are very small surfaces of meadows with some herbs and no shrubs). The good fructification of beech (almos annualy) causes seasonal „visits” of wildboar (*Sus scrofa*).

The predators’ presence is also occasional – fox (*Vulpes vulpes*), wolf (*Canis lupus*), and bear (*Ursus arctos*), being conditionned by the existence of their prey.

## 8. MAIN HUMAN THREATS TO THE STABILITY OF THIS FOREST

This forest kept its natural (virgin) characteristics due to its inaccessibility. Some of the border zones suffered from human influence, but most of the surface is completely undisturbed by humans.

Probably the most important threat is the uncontrolled grazing on the top of the Semenic Mountain. The pasturage is a traditional activity for the mountain grassland areas and it is still not efficiently controlled (even in protected areas like a National Park). Because of the neighbouring between the Reserve and the mountain grassland, accidentally cattle break into the forest, causing local damages on the young trees.

Another human threat is the mushroom harvesting. A definitory characteristic of the virgin forest is the existence of dead wood in large quantities; the decaying wood is processed by many species of mushrooms, some of them (like *Pleurotus ostreatus* and *Polyporus squamarius*) are particularly searched for by the local people. This mushroom harvesting activity is not such a popular activity now as it was in the 1970-1980s, but it still affects the forest in an almost unseen (but important!) way: most of the mushrooms from the mentioned species grow on standing dead trees or on damaged living trees, inside or close to a forest canopy gap; in order to harvest them from several meters height, people cut down the closest young tree which is tall enough to reach the mushrooms. In many cases, that young tree was the oldest/largest from the regeneration spot inside the gap - about 10 cm in dbh and with 5-6 m height - and probably the future dominant tree. This is a subtle intervention in the local forest dynamics.

The most „modern” threat to the integrity of the Reserve is uncontrolled tourism, and especially an extreme branch of this activity – the motorcycle tourism. Some of the tourism operators in the Cars-Severin County started this type of activity, but without regard to the protected areas; unfortunately, the tourists are not aware that the „Izvoarele Nerei” area is a strict reserve and they pass through, causing a lot of noise (major disturbance for the fauna) and brutal damages to the soil and the young trees.

## 9. RESEARCH PROJECTS UNDERTAKEN IN THE IZVOARELE NEREI SCIENTIFIC RESERVE

### A. B.SC. DIPLOMA DISERTATION THESES

1. Degen, T., 2000: *Etude de la biodiversite d'une hetraie naturelle en Roumanie et mise en relation avec la structure*, Universite Catholique de Louvain – la –Neuve;
2. Lemaire, D., 2000: *Caracterisation de la structure d'une foret naturelle de hetre en Roumanie*. Universite Catholique de Louvain – la –Neuve, 185 pag;
3. Turcu, D. O., 2002: *Cercetări privind structura unor arborete naturale de fag din Rezervația Științifică „Izvoarele Nerei” (sud-vestul României) / Researches on the structure of natural beech forests from „Izvoarele Nerei” Scientific Reserve (South-Western Romania)*, Transilvania University Brasov, 143 pp.

### B. MASTER THESES

1. Kroon, Th., 2007: *The effect of altitude on seed production, sapling age structure, growth and survival of *Fagus sylvatica* L.*, MSC thesis, Wageningen University;
2. Terhurne, Renske, 2007: *The weakest link. The effects of light and root competition on the regeneration of *Fagus sylvatica* L. along an altitudinal gradient*, MSC thesis, Wageningen University.

### C. PH.D. THESES

1. Frățilă, E., 1999: *Structura și regenerarea naturală a arboretelor din ecosistemele de fâgete de mare altitudine din Banat / The structure and the natural regeneration of the stands from the high altitude beech ecosystems in Banat Region*, Academy of Agricultural and Forest Sciences, București, 266 pp;
2. Brad Radu – ongoing Ph.D. research on the crown characteristics of the young trees from cultivated and natural forests, started 2002.
3. Turcu Daniel – ongoing Ph.D. research on the stand structural dynamics and the young trees' mortality, started 2002.
4. Ștețca Ioan Alexandru – ongoing Ph.D. research on the dynamics of the natural forest, started 2005.
5. Cornici Dănuț – ongoing Ph.D. research on the structure and productivity of the Nera virgin forest, started 2006.

### D. OTHER RESEARCH PROJECTS

1. Bândiu, C. ; Smejkal, G. M. ; Vișoiu – Smejkal, D. , 1995: *Pădurea seculară. Cercetări ecologice în Banat / The oldgrowth forest. Ecological researches in Banat*, Editura Mirton, Timișoara, 160 pp;
2. Frățilă, E., 2000-2001: *Studiul complex al ecosistemelor de fâgete din rezervația "Izvoarele Nerei" / Complex study of the beech forest ecosystems from the "Izvoarele Nerei" Reserve*, ICAS, 56+89 pp.
3. xxx, 2004: *"Inventory and strategy for sustainable management and protection of virgin forests in Romania" – PINMATRA project*, co-financed by the Dutch Royal Society for Nature Conservation, KNNV;
4. Tomescu, R.; Tarziu, D.; Gancz, V.; Petrila, M.; Teodosiu, M.; Turcu, D.; Brad, R.; Stetca, I., 2004-2006. *Studiul factorilor de stabilitate in ecosistemele forestiere naturale. Evaluarea posibilităților de ameliorare a practicilor silvice în vederea gospodăririi durabile a pădurilor / Study of the Stability Factors in Natural Forest Ecosystems. Evaluation of the Possibilities to Ameliorate the Silvicultural Practices for the Sustainable Management of the Forests*, Forest Research and Management Institute (ICAS) Bucharest, The Ministry Of Agriculture, Forests and Rural Development, collaboration with the Ministry of the Wallon Region and the Catholic University of Louvain la Neuve, Belgium, 3 volumes. This project continues with a new phase 2007-2008.
5. Merce, O.; Turcu, D. O., 2005-2006: *Cercetări privind rolul ecologic al lemnului mort în ecosisteme forestiere cvasivirgine / Researces concerning the ecological role of the dead wood in quasi-virgin forest ecosystems*, ICAS technical report, 62+55 pp;
6. Biriș, I.A., et al., 2006-2008, still ongoing: *Structura și dinamica ecosistemelor forestiere naturale, suport pentru fundamentarea de măsuri silviculturale apropiate de natură și pentru o gestiune durabilă a pădurilor / The structure and the dynamics of the natural forest ecosystems, base for the development of close to nature sylvicultural measures and a sustainable management of the forest ecosystems*, project funded by the Romanian Ministry of Education and Research.