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INTERESTING VASCULAR PLANT SPECIES IN THE BUG RIVER VALLEY (GOŁĘBIE–KOSTOMŁOTY SECTION)

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Summary. The paper presents the results of floristic studies conducted in 2002–2012 in the Bug River valley between the villages of Gołębie and Kostomłoty (as far as the border of the Terespol rural district). The area extends across the floodplain and fluvial terrace of the valley the so-called „Nadbużanka" road. The studies were performed in areas adjacent to and naturally related to the valley, i.e. valley slopes and edges. Among the species reported, special attention should be paid to 142 rare and legally protected species. The most interesting of them are species that have not been reported from the eastern part of the country or have not been included in species distribution maps in Poland [Zając and Zając 2001] and their localities have not been published so far (e.g. *Juncus acutiflorus*); species that do not grow in the Vistula River valley and the Bug River valley in the section between Niemirów and Ujście [Faliński *et al*. 2000] (e.g. *Gypsophila paniculata*, *Lathyrus latifolia*, *Echium russicum*, *Najas minor*, *Phyteuma orbiculare*, and *Silene lithuanica*), and species that occur in a limited number of localities (e.g. *Chaenorhinum minus*, *Corispermum leptospermum, Asplenium ruta-muraria*, and *Euphorbia villosa*). The *Orchis morio* population with its 2000 specimens is particularly valuable. The investigations also involved plant species that are characteristic for large river valleys as well as invasive species.

Key words: interesting vascular plant species, Bug river valley (Gołębie–Kostomłoty section)

INTRODUCTION

The Bug River valley is one of the least transformed river valleys in Poland and Europe. It is characterized by a high degree of naturalness of the ecosystems with a belt-like arrangement of plant communities. There is great diversity of plant communities present in the valley caused by both natural (diversity of

habitats along the longitudinal and transverse valley axis) and anthropogenic (mainly agricultural) factors. The major factors that distinguish the habitats within the riverbed and riverbanks are spontaneous erosion-accumulation processes. The distribution of plant communities in the Bug River valley is dependent on river inundation, the quality and quantity of transported material, and the level of groundwater [Dombrowski *et al*. 2002]. According to Głowacki *et al*. [2002a], the current vegetation cover of the Bug River valley is a resultant of long-term plant migration that has been taking place since the early post-glacial period until the present day and persistent anthropopressure exerted by man inhabiting the area. Investigations conducted at the end of the last century [Głowacki *et al*. 2002] reported 1280 species growing in the Bug River valley. Out of this number, 14 were considered extinct, 1252 were permanent components of the flora, and 6 were ephemeral or cultivated species temporarily running wild. 1024 were native species (spontaneophytes). There were 234 anthropophytes with 112 archaeophytes, 79 epekophytes, and 43 agriophytes, i.e. species established in natural and semi-natural communities.

In the 60s, plant communities of the left-hand Bug River valley lying within the Lublin region was described by Fijałkowski [1966]. His paper presented general natural characteristics, descriptions of associations and their dynamics, and economic issues primarily related to meadow ecosystems. Data on occurrence of rare plant species can be found in a few papers by Fijałkowski [1962, 1963, 1964]. A synthetic report is provided in „The Flora of the Lublin Region" [Fijałkowski 1995]. Xerothermic communities in the Bug valley have been described by Fijałkowski [1957], Trąba [2001], and Wójciak and Urban [2011]. Comprehensive studies of the vegetation of the old riverbeds have been conducted by Urban and Wójciak [1999, 2002a, 2003, 2004, 2006] and Lorens [2006]. The paper by Wójciak and Urban [2009] provides characterization of localities of species from the family Lemnaceae occurring at the border area of the Bug River valley. The plant cover of the left side of the Bug valley at the border area between Gołębie and Terespol was described in the 90s of the last century by Urban and Wójciak [2002b].

There is a considerably higher number of reports of plant communities and flora of the lower section of the Bug valley [Celiński 1954, 1961, e.g. Ambrożewska 1965, Ciosek and Krechowski 1998, Ćwikliński and Głowacki 1999, 2000, Głowacki *et al*. 2002b, Krechowski *et al*. 2010, Marciniuk *et al*. 2012, Wierzba *et al*. 2008].

