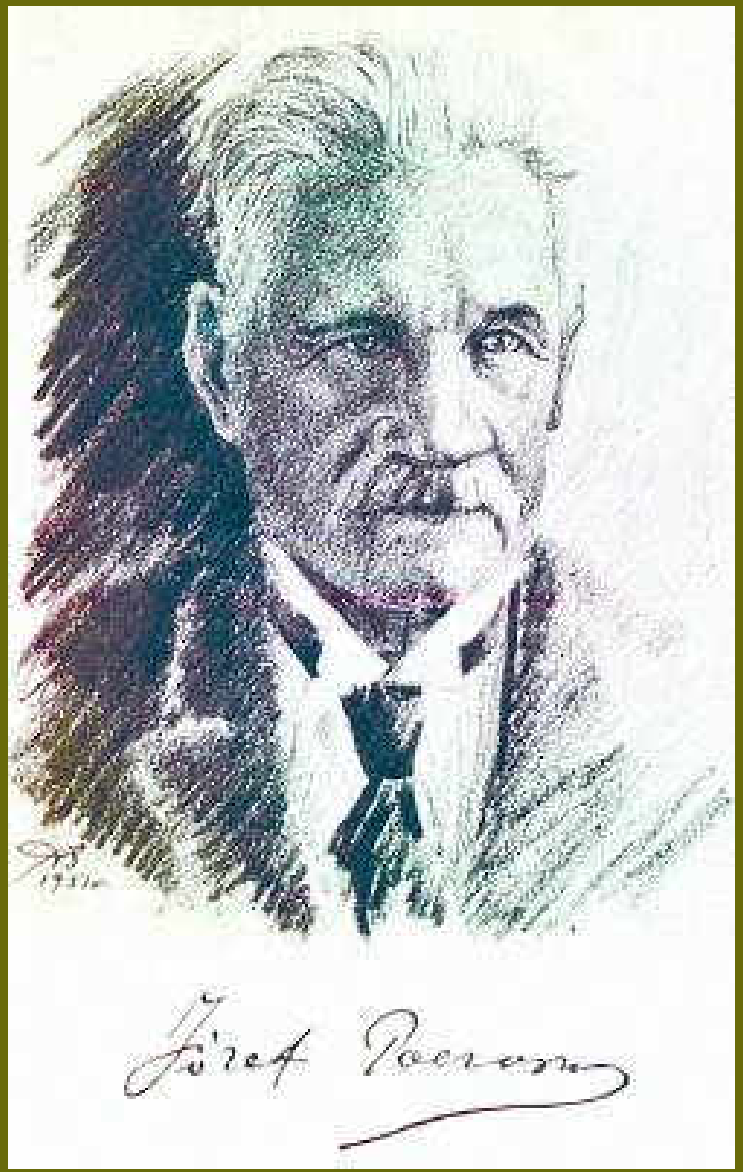
ADVANTAGES AND DISADVANTAGES OF PHYTOSOCIOLOGICAL APPROACH

IN VEGETATION ECOLOGY AND NATURE PROTECTION

PHYTOSOCIOLY BEGUN AT THE END OF 19TH CENTURY



In 1895 Józef Paczoski proposed the term „phytosociology” for studies on vegetation – its structure and dynamics

Due to his approach to studies on vegetation Józef Paczoski is regarded one of the founders of modern ecology

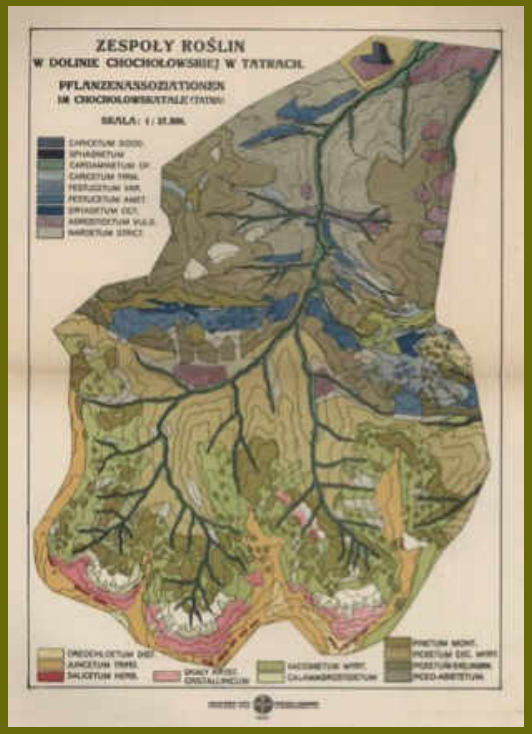
However

phytosociology chose another way

ALMOST 100-YEAR HISTORY OF PHYTOSOCIOLOGICAL STUDIES IN POLAND

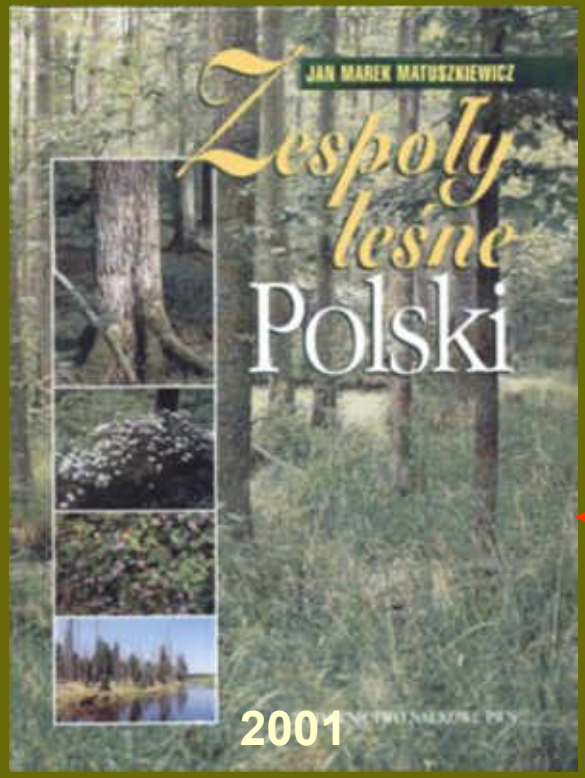
The phytosociological studies in Poland started in 1922 in the Tatras

Szafer W., Pawłowski B., Kulczyński S., 1923. Die Pflanzenassoziationen des Tatra-Gebirges. I Teil: Die Pflanzenassoziationen des Chochołowska-Tales. Bull. Acad. Pol. Sc. L. Cl. Math.-Nat., sér. B., Suppl. 1: 1-66. Kraków.



THE LONG HISTORY RESULTED IN COMPREHENSHIVE SURVEYS OF FOREST VEGETATION IN POLAND

„Forest communities of Poland”
by J.M. Matuszkiewicz



as many as
12,644 relevés
were used
in this survey

„Forests and brushwoods”
by W. Matuszkieiwcz and others

QUESTION:

IS A PATTERN OF FOREST VEGETATION VARIABILITY REVEALED IN PHYTOSOCIOLOGICAL STUDIES BIASED?

Phytocoenologia	35 (1)	1–18	Berlin–Stuttgart, April 11, 2005

Biased vegetation patterns and detection of vegetation changes using phytosociological databases. A case study in the forests of the Babia Góra National Park (the West Carpathians, Poland)

by Jan Holeksa, Kraków and Gabriela Woźniak, Katowice, Poland

Specific question:
If and how a revealed pattern depends on sampling method used in the field?

Two samples were compared: (1) non-random subjective sample and (2) random sample

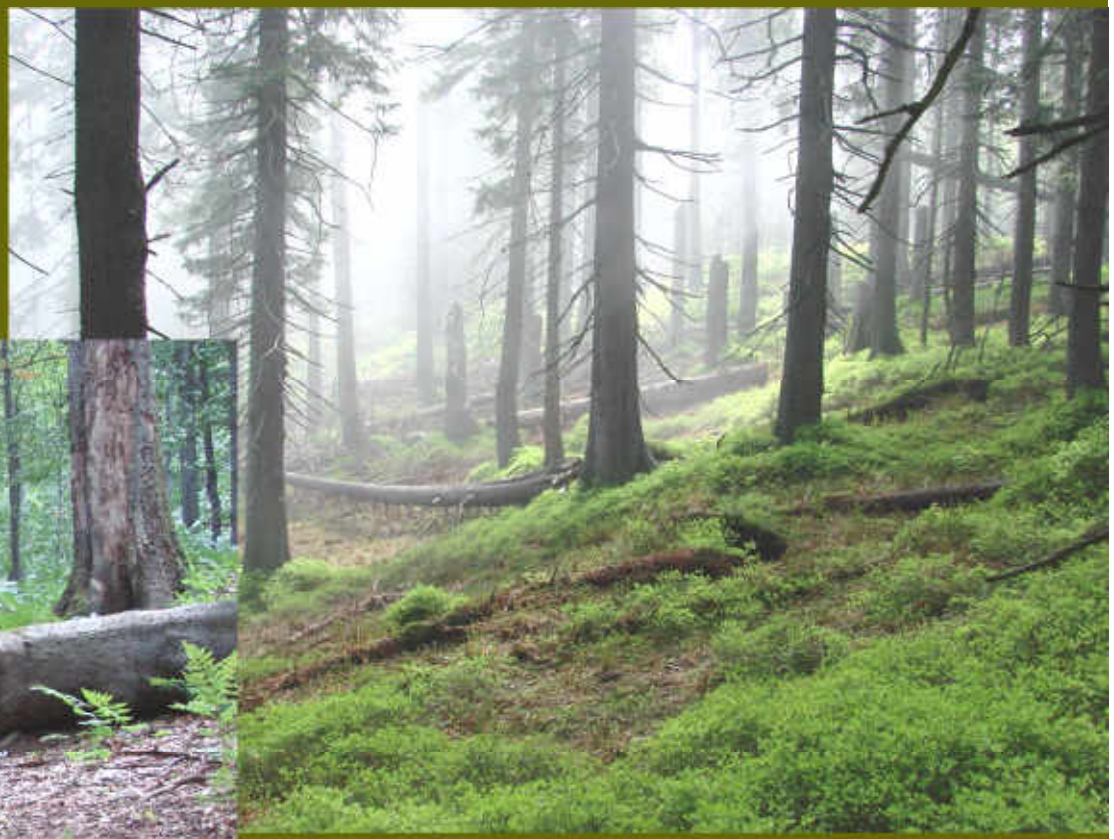
Babia Góra National Park

These two samples were collected: (1) in the same area but (2) in different time – in the late 1950s (non-random) and in 1991 (random)

