



PRO SILVA EXEMPLARY FORESTS

Object name: FORESTS OF PAHERNIK FAMILY

Main characteristics

These forests are among the best examples of the development of close-to-nature silvicultural techniques in Slovenia (Figure 1, 3). Special stress is given to freestyle silviculture, gradual transformation of Norway spruce plantations into more natural structures, and to consistent verification of the management success with the “control” method. The Pahernik family forests also include examples of the most productive forest sites in Slovenia (*Dryopterido-Abietetum*) with some remarkable old and large trees (*Picea abies*; Figure 5). A teaching trail leads through a part of the forest.



Figure 1: A typical view of the Pahernik forest as an example of “free style” and multifunctional silviculture

Location

46°30'56" N; 15°15'56" E;

The Pahernik forests are situated in the central part of the north slopes of the Pohorje mountains chain – outcrops of the Alpine arch (Figure 2). Forests stretch from the foothills of the mountain Pohorje (370 m a.s.l.) to its highest peaks (1542 m a.s.l.). They are part of a forested landscape interwoven with individual farms up to the altitude of 1000 m.



Figure 2: Republic of Slovenia with the location of the Pahernik forests (green dot)

Area and site conditions

Forests encompass 551.8 ha. The majority of them (53%) lie on steep slopes (20°–30°) and the rest on slopes with inclination of 30° and more. Precipitation ranges from 1100 mm to 1500 mm. The most rainfall (60–70%) falls during the vegetation period. In the lower part geology is comprised of metamorphic stones (gneiss, fillit), while in the upper part magmatic stones prevail (tonalit, dacit). Soils are mostly acid brown soils (district cambisol).

Table 1: Forest communities in Pahernik forests

Forest community	Area (ha)
Mountain acidophilic beech forest (<i>Polygonato verticillati-Luzulo-Fagetum</i>)	292.7
Silver fir forest with ferns (<i>Dryopterido-Abietetum</i> KOŠ.64 (mscr.)p.p.)	189.8
Beech forest with European wood rush (<i>Luzulo-Fagetum</i> MEUSEL 37)	26.9
Spruce forest with Greater wood rush (<i>Luzulo sylvaticae-Piceetum</i> M.WRAB.63)	20.0

cor. ZUP.99)	
Acidophilic silver fir beech forest (<i>Abieti–Fagetum praealpinum</i> ROB.65 (mscr))	11.9
Forest of noble hardwoods (<i>Aceri–Fraxinetum</i>)	9.8
Acidophilic mountain beech forest (<i>Blechno–Fagetum</i> HT. ex MAR. 70)	0.7
Total	551.8

Historical and silvicultural characteristics

- The first changes in natural forests started in the 13th Century. In the 14th and 15th Century large pastures were spread on the highest parts of Pohorje.
- Because of mining, glass and iron industries the forested landscape dramatically changed during the 18th Century.
- In 1863 the railway to Koroška was built, followed by an increase in the value of conifer wood. Consequently, many spruce monocultures were planted, especially on the large estates and larger farms.
- In the area around the Pahernik property some natural forest structures were preserved on medium and small farms due to selection management based on natural regeneration.
- In 1949 clear-cutting was prohibited by law.
- In 1952 forest planning with ten year intervals started in private forests.
- In 1957 detailed silvicultural planning was introduced on an area of 157 ha.
- In 1960 an irregular shelterwood silvicultural (Ger. “Femelschlag”) system was initiated.
- Until 1980 the optimal road network was established (41 m/ha roads in 76 m/ha skidding roads).
- By the 1990 the freestyle silvicultural system was completely implemented. The texture of stands is a result of application of various techniques: from single and group selection to irregular shelterwood.



Figure 3: Example of ongoing gradual conversion of Norway spruce monocultures with “free style” silviculture

Forest structures

The growing stock of the Pahernik forest significantly increased during the last fifty years. The steady increase was interrupted during the silver fir decline in 1970. The last forest management plan estimated the following values for the growing stock, increment and possible fellings in m^3/ha :

- growing stock: conifers = $339 \text{ m}^3/\text{ha}$, broadleaves = $79 \text{ m}^3/\text{ha}$, total = $418 \text{ m}^3/\text{ha}$
- increment: conifers = $6,7 \text{ m}^3/\text{ha}$; broadleaves = $1.6 \text{ m}^3/\text{ha}$; total = $8.3 \text{ m}^3/\text{ha}$
- possible felling: conifers = $4,1 \text{ m}^3/\text{ha}$; broadleaves = $0.9 \text{ m}^3/\text{ha}$; total = $5.0 \text{ m}^3/\text{ha}$

Site productivity is estimated at $11.2 \text{ m}^3/\text{ha}/\text{year}$. The recent ratio of developmental phases is different from the balanced model for forests managed by irregular shelterwood (Figure 4).

