



4th Semester FIT
Student Research Colloquium

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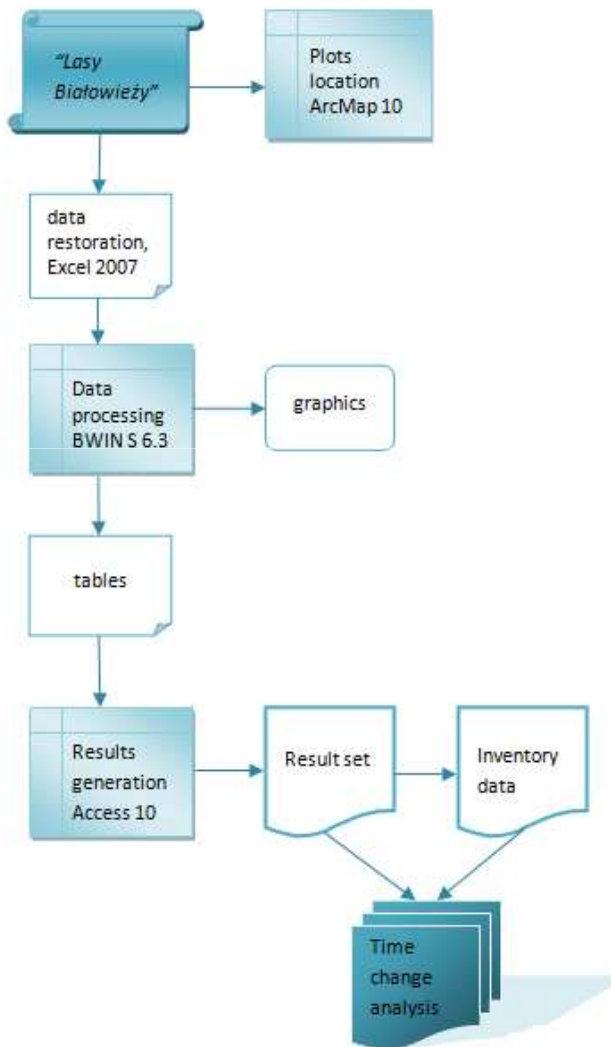
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Assessment of the long-term compositional and structural stability of
Carpinetum community in the Białowieża Primeval Forest based on
historical and present-day data

Presentation content:

Work-flow
Introduction
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Work-flow of the Project



The research was divided in three main parts

- restoration of data,
- processing data and
- comparison with new inventory.

Introduction to the topic

Primeval forest- a great natural forest with slight trace of human influence

Białowieża Forest- World Heritage Site, located in two countries Poland and Belarus, established in 1932

