

ENVIRONMENTAL EVALUATION IN A SECTION
OF THE WARTA RIVER VALLEY*

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Abstract. River valleys are characterized by extensive biodiversity resulting from the chemical properties of the water itself, diversified littoral surface features, and varied humidity of habitats. These elements caused increased flora and fauna richness in the valley, thus enhancing the high environmental values. The floral and phytosociological study was carried in 2003-2005 in the Warta river valley, on an area of 26 hectares between the villages of Santok and Stare Polichno. The flora and communities of the area were analysed in terms of environmental evaluation, and phonological and faunistic observations were made. As a result 142 plant species were identified (including 4 trees and 9 bushes) and classified them in 7 communities from 4 phytosociological classes. Such a diversity of species caused a significant differentiation in the environmental evaluation. For the flora, the values of environmental evaluation of habitats varied from low, through moderate, to high. In spite of the area having only slight variability of surface features, it included habitats varying from permanently bogged, through strongly wet, wet turning to bog, to moderately dry.

Key words: environmental evaluation, flora, the Warta valley

INTRODUCTION

Rivers valleys have been subjected to transformation for many years, nevertheless many of them still feature high biodiversity which is characteristic for natural habitats. Many different factors contribute to that, for example: water chemical properties, diversity of littoral surface features, and variable humidity of habitats. Those factors contribute to the floristic abundance of the valleys, and thus enhance their high natural values [3,6,14,15]. Estimation of the environmental evaluation of flora and

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floral associations in the Warta river valley, between the villages of Santok and Stare Polichno, was the aim of this research.

MATERIALS AND METHODS

The floristic and phytosociological study was carried out in the years 2003-2005 (till August 2005) on a part of a flood terrace situated on the right side of the Warta river shore, on 26 hectares. 142 species of vascular plants (including 4 trees and 9 bushes) were determined on this area. All the plants were classified in seven different communities [9]. Also humidity analysis of habitats and environmental evaluation of flora and floral associations were carried out [10,11].

RESULTS

Species abundance (142 species of vascular plants), structural diversity of flora (132 species of herbaceous plants, 6 bushes, 4 trees), variable humidity of habitats (five types), and diversity of floral associations (seven forms), created very colourful and structural richness of plant associations.

This kind of diversity caused considerable differences in the values of species environmental evaluation. For flora, the values of evaluation of habitats varied from low, through moderate, to habitats of high environmental value (Tab. 1). The highest evaluation values (very high) were achieved by species of *Caricetum* rushes, lower by *Glycerietum* rushes (high), and the lowest were those of *Phalaridetum* rushes (moderately high). Lower evaluation values were given to meadow species from *Lolio-Cynosuretum* and *Elymus repens* associations (moderately low) and the occasional cut-cover species, for example *Calamagrostietum epigei*, which gained low evaluation values. The ruderal flora with *Chenopodietum boni-henrici* association had the lowest environmental evaluation values (very low).

Table 1. Occurrence of flora evaluation classes

Sort of flora	Natural values	Average of evaluation value
Ruderal	Very low	< 1.4
Tread meadows	Medium low	1.5-1.8
Clearing	Low	1.9-2.2
	Moderate high	3.1-3.4
Marshy	High	3.5-3.8
	Very high	3.9-4.2

For associations, the highest value of environmental evaluation was estimated for the associations of *Phragmitetea – Caricetum acutiformis*, *Glycerietum maximae* and *Phalaridetum arundinaceae* rushes (outstanding value – class XI). A lower value was indicated for meadow associations – *Molinio-Arrhenatheretea*

– *Elymus repens* and *Lolio-Cynosuretum* and ruderal species – *Epilobietea angustifolii* – association of *Calamagrostietum epigei*, and for *Chenopodietum boni-henrici* association with *Artemisietea vulgaris* – very low (class I).

In spite of the studied area being characterised by slight diversity of surface features, in respect of habitat humidity it featured different values, varying from permanently swampy associations, through strongly humid, wet and swamping, to slightly dry (Tab. 2).

Table 2. Wet biotopes in permanent sites

Sort of flora	Type of habitat	Range of average humidity values
Clearing	Slightly dry	3.6-4.0
Ruderal and tread meadows	Heavily humidified	4.7-5.3
Marshy	Heavily moist, wet paludal	7.7-7.9
	Drying with difficulties	8.5-8.7
	Permanently swampy	8.8-9.1

Rushes species were characterized by the highest values, particularly those from *Caricetum acutiformis* (associations – swampy and permanently swampy). A notably lower evaluation was that of *Glycerietum maximae* association (swampy with poor drainage) and *Phalaridetum arundinaceae* (strongly humid, wet and swampy). Species creating meadow associations often occurred in drier habitats (dry, strongly wetting), similar to ruderal species creating the *Chenopodietum boni-henrici* association. The lowest humidity values were observed on areas occupied by species from *Calamagrostietum epigei* (slightly dry).

