

Prądnik. Prace Muz. Szafera	3	9-12	1991
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**WARUNKI SKUTECZNOŚCI DZIAŁAŃ NA RZECZ OCHRONY FLORY
I FAUNY PARKÓW NARODOWYCH I REZERWATÓW**

**Conditions of effective protection of flora and fauna in national parks and
nature reserves**

ABSTRACT. This article presents factors which cause plant and animal species to vanish. The conditions that must be fulfilled by studies of this phenomenon and activities ensuring the permanence of species localities and biocenoses are given.

KEY WORDS: species extinction, conditions of species protection, national parks, nature reserves.

SUMMARY

Vanishing of many plant and animal species, occurring also in the national parks and nature reserves, is caused by many factors, including:

- a. the process of primary succession expressing the tendencies of ecosystem development,
- b. secondary succession process reconstructing the natural biocenoses composition,
- c. general (directional) climate changes,
- d. periodic changes of particular climate elements (temperature, rainfall, insolation),
- e. alterations of physical and chemical environment properties caused by man's activity such as air, water and soil pollution,
- f. protection system applied (strict or partial protection),
- g. economy system on the protected object (cultivating, thinning applied in a forest, method of protection against pests),
- h. tourism management and the intensity and character of tourist traffic,

Knowledge about the state of the population, number of its localities and the amount of individuals on each, is essential for studies on species extinction.

The character and range of protection measures applied to flora and fauna should be decided according to the function a given part of a national park, or a nature reserve is to serve.

The problem of species extinction should be solved according to their state on the whole area of the country, and on the whole area of their occurrence. On this area, the real extend of danger to species should be determined, and the urgency of protection measures decided. Therefore, international cooperation is very important, mainly because the most dangerous factor (industrial pollution) has a global range.

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UWAGI O OCHRONIE PULI GENOWEJ POPULACJI

On the conservation of gene pool of population

ABSTRACT. Geneticists are all agreed that the genetic variability of population determines its fitness and survival. This has been proved by comparative studies on homo- and heterozygotes as well as by observations of diplo- and polyploid populations of the same species. Small populations are at the great risk of losing their genetic variability due to so-called “founder effect”, inbreeding and genetic drift.

The conservation of gene pool should concern, first of all, rare, vanishing, and genetically isolated species. Gene pools of other species should be secured by an adequate system of protected areas.

KEY WORDS: small population, fitness, genetic variability, gene pool, conservation of gene pool.

SUMMARY

Population geneticists are of an unanimous opinion that the fitness of an individual is determined by its genetic variability as well as by the genetic diversity of the whole population. The genetic polymorphism of an individual increases its chances for survival and makes it more resistant to diseases. Heterozygotic individuals develop quicker and the process of their development is better stabilized than in homozygotes. Parthenogenetic polyploid forms, in comparison with the reproducing sexually diploid forms of the same species, have, in general, a much wider geographical range and they are also more resistant to unfavourable environmental conditions.

In small populations the progressive loss of genetic variability is a very dangerous natural (endogenic) phenomenon. It is caused by inbreeding, genetic drift, and “founder effect”. The conservation of the gene pool of rare species consists in preventing these negative phenomena. Adequate population numbers are a chief factor securing specimens from the loss of genetic variability. A so-called effective number of specimens on the scale of several generations should be not smaller than 50, and on the scale of some hundred generations – than 500. Not all species can and should be included in the conservation of gene pool. First of all, we should protect these forms that are genetically distant from others, that are strongly threatened with extinction, or that live in isolated populations. To conserve gene pools of other species an adequate system of protected areas should be created.

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**OCENA WARUNKÓW SIEDLISKOWYCH WSTĘPNYM ZADANIEM
W CZYNNEJ OCHRONIE GATUNKOWEJ ROŚLIN**

**Evaluation of habitat conditions as a preliminary task in the active protection
of plant species**

ABSTRACT. The active protection of plant species, and particularly their introduction, reintroduction, and metaplantation, needs the knowledge of their autecology. The principles of the optimum selection of natural populations and specimens for the preservative culture should be worked out. It is necessary to know optimum habitat and microhabitat conditions for the plant populations investigated. The planned experimenting in this field is postulated.

KEY WORDS: optimum habitat conditions, preservative plan culture, ecological variability of microhabitats, ecological structure of population.

SUMMARY

In a small area occupied by a given plant species, its different populations occur under different habitat conditions constituting their microhabitats. The active protection of plant species must be based on the knowledge of the biology of given plant species as well as of optimum habitat conditions for each populations we are able to investigate. Thus, a detailed ecological analysis of species and population characteristics should be made. This, among others, allowed to determine the optimum habitat conditions and select the populations suitable for introduction and reintroduction of many species, e.g. *Dactylorhiza sambucina*, *Iris sibirica*, *Arnica montana*, *Utricularia neglecta*, and *Utricularia minor*. The effectiveness of the active protection of plant species depends to a high degree upon the knowledge of their autecology. Protective measures including the introduction of wild plants for preservative culture in botanical gardens as well as the reintroduction, metaplantation, and other ecomanipulations in nature, should be based on the appropriately planned research and experiments. Otherwise, we could not make the optimum selection of populations and specimens for their preservation in the bank of genes and in nature.

Prądnik. Prace Muz. Szafera	3	31–37	1991
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WYMIERANIE DRZEW I KRZEWÓW W KARKONOSKIM PARKU NARODOWYM

The extinction of trees and shrubs in Karkonosze National Park

ABSTRACT. Among the results of man-caused changes of the environment of Karkonosze National Park, the extinction of trees and shrubs is the most frightening. This paper presents the character of endangering factors, and the process of extinction of fir, spruce, common pine, dwarf mountain pine and carpathian birch.

KEY WORDS: extinction of tree and shrub species, air pollution, pasturing, tourism, Karkonosze National Park.

SUMMARY

Gaseous and dust air pollution, results of wrong forest management, changes of natural environment caused by pasturing, tourism, sport and human colonization are the most important factors endangering the tree and shrub populations of Karkonosze National Park.