MORE INFORMATION ABOUT TWO SAMPLES

They were collected in the best preserved forests in the Polish West Carpathians: protected from 1932; from 1954 strictly protected in the Babia Góra National Park

Mountain mixed forests



Subalpine coniferous forests

MORE INFORMATION ABOUT TWO SAMPLES

Non-random sample

96 relevés, which were collected on the north slopes of Babia Góra in strictly protected forests (published by Celiński and Wojterski in 1978);
area of relevés was 100-400 m^2 (average ~300 m^2)

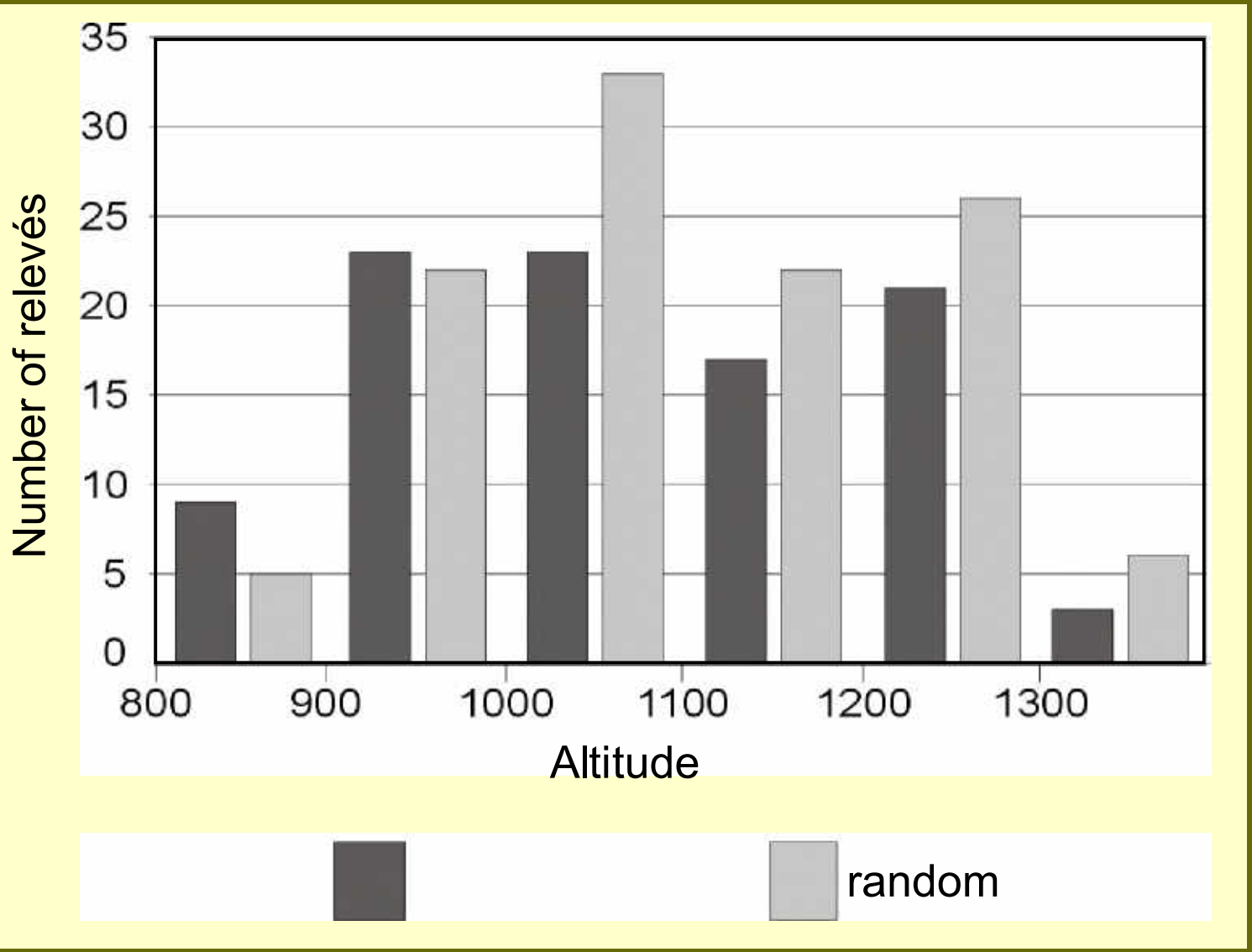
Selected relevés represented four forest communities:

West Carpathian beech forest	–	*Dentario glandulosae-Fagetum*
Fir forest	–	*Galio rotudnifolii-Abietetum*
Mixed coniferous forest	–	*Abieti-Piceetum*
Carpathian subalpine spruce forest	–	*Plagiothecio undulatii-Piceetum*

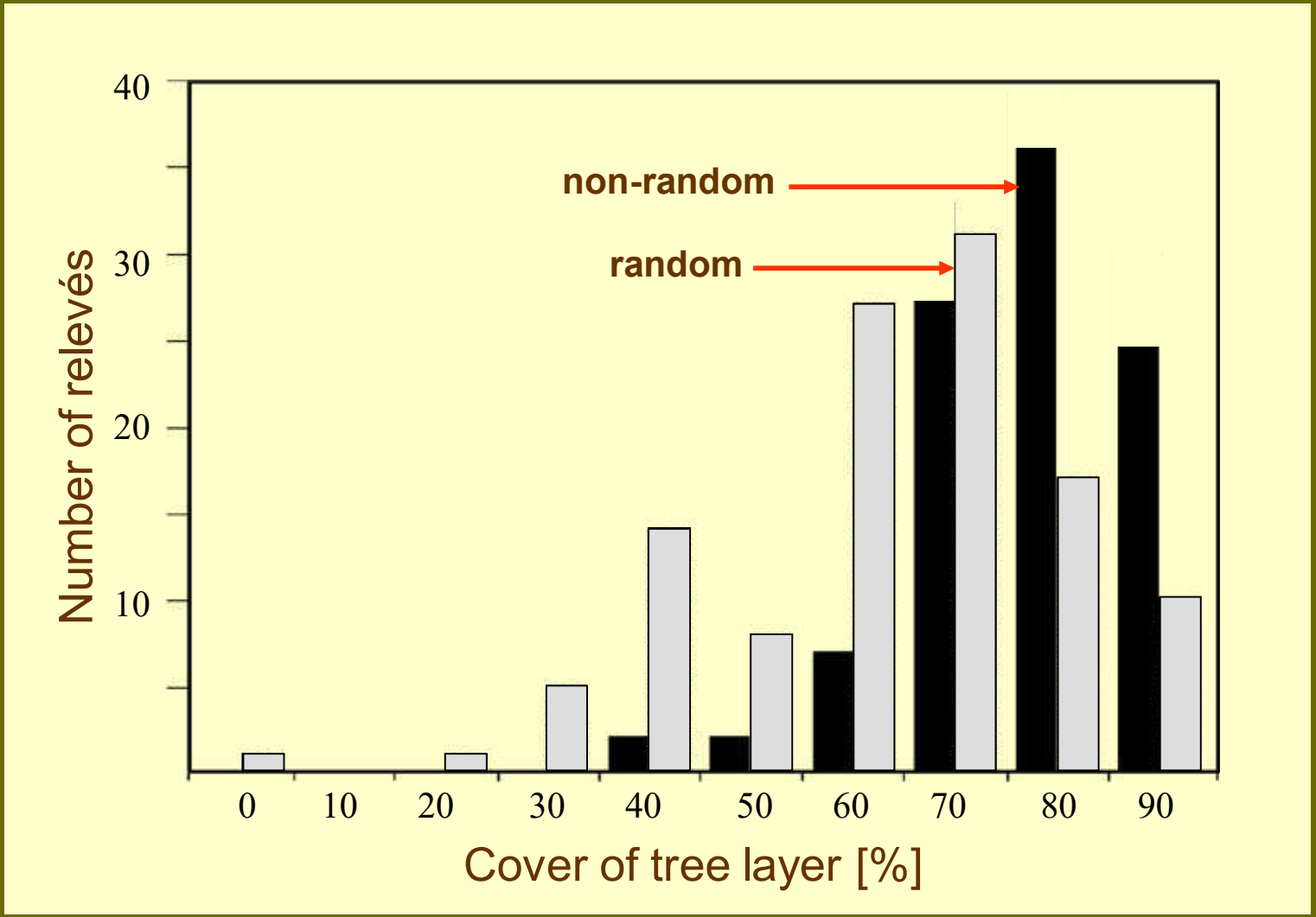
Random sample

113 relevés collected on the north slopes in strictly protected forests in points randomly selected from a regular network of points 100 m x 100 m;
area of each relevé – 300 m^2