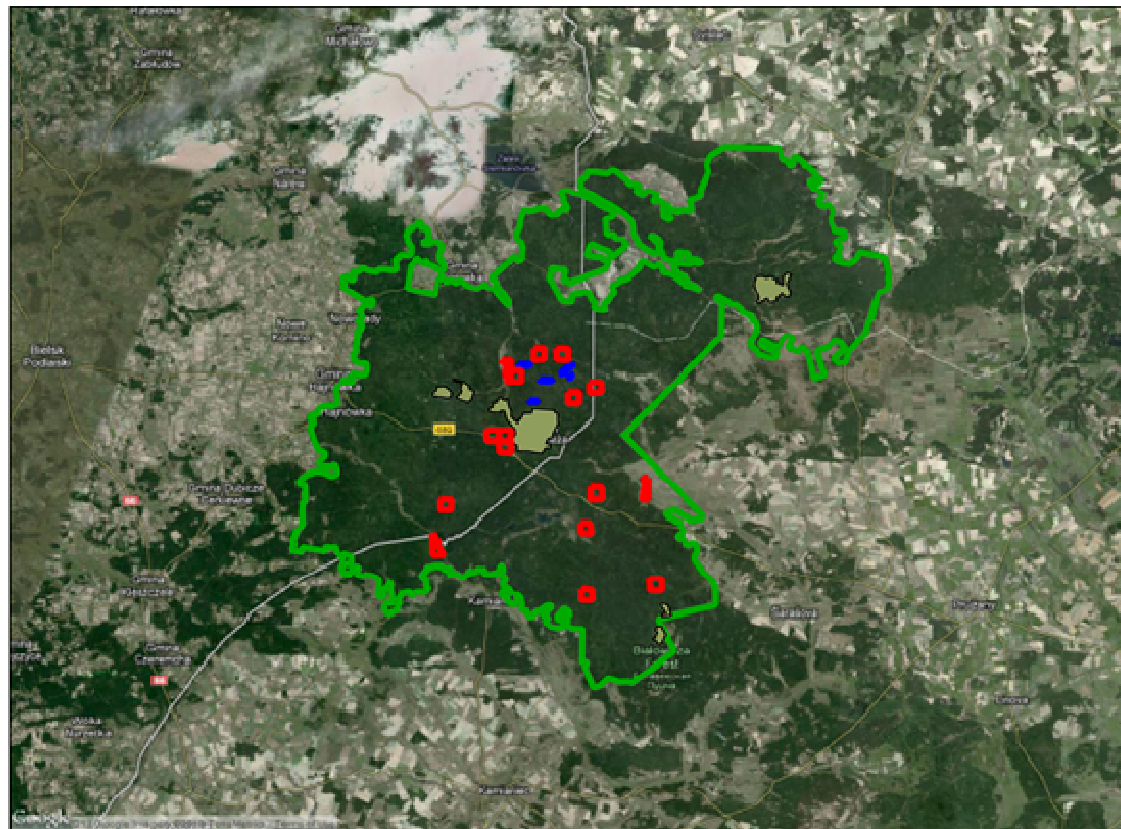
Carpinetum community forest- is a broadleaved forest with *Carpinus betulus* as the main tree species;
the most important forest community type in the B. N. P.

Forest succession- changes in composition and structure of the forest

Józef Paczoski- Polish botanist, pioneer of the science of phytosociology

Study area

Map of the Białowieża forest (NE Poland, at 52°43' N, 23°50' E)
with localized sample plots



Legend:

- 1930 outline of Białowieża Primeval Forest
- Sample plots 1930
- Sample plots 2009
- Settled areas

Data source

- historical data
“Lasy Białowieży” (Józef Paczoski, 1930)



The cover of the book

The image is a scan of a handwritten table from a forest inventory. It lists data for three tree species: Grab (Oak), Klon (Alder), and Świerk (Spruce). Each species has a table with columns for diameter classes (in cm) and the number of trees in each class. The total number of trees and the average diameter are also noted for each species.

Grab:							
10	20	30	40	50	60	70	grubość w cm
15	41	35	10	1			ilość drzew w klasie grub.
razem 102, a na ha 204 (przeciętna średnia grubość=30,4 cm)							
Klon:							
10	20	grubość w cm					
4		ilość drzew w klasie					
na ha 8.							
Świerk:							
10	20	30	grubość w cm				
3	1		ilość drzew w klasie				
na ha 8.							
Lipa:							
70	80	90	grubość w cm				
1	1		ilość drzew w klasie				
na ha 4.							

Data example, scan

- modern inventory
the forest management plan (2010), elaborated by a team from the
Silviculture Department, WULS

Methods

Paczoski distinguished 10 subtypes of *Carpinetum* forest in Białowieża forest, represented by 18 sample plots. These Subtypes were assigned to modern forest site types, that is to:

fresh mixed broadleaved forest (FM),

fresh broadleaved forest (F) and

moist broadleaved forest (M)

<i>Carpinetum</i> subtype	number	site type
<i>C. piceetosum</i>	2	FM
<i>C. quercosum</i>	5	
<i>C. tremuloides</i>	1	F
<i>C. typicum</i> (with lime)	1	
<i>C. typicum</i> (no lime)	1	
<i>C. typicum</i> (with Silver fir)	1	M
<i>C. acerosum</i>	2	
<i>C. corylosum</i>	2	
<i>C. fraxinosum</i>	2	
<i>C. subuliginosum</i>	1	

The area of sample plots, established by Paczoski ranged from 0,2ha to 1ha. Where it was necessary, the area was recalculated to 1ha.

