

MAREK FERCHMIN

PROGRAMME FOR THE RESTORATION OF PLANT COVER IN THE
KAMPINOS NATIONAL PARK

ABSTRACT

A competent cooperation with natural processes of the recovery of plant communities is considered as a basis for the restoration of plant cover in the Kampinos Forest through the reforestation of arable lands and reconstruction of the species composition of already existing tree stands. The author describes 12 potential phytosociological units (associations and subassociations) recognized on the "Map of potential plant communities of the Kampinos Forest" being the main reference source in carrying out the programme for the restoration.

Also the proposal for increasing the area of strict reserves in the Kampinos National Park up to 5230 ha in 21 objects is analysed.

INTRODUCTION

From 18 July, 1975, when it was decided to buy up from private owners areas of the so-called "inner enveloping zone" of the Kampinos National Park, the administrative authorities have faced an enormous task to rejoin to the Kampinos Forest large areas detached from it centuries ago. This is a very difficult and work-consuming legal-organizational problem. The present contribution discusses biological aspects of this action since nature, its protection and restoration, are the essence of the national park.

The aim of the foresters who work in the Kampinos National Park is to restore natural relationships in the Kampinos Forest so that the term "virgin forest" had not only historical but also actual content. To reach this objective and to avoid biological errors, a prognosis must be prepared of natural changes occurring in forest communities as a result of:

- reforestation of the arable land bought up from private owners,
- rebuilding of tree stands by means of cultivation treatments,
- natural recovery of forest communities and their habitats being deformed by long-term forest management (more than 200 years).

The pure form of these restorative processes will be developed in strict nature reserves, while in the remaining areas (partial reserves) they can only be accelerated by appropriate cultivation treatments. It should be emphasized that all the treatments can be successful on the condition that they will be based on the "Map of potential plant communities of the Kampinos Forest".

The soil substrate of the major part of the Kampinos Forest is relatively uniform. These are mostly fine sandy soils. Thus the basic habitat factor deciding on the development of particular plant communities is water relations, including the amount of water and its occurrence type. Hence, the map of potential plant communities of the Kampinos Forest is adequate to the prognosis of water requirements in this area.

The work on the map of potential plant communities was based on the papers published so far [1—4, 6—8] and on several-year observations of the natural recovery of forest habitats. A comparative method was mainly used, taking as a starting point natural patterns of the location of particular communities according to the configuration of the area and in relation to one another.

All the communities indicated on the map exist now, only the proportions of the areas covered with them being different from those on the actual habitat forest maps, particularly on the tree-stand maps. Hence, their description is not of hypothetical but of real character, and it is consistent with the "Key to identification of taxonomic units in the Kampinos National Park", which was ratified by the Technical-Scientific Commission for the use by workers of the Bureau of Forest Projects.

It is possible to restore natural forest communities already in the first generation of trees on the condition that the species composition and the percentage contribution of particular species in plantations will be based on the map and on the "Key to identification of taxonomic units".

DESCRIPTION OF PLANT COMMUNITIES

1. Wet alderwood (*Carici elongatae-Alnetum*), called typical alderwood in the forest typology.

It is located on peat bogs and marshes, mainly along belts of wetlands separating belts of dunes, occasionally also in larger deflationary bowls within dune belts. Developed on lowmoor soils.

Stagnant or sluggish water covers the soil surface for most of the year. Water-table varies from +0.5 to -0.5 m.

Tree layer dominated by *Alnus glutinosa* (80%) with an admixture of *Betula pubescens* (20%). Shrub layer mainly consists of shrubby willows such as *Salix cinerea* and *Salix aurita*. In the herb layer there are rush plants (of the class *Phragmitetea*). Hence, on the map this association is considered jointly with the rush communities not destined for forestation but undergoing natural succession; their main role lies in water retention.

This community covers 4% of the whole Kampinos National Park, which is 34 410 ha in area.