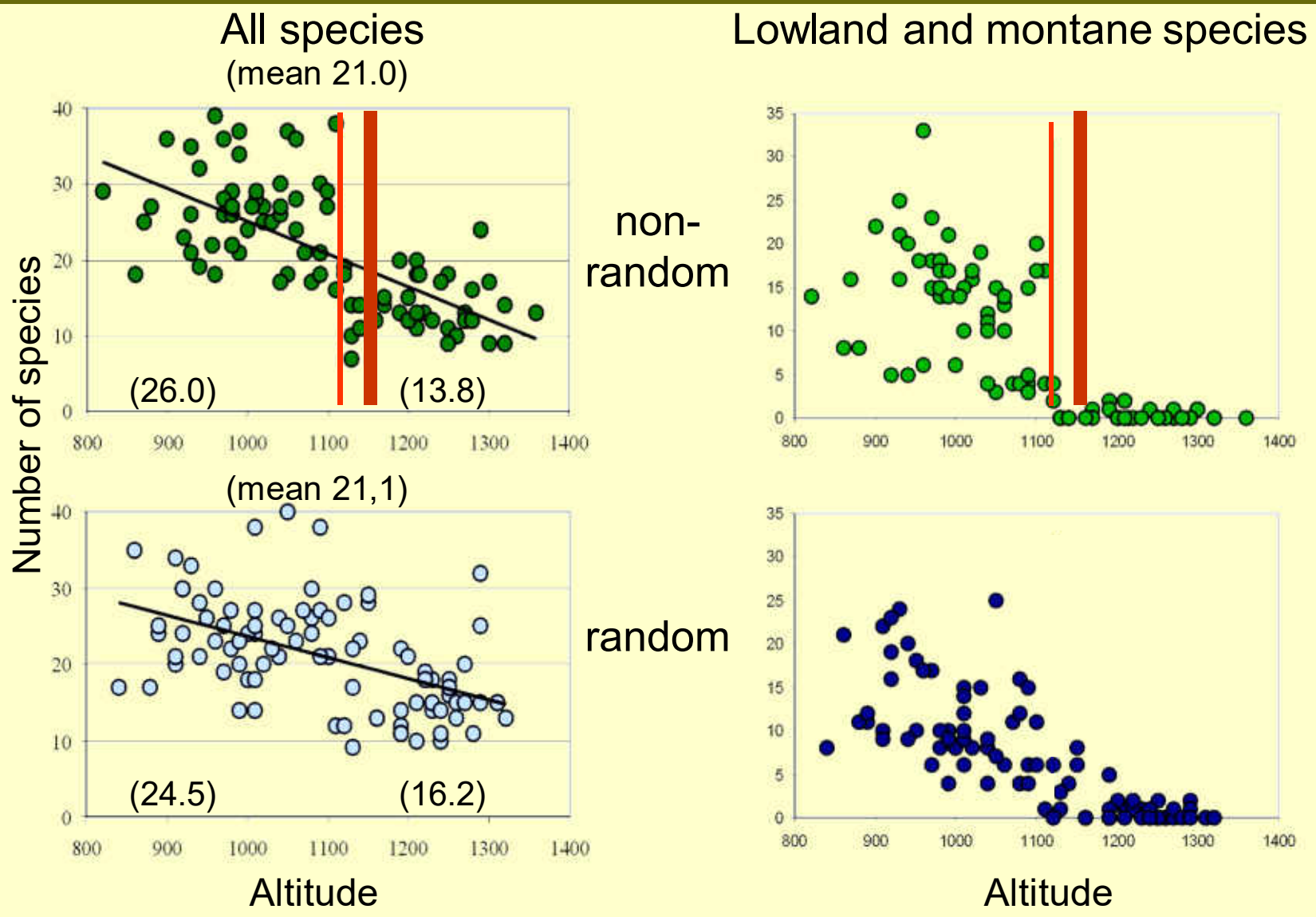
ALTITUDINAL DISTRIBUTION OF RELEVÉS



VARIABILITY IN COVER OF TREE LAYER



CHANGES IN SPECIES RICHNESS IN ALTITUDINAL GRADIENT

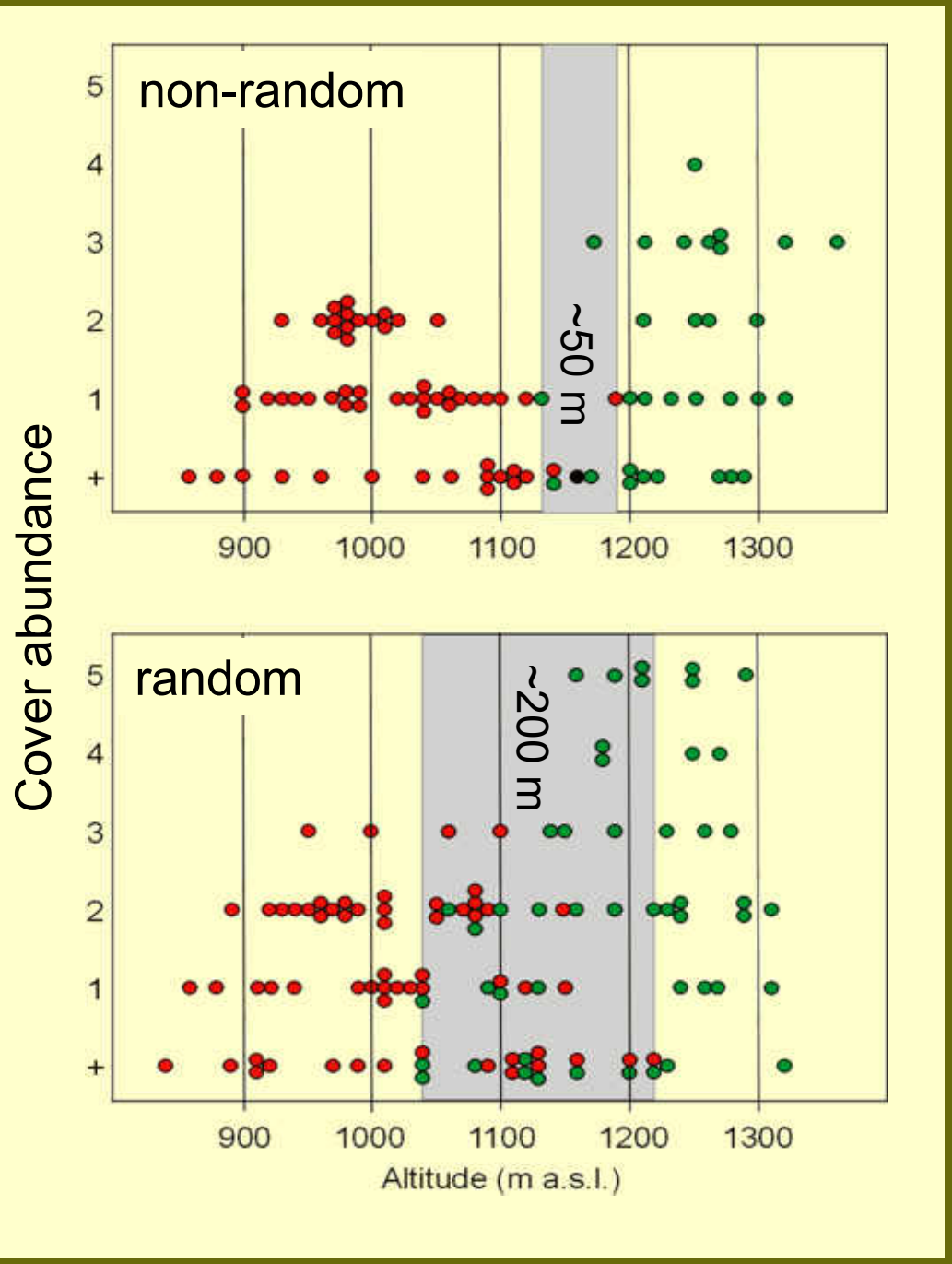


Athyrium filix-femina and *Athyrium distentifolium* in altitudinal gradient

Athyrium filix-femian

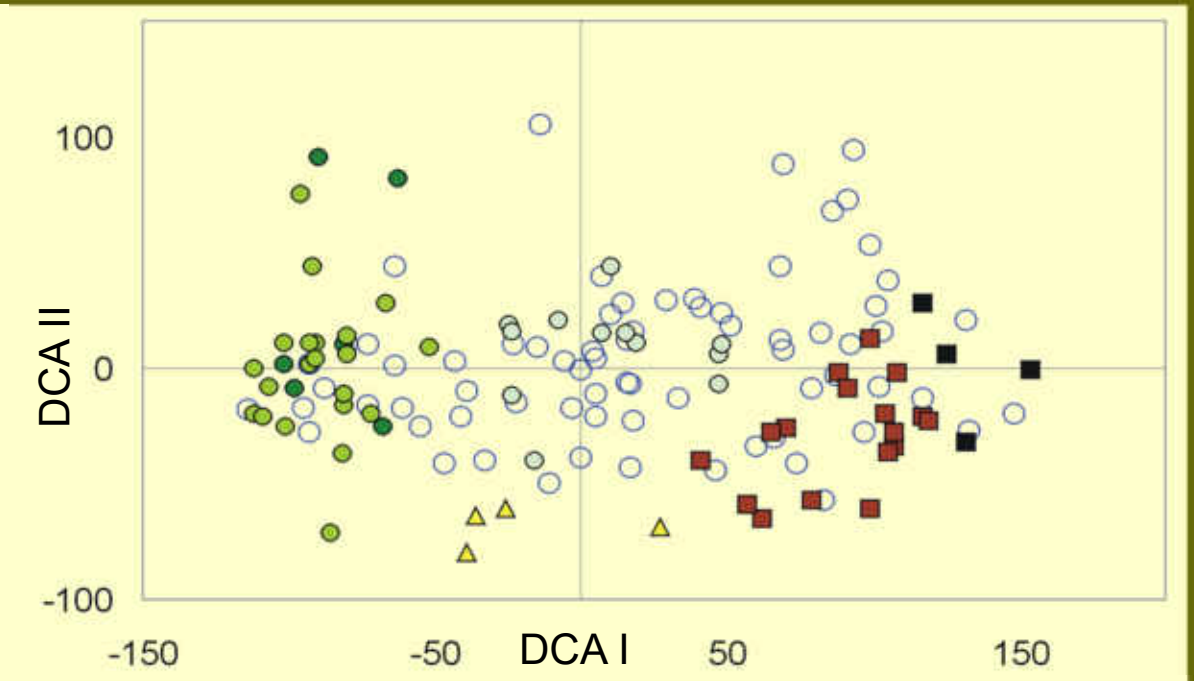
Athyrium distentifolium

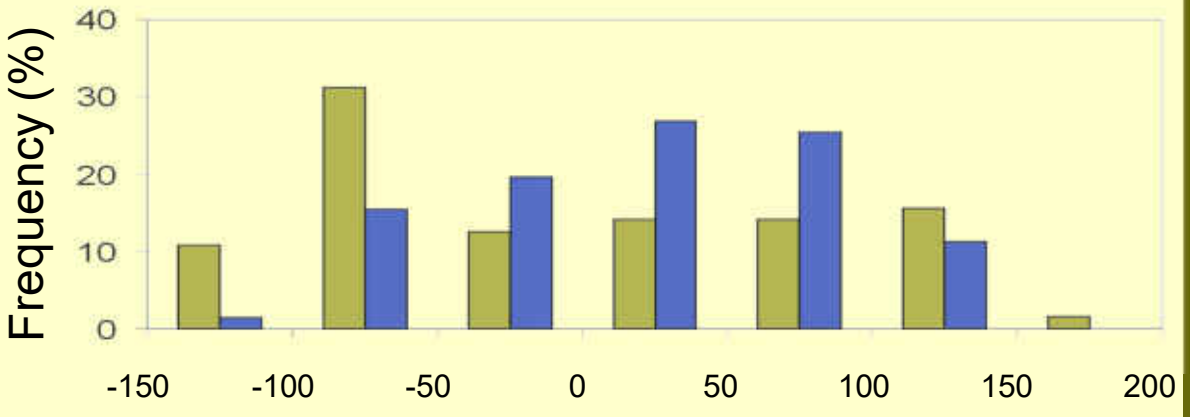
Transition zone with both species