Out of 61 tree and shrub species found in this national park as many as 38 presently exist on a few localities and are endangered because of being rare. Between the last ten and twenty years the extinction of forest-composing species as well as of those which make up the subalpine scrub has been very frightening. Nearly all fir has died out already, spruce is rapidly becoming extinct, dwarf mountain pine and carpathian birch are dying out. The process of tree and shrub extinction causes climatically conditioned ecosystems of forests and mountain scrub to fall apart. As its result, the nature of Karkonosze National Park is greatly and irreversibly damaged.

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**WYMIERANIE RZADKICH GATUNKÓW ROŚLIN NA POWIERZCHNI
BADAWCZEJ „CZYŻÓWKI” W OJCOWSKIM PARKU NARODOWYM**

**The extinction of rare plant species on „Czyżówka” study plot
in Ojców National Park**

ABSTRACT. From a permanent study plot, containing a rocky ridge typical for Ojców National Park, numerous species of vascular plants are vanishing. Plants both light loving and highly xerothermic are these rapidly losing their localities, as a result of the rocks being overgrown with shrubs and shaded by trees.

KEY WORDS: species extinction, rare plant species, ecological classification of plant species, flora gene resources protection, Ojców National Park.

SUMMARY

During the last two decades, plant species have been vanishing from Ojców National Park with great intensity. Studies using permanent study plots have been conducted for twenty years, as to determine the causes and rate of this extinction.

The „Czyżówka” study plot contains a rocky ridge typical of Ojców National Park (fig. 1,2). Highly various relief of the territory and its microclimate provides the environment for plants of different ecological characteristics.

Between 1968 and 1988, the changes in the number of localities occupied by each of the 40 plant species were determined, using mapping in scale 1:500. Xerothermic plants decreased their number of localities to the greatest extent (tab. 1,2, fig. 3-33). Many localities were lost to mountain plants which are oligothermic but also light-loving. Only the shade-loving sylvan plants expanded their area to a great extent.

These changes are caused by the overgrowth of rocks and grasslands by shrubs and shading by trees. On this rocky ridge, strictly protected, 3 species: *Agrimonia eupatoria*, *Inula salicina* and *Pulmonaria mollissima*, have already died out. 13 more species have lessened the number of their localities by more than 70% (tab. 3). Many of them may become extinct in the coming decade.

These results will be used to elaborate the programme for active protection of ecological diversity and flora gene resources.

Prądnik. Prace Muz. Szafera	3	81–91	1991
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PROGRAM AKTYWNEJ OCHRONY ZASOBÓW GENOWYCH FLORY OJCOWSKIEGO PARKU NARODOWEGO

Programme of active protection of the gene resources in the Ojców National Park

ABSTRACT. The present flora of the Ojców National Park is characterized by an outstanding richness and diversity. This is a great extend the result of the previous human economy, which led to the development of semi-natural biocenoses which are extremely abundant in species. In order to protect the maximum diversity and gene resources of the flora, the spatial arrangement of communities must be carefully programmed and strictly connected with the habitat conditions of the area. In the natural situation of the Ojców National Park it would be most favourable to given preference to grassland communities and scrub on the southern slopes and dense woods on the northern ones.

KEY WORDS: anthropogenic changes in the vegetation, plant species extinction, biodiversity protection, flora gene resources protection, protection management, active protection, national parks.

SUMMARY

Between 1809–1956 on the territory of the present Park intensive husbandry was carried out, consisting mainly of logging and grazing of liverstock. It caused profound changes in all types of plant communities and in the local flora. Those species which had died out or whose number had decreased were mainly oligothermic, shade-loving and hydrophilous. Among the mesophilous, ubiquitous, and xerothermic plants, there was a dominant tendency to spread and to show an increase in population number (fig. 1).

After the establishment of the Ojców National Park in 1956, and after the introduction of strict protection in the natural forest biocenoses the extinction rare of the species connected with theme was reduced. The visible tendency towards extinction of the communities and species of damp and aquatic habitats was not curbed after the establishment of the Park. In the last 30 years 10 vascular plant species e.g., *Sanquisorba officinalis*, *Equisetum variegatum*, *Epipactis palustris*, *Valeriana dioica*, have died out. At the same time, a rapid overgrowth of xerothermic grasslands on valley slopes followed, resulting from severe grazing restrictions. Grasslands were diminished by 70-75%. Some rare species of xerothermic plants, such as *Onobrychis arenaria*, *Adenophora liliifolia*, *Nepeta pannonica*, *Orobanche alba*, *O. lutea*, *O. alsatica*, *Hieracium echioides*, *Salvia nemorosa*, vanished from the Park. The populations of more than a dozen e.g., *Aster amellus*, *Agropyron trichophorum*, *Anemone sylvestris*, *Cirsium pannonicum*, fell to a critical number and are likely to become extinct in the near future.

The trends of changes in the vegetation of the Ojców National Park observed in the last 30 years is unfavourable from the point of view of the biocenotic diversity and gene resources. They lead to the extinction of non-forest communities and xerothermic and hygrophilous species (cf. Fig. 1). As a result, there follows a rapid decrease in ecological diversity of plant communities and the impoverishment of the gene resource of the flora.

The present vegetation of the Ojców National Park is still characterized by an outstanding richness and diversity. This diversity is to a great extent the result of the previous human economy, which led to the development of semi-natural biocenoses extremely abundant in species. The protection of this exceptional diversity is the main task of the Park. It demands a carefully designed spatial network of partial and strict reserves, and precisely conducted diversified routine protection measures. The area of the Park was divided into units with separate protective functions (Fig. 2). The rocky Prądnik Valley is intended for protection of the cultivated landscape with a mosaic spatial structure of the main plant formations (woods, scrub and grasslands). In order to archive maximum diversity, the spatial arrangement of communities cannot be fortuitous. It must be carefully programmed and strictly connected with the habitat conditions of the area. Taking into consideration the aspects mentioned above, studies were carried out on model, comparable sections of valleys, which differed as to the spatial distribution of plant formations (Fig. 3). From the studies it appears that in order to protect the gene resources and ecological diversity of the flora in the condition of the Ojców National Park it would be most favourable to give preference to grassland communities and thin scrub on the southern slopes and dense woods on the northern ones. If we assume that in this optimum model of protection the habitat potential is utilized about 100%, then in the order exemplary valley sections analysed it is utilized only in 60% and in 40% (Fig. 3).