DISCUSSION

River valleys are characterized by very high floristic values. Diversity of river-beds and valley slopes, and also the presence of old river-beds, sandbars, seasonal flooding of valley areas, and finally fluctuations in groundwater level promote such high floristic values [5,7]. This kind of factors caused that river valleys maintained many of their old – natural – environmental values. That is why the valleys continue to be valuable habitats for more rarely appearing species of some unique plants [4,12]. In the Pomerania region, in river Reknica river valley 619 plant species were determined [1], and in the Radunia valley – 537 plant species (on 100 hectares) [13]. Taking into account the small surface of the studied area (26 ha), 142 different plant species recorded there is a number close to the values obtained in the Kaszubskie Lakeland.

The existence of a well stocked green strip creating the plant cover of the river valley may help prevent the extinction of many plant species, especially those related with water or seasonally flooded, rushes and peat swamp [14].

However, the regulated character of the Warta river valley also caused the presence of degraded meadows and ruderal associations, with only the narrow green strip of rushes observed along the Warta river waterline and no peat swamp plants.

In plant seeding along rivers, water plays the main role. Migration, especially of foreign species, takes the air, water or ground routes on the shores and terraces of valleys [8]. However, in the studied area new species constituted only 22% of all floras.

Biodiversity of river valleys is strictly connected with the seasonal dynamics of water flow in the rivers: in the open-table waters there appear associations of water species, near and further from open-table waters there appear terrestrial species [2]. In the narrow green strip along the river (0.2 km) there were determined seven plant associations and, additionally three rushes associations (*Phragmitetea*); farther away from the water, on the degraded area – two meadow associations (*Molinio-Arrhenatheretea*), and on the border - two ruderal associations (*Artemisietea vulgaris*, *Epilobietea angustifolii*).

That part of the Warta valley is recommended for protection as a protected landscape area in “Polish Rivers Valleys Protection Programme” [3]. That is why this area should be quickly protected from further negative changes.

CONCLUSIONS

1. In spite of the small surface area (26 hectares), the studied area of the Warta valley is characterized by high floral diversity. 142 species of vascular plants (including 4 trees and 9 bushes) were determined within this area. This species diversity was confirmed during the whole vegetation season.

2. Surface features diversity caused that plant associations located near to the river were characterized by lower humidity, while associations located farther away were characterized by higher humidity.

3. Rushes species domination caused high environmental evaluation value and classified them as very high.

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WALORYZACJA PRZYRODNICZA ODCINKA DOLINY RZEKI WARTY

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Streszczenie. Doliny rzeczne cechuje duża bioróżnorodność. Wpływają na to m.in.: właściwości chemiczne samej wody, zróżnicowana rzeźba przybrzeżnej części doliny oraz różnorodna i zmienna wilgotność siedlisk. Czynniki te przyczyniają się do wzrostu bogactwa florystycznego i faunistycznego doliny, a tym samym potęgują jej wysokie walory przyrodnicze. W latach 2003-2005 prowadzono badania florystyczno-fitosocjologiczne w dolinie rzeki Warty na obszarze 26 ha pomiędzy miejscowością Santok a Starym Polichno (województwo lubuskie). Oceniono florę i zbiorowiska pod względem walorów przyrodniczych oraz dokonano obserwacji fenologicznych oraz faunistycznych. Oznaczono 142 gatunki roślin naczyniowych (w tym cztery drzewa i dziewięć krzewów) klasyfikując je do siedmiu zbiorowisk przynależnych do czterech klas fitosocjologicznych. Taka różnorodność gatunków roślin spowodowała znaczne różnice w wartościach waloryzacji przyrodniczej. Dla flory wartości waloryzacji te wahały się od siedlisk: o małych walorach, poprzez umiarkowane, a kończąc na dużych. Pomimo, że badany teren charakteryzował się nieznacznie zróżnicowaną rzeźbą terenu, jednak pod względem uwilgotnienia cechował się odmiennymi wartościami od siedlisk: bagiennych trwale zabagnionych, poprzez silnie wilgotne, mokre i zabagniające się, aż po słabiej suche.

Słowa kluczowe: waloryzacja przyrodnicza, flora, dolina Warty