GRADIENTS IN SPECIES COMPOSITION IN MONTANE FORESTS AT 850-1150 M A.S.L.

DCA ordination, the presence of all species





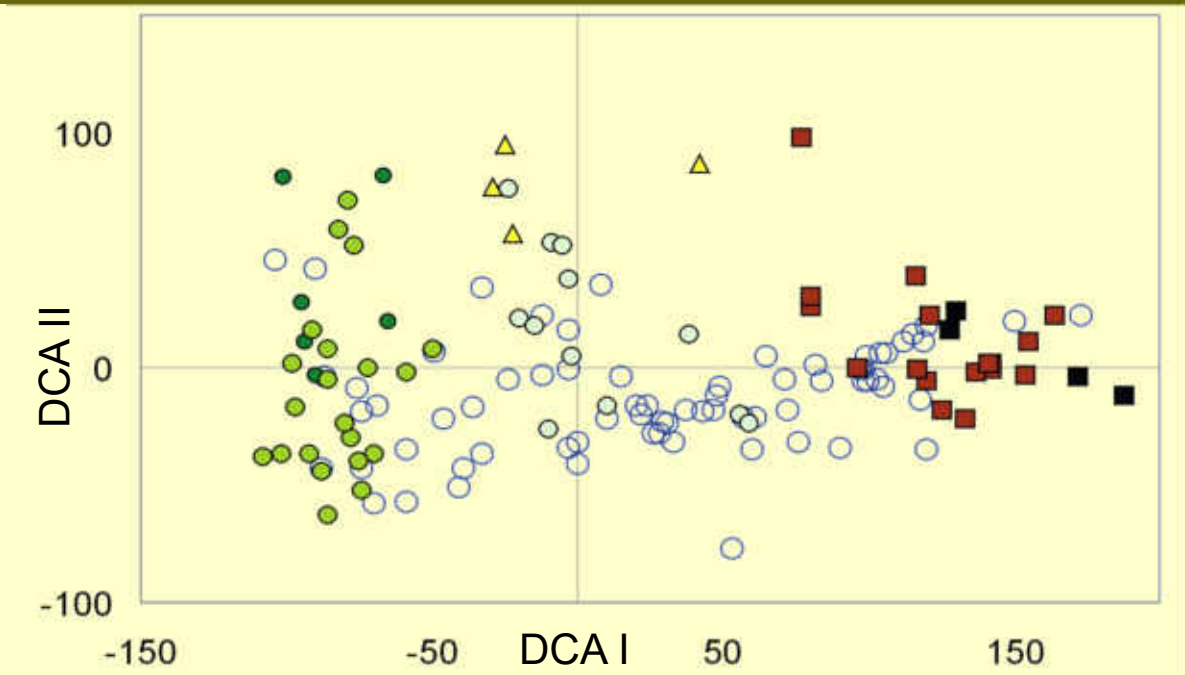
- Dent.gl.-Fagetum allietosum
- Dent.gl.-Fagetum typicum
- Dent.gl.-Fagetum festucetosum
- Galio-Abietetum
- Abieti-Piceetum
- Plagiothecio-Piceetum
- Random sample

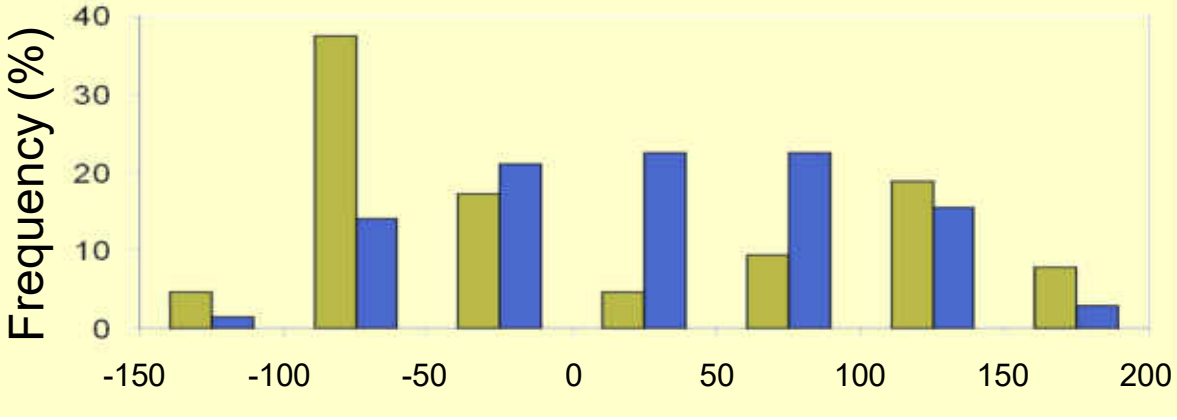
Distribution of two samples along the first DCA axis

- non-random
- random

GRADIENTS IN SPECIES COMPOSITION IN MONTANE FORESTS AT 850-1150 M A.S.L.