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**ROŚLINY NACZYNIOWE Z CZERWONEJ LISTY KRAJOWEJ
W BIESZCZADZKIM PARKU NARODOWYM – ZAGROŻENIE
I PROBLEMY OCHRONY**

**Vascular plants from the Polish „Red List” in Bieszczadzki National Park –
threats and protection problems**

ABSTRACT. The list of the endangered and rare vascular plants in Poland contains 339 species, 9 of them occur only in Bieszczady National Park. *Primula halleri*, of which few specimens existed is already extinct. A locality of *Aconitum tauricum* subsp. *nanum*, consisting of only 20 individuals, is endangered. The rest of the species are of the rare category, as presently they are not clearly endangered.

KEY WORDS: Red List, plant species extinction, Bieszczady National Park, Eastern Carpathian Mts.

SUMMARY

339 vascular plant species are placed on the „Red List” of Polish vascular flora (Zarzycki, Wojewoda 1986). 9 of them occur only in Bieszczady National Park. They are mostly endemic for Carpathians, or species belonging to the East Carpathian geographical element. Some of these species are endangered to a various degree, mainly as a result of the specimens being dug out by botanists-collectors, or picked and trampled by tourists. For this reason *Primula halleri*, whose locality had contained 4 individuals, became extinct, and the population (about 20 specimens) of *Aconitum tauricum* subsp. *nanum* is endangered. The remaining 7 species are included in the rare category. Of these, only *Hesperis nivea* has a very small population of about 20-30 individuals. The two known localities of *Helleborus purpurascens* comprise 500-600 specimens. *Aconitum lasiocarpum*, *Carex dacica*, *Carex rupestris*, *Melampyrum saxosum* and *Sesleria coeruleans* have populations of a thousand to a few thousands individuals.

Only the locality of *Aconitum tauricum* requires fast protective actions, safeguarding it against tourists. Moving a few specimens to other locations, not endangered by tourism, is also recommended. The populations of the remaining species should be constantly controlled, and excessive numbers of hikers should not be allowed at their localities.

Prądnik. Prace Muz. Szafera	3	103–114	1991
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**RZADKIE I GINĄCE GATUNKI ROŚLIN NACZYNIOWYCH
W REZERWACIE LAS BIELAŃSKI W WARSZAWIE**

**Rare and vanishing vascular plant species in the Las Bielański nature reserve
in Warsaw**

ABSTRACT. Out of 150 native forest species occurring in the Las Bielański nature reserve, as much as 16 may be considered as rare or vanishing. Their localities are situated within the most natural phytocoenoses which at present cover only 20% of the area and which undergo a further gradual degradation due to anthropoppression.

KEY WORDS: Las Bielański nature reserve, vascular plants, species endangerment, anthropoppression, native flora degradation.

SUMMARY

There was made a preliminary evaluation of a degree of the endangerment of native forest species that are rare in the area of the nature reserve and not show a tendency to apophytism. This evaluation included coenoelements of forest syntaxa as well as species of oak-hornbeam forests and of alderwoods forming there a characteristic combination. As a basis for the evaluation of their endangerment there were accepted: their present area in Las Bielański, their occurrence or absence in other forests of Warsaw as well as the degree of degeneration of natural phytocoenoses resulting, among others, from the neighbourhood of housing estates and highways (fig. 1).

It has been found that in the contemporary flora of the nature reserve the share of native and foreign non-forest species is high and that the dominance of native forest species is only slight (fig. 2). Among these latter only few occur commonly and behave like typical hemerophiles (fig. 3a, b), while many are restricted to several or ten-twenty at the utmost, localities (fig. 3c).

To the particularly threatened species, occurring sporadically also in other forests of Warsaw, there belong: *Carex remota*, *Chrysosplenium alternifolium*, *Asarum europaeum*, *Isopyrum thalictroides*, *Paris quadrifolia*, *Phyteuma spicatum*, *Carex digitata*, *Brachypodium sylvaticum*, and *Hypericum montanum*. The species fairly common in other forests outside the nature reserve, and namely: *Athyrium filix-femina*, *Trientalis europaea*, *Vaccinium myrtillus*, *Dryopteris filix-mas*, *Epipactis helleborine*, *Luzula multiflora*, and *Polygonatum odoratum* are threatened to a lesser degree. The localities of all rare species lie within or in the immediate vicinity of the most natural patches (see fig. 4). Unfortunately, these cover only 20% of the area of the nature reserve and undergo further degenerative changes due to anthropoppression (Baum et al. 1982, Chojnacki, Mróz 1984).

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**EKOLOGICZNA WRAŻLIWOŚĆ WYBRANYCH MAKROHYDROFITÓW
WZGLĘDEM SKAŻEŃ CHEMICZNYCH WÓD A ICH ZANIKANIE**

**Ecological sensibility of chosen macrohydrophytes to chemical contamination
of waters and their extinction**

ABSTRACT. Chemical contamination of waters causes the extinction of many macrohydrophytes. Various populations of the same species often display varied ecological sensibility to the same toxin. Accordingly, they show ecotope differentiation, mainly because of its water and hydrosol chemism. This phenomenon is crucial in the conservation cultures of water plants.

KEY WORDS: ecological sensibility of macrohydrophytes, macrohydrophyte extinction, chemical contamination of waters, treshold and lethal concentration LC_{50} and LC_{100} .