Example of digitized data

Stand ID: cc314

Latin

name: *Carpinetum corylosum*

Year: 1927

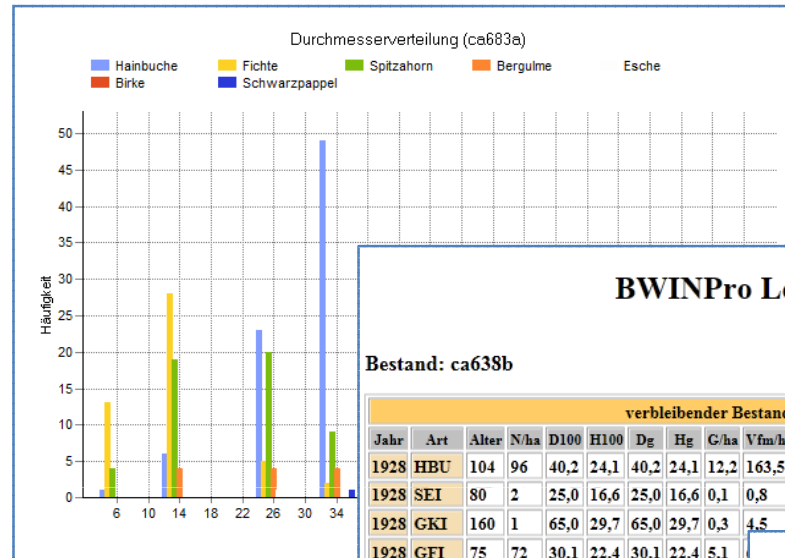
Area: 1ha

Middle of Bhd class (cm)	Tree species						Estimated age (years)
	<i>Carpinus</i>	<i>Picea</i>	<i>Acer</i>	<i>Tilia</i>	<i>Fraxinus</i>	<i>Quercus</i>	
7.5	1	13	.	.	.	.	40
15	1	19	.	.	.	.	60
25	2	8	.	.	.	.	80
35	12	4	.	.	.	.	100
45	12	.	1	.	.	.	120
55	12	3	3	.	.	.	140
65	2	.	3	1	1	.	160
75	1	1	.	4	1	.	180
85	.	1	.	3	1	2	200
95	.	.	.	2	1	1	220
105	.	.	.	1	.	.	240
115	.	.	.	.	.	.	260
125	.	.	.	.	.	.	280
135	.	.	.	.	.	.	300
145	.	.	.	.	.	.	320
155	.	.	.	.	.	.	340
165	.	.	.	.	.	.	360
N/ha	43	49	7	11	4	3	
Tree species code	221	511	322	340	311	111	

14;cc314;1;1927;221;1;40;7.5;0;0;0;0;0;0;0
 14;cc314;1;1927;221;1;60;15;0;0;0;0;0;0;0
 14;cc314;1;1927;221;2;80;25;0;0;0;0;0;0;0
 14;cc314;1;1927;221;12;100;35;0;0;0;0;0;0;0
 14;cc314;1;1927;221;12;120;45;0;0;0;0;0;0;0
 14;cc314;1;1927;221;12;140;55;0;0;0;0;0;0;0
 14;cc314;1;1927;221;2;160;65;0;0;0;0;0;0;0
 14;cc314;1;1927;221;1;180;75;0;0;0;0;0;0;0
 14;cc314;1;1927;511;13;40;7.5;0;0;0;0;0;0;0
 14;cc314;1;1927;511;19;60;15;0;0;0;0;0;0;0
 14;cc314;1;1927;511;8;80;25;0;0;0;0;0;0;0
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 14;cc314;1;1927;511;1;180;75;0;0;0;0;0;0;0
 14;cc314;1;1927;511;1;200;85;0;0;0;0;0;0;0
 14;cc314;1;1927;322;1;120;45;0;0;0;0;0;0;0
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 14;cc314;1;1927;322;3;160;65;0;0;0;0;0;0;0
 14;cc314;1;1927;340;1;160;65;0;0;0;0;0;0;0
 14;cc314;1;1927;340;4;180;75;0;0;0;0;0;0;0
 14;cc314;1;1927;340;3;200;85;0;0;0;0;0;0;0
 14;cc314;1;1927;340;2;220;95;0;0;0;0;0;0;0
 14;cc314;1;1927;340;1;240;105;0;0;0;0;0;0;0
 14;cc314;1;1927;311;1;160;65;0;0;0;0;0;0;0
 14;cc314;1;1927;311;1;180;75;0;0;0;0;0;0;0
 14;cc314;1;1927;311;1;200;85;0;0;0;0;0;0;0
 14;cc314;1;1927;311;1;220;95;0;0;0;0;0;0;0
 14;cc314;1;1927;111;2;200;85;0;0;0;0;0;0;0
 14;cc314;1;1927;111;1;220;95;0;0;0;0;0;0;0