DCA ordination, the presence of species characteristic for Q-F and V-P





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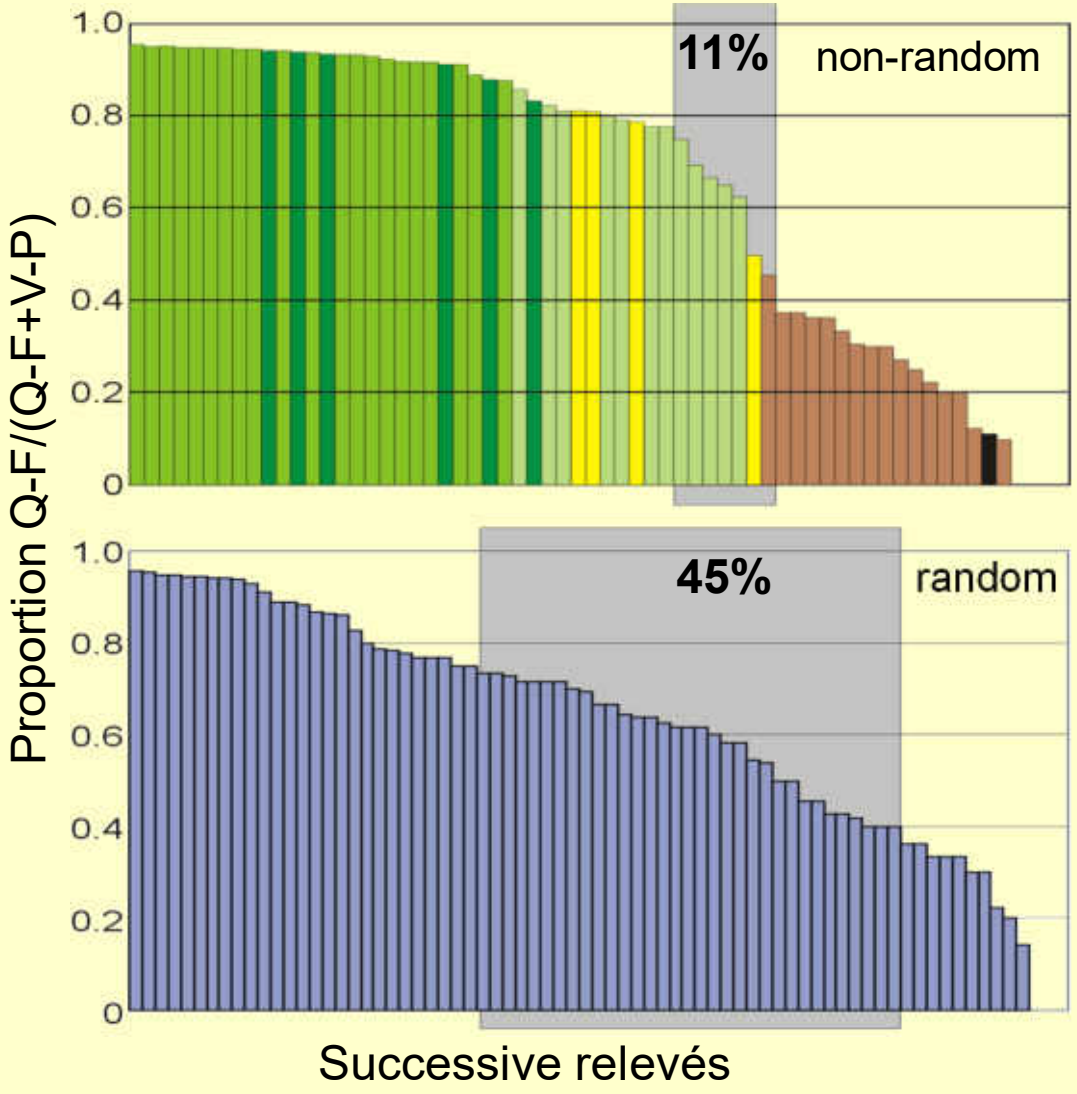
- Plagiothecio-Piceetum
- Random sample

Distribution of two samples along the first DCA axis

- non-random
- random

GRADIENT IN SPECIES COMPOSITION IN MONTANE FORESTS AT 850-1150 M A.S.L.

Proportion of species characteristic for Querco-Fagetea



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- Dent.gl.-Fagetum typicum
- Dent.gl.-Fagetum festucetosum
- Galio-Abietetum
- Abieti-Piceetum
- Plagiothecio-Piceetum

Transition zone between beech and coniferous forests

CONCLUSIONS FROM THE COMPARISON OF RANDOM AND NON-RANDOM SAMPLES FOR VEGETATION ECOLOGY

disandvantages

The standard phytosociological studies gave distinct associations with transitional patches poorly represented in two gradients:

- in the site condition gradient from beech to coniferous forests in the montane belt,
- in the altitudinal gradient from montane to subalpine belt

However

there is no discontinuity in species composition in both gradients as revealed in the random sample

Therefore

a considerable part of vegetation variability was omitted in phytosociological studies to emphasize differences among associations

CONCLUSIONS FROM THE COMPARISON OF RANDOM AND NON-RANDOM SAMPLES FOR VEGETATION ECOLOGY

advantages

Huge colections of phytosociological relevés can be used in studies on long-term changes in vegetation

However

it should be done carefully taking into account shortcomings of phytosociological methods

?

THE SECOND QUESTION:

IS THE BIASED PATTERN OF FOREST VEGETATION VARIABILITY APPROPRIATE BASIS FOR NATURE PROTECTION?

Ecological Questions 6/2005: 19–27

Advantages and disadvantages of the strong position of phytosociology for nature conservation in Poland

Jan Holeksa

PHYTOSOCIOLOGY IS AN IMPORTANT STRATEGIC TOOL IN NATURE CONSERVATION

because

phytosociologists have always belonged to the most active in nature conservation

- **Silesian University:**
  Department of Geobotany and Nature Protection
- **Łódź University:**
  Department of Geobotany and Nature Protection
- **Gdańsk University:**
  Laboratory of Geobotany and Nature Protection
- **Polish Botanical Society:**
  Section of Geobotany and Plant Cover Protection

PHYTOSOCIOLOGY IS AN IMPORTANT STRATEGIC TOOL IN NATURE CONSERVATION

because

it successfuly provides a comprehensive overwiew of geographical and habitat diversity in vegetation

therefore

it is accepted as an important tool for development of any system of protected areas

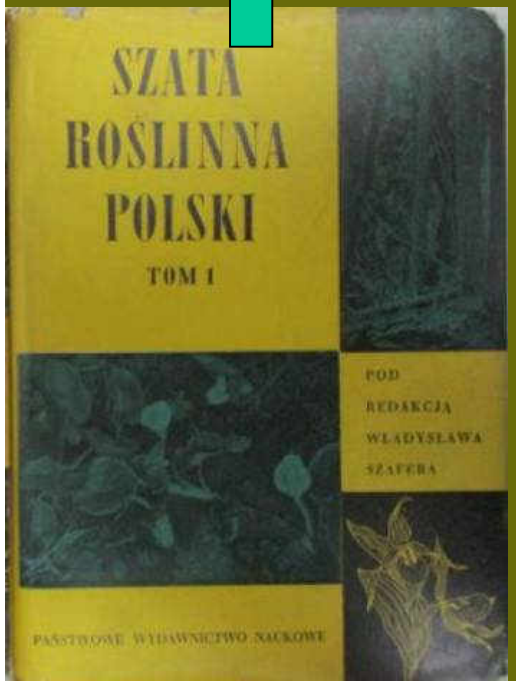
But

besides plant geography also ecology is important for development of any system of protected areas

PHYTOSOCIOLOGICAL MEASURE OF NATURALNESS

Definition of natural community:

Natural community is a community, which „although influenced by human activitiies retained its original species composition”

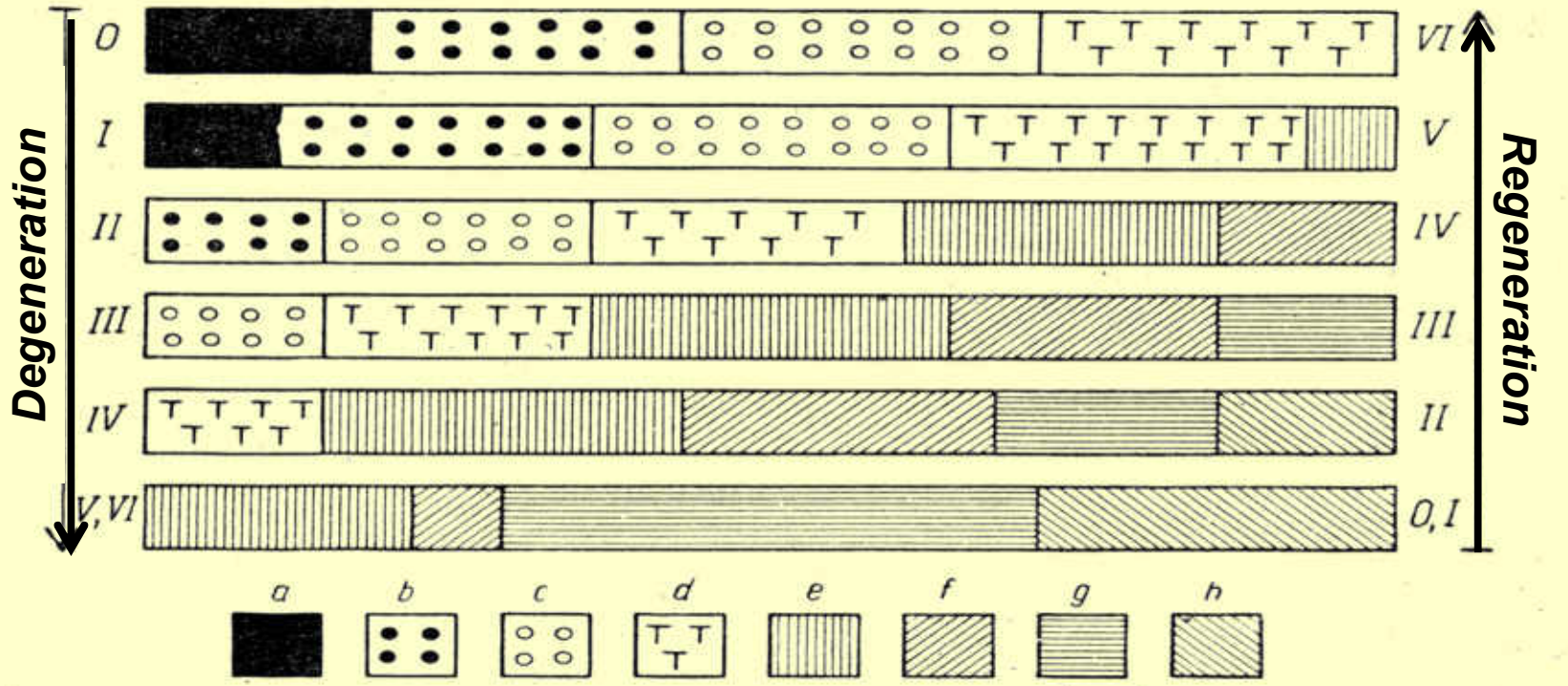


Operational definition of natural community can be as follows:

Natural community is a community, which although influenced by human activitiies retained its set of diagnostic species