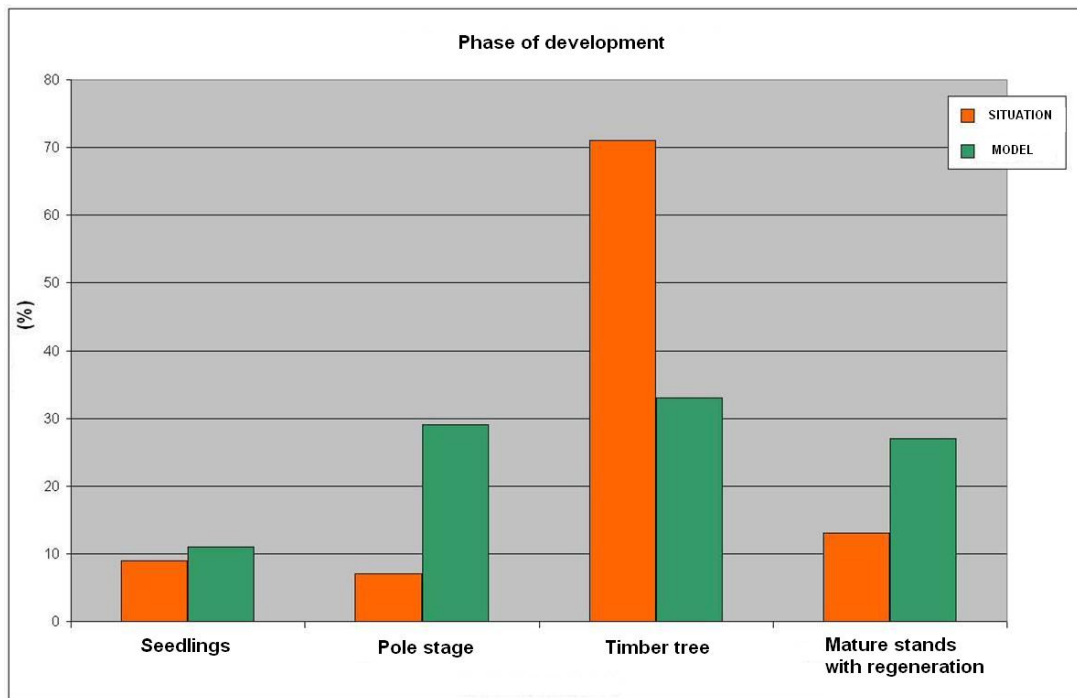


Figure 4: Comparison of the recent share of developmental phases with the balanced model for forests managed by irregular shelterwood

Economic return

The forest infrastructure of the Pahernik property is optimal (41 m/ha roads and 76 m/ha skidding roads) thus enabling easy wood removal considering all the forest functions. Fellings are still lower than the annual increment to increase the overall growing stock. However, close-to-nature management already assures continuous economic returns. With all this in mind and continuous tending of individual high quality crop trees (pruning, light increment) the economic returns are expected to increase even more in the near future.



Figure 5: Large diameter trees as an important component of close-to-nature forestry on the Pahernik farm

Broader significance of the Pahernik forests

In the 17th, 18th and first part of the 19th Century the forests in the Pohorje region were devastated due to clearings, heavy fellings and forest grazing. At the beginning of the 20th Century, ing. Franjo Pahernik – owner and academically educated forester began a gradual process of forest restoration on his property by planting, tending and selection management. He was a pioneer and an excellent example for development of close-to-nature forestry in the region. After the Second World War the conditions for complex forest management in Slovenia significantly improved, thus close-to-nature management could be successfully established in all Slovenian forests. The Forest law from 1994 assured a complex professional approach to forest management irrespective of forest ownership.

The Pahernik forests represent one of best practices of forest management in Slovenia, which is based on:

- “freestyle” silviculture following natural principles
- carefully planned forest management including infrastructure
- forest site research
- complex forest tending
- natural regeneration
- consideration of all forest functions
- harmony between ecology and economy.

The Pahernik property closely collaborates with the Biotechnical faculty, and is thus open for research activities. Moreover, with the collaboration of the Slovenia Forest Service, and the Forestry society Slovenj Gradec different activities from forest pedagogic to forest extension are taking place. For this purpose numerous silvicultural objects, plots and educational paths are maintained.

The daughter of the forest engineer Franjo Pahernik, Mrs. Vida Ribnikar, established the Pahernik foundation. The purpose of the foundation will be to provide scholarships to forestry students at the Biotechnical faculty, University of Ljubljana.



Figure 6: A monument of ing. Franjo Pahernik, former owner and a pioneer of close-to-nature forestry in the Pohorje region

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