Examples of BWin output:

➤ graphs



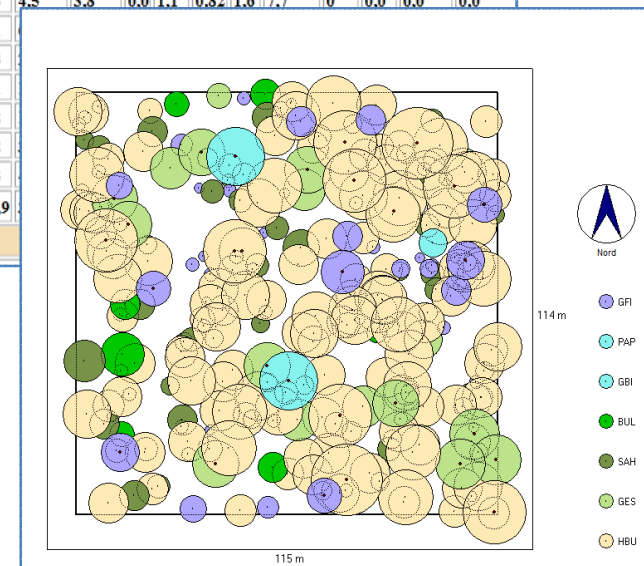
➤ tables

BWINPro Leistungsdaten

Bestand: ca638b

Jahr	Art	Alter	N/ha	verbleibender Bestand										ausscheidend					
				D100	H100	Dg	Hg	G/ha	Vfm/ha	Efm/ha	LZ	G%	B°	Bon	dCZ100	N/ha	G/ha	Vfm/ha	Efm/ha
1928	HBU	104	96	40,2	24,1	40,2	24,1	12,2	163,5	150,4	0,0	42,1	1,04	3,4	4,8	0	0,0	0,0	0,0
1928	SEI	80	2	25,0	16,6	25,0	16,6	0,1	0,8	0,7	0,0	0,3	1,30	3,2	3,3	0	0,0	0,0	0,0
1928	GKI	160	1	65,0	29,7	65,0	29,7	0,3	4,5	3,8	0,0	1,1	0,82	1,6	7,7	0	0,0	0,0	0,0
1928	GFI	75	72	30,1	22,4	30,1	22,4	5,1											
1928	SAH	91	27	32,6	18,9	32,6	18,9	2,3											
1928	BUL	73	3	23,6	14,7	23,6	14,7	0,1											
1928	GES	131	37	53,3	23,7	53,3	23,7	8,2											
1928	GBI	140	1	55,0	29,7	55,0	29,7	0,2											
1928	PAP	110	2	42,7	23,8	42,7	23,8	0,3											
1928	Gesamt		241					28,9											