SUMMARY

Chemical contamination of various waters in Lower Silesia causes the extinction of many macrohydrophytes (tab. 1). Among them our attention is called to dying out water liverworts (*Riccia fluitans*, *Ricciocarpus natans* and *Scapania undulata*), water mosses including *Fontinalis antipyretica* and *Platyhypnidium rusciforme*; and also vascular plants such as *Utricularia* sp. sp., *Callitriche* sp. sp., *Potamogeton* sp. sp. and others.

Macrohydrophytes (e.g. *Lemna minor*, *Spirodela polyrhiza*, *Shoenoplectus lacustris*, the rare *Salvinia natans* and *Aldrovanda vesiculosa*) display ecotope differentiation mainly because of its water and hydrosol chemistry.

The ecotope variability of natural *Riccia fluitans* and *Ricciocarpus natans* populations, and also water mosses *Fontinalis antipyretica* and *Platyhypnidium rusciforme* is proved by their varied sensibility to phytotoxines (tab. 2, 3).

Active protection of macrohydrophyte species, such as introducing them to cultivation *in vitro* conservation cultures requires a knowledge of their chemical ecology, and especially their varied sensibility to chemically contaminated water.

PRĄDNIK
PRACE I MATERIAŁY MUZEUM IM. PROF. WŁADYSŁAWA SZAFERA

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**ZMIANY POWIERZCHNI ZESPOŁÓW ROŚLINNOŚCI
KSEROTERMICZNEJ NA WYŻYNIĘ LUBELSKIEJ**

Changes of the area of xerothermal plant communities in the Lublin Upland

[brak abstraktu, słów kluczowych i streszczenia]

Prądnik. Prace Muz. Szafera	3	125–133	1991
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**PRZYCZYNY I STOPIEŃ ZAGROŻENIA STANOWISK LNU
WŁOCHATEGO *LINUM HIRSUTUM* L. W POLSCE**

**The causes and degree of the endangerment of *Linum hirsutum* L. stands
in Poland**

ABSTRACT. *Linum hirsutum* L. is a rare, threatened with extinction, plant in Poland. It occurs at present in 17 stands but only in 4 of them it is likely to survive. *L. hirsutum* needs active protection; strict nature reserves are not a proper form of its conservation.

KEY WORDS: *Linum hirsutum*, species distribution, abundance of species, threat factors, active protection.

SUMMARY

Linum hirsutum L. is a thermo- and photophilous species representing a Pontic-Pannonian element in our flora. Its continuous range includes Southern and South-Eastern Europe and Little Asia. In Poland this plant reaches the north-western border of its range. Out of 23 stands previously known from Poland, only 17 have remained (tab. 1): 7 in Miechów region and 10 in the Pińczów region. The species has become extinct in 3 stands that connected these two areas forming then one distributional island as well as in 3 isolated stands lying in the environs of Kazimierz, Sandomierz, and Chodel in the Lublin Upland.

L. hirsutum is connected with steep south-facing slopes. It most often grows in moderately dry grasslands of the *Cirsio-Brachypodium* alliance. The plant is most abundant in the initial stages of the *Inuletum ensifoliae* and *Origano-Brachypodietum* associations overgrowing poor, shallow, carbonate or gypsum rendzinas of an alkaline reaction.

The area of particular stands varies between several square meters and several square kilometers; they most often cover a few areas. *L. hirsutum* populations, changing in numbers from year to year, include from several to some thousand specimens in the particular stands (fig. 1).

The degree of the endangerment of *L. hirsutum* stands is an effect of the operation of factors favouring this species or eliminating it. Natural erosion and artificial soil exposures (uncultivated ground, margins of fields, excavations formed due to the exploitation of stone or sand) as well as moderate grazing are factors favourable for *L. hirsutum*. On the other hand, the ploughing of stands, natural succession leading to their overgrowing with shrubs and trees, afforestation of grasslands, intense grazing, or utilization of stands as dumping grounds are factors eliminating *L. hirsutum*.

The state of the endangerment of *L. hirsutum* stands is as follows: 4 stands are endangered only slightly and they likely to be preserved, 11 are moderately or strongly endangered, while 2 are disappearing (fig. 1).

L. hirsutum needs active protection which should consist chiefly in preventing the natural succession. Strict nature reserves are not a proper form of the protection of this species. Stands included in strict nature reserves are more endangered than those lying in unprotected ones (fig. 1, tab. 1.).

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**ZMIANY LICZEBNOŚCI I PRZYCZYNY ZAMIERANIA
POPULACJI DŁUGOSZA KRÓLEWSKIEGO *OSMUNDA REGALIS* L.
W REZERWACIE FLORYSTYCZNYM „DŁUGOSZ KRÓLEWSKI”
W PUSZCZY NIEPOŁOMICKIEJ**

**Changes in number and the causes of extinction of *Osmunda regalis* L. popula-
tion in the „Długosz Królewski” reserve, Niepołomicka forest**

ABSTRACT. The paper presents the results of a study on the number and structure of *Osmunda regalis* L. population between 1959 and 1986, on the background of degradation of the reserve's forest environment. The effectiveness of the conservation measures applied so far was appraised and the method of an active protection of the species proposed.

KEY WORDS: autoecology of *Osmunda regalis* L., extinction of rare plant species, population structure and dynamics, active protection methods, Niepołomicka forest.

SUMMARY

The royal fern, *Osmunda regalis* L. is the only representative of *Osmundaceae* R. Br. Family in Poland. Since 1957 it is protected by law, as it is an endangered species (Zarzycki, Wojewoda 1986). On the localities still existing, unfavourable changes in the population of this species are observed. One of such localities is “Długosz Królewski” reserve in Niepołomicka forest.

As the result of the studies, the following phenomena were observed:

1. Shrinking of the range (from 16% of the reserve area in 1959 to 2% in 1986) of *Osmunda regalis* localities as a result of water drainage and shading.
2. Existence of 96 tufts fern (Mazur 1991), in which 1286 individuals were counted (tab. 1).
3. Assymetrical distribution of the population's height structure caused by rapid dying of mature individuals, and the lack of young plants to compensate because of disturbances in the generative reproduction (fig.1).
4. Not effective methods of species protection used so far.