STUDY OBJECT AND METHODS

The plant communities of the Bug valley between Gołębie and Kostomłoty are characterized by high diversity. The section of the valley studied can be divided into two parts: southern – adjacent to the upland belt (West-Volhynian Upland), and northern – neighbouring the Polesie Region. In its southern part,

the Bug valley is narrower, and the river flows through loess areas. According to Fijałkowski [1966], the valley is silted to a lesser degree, and marshy soils develop in numerous sites from fen peat. The valley is predominated by meadows and pastures from the class *Molinio-Arrhenatheretea*. Communities from the association *Magnocaricion* have developed in the old riverbeds. Elevated grounds (the fluvial terraces, and less frequently the floodplain) constitute arable land. Forests and shrub land cover a small proportion of the area, although there are fragments of remarkable hornbeam forests (e.g. near Gołębie and Gródek). The steep loess valley slopes are covered by xerothermic plant communities (Gołębie, Łuszków, Czumów, Gródek). Willow and poplar shrub form small patches are located at the riverbed. In the Podlasie section from Skryhiczyn, the Bug valley is considerably wider (except for the gorge-like fragments). The river meanders and forms numerous bends. There are many old riverbeds overgrown by aquatic and rush vegetation. The riverbed is covered by riparian communities; forests grow on the valley slopes, and the sandy hills in the valley are overgrown by psammophilic plants and dry pine forests. A large part of the valley constitutes an arable land, where cereals, root crops, and vegetables are grown. Flat hills near the riverbed are overgrown by xerophilic species.

Meadows and arable land cover the greatest area in the Bug River valley. Aquatic and wetland (rush) communities constitute a large proportion, whereas forest and shrub vegetation cover a smaller area. The smallest area is overgrown by communities of dry sandy dunes, xerothermic communities, riverside terophytes and plants typical of periodically wet depressions, and peatbog communities from the class *Scheuchzerio-Caricetea nigrae* [Urban and Wójciak 2002].

The studies were conducted on the left side of the Bug River valley between the villages of Gołębie and Kostomłoty (as far as the border of the Terespol rural district). The area extends across the floodplain and fluvial terrace of the valley the so-called Nadbużanka road. The studies were performed in areas adjacent to and naturally related to the valley, i.e. valley slopes and edges. Agricultural and urbanized areas were also analyzed. In terms of the administrative division, the fragment of the Bug valley belongs to theLublin Province and is located within the rural districts of Dołhobyczów, Hrubieszów, Dubienka, Dorohusk, Ruda Huta, Wola Uhruska, Włodawa, Hanna, Sławatycze, and Kodeń. According to the division proposed by Kondracki [2002], the study area is situated in the Volhynian Upland (Hrubieszów Basin and Horodło Range), Volhynian Polesie Region (Dubienka Depression), Western Polesie (Łęczyńsko-Włodawska Plain, Włodawa Hummock, Sosnowica Hollow, Kodeń Plain). In the division of Poland into the ATPOL grid system [Zając 1978], the area is situated in squares GE88, GE78, GE77, GE78, GE67, GE68, GE58, GE57, GE46, GE47, GE36, GE25, GE26, GE15, GE05, GD94, GD95, GD84, GD74, GD64, GD54, GD44, and GD45.

The field study conducted in 2002–2012 (between May and October) was focused on exploration of the flora of the Bug River valley between the villages of Gołębie–Kostomłoty. The topographic method [Faliński 2001] was employed in the study. All species of vascular plants, with emphasis on legally protected,

rare, and invasive species, were recorded. Species associated with the river valley were also taken into account. Observations of changes in the abundance of the most valuable species in particular localities were performed as well. The species nomenclature follows that proposed by Mirek *et al*. [2002]. Photographic documentation was prepared. Table 1 presents a list and short characteristics of rare and legally protected vascular plants. This paper does not include species from the genus *Carex*. Presentation of species from this genus will be a subject of a further report.