2. Alder-ash carr (*Circaeo-Alnetum*), called wet ash alderwood in the forest typology.

Located on wetlands mainly in belts between dunes, generally along streams, and for this reason also called the riverine carr.

Generally on muck and black turf soils, also on mineralized low-moor soils.

Vertical and horizontal water movements. Water-table varies over the year from +0.2 to 0 m (optimum) and to -0.5 m.

Tree layer consists of *Alnus glutinosa* (40%) and *Fraxinus excelsior* (40%) with an admixture of *Ulmus laevis* (10%), *Ulmus campestris* (10%), and also *Betula verrucosa*, *Betula pubescens*, *Betula obscura*, and *Quercus robur*. Very rich shrub layer. Among most characteristic species there are *Padus racemosa*, *Ribes schlechtendalii*, *Cornus sanguinea* and *Evonymus europaea*.

Herb layer dominated by plants associated with fertile deciduous forests (class *Querco-Fagetea*) and among nonforest plants, those living in meadows (class *Molinio-Arrhenatheretea*) dominate over rush plants (class *Phragmitetea*).

This association covers 16.9% of the Park.

3. Willow-poplar carr (*Salici-Populetum*), called carr wood, in the forest typology.

Located exclusively on the alluvial terrace of the Vistula and Bzura rivers, thus beyond the Park boundaries, in the enveloping zone. Developed on alluvial soils.

Water-table varies considerably, depending on the water level in rivers, from +2.0 to -1.0 m and deeper.

Natural tree layer consists of four native poplar species: *Populus nigra* (20%), *Populus alba* (20%), *Populus canescens* (20%), and *Populus tremula*, and also of *Salix alba* (10%), *Salix fragilis* (10%), *Quercus robur* (20%), and occasionally *Ulmus laevis*, *Fraxinus excelsior*, and *Alnus incana*. Shrub layer is very dense and rich in species dominated by *Salix purpurea*, *Sambucus nigra*, *Sambucus racemosa*, and *Cornus sanguinea*. Herb layer includes many characteristic species.

4. Low oak-hornbeam forest (*Quercus-Carpinetum stachytosum sylvaticae*), called wet deciduous forest in the forest typology.

Located on flat belts between dune belts, occasionally at the base of dunes and on low dunes emerging from the wetland.

Occurs on brown soils formed from medium sand and sands with admixture of very fine sand fraction, as well as from loams and clays (outside the dune terrace), and also on mineralized black turf soil.

Water-table varies little, from 0 to -0.5 m, occasionally to -1.0 m.

Tree layer dominated by *Quercus robur* (30%), *Carpinus betulus* (30%), and *Tilia cordata* (30%), with admixture of *Larix polonica* and many species of deciduous trees: *Acer platanoides* (10%), *Fraxinus excelsior* (10%), *Ulmus laevis*, *Ulmus campestris*, *Ulmus scabra*, *Betula obscura*, and *Betula verrucosa*. Rich shrub layer with *Lonicera xylosteum*, *Daphne mezereum*, *Cerasus avium*, *Evonymus europaea*, *Crataegus oxyacantha*, *Crataegus monogyna*, *Corylus avellana*, and others. Herb layer consists of plant species associated with fertile deciduous forests (class *Quercus-Fagetea*), nonforest plants being completely or almost completely absent.

This subassociation covers 21.6% of the Park.

5. Raised oak-hornbeam forest (*Quercus-Carpinetum typicum*), called damp forest in the forest typology.

Located on large flat elevations in the zone of wetland belts, and in the central, highest parts of mid-marsh dunes. Occurs exclusively on brown soils, which can be formed from loose sands, very fine sands and medium sands.

Water-table generally ranges between -1.0 and -2.0 m.

