

Multidimensional scaling for describing the risks for grassland ecosystems located in the Polish Landscape Parks

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INTRODUCTION

Both, identification and elimination of the factors that might endanger grassland ecosystems are the most important tasks concerning the maintenance and protection of grassland biodiversity. Based on questionnaires that were sent to all Landscape Parks' managements in Poland, it was possible to list the most threatening factors. It was the aim of the presented work to describe similarities between the analysed Parks with the respect to the selected threats using the multidimensional scaling analysis.

RESULTS

We have found a few threats that were obviously typical for the Parks which is indicated by the close location of the referring items in the chart: Cessation of grassland management (1 in Fig.1), Secondary succession (2), Infrastructure building (3) and Urbanization building (4). In this way, the Parks were allocated to 5 groups. **The groups of Parks have different proportion of endangering factors for grasslands.**

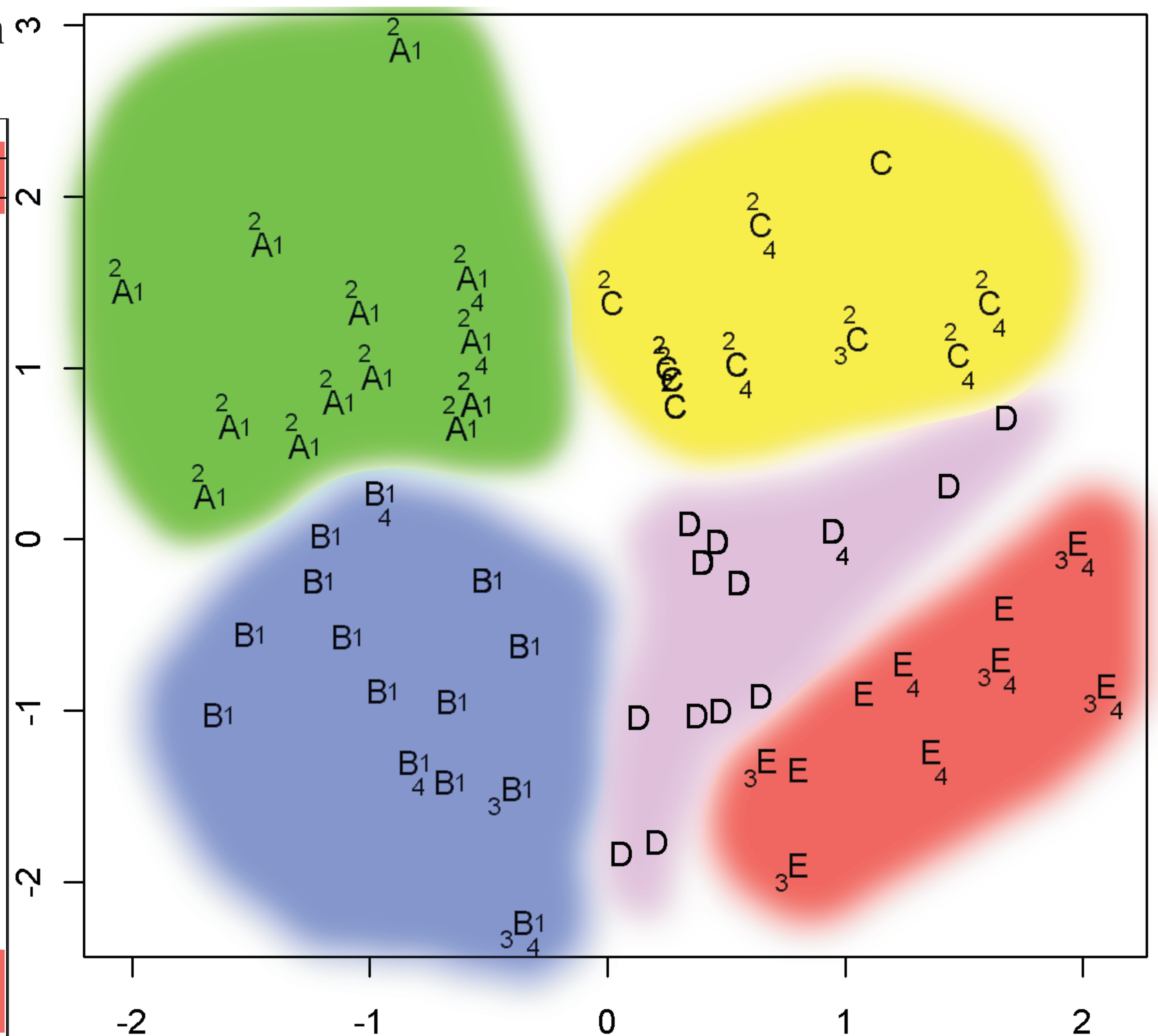
METHODS

The presented results are based on the questionnaire that was sent to all Landscape Parks in Poland which amounted 127 in 2005. The respondents were asked about the threats that may be harmful to grasslands located in each Park. They could choose among 30 given possibilities. The questionnaire was completed by 95 % of the Parks' managers. In the questionnaire a threat was marked "1" if it was occurring in the Park, and '0' if not. The Euclidean distance was computed between Landscape Parks. The metric multidimensional scaling, known as the principal coordinate analysis (PCoA), was used to describe similarities between landscape parks in terms of the perceived threats.

Fig 1. The multidimensional distance plot of Euclidean distance for the vector of threats in Landscape Parks and the 5 groups of Parks connected to the groups with distinctive threats