RESULTS AND DISCUSSION

The Bug is a meandering and highly dynamic river, as it has not been regulated in its border section. The valley width is variable and reaches an average value of 1.74 km. The floodplain extends to 3 km in some parts. It is being used as extensive hay-growing meadows. Evident vegetation changes occurred within a few seasons or even year by year. The studies carried out in the Gołębie–Terespol section of the valley in 2002–2012 demonstrated occurrence of approximately 1100 vascular plant species, including 65 protected species, i.e. 53 species under strict and 12 under partial protection. Moreover, 77 rare and endangered species in the country or regional scale were found in the area. Some of the legally protected or rare species occur abundantly or even massively here, e.g. *Nymphaea alba*, *Nuphar lutea*, *Utricularia vulgaris*, *Helichrysum arenarium*, *Ononis arvensis*, *Lemna turionifera* and *Lemna gibba*. Other species, e.g. *Bromus squarrosus*, *Corispermum leptopterum*, *Dianthus armeria*, *Diphasistrum complanatum*, *Epipactis palustris*, *Euphorbia villosa*, *Listera ovata*, *Nymphaea candida*, *Salvinia natans* and *Verbascum blattaria* grow in few and often single localities. 8 species included in the „Polish Red Data Book of Plants" [Kaźmierczakowa and Zarzycki 2001] were found in the study area, i.e. 1 critically endangered CR species (*Echium russicum*), 4 endangered EN species (*Angelica palustris*, *Chamaecytisus albus*, *Lathyrus latifolius*, *Orchis morio*), and 3 vulnerable VU species (*Iris aphylla*, *Nymphaea candida*, *Succicella inflexa*).

Species listed in the „Red List of Endangered Vascular Plants in Poland" [Mirek *et al*. 2006] were found, e.g. *Achillea setacea* and *Echium russicum* (category E – near extinct); *Chamaecytisus albus* (category R – rare); *Adonis vernalis*, *Anagallis foemina*, *Angelica palustris*, *Asperula tinctoria*, *Cnidium dubium*, *Dactylorhiza maculata*, *Dianthus superbus*, *Drosera rotundifolia*, *Dryopteris cristata*, *Epipactis palustris*, *Euphorbia villosa*, *Gentiana pneumonanthe*, *Hierochloë australis*, *Hierochloë odorata*, *Hippuris vulgaris*, *Iris aphylla*, *Iris sibirica*, *Juncus acutiflorus*, *Lathyrus palustris*, *Najas minor*, *Ophioglossum vulgatum*, *Orchis militaris*, *Orchis morio*, *Pedicularis palustris*, *Peucedanum alsaticum*, *Pulicaria vulgaris*, *Ranunculus lingua*, *Salvinia natans*, *Scutellaria hastifolia*, *Succisella inflexa* and *Teucrium scordium* (category V – vulnerable). Two species from Annex II of the Habitats Directive, i.e. *Angelica sylvestris* and *Echium russicum* were found in the study area.

Table 1. List of rare, protected, and endangered vascular plant species in the Bug River valley (Gołębie–Kostomłoty section) frequency of occurrence in the Bug River valley