The study determined, that in order to stop the extinction of the species, the shading of plants by trees and shrubs should be stopped. The number of localities can be increased by planting individuals produced by rhizome division.

This method does not guarantee saving the gene diversity of *Osmunda regalis*, which can only be achieved by generative reproduction. As there is no such reproduction taking place in the reserve, a laboratory method of growing plants from spores has to be devised. Young plants produced in this way should be planted onto existant and historical localities, in optimal habitat conditions.

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**WYMIERANIE I WARUNKI AKTYWNEJ OCHRONY POPULACJI
SZAFRANU SPISKIEGO *CROCUS SCEPUSIENSIS* (REHM. ET WOŁ.)
BORB. W GORCZAŃSKIM PARKU NARODOWYM**

The extinction of *Crocus scepusiensis* (Rehm. Et Woł.) Borb. and active protection conditions for its population in Gorce National Park

ABSTRACT. On mountain glades of Gorce National Park (Western Carpathians) a rapid decrease in number of *Crocus scepusiensis* (Rehm. et Woł.) Borb., as a result of the abandonment of pasturing, has been observed. In this paper, this process and its dependencies on various habitat factors are described. *Crocus scepusiensis* becomes completely extinct in 20 years after all utilization and manuring of glades is stopped. To keep a big number of this species, the pause in utilization (pasturing and hay-making) and manuring of glades should not be longer than 5-7 years.

KEY WORDS: autoecology of *Crocus scepusiensis*, population dynamics, secondary succession, plant species protection, national parks, Western Carpathians.

SUMMARY

Crocus scepusiensis (Rehm. et Woł.) Borb. occurs in Western Carpathians on pastured glades. In Poland, it is protected by law.

For over 20 years, in Gorce National Park (Western Beskidy Mts.) systematic studies on the population dynamics of *Crocus scepusiensis*, have been conducted on an exemplary glade (fig. 1), on which pasturing and manuring was abandoned in 1967. A rapid decrease of the area occupied by *Crocus scepusiensis*, as a result of the overgrowth of this glade by association with *Vaccinium myrtillus* and spruce forest, was observed (fig. 2a, b). It is forecasted that *Crocus scepusiensis* may die out completely by about 2005 (fig. 3).

During consecutive stages of vegetation succession, leading from pastured meadow *Gladiolo-Agrostietum* to spruce forest *Piceetum tatricum* (tab. 1), a significant decrease in number of its population was observed. Only on the plot No. 1, which was systematically pastured and manured, the number of *Crocus scepusiensis* specimens increased. The age structure of the population also changed (fig. 4, tab. 2). During consecutive stages of succession, the participation of young specimens decreased and the age structure became typical for populations dying out.

The decrease in number and worsening of the age structure of *Crocus scepusiensis* population is significantly dependent on various habitat conditions (fig. 5, tab. 3).

As a result of the conducted studies it was established that keeping rich populations of *Crocus scepusiensis* needs a periodical utilization (pasturing or hay-making) and manuring of glades. The pauses in utilization and manuring should not be longer than 5-7 years. When *Vaccinium myrtillus* association has been allowed to overgrow the glade, the reconstruction of *Gladiolo-Agrostetium* associations with a large population of *Crocus scepusiensis* is practically impossible.

Prądnik. Prace Muz. Szafera	3	161–174	1991
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**ZMIANY ZAGĘSZCZENIA I STRUKTURY POPULACJI DZIEWIĘĆSIŁU
POPŁOCHOLISTNEGO *CARLINA ONOPORDIFOLIA* BESSER
W PROCESIE SUKCESJI MURAWY KSEROTERMICZNEJ
ORAZ PROBLEMY JEGO AKTYWNEJ OCHRONY „IN SITU”**

**Changes in the density and structure of the *Carlina onopordifolia* Besser
population in the course of the succession of xerothermic grassland
and problem of its active „in situ” protection**

ABSTRACT. It has been found that habitat conditions greatly influence the density and structure of *Carlina onopordifolia* Besser. These characteristics attain their optimum in the *Inuletum ensifoliae* associations, at a sward cover of 70-97%.

KEY WORDS: *Carlina onopordifolia* Besser, habitat conditions, germination of seeds, survival of seedlings, population structure, population density, *Inuletum ensifoliae*.

SUMMARY

The range of *Carlina onopordifolia* Besser includes the Małopolska, Podole, Lublin and Wołyń Uplands (fig. 1). Because of its specific demands as to habitat conditions and the instability of communities in which it grows, the species needs active protection in our country. The germination of seeds and survival of seedling were examined in permanent study areas, while the density and structure – in randomly chosen plots within the particular communities. The germination of seeds and survival of seedling depend to a high degree upon habitat conditions (fig. 4). The greatest number of seeds (20%) germinated in the *Inuletum ensifoliae* association, at a sward cover of ca. 93%. The greatest number of seedlings (90%) survived the winter period in the *Inuletum ensifoliae* association, at a sward density of ca. 70%. The species occurred most numerously (11,36-17,20 specimens per 1 m²) where a sward cover was ca. 97% (fig. 7). The developmental structure of *Carlina onopordifolia* was very sound under these conditions, too, for all size classes of specimens were represented (fig. 8). The triangular shape of the developmental pyramid of a wide base indicates that the species well regenerates here. The active “in situ” protection of *Carlina onopordifolia* Besser consists in preserving the *Inuletum ensifoliae* associations of an appropriate species composition and structure. This can be done by (1) cutting trees and shrubs that overshadow a grassland and stabilize a ground, (2) preventing a sward from getting too dense, and (3) sowing seeds under control.