Tree layer consists of many deciduous species, mostly *Quercus robur* (20%), *Quercus sessilis* (10%), *Carpinus betulus* (20%), and *Tilia cordata* (20%), with an admixture of *Larix polonica* (10%), *Acer pseudo-platanus* (10%), *Acer platanoides* (10%), *Betula verrucosa*, *Pirus communis*, and others. Rich shrub layer dominated by *Corylus avellana*, *Viburnum opulus* and *Evonymus verrucosa*. Herb layer dominated by plants associated with fertile deciduous forests (class *Quercus-Fagetea*), permanent small admixture of xerophilous plants (class *Festuco-Brometea*, and order *Quercetalia pubescentis*) and meadow plants (class *Molinio-Arrhenatheretea*).

6. Reed-grass oak-hornbeam forest (*Quercus-Carpinetum calamagrostetosum*), called mixed deciduous forest in the forest typology.

Located on the peripheries of dune belts, on low and medium dunes in large patches of low and raised oak-hornbeam forests, non

seldom also on medium dunes among marshes covered with forests for a long time. Occurs on brown soils, less frequently on brown podzolic soils, formed from loose, very fine, and medium sands.

Water-table generally below —2.0 m, sometimes not so deep.

Tree layer consists of many deciduous species, mostly *Quercus sessilis* (20%), *Quercus robur* (10%), *Carpinus betulus* (20%), *Tilia cordata* (20%), *Acer pseudoplatanus* (10%), and *Larix polonica* (20%), with a small admixture of *Betula verrucosa*, *Acer platanoides*, and even *Pinus silvestris*. Most characteristic shrubs include *Evonymus verrucosa*, *Corylus avellana*, and *Juniperus communis*. Among dominant herb-layer species associated with fertile deciduous forests (class *Querco-Fagetea*), there is a constant proportion of mesophilous species (part of the class *Vaccinio-Piceetea*, and particularly the alliance *Pino-Quercion*), being also associated with coniferous forests, as well as of meadow species (class *Molinio-Arrhenatheretea*).

The two last subassociations of raised oak-hornbeam forests occupy together 19.4% of the Park.

7. Xerothermic oak wood (*Potentillo albae-Quercetum*), without corresponding name in the forest typology.

Located on steep, southern, eastern and northeastern slopes of dunes, at the base of which there are marshes and peat bogs; occasionally, beyond the dune terrace, in more flat areas. Brown podzolic or brown soils, formed on loose or medium sands.

Water-table generally much below —2.0, only occasionally not so deep. Condensation water, available for plants due to high relative air humidity and large daily temperature fluctuations, is of great importance to this community.

Tree layer almost exclusively consists of deciduous species dominated by *Quercus sessilis* (50%). There are also *Tilia cordata* (10%), *Acer pseudoplatanus* (10%), *Larix polonica* (10%), *Acer platanoides* (10%), *Quercus robur* (10%); a characteristic feature is the absence of *Carpinus betulus* Rich. shrub layer includes *Berberis vulgaris*, *Rhamnus cathartica*, *Prunus spinosa*, *Rosa canina*, *Evonymus verrucosa*, and *Corylus avellana*. Herb layer is characterized by a large proportion or even dominance of xerothermic plants (order *Quercetalia pubescentis* and class *Festuco-Brometea*) and meadow plants (class *Molinio-Arrhenatheretea*) and a complete lack of plants associated with pine forests, unless pines are artificially introduced into this habitat.

This association covers 5.8% of the Park.

8. Oak-pine forest (*Pino-Quercetum*), also called damp mixed forest in the forest typology.

Generally located on gentle, northwestern slopes of dunes, deep in the dune belt also on steeper slopes with another exposure, not so

frequently in more flat areas; does not occur along wetland belts. Podzolic soils, formed from loose or very fine sands.

Water-table ranges from -1.5 to -2.5 m, seldom deeper.

Tree layer dominated by *Pinus silvestris* (40%) and *Quercus sessilis* (40%), with an admixture of *Larix polonica* (10%), as well as *Tilia cordata*, *Betula verrucosa*, and *Acer pseudoplatanus* (together 10%). Shrub layer rather abundant in species, the most characteristic being *Juniperus communis*, *Corylus avellana*, *Evonymus verrucosa*, and *Sorbus aucuparia*. Among dominant herb-layer species associated with pine forests (class *Vaccinio-Piceetea*), permanently occur mesophilous plants (mainly alliance *Pino-Quercion*) and also plants associated with fertile deciduous forests (class *Quercu-Fagetea*).