No.	Species	Frequency	Status	Habitat	Locality ATPOL square
1.	*Achillea pannonica* SCHEELE	2	rz	Xerothermic grassland on the valley slopes	Kryłów GE88, Czumów GE77, Gródek GE77, Teptiuków GE67
2.	*Achillea setacea* WALDST & KIT.	2	rz	Xerothermic grassland on the valley slopes	Kryłów GE88, Kolonia Kosmów GE88, Ślipcze GE78, Gródek GE77
3.	*Adonis vernalis* L.	2	§§	Xerothermic grassland on the valley slopes	Czumów GE77, Gródek GE77
4.	*Agrimonia procera* WALLR.	2	rz	Xerothermic grassland	Gołębie GE88, Hniszów GE36, Stare Stulno GE05
5.	*Alisma lanceolatum* WITH.	2	rz	Riverbed margins, wet valley depressions	Teptiuków GE657, Husynne near Hrubieszów GE67, Dubienka GE47, Dorohusk GE36, Stare Stulno GE05, Sławatycze GD64, Parośla GD64
6.	*Alnus incana* (L.) MOENCH	3	rz	Riverbed margins	Kosmów GE78, Hniszów GE36, Kolonia Marysin near Hniszów GE36, Siedliszcze GE15, Szostaki GD54, Zalewsze GD54, Kodeń GD54, Kostomłoty GD45
7.	*Alopecurus myosuroides* HUDS.	2	rz	Arable field	Kryłów GE88, Kolonia Kosmów GE88
8.	*Althaea officinalis* L.	3	rz	Roadsides, fallows	Uchańka GE47, Okopy Nowe GE26
9.	*Anagallis foemina* MILL.	2	rz	Arable field	Matcze GE57
10.	*Anemone sylvestris* L.	2	§§	Xerothermic grassland on the valley slopes	Czumów GE77, Gródek GE77
11.	*Angelica palustris* (BESSER) HOFFM.	3	§§	Wet meadows	Gródek GE77, Matcze GE57, Zagórnik GE57, Starosiele GE47
12.	*Antennaria dioica* (L.) GAERTN.	2	rz	Sandy roadsides	Sugry near Kodeń GD44
13.	*Anthericum ramosum* L.	2	rz	Xerothermic grassland	Czumów GE77, slope of „Grybienowa Mount" near Stare Stulno GE05
14.	*Aquilegia vulgaris* L.	2	§§	Valley edge (probably anthropogenic localities)	Gródek GE77, Szostaki GD54
15.	*Arctostaphylos uva-ursi* (L.) SPRENG.	2	§§	Roadsides, forest division lines	Dubnik GD94, Sobibór-village GD95
16.	*Asarum europaeum* L.	3	§	Hornbeam forests on valley slopes	Gołębie GE88, Kolonia Kosmów GE88, Gródek GE77, Husynne near Hrubieszów GE67, Matcze GE57, Husynne GE36, Okopy Nowe GE36, GE26, Rudka GE25, Dubnik GD94
17.	*Asclepias syriaca* L.	3	rz	Roadsides, fallows	Ladeniska GE36, Dorohusk GE36, Okopy Nowe GE36, Świerże GE26, Rudka GE25, Zbereże GE05, Suszno GD84, Szostaki GD54

18.	*Asperula tinctoria* L.	2	rz	Xerothermic grassland on the valley slopes	Czumów GE77
19.	*Asplenium ruta-muraria* L.	1	rz	Chapel wall	Kodeń GD54
20.	*Aster amellus* L.	2	§§	Xerothermic grassland on the valley slopes	Czumów GE77
21.	*Astragalus danicus* RETZ.	2	rz	Xerothermic grassland on the valley slopes, roadsides	Czumów GE77
22.	*Astragalus onobrychis* L.	2	rz	Xerothermic grassland on the valley slopes	Czumów GE77
23.	*Blysmus compressus* (L.) PANZ. EX LINK.	3	rz	Wet meadows	Along the entire bug valley section studied
24.	*Bolboschoenus maritimus* L.	3	rz	Riverbed margins, wet valley depressions	Kryłów GE88, Kolonia Kosmów GE88, Husynne near Hrubieszów GE67, Teptiuków GE67, Husynne GE36, Starzyzna near Dorohusk GE36, Dorohusk GE36, Świerże GE26, Rudka GE25, Siedliszcze GE15, Bytyń GE15, Stare Stulno GE05, Pawluki GD74, Jabłeczna GD64, Szostaki GD54
25.	*Bromus squarrosus* L.	1	rz	Railway embankment	Włodawa – railway station GD94
26.	*Campanula bononiensis* L.	2	§§	Xerothermic grassland on the valley margin, roadsides	Kryłów GE88, Czumów GE77, Dubnik GD95, Różanka GD84, Szostaki GD54
27.	*Campanula sibirica* L.	2	§§	Xerothermic grassland on the valley margin	Kryłów GE88
28.	*Centaurium erythraea* RAHN	4	§§	Meadows, roadsides	Gołębie GE88, Kryłów GE88, Kolonia Kosmów GE88, Gródek GE77, Husynne near Hrubieszów GE67, Matcze GE57, Skryhiczyn GE47, Husynne GE36, Starzyzna koło Dorohuska GE36, Dorohusk GE36, Okopy Nowe GE36, GE26, Hniszów GE25, Rudka GE25, Siedliszcze GE15, Stulno GE05, Zbereże GE05, Patochy GD74, Łydyny GD74, Dołhobrody Gd74, Mościce Dolne GD64, Jabłeczna GD64, Kodeń GD54, GD44
29.	*Centaurium pulchellum* (SW.) DRUCE	2	§§	Wet terrain depressions	Prehoryłe GE88, Kryłów GE88, Gródek GE77, Zagórnik GE57, Starzyzna near Dorohusk GE36, Dorohusk GE36, Okopy Nowe GE36, GE26, Sławatycze GD64
30.	*Chaenorhinum minus* (L.) LANGE	1	rz	Fallows	Husynne GE36
31.	*Chamaecytisus albus* (HACQ.) ROTHM.	1	§§	Steep valley slopes	Czumów GE77
32.	*Chamaecytisus ruthenicus* (FISH. EX WOŁ.) KLÁSK.	1	rz	Steep valley slopes	Czumów GE77; slope of „Grybienowa Mount" near Stare Stulno GE05