Tab 1. The proportion of threats in the groups of Polish Landscape Parks

Threat	Group of Parks				
	A	B	C	D	E
Cessation of grassland management (mowing/grazing)	100%	100%	0%	0%	0%
Conversion into arable land	19%	2%	11%	8%	18%
Afforestation	19%	5%	17%	3%	18%
Inappropriate forest management	0%	0%	0%	0%	0%
Soil drainage	25%	12%	11%	8%	27%
Secondary marshy processes	6%	2%	11%	0%	0%
Increasing in number of cuttings per year	6%	0%	6%	3%	0%
Early cutting ●	0%	2%	0%	0%	0%
Late cutting	0%	0%	0%	0%	0%
Mechanization of grassland farming ●	0%	0%	0%	0%	9%
Lack of fertilization ●	6%	0%	0%	0%	0%
High fertilizer input	6%	0%	6%	3%	0%
High stocking rate	6%	0%	6%	3%	0%
Low livestock rate ●	19%	0%	0%	0%	0%
Burning	6%	10%	11%	17%	27%
Poaching ●	0%	2%	0%	3%	9%
Secondary succession	100%	0%	94%	0%	0%
Unprofitability of grassland production	25%	2%	17%	6%	9%
Dams building	6%	2%	6%	0%	9%
Tourist building	13%	7%	28%	6%	55%
Infrastructure building ●	0%	5%	6%	0%	55%
Urbanization building ●	6%	2%	0%	3%	36%
Unrestricted buying out of land ●	6%	5%	0%	3%	18%
Inappropriate waste management	0%	0%	6%	0%	9%
Nearness to pollutants emitters	0%	0%	0%	0%	0%
Difficulties in execution of regulations	6%	0%	6%	0%	0%
Difficulties in agreement with local government ●	0%	0%	0%	3%	0%
Financial difficulties ●	0%	0%	0%	3%	9%
Limited decision rights of the park management	6%	0%	6%	6%	0%
Insufficient staff level ●	13%	0%	0%	3%	0%



A, B, C, D, E groups of the Landscape Parks similar in term of the perceived threats.

The distinctive threats: 1 Cessation of grassland management; 2 Secondary succession; 3 Infrastructure building; 4 Urbanization building

CONCLUSIONS

A multidimensional scaling graph of the similarity among parks enables us to indicate threats that are typical for the group of Parks. Moreover, it may be a possibility of finding the threats that occur together. Summing up: **factors that are harmful to grasslands do not exist independently which should be taken into account for conservation aims.**