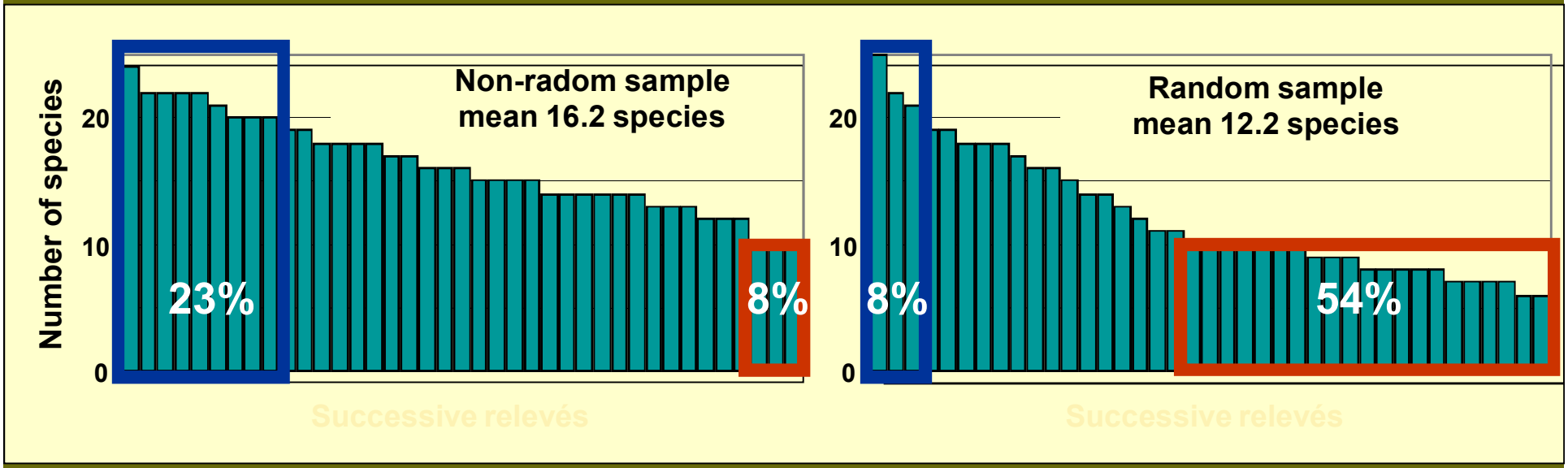
PHYTOSOCIOLOGICAL MEASURE OF NATURALNESS

The operational definition was applied by Janusz B. Faliński in its system of degeneration phases of phytocenosis



PHYTOSOCIOLOGISTS HAVE BEEN FOCUSED ON PHYTOCOENOSES WITH HIGH NUMBER OF CHARACTERISTIC SPECIES FOR A LONG TIME

Number of species characteristic for QUERCO-FAGETEA forests in relevés from Dentario glandulosae-Fagetum in Baba Góra National Park



PHYTOSOCIOLOGICAL MEASURE OF NATURALNESS AND ITS CONSEQUENCES FOR PROTECTION OF FORESTS

Phytocoenoses with high number of diagnostic species are recognized as benchmarks for assesment of naturalness

However

phytocenosis with high number of diagnostic species can be higly influenced by human activity

and

a small number of diagnostic species does not necessarily evidences a man-made distortion

PHYTOCENOSES WITH HIGH NUMBER OF DIAGNOSTIC SPECIES CAN BE HIGLY INFLUENCED BY HUMAN ACTIVITY

Long-term persistence of dense tree stand is favourable for spring ephemerals and sciophilous species in the herb layer of QUERCO-FAGETEA forest

Beech forest

Oak-hornbeam forest

PHYTOCENOSES WITH LOW NUMBER OF DIAGNOSTIC SPECIES CAN BE SHAPED MAINLY BY NATURAL PROCESSE

Not typical forest species but heliophilous and nitrophilous plants benefit from ecological disturbances in QUERCO-FAGETEA forests

Beech forest

Oak-hornbeam forest

POSSIBLE PHYTOSOCIOLOGY-CAUSED ERRORS IN CONSERVATION OF FOREST ECOSYSTEMS

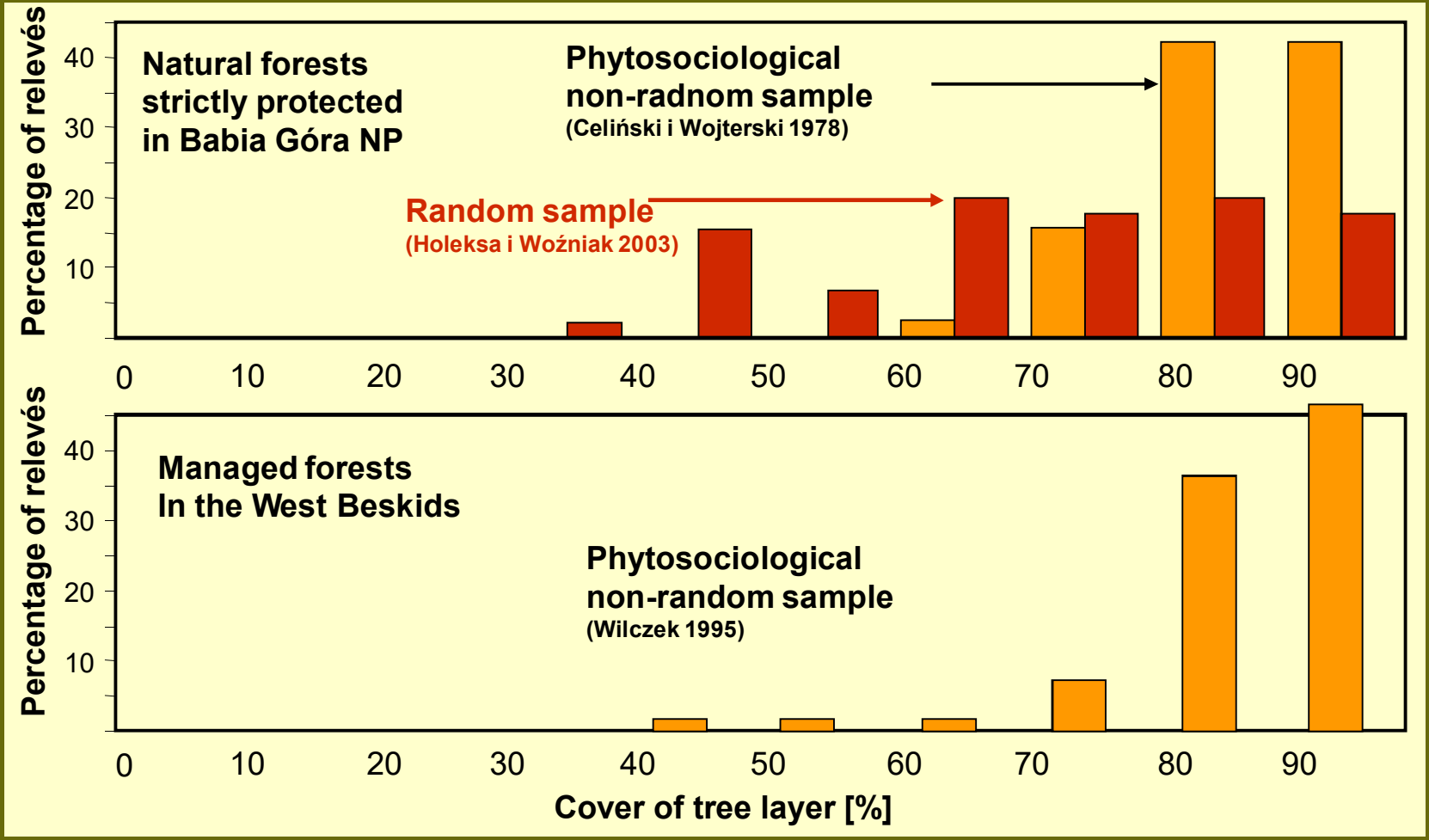
omission of a natural forest with small number of diagnostic species as inappropriate for protection

application of treatments to restore naturalness in quite a natural forest, because of small number of diagnostic species in it

recognition an unnatural forest as a natural one in spite of its long-term management