Prądnik. Prace Muz. Szafera	3	175–181	1991
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**OCHRONA CZYNNA STANOWISKA OSTNICY JANA *STIPA JOANNIS*
CEL. NA SKALE JONASZÓWKA W OJCOWSKIM PARKU NARODOWYM**

**Active protection of the *Stipa Joannis* Cel. locality on the “Jonaszówka” rock
in the Ojców National Park**

ABSTRACT. Changes of some chosen parameters of the population of *Stipa Joannis*, as a result of protection management are presented. In the period of investigation (1981-1989), a rapid increase in the number of tufts (from 17 to 101) and of generative shoots (from 10 to 966) was observed.

KEY WORDS: rare plant, species extinction, population dynamics, active protection, *Stipa Joannis* Cel., Ojców National Park.

SUMMARY

Stipa Joannis represents a rare steppe element in the flora of the Ojców National Park. Now, only a few of its localities remain on the strongly isolated rocks (fig.1). The locality on “Jonaszówka” rock, near a didactic trail, was endangered as a result of overgrowing by scrubs and shading by trees. In order to protect this locality of *Stipa Joannis*, the scrubs and selected trees were cut down and removed (fig. 2). These simple methods of active protection were very effective. Between 1981 and 1989, the number of tufts of *Stipa Joannis* increased from 17 to 101 (fig. 3) and the number of generative shoots rose from 10 to 966 (tab. 1, fig. 4). This way the small, typical fragment of the steppe grassland has been reconstructed as a result of protection management.

Prądnik. Prace Muz. Szafera	3	183–191	1991
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**STRUKTURA ROZMIESZCZENIA I WIELKOŚCI POPULACJI
OBUWIKA POSPOLITEGO *CYPRIPEDIUM CALCEOLUS* L. NAD
JEZIOREM KWIECKO (WOJ. KOSZALIŃSKIE)**

**Structure of the distribution and size of *Cypripedium calceolus* L. population
on the Kwiecko lake (province of Koszalin)**

ABSTRACT. In this paper there is presented the dynamics of the *Cypripedium calceolus* population in the investigated locality, that in the years 1986-1989 totalled 324-329 specimens.

KEY WORDS: *Cypripedium calceolus* L., population dynamics, size structure of the population, spatial structure of the population.

SUMMARY

The locality of *Cypripedium calceolus* L. on the Kwiecko lake is situated on the border of the inundated zone of the pumped-storage power station in Żydowo. About 300 specimens of this plant occur there. It was found that in the period 1986-1989 the number of overground shoots and share of generative ones as well as the character of the distribution of this population did not changed significantly. The structure of the size of shoots also remained stable.

Prądnik. Prace Muz. Szafera	3	193–208	1991
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WSTĘPNE WYNIKI PRAC NAD BIOLOGIĄ POPULACJI *THYMUS PRAECOX* OPIZ JAKO PRZYKŁAD BADAŃ WARUNKUJĄCYCH SKUTECZNĄ OCHRONĘ ZAGROŻONYCH GATUNKÓW ROŚLIN NACZYNIOWYCH

Preliminary results of studies on the biology of *Thymus praecox* Opiz population as an example of research essential for the effective protection of endangered vascular plant species

ABSTRACT. *Thymus praecox* Opiz occurs in Poland only in one, relict locality in the Ojców National Park, South Poland. The investigated population undergoes unfavourable changes. In shaded grasslands the number of mats decreases. In all the examined localities a decrease in number of specimen of different genetic origin is observed. The author suggests that the accurate knowledge of species life strategy and population trend are crucial to determine the effective protection methods of the species.

KEY WORDS: Ojców National Park, *Thymus praecox* Opiz, demography, reproduction, life strategy.

SUMMARY

Thymus praecox Opiz is a rare species in the flora of Poland. It occurs in the Ojców National Park, in grasslands *Festucetum pallentis*. In the years 1988-1990 demographical studies consisting in mapping the particular mats of the plant as well as biometrical measurements were carried out in the permanent 1 m² plots. To determine the production of seeds and the power and energy of their germination samples of seeds were taken.

The results obtained indicate that the investigated population of *Th. praecox* undergoes unfavourable changes. In shaded localities a reduction in the number of mats was found. In all the examined localities a decrease in number of specimen of different genetic origin is observed. Michalik's data (1991) as well as the author's unpublished data show that the number of localities in the Ojców National Park declines due to successional changes of vegetation.

The author is of the opinion that to protect successfully endangered vascular plant species we must determine:

1. Taxonomy of the species,
2. Size and distribution of a population in the area as well as a degree of isolation of the particular patches within the range of the species,
3. Habitat requirements of the species,
4. Population structure,
5. Life strategy – understood as a scheme of reproduction and survival,
6. Population trend.

PRĄDNIK
PRACE I MATERIAŁY MUZEUM IM. PROF. WŁADYSŁAWA SZAFERA

Prądnik. Prace Muz. Szafera	3	209–211	1991
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**ELEMENT TRZECIORZĘDOWY W FAUNIE POLSKI – KONIECZNOŚĆ
OCHRONY**

The Tertiary element in the Polish fauna – necessity of protection

ABSTRACT. Some examples of the Tertiary relics in the Polish fauna are described. The problem of protection are discussed.

KEY WORDS: Tertiary relict, species protection, faunistical research.

SUMMARY

The oldest element of the Polish fauna are some species of invertebrates which can be recognized as Tertiary relics. Some examples of this group are discussed above. They are distributed mostly in Carpathians but some of them were recorded from the Cracow-Wielunian Highland, too. The species under question are mostly small, soil, living and of unknown biology. Their protection needs at first the knowledge of their detailed distribution. It should be based on the further faunistical research.

Prądnik. Prace Muz. Szafera	3	213–219	1991
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**ZNACZENIE MIGRACJI DLA TRWAŁOŚCI POPULACJI SSAKÓW:
WNIOSKI PŁYNAĆCE Z BADAŃ NAD GRYZONIAM I**

**The significance of dispersal for the stability of mammalian populations:
conclusions stemming from studies on rodents**

ABSTRACT. On the basis of studies on dispersal in small mammals it has been shown that the dispersal behaviour prevents the local extinction of small populations decreasing, among others, their susceptibility to the random variability of habitat conditions. Controversial opinions concerning the advantages and shortcomings of corridors facilitating migrations for animals living in nature reserves were presented.