33.	*Chondrilla juncea* L.	2	rz	Dunes, sandy roadsides	Wola Uhruska GE15, Zbereże GE05, Sobibór-village GD95, Dubnik GD94, Orchówek GD94, Włodawa GD94, Hanna GD74, Kuzawka GD74, Szostaki GD54, Kodeń GD54, Kostomłoty GD44
34.	*Cirsium pannonicum* (L. F.) LINK	1	§§	Xerothermic grassland	Gródek GE77, Czumów GE77
35.	*Clematis recta* L.	1	§§	Steep valley slopes	Kryłów GE88, Kosmów GE78
36.	*Cnidium dubium* (SCHKUHR) THELL.	3	rz	Wet meadows, scattered in the valley	Rich localities near Matcze GE57, Skryhiczyn GE47, Dorohusk GE36, Bytyń GE15, Stulno GE05, Orchówek GD94, Stawki GD84, Dołhobrody GD74, Hanna GD74, Kuzawka GD74, Sławatycze GD64, Liszna GD64, Jabłeczna GD64, Pniski GD64, Szostaki GD54, Zalewsze GD 54, Kodeń GD54
37.	*Convallaria majalis* L.	4	§	Forest communities on valley slopes	Kosmów GE78, Husynne near Hrubieszów GE67, Zagórnik GE57, Hniszów GE36, Okopy Nowe GE36, Rudka GE25, Stulno GE05, Dubnik GD94, Hanna GD74, Kolonia Hanna GD74, Jabłeczna GD54, Szostaki GD54, Kodeń-Łęgi GD44, Kostomłoty GD44
38.	*Corispermum leptopterum* (ASCH.)	1	rz	Dune	Wola Uhruska GE15
39.	*Dactylorhiza incarnata* (L.) SOÓ	3	§§	Wet meadows	Gródek GE77, Strzyżów GE68, Matcze GE57, Zagórnik GE57, Starzyzna near Dorohusk GE36, Dubnik GD94, Łydyny GD74, Patochy GD74, Jabłeczna GD64, Szostaki GD54, Zalewsze GD54
40.	*Dactylorhiza maculata* (L.) SOÓ	2	§§	Wet meadows	Gródek GE77, Matcze GE57, Łydyny GD74, Patochy GD74, Jabłeczna GD64
41.	*Dactylorhiza majalis* (RCHB.) P.F. HUNT&SUMMERH.	2	§§	Wet meadows	Czumów GE77, Gródek GE77, Matcze GE57, Zagórnik GE57, Starzyzna near Dorohusk GE36, Dubnik GD94, Patochy GD74, Szostaki GD54, Zalewsze GD54
42.	*Datura stramonium* L.