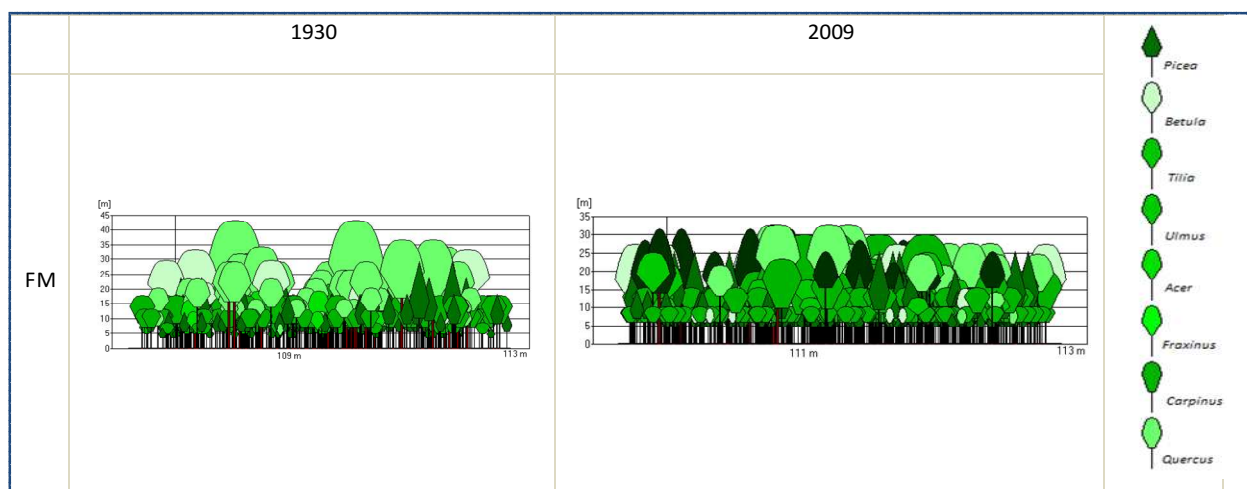
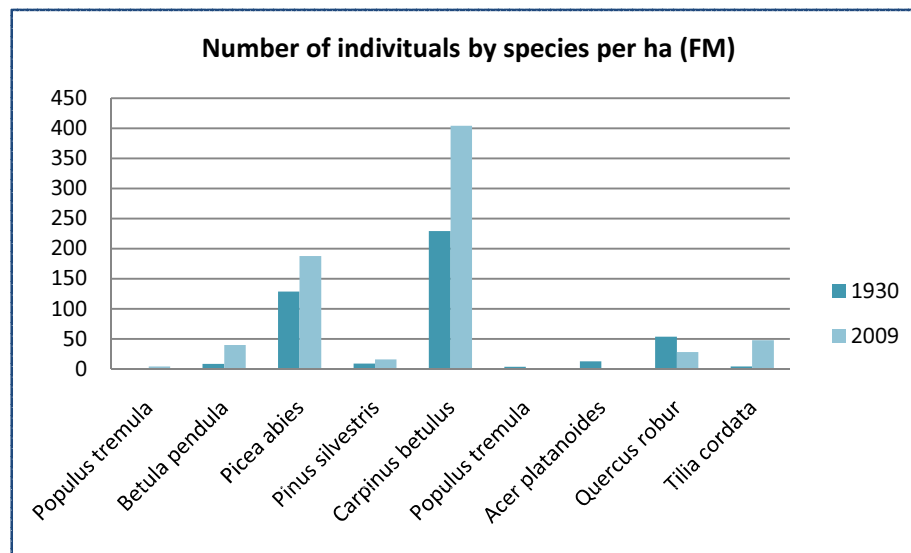
➤ images



The last phase was to compare stand parameters from 1930s to those from 2009

The main parameter of forest types

site type	year	N/ha	G (m ² /ha)	V (m ³ /ha)	Dg (cm)	Hg (m)
FM	1930	449	41.1	591.8	38.3	21.6
	2009	728	27.2	291.7	33.6	21.0
F	1930	430	43.3	585.5	40.1	22.5
	2009	628	39.8	555.5	37.9	21.8
M	1930	300	36.7	490.0	44.5	23.0
	2009	616	36.6	476.5	37.8	22.9



Results

➤ Dynamic changes

Pioneer, light-demand species (*Betula pentudula*, *Populus tremula*, *Pinus sylvestris*) strongly decreased in number.

Abies alba, after approximately 80 years, did not occur in any of the analyzed forest site types.

➤ Tree structure not in balance

Coniferous trees are decreasing in number (*Picea abies*).

Presence of pine is an effect of human influence on the forest in the past.

➤ Tree species changed their importance position in the species composition

The species composition dominated by *Carpinus betulus* and *Tilia cordata*.

Evaluation and Outlook of the Research

- deep analysis of *Carpinetum* community forest from the J.Paczoski research
- natural succession changes complemented with data from middle of the 80 years period
- study on climate and animal influence on direction of changes

References

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Thank you for your kind attention

Do you have any questions? Or suggestions?