KEY WORDS: mammals, nature reserves, migrations, extinction of small populations, variability of habitat, ecological corridors.

SUMMARY

Dispersal behaviour of mammals creates an additional problem for their protection in nature reserves, where they often live as confined populations. It was found in model studies of rodent populations that preventing the animals from dispersal may cause:

(1) sharp increase in population numbers, overexploitation of the habitat, and as a result, extinction of all individuals; (2) drastic reduction of the effective population size in relation to the total population size; (3) increase in the susceptibility of the population to extinction due to randomly operating demographic and environmental factors.

Thus, mammal populations inhabiting protected areas can achieve higher stability and persistence, if they may disperse. To ensure free dispersal for mammals (particularly for larger species) ecological corridors should be constructed which, however, have many shortcomings (Table 2). On the other hand, maintenance of small populations confined to nature reserves (with no possibility to disperse) requires undertaking difficult and expensive substitute measures for their protection.

Prądnik. Prace Muz. Szafera	3	221–228	1991
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GINĄCE MOTYLE Z RODZAJU *MACULINEA* I ICH BIOLOGIA

Vanishing species of the genus *Maculinea* and their biology

ABSTRACT. There were characterized five European species of the genus *Maculinea*, the larval stages of which after completing the endophytic phase of life become specific parasites in the nests of ants representing the genus *Myrmica*. Causes of the endangerment of the occurrence of *Maculinea* were determined and methods of their protection proposed.

KEY WORDS: *Maculinea*, species endangerment, species biology, active protection.

SUMMARY

There are five species of the genus *Maculinea* known from Europe, and namely: *M. arion*, *M.alcon*, *M. teleius*, *M. nausithous*, and *M. rebeli*. In Poland only the occurrence of the last one, though possible, may be questionable. The existence of these species depend not only upon the presence of their host plants on which the larval stages feed in the early period of life but also upon the occurrence of the particular species of ants of the genus *Myrmica* in the nests of which these larvae parasitize in the later period of their life (tab. 1).

All *Maculinea* included in the world list of vanishing species are threatened with extinction in the western parts of their range, among others also in Poland, and their preservation depends upon active protection. In the Ojców National Park exist suitable conditions enabling this protection. In the present paper there was given essential information on the biology of these species, the knowledge of this is indispensable to protect them rationally. The preservation of all *Maculinea* species is the more important so as their larvae are parasitized by peculiar parasites of the genus *Neotypus*. Thus, the presented here natural system consisting of a host plant, butterflies, and at last secondary parasites of these butterflies, is very interesting, and worth of particular protection.

Prądnik. Prace Muz. Szafera	3	229–241	1991
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**ZMIANY W SKŁADZIE GATUNKOWYM I LICZEBNOŚCI *APOIDEA* W
OJCOWSKIM PARKU NARODOWYM W LATACH OD 1975 DO 1985**

**Changes in species composition and abundance of *Apoidea* in the Ojców
National Park in period 1975-1985**

ABSTRACT. During the last 5 years (1985-1989) only 28% species of *Apoidea* (excl. *Apidae*) were stated in the Ojców National Park in comparison with the data from the 60-ties and early 70-ties. The total number of those insects decreased even more (12,5%). The numbers of *Bombus* and *Psithyrus* (*Apidae*) decreased by about 5 times in the Sąsówka Valley; species connected with the meadows *Arrhenatherion elatioris* vanished. So, in the decade 1975-1985 at least 50% species and 70% numbers of specimens *Apoidea* (excl. *Apidae*) were extinct.

KEY WORDS: *Apoidea*, number of species, changes in abundance, habitat degradation.

SUMMARY

In the years 1958–1975 I collected 134 species of *Apoidea* (excl. *Apidae*) in the Ojców National Park. Later, in the years 1985–1989 I undertook studies on changes in a species composition and number of these insects.

Studies on changes in species composition consisted in catching *Apoidea* (excl. *Apidae*) in the three places most abundant in the bees fauna where in the 1958–1975 period. I collected 75% of the species and 64% of the specimens of *Apoidea* from the whole area of the Ojców National Park. I was able to catch a mere 28% of the species and 12,5% of the specimens collected in the first phase of studies. The investigated places have been subjected to considerable degradation because they have become wet as a result of the introduction of beavers, xerothermal patches being overgrown, and the mowing of meadows discontinued. For this reason, at least 50% of the species of the Ojców National Park have vanished and their number has decreased by over 50%.

From 1958 to 1987 the number of *Bombus* Latr. and *Psithyrus* Lep. in the Sąsów Valley declined about fourfold, and from 1974–1975 it was about 12 times as low as in the period 1958-1964 (70 specimens per 100m²).

Further degradation of *Apoidea* fauna here may be provarted by the removal of the beavers, thinning of overgrown xerothermal patches, and systematic mowing of meadows (leaving unmown strips).

Prądnik. Prace Muz. Szafera	3	243–245	1991
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**O POTRZEBIE OCHRONY NOCLEGOWISK BŁOTNIAKÓW
ZBOŻOWYCH (*CIRCUS CYANEUS* L.) W OKRESIE WĘDRÓWEK
I ZIMOWANIA**

**On the need for the protection of communal roostings of the hen harriers
(*Circus cyaneus* L.) during their migrations and wintering**

ABSTRACT. Two communal roostings of hen harriers (*Circus cyaneus* L.) were investigated. An analysis of the feathers and feces found in the communal roostings of hen harries revealed that short-eared owls (*Asio flammeus* L.), barn owls (*Tyto alba* L.) and pheasants (*Phasianus colchicus* L.) made use of them. Hen harriers fed chiefly on voles (*Microtus* sp.).