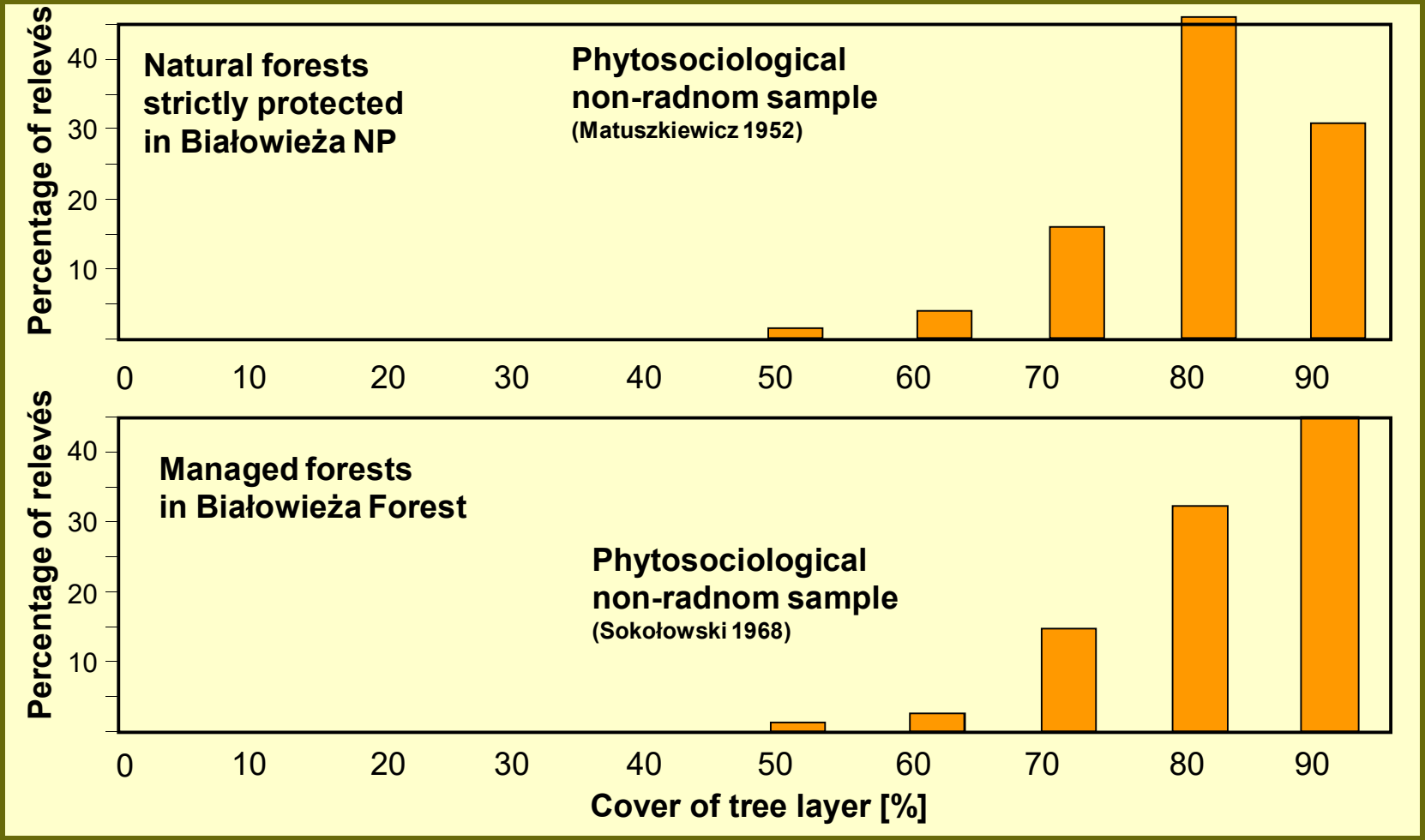
AN OVERREPRESENTATION OF RELEVÉS WITH DENSE TREE STANDS IN PHYTOSOCIOLOGICAL DATABASES

West Carpathian beech forest



AN OVERREPRESENTATION OF RELEVÉS WITH DENSE TREE STANDS IN PHYTOSOCIOLOGICAL DATABASES

Oak-hornbeam forest in Białowieża Forest




According to phytosociology
THIS IS A FORERST!

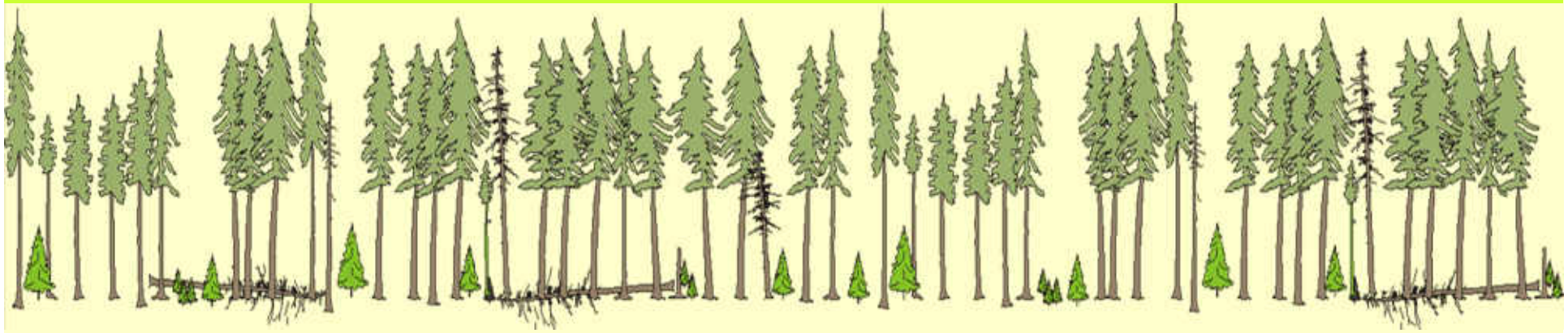

According to phytosociology
THIS IS A FORERST AS WELL!

ARE THEY FOREST...

...according to phytosociology?

According to phytosociology, forest is there...

Forest community



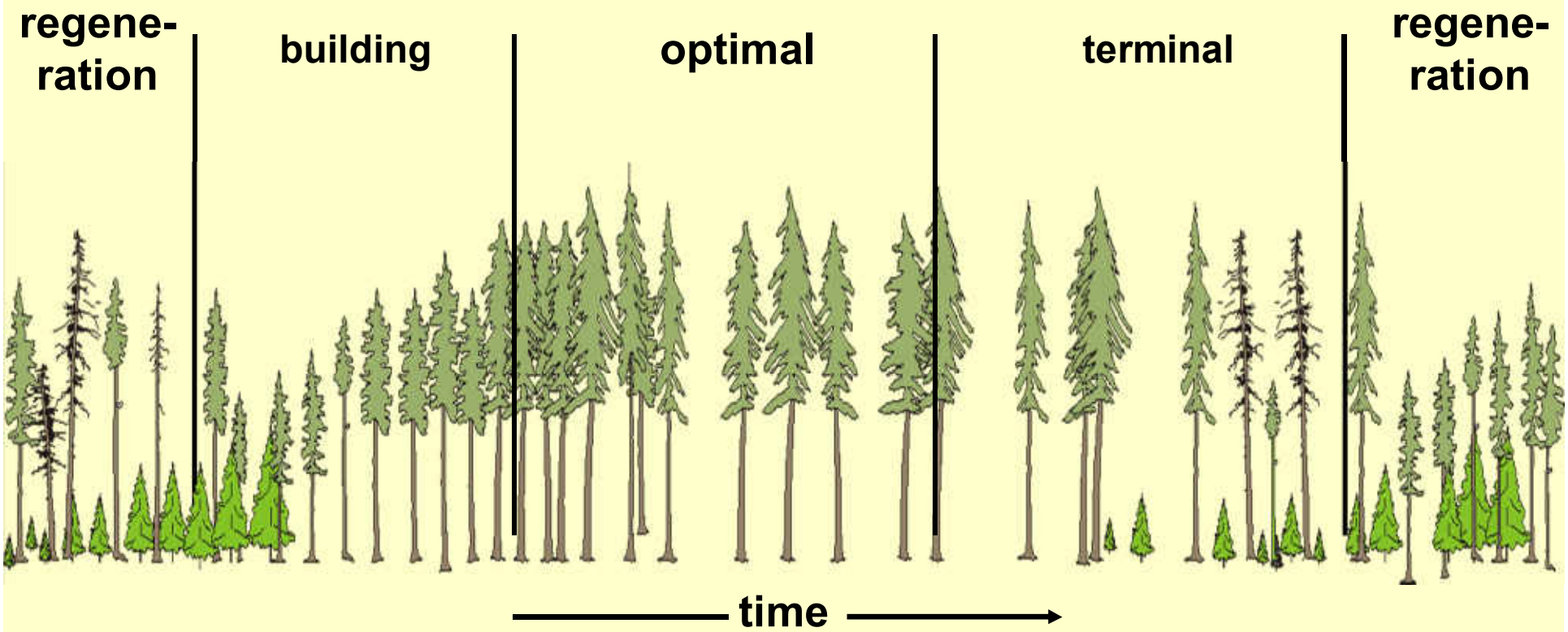
Plant communities

clea-ring | brush-wood | **Forest** | brush-wood | **Forest** | clea-ring | **Forest**

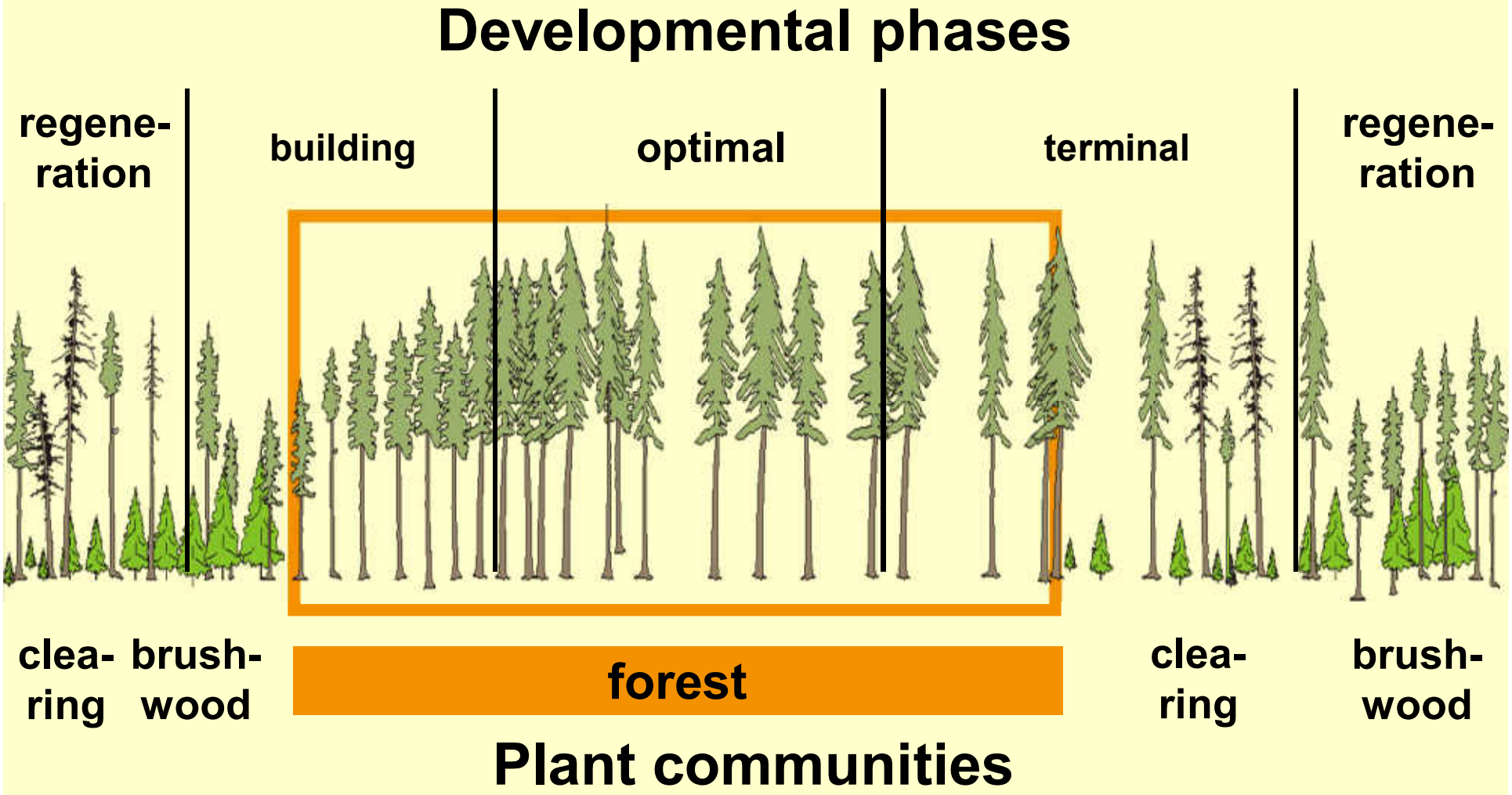
...where tree layer is well developed

DEVELOPMENTAL CYCLE OF NATURAL FORESTS (according to S. Korpeľ)

Developmental phases

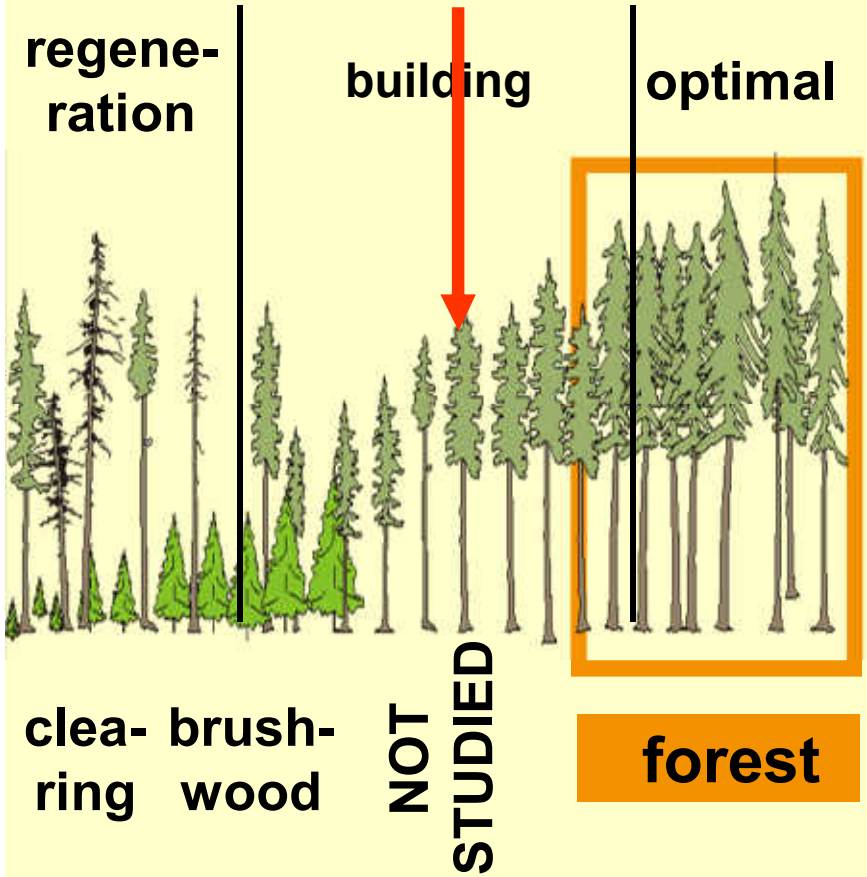


DEVELOPMENTAL CYCLE OF NATURAL FORESTS AND PHYTOSOCIOLOGY



DEVELOPMENTAL CYCLE OF MANAGED FORESTS AND OBJECTIVES OF PHYTOSOCIOLOGICAL STUDIES

Developmental phases

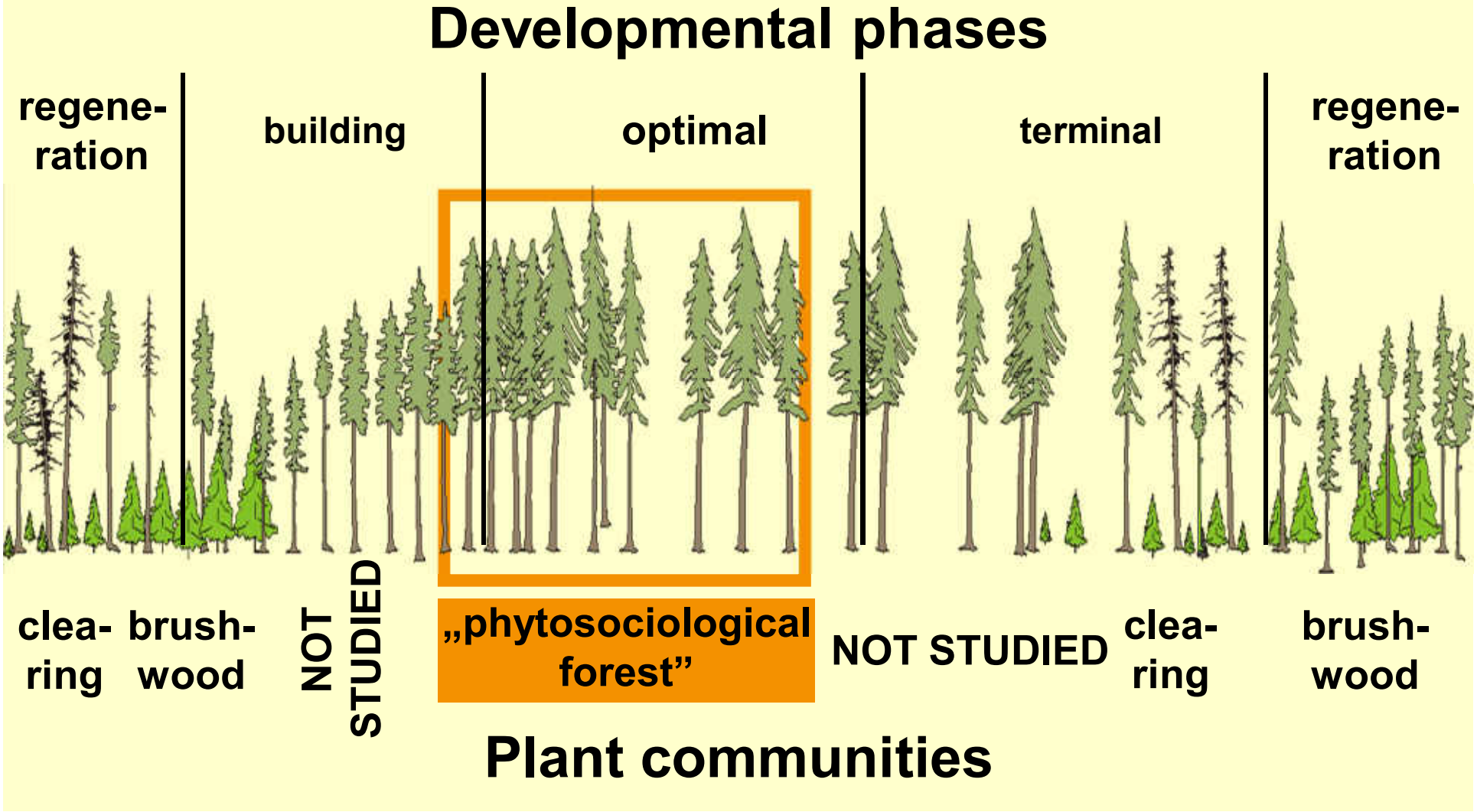


Much more phytocociological data have been collected in managed forests than old-growth strictly protected forests

Therefore

the design of forest associations revealed by phytosociology is strongly influenced by studies conducted in commercial forests

DEVELOPMENTAL CYCLE OF NATURAL FORESTS AND OBJECTIVES OF PHYTOSOCIOLOGICAL STUDIES



IT IS DIFFICULT TO ACCEPT „PHYTOSOCIOLOGICAL FOREST" AS A PROPER BENCHMARK FOR NATURE PROTECTION

because:

the phytosociological approach narrows down the dynamic variability of forest vegetation

it suspects symptoms of degeneration in patches which depart from forms accepted as typical for forest associations

and the most important is that

one of the key ecological process, that is the decay of tree layer is treated as degeneration of forest community and even as its disappearance

FINAL CONCLUSION:

The significant contribution of phytosociology upon nature conservation in Poland and other European countries has brought an unexpected result:

Not only natural processes

but also

silvicultural practices

produced the forests which became models for nature conservation in national parks and forest reserves