This association covers 16.7% of the Park.

9. Pine forest (*Vaccinio myrtilli-Pinetum typicum*), called damp pine forest in the forest typology.

Located on large, flat areas in central parts of dune belts. Podzolic soil formed on loose sands.

Water-table generally much below -2.5 m.

Tree layer dominated by *Pinus silvestris* (60%) with a large admixture of *Betula verrucosa* (20%) and *Quercus sessilis* (20%). Shrub layer includes *Juniperus communis*, *Sorbus aucuparia*, and *Frangula alnus*. Herb layer made up of forest acidophilous plants (class *Vaccinio-Piceetea*) and nonforest (class *Nardo-Callunetea*).

This subassociation occupies 13.5% of the Park.

10. Moor-grass pine forest (*Vaccinio myrtilli-Pinetum molinietosum*), called wet pine forest in the forest typology.

Located in dune depressions, surrounded by pine and oak-pine forests within dune belts. Podzolic soil formed on loose sands.

Water-table varies from 0 to -1.0 m.

Tree layer almost exclusively consists of *Pinus silvestris* (70%) with an admixture of *Betula pubescens* (20%) and *Quercus robur* (10%). Scarce shrub layer made up of only three species: *Frangula alnus*, *Sorbus aucuparia* and *Juniperus communis*. Acidophilous herb layer, poor in species, dominated by a meadow plant *Molinia coerulea*.

This subassociation covers 1.8% of the Park.

11. Cup-moss pine forest (*Cladonio-Pinetum*), called dry pine forest in the forest typology.

Occurrence of this association among potential plant communities of the Kampinos Forest is problematic. Stands indicated on the map are located within a large area occupied by damp pine and oak-pine forests. Soil profile not developed; these are loose dry sands without humus horizon.

Water-table lower than -2.5 m.

Tree layer consists of *Pinus silvestris* (70%) and *Betula verrucosa* (30%). Sparse shrub layer. Herb layer consists almost only of acidophilous species, mostly nonforest (class *Nardo-Callunetea*), and also of psammitophilous species (orders *Corynephoretalia* and *Festuco-Sedetalia*). Cup-mosses (*Cladonia* sp. div.) and other epigeic lichens (*Lichenes*) are characteristic dominants.

This is a recessing association and covers no more than 0.2% of the Park.

12. Bog pine forest (*Vaccinio uliginosi-Pinetum*), also the same name in forest typology.

Located in several deeper deflationary bowls, in some places adjoins wet alder forests. Organogenic, hydromorphic soils, forest-sphagnum peat.

Stagnant water, with small annual fluctuations from +0.5 to -0.5 m; optimum at the soil level.

Tree layer dominated by *Pinus silvestris* (80%) with an admixture of *Betula pubescens* (20%). Among shrubs only *Sorbus aucuparia* and *Rhamnus frangula*. Herb layer consists of plants associated with high-moors (class *Oxycocco-Sphagnetea*) and transitional moors (order *Scheuchzerietalia*), and also of acidophilous forest plants (class *Vaccinio-Piceetea*).

This association covers a stable area but it does not exceed 0.1% of the Park.

PROJECT FOR ENLARGEMENT OF STRICT RESERVES IN THE KAMPINOS NATIONAL PARK

Natural processes of the regeneration of plant communities have been disregarded as yet, and not only in the Kampinos Forest. It was even argued that forest communities underwent "self-annihilation" in strict reserves. Extremely valuable comments on this subject were published by A. W. Sokołowski [5]. After 19 years from the establishment of the Kampinos National Park, it was possible to shift 3200 ha of its area from the category of partial reserves to the category of strict reserves, which proves that plant communities of the Kampinos Forest are very vigorous and have enormous vitality. The total area of strict reserves covers now 5230 ha, that is, more than 15% of the total Park area. According to the project set up recently, the following actions will be carried out:

— enlargement of the Professor Roman Kobendza strict reserve "Sieraków" by incorporation of the following areas: Ćwikowa Góra, Biała Góra, Nożyce, Długie Bagno, Torfisko. Biały Grąd,

- Komary, Młynisko, and a part of the Sierakowskie meadows; the total area of this reserve will be 1230 ha.
- enlargement of the strict reserve "Zaborów Leśny" by incorporation of the forest Trzy Włóki; the total area will be 136 ha.
 - enlargement of the strict reserve "Roztoka" by 2 ha; the total area will be 10 ha.
 - enlargement of the strict reserve "Wilków" by incorporation of Biela with surroundings and Poddział, the total area will be 431 ha.
 - enlargement of the strict reserve "Krzywa Góra" by: Klin, Ludwików, Matusy, Rzepowa Góra, Demboskie Góry, and Krężel; the total area will be 1107 ha.
 - enlargement of the strict reserve "Granica" by Meres and surroundings; the total area will be 223 ha.
 - enlargement of the strict reserve "Czapliniec" so that it will cover 12 ha.
 - the strict reserves "Rybitew" (213 ha), "Nart" (18 ha) and "Zamczysko" (5 ha) will not be enlarged.
 - establishment of the strict reserve "Cyganka" covering an area of 101 ha and including the forests Cyganka and Bór Niepustowy.
 - establishment of the strict reserve "Kaliszki" covering 120 ha.
 - establishment of the strict reserve "Debły", 294 ha in area and including Babia Łąka, Przykop, Wystawka, Ławskie Dęby, and Grabowy Grąd.
 - establishment of the strict reserve "Żurawiowe", 199 ha in area, including Żurawiowe, Na Działy, Wyrzut, Opalona Góra.
 - establishment of the strict reserve "Czarna Woda", 87 ha in area.
 - establishment of the strict reserves "Czerwińskie Góry I", 26 ha, and Czerwińskie Góry II, 21 ha.
 - establishment of the strict reserve "Niepust", 170 ha, including Niepustowe Łyse Góry, Czarne Bagno, and Paśniki.
 - establishment of the strict reserve "Łuże", 100 ha, including Łuże and Góra Łużowa.
 - establishment of the strict reserve "Kalisko", 280 ha, among villages Ławy, Wyględy Górne and Zaborów Leśny.
 - establishment of the strict reserve "Pożary", 450 ha, among villages Narty, Koszówka, Korfowe, Wróblewo, and Grabina.

Due to the planned restoration of the areas detached before centuries, the Kampinos Forest boundaries will almost correspond to those existing early in the 15th century. But we shall have to wait for a long time until full-grown trees sough on present meadows and arable lands. Observing the effects of many-year errors in the forest management frequently acting against nature, we shall make efforts to restore the plant cover of the Kampinos Forest in accordance with

laws of nature and with achievements in different fields of biological knowledge.

A good forester always realizes that greatest success in forest management can be reached when natural processes are merely accelerated by cultivation treatments, without fighting against nature, or conquering it and bending to our will. This should always be kept in mind, especially in the national park.