KEY WORDS: *Circus cyaneus* L., night platforms, winter communal roostings, threat factors.

SUMMARY

Population number of the majority of birds are controlled not only in their breeding grounds but also during their migrations and wintering. Every year hen harriers use the same places as their communal roostings where they jointly spend the night. The disturbance of bird or destruction of night quarters (drainage, burning of vegetation) may cause losses in the population. There were investigated two communal roostings of hen harriers: communal roosting A, located on the Tarnowo carbonate peat-bog near Pławnice (province Chełm) with *Cladium mariscus* (L.) Pohl as a dominating plant, and communal roosting B, on the Międzybłocie peat-bog near Dub (province of Zamość) with *Carex elata* Bell. Numbers of hen harriers considerably changed. Peak numbers feel on December and February. These fluctuation in numbers were influenced by the presence of satellite-communal roostings. As the night platforms were regularly controlled the collections of pellets, and feces were made. An analysis of the collected material revealed that the night platforms of hen harriers were used by other animal species such as the short-eared owl (*Asio flammeus* L.) pheasant (*Phasianus colchicus* L.) as well as red fox (*Vulpes vulpes* L.) and European hare (*Lepus capensis* L.).

Prądnik. Prace Muz. Szafera	3	247–250	1991
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**PRÓBY OCHRONY STANOWISKA ŻÓŁWI BŁOTNYCH
(*EMYS ORBICULARIS* L.) WE WSI STAŃKÓW KOŁO CHEŁMA**

Attempts at the protection of the stand of European pond tortoise (*Emys orbicularis* L.) in the village of Stańków near Chełm

ABSTRACT. There were analysed attempts at preserving the locality of European pond tortoise and creating a nature reserve in the village of Stańków near Chełm. One of the strongest populations of this species occurred in that area previously. The region under discussion was subject to drainage and a nature reserve has not been established. However, the locality has been preserved because drainage was realized only in part and an artificial lake was created.

KEY WORDS: *Emys orbicularis* L., population number, threats to population.

SUMMARY

There were analysed Skibiński's attempts at creating a nature reserve and preserving the locality of European pond tortoise in the vicinity of the village of Stańków near Chełm. In the fifties one of the most numerous populations of this species, estimated by Skibiński at 100 specimens, occurred there. The area in which the planned nature reserve was to be located was subject to drainage; there were carried out such operations as draining of marshes, channelization of rivers etc. However, the locality under discussion has been preserved because the area has been drained only in part and an artificial lake has been formed in a small valley. Also the influx of municipal sewage and industrial wastes to the water reservoir has been prevented. Despite much endeavour a nature reserve has not been created. Observations and information given by local people indicate that in the overgrown and not ramparted part of the water reservoir there several or even ten to twenty pond tortoises. This decimated population should be taken under protection.

Prądnik. Prace Muz. Szafera	3	251–254	1994
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**CZYNNIKI REGULUJĄCE LICZEBNOŚĆ BŁOTNIAKÓW
ŁĄKOWYCH (*CIRCUS PYGARGUS*, *AVES*, *ACCIPITRIDAE*)
W REZERWATACH TORFOWISKOWYCH LUBELSZCZYZNY**

**Factors limiting the numbers of Montagu's harriers (*Circus pygargus*, *Aves*,
Accipitridae) in peat-bog nature reserve in the region of Lublin**

ABSTRACT. The population of the Montagu's harriers (*Circus pygargus*) in nature reserve of the Lublin region is strongly endangered. The destruction of nests by different predators and scarcity of food are chief factors limiting the population numbers.

KEY WORDS: *Circus pygargus*, small population, limits of reproduction

SUMMARY

The Montagu's harriers, a strongly endangered bird of prey, has its breeding colonies in several marshes nature reserve in the region of Lublin. Carbonate marshes near Chełm form one of the rare natural habitats of the species in Europe. Main factors limiting the reproduction in the Montagu's harrier are of a natural character. These are predation and food availability. Numerous predators influencing the different stages of the breeding cycle in the Montagu's harrier destroy about 30% of its nests. Montagu's harrier feed chiefly on field voles (*Microtus* spp.). A scarcity of food in the particular years affects the breeding success of this species through (1) the mortality of embryos, (2) mortality of nestlings, and (3) kainism. This enables to adjust the size of population to the actual food resources.

Prądnik. Prace Muz. Szafera	3	255–257	1991
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**OCHRONA GNIAZD PTAKÓW SZCZEGÓLNIIE ZAGROŻONYCH
W LASACH LUBELSZZCZYZZNY**

Protection of threatened bird species' nests in forests of the Lublin region

ABSTRACT. Forests cover about 20% of the area of the Lublin region. Three species of eagles, Black Stork, and Eagle Owl breed there. All their nests should be provided with protective zones of a radius of 200-500 m. These zones have been created around most of the nests of White-tailed Eagles, Eagle Owl, and Spotted Eagle. On the other hand, the nests of much more abundant Black Stork and Lesser Spotted Eagle are secured unsatisfactorily.

KEY WORDS: threatened bird species, eagles, Eagle Owl, Black Stork, protective zones.

SUMMARY

Forest cover about 20% of the area of the Lublin region. The occurrence of 3 eagle species: White-tailed Eagles, Lesser Spotted Eagle, and Spotted Eagle as well as of Black Stork and Eagle Owl has been noted there. According to the instructions given by the Ministry of Forestry and Timber Industry in 1983 the nests of these bird should be provided with protection zones. In the Lublin region these zones have been created around all nests of White-tailed Eagles, around 50% of the nests of Eagle Owl and Spotted Eagle, and around but 16% of the nests of Black Stork and of Lesser Spotted Eagle. To improve the protection of the nests of these species, the existing regulations must be rigorously enforced in the established protective zones, more detailed studies on the distribution of the species under discussion should be undertaken, and old Buzzard's nests, that may next serve Eagle Owl and Black Stork, should be secured.