Kampinoski Park Narodowy
Stacja Naukowo-Badawcza
05-891 Łaski Warszawskie
Polska

REFERENCES

1. Ferchmin, M. 1977. Leśne jednostki taksacyjne obowiązujące w Kampinoskim Parku Narodowym. Klucz. Wyd. KPN.
2. Ferchmin, M. 1977. Mapa potencjalnych zespołów leśnych Puszczy Kampinoskiej. (Niepubl.) St. Nauk. Bd. KPN
3. Ferchmin, M. 1978. Projekt sieci rezerwatów ścisłych w Kampinoskim Parku Narodowym. (Masz.) St. Nauk. Bad. KPN.
4. Kobendza, R. 1930. Stosunki fitosocjologiczne Puszczy Kampinoskiej. *Planta Polonica* 2.
5. Sokołowski, A. W. 1977. O właściwe kierowanie rozwojem rezerwatów leśnych. *Chr. Przyr. Ojcz.*, 33: 66—70.
6. Traczyk, T., Traczyk, H. 1963. Ocena fitosocjologiczna rezerwatów ścisłych Kampinoskiego Parku Narodowego. (Masz.) St. Nauk. Bad. KPN.
7. Traczyk, T., Traczyk, H. 1965. Charakterystyka fitosocjologiczna terenów badawczych Instytutu Ekologii PAN w Dziekanowie Leśnym (Puszcza Kampinoska). *Fragm. Florist. Geobot. (Cracow)*, 11: 547—562.
8. Wolak, J. 1967. Inwentaryzacja fitosocjologiczna Kampinoskiego Parku Narodowego — zespoły leśne. I. Klucz do kartowania roślinności. (Masz.) St. Nauk. Bad. KPN

PROGRAM RESTYTUCJI SZATY ROŚLINNEJ KAMPINOSKIEGO PARKU NARODOWEGO

STRESZCZENIE

Celem działania Kampinoskiego Parku Narodowego jest jak najszybsze unaturalnienie Puszczy Kampinoskiej. Dokonać tego można stosując się ściśle do „Mapy potencjalnych zespołów leśnych Puszczy Kampinoskiej”, która prognozuje zmiany jakie nastąpią w zbiorowiskach roślinnych na skutek: 1) zalesiania gruntów porolnych uzyskanych dla Kampinoskiego Parku Narodowego drogą wykupu, 2) przebudowy drzewostanów przy pomocy zabiegów hodowlanych (w rezerwachach częściowych), 3) naturalnej regeneracji zbiorowisk leśnych i ich siedlisk (w całym parku a w rezerwachach ścisłych wyłącznie).

Program restytucji szaty roślinnej zakłada występowanie w Puszczy Kampinoskiej 12 potencjalnych jednostek (w nawiasach podano ich udział procentowy w powierzchni Parku — 34.410 ha): *Carici elongatae-Alnetum* O1 (4,0%), *Circaeo-Alnetum* OIJ (16,9%), *Salici-Populetum* LŁ (w otulinie) *Quercu-Carpinetum stachytosum* LW (21,6%), *Quercu-Carpinetum typicum* Lśw i *Quercu-Carpinetum calamagrostetosum* LM (razem 19,4%), *Potentillo albae-Quercetum* (5,8%), *Pino-Quercetum* BMśw (16,7%), *Vaccinio myrtilli-Pinetum typicum* Bśw (13,5%), *Vaccinio myrtilli-Pinetum molinietosum* BW (1,8%), *Cladonio-Pinetum* BS (0,2%), *Vaccinio uliginosi-Pinetum* BB (0,1%).

Efektem naturalnej regeneracji, częściowo przyspieszonej zabiegami hodowlanymi, jest możliwość rozbudowania sieci rezerwatów ścisłych o 5.230 ha, tj. o ponad 15% powierzchni Kampinoskiego Parku Narodowego.

ПРОГРАММА РЕСТИТУЦИИ РАСТИТЕЛЬНОГО ПОКРОВА КАМПИНОССКОГО НАЦИОНАЛЬНОГО ПАРКА

РЕЗЮМЕ

Автор считает, что основой для реституции растительного покрова Кампиносского национального парка является искусное воздействие с естественным процессом регенерации растительных сообществ и их биотопов путем соответствующего облесения возделываемых в прошлом и откупленных земель и перестройки видового состава уже имеющихся древостоев. Он перечисляет 12 потенциальных фитосоциологических единиц, представленных на „Карте потенциальных лесных ассоциаций Кампиносской пуши”, которая служит явным вспомогательным средством при реализации программы реституции растительного покрова.

Вторая часть доклада посвящена обсуждению продолжения о расширении сети полностью заповедных территорий Кампиносского национального парка до 5 230 га в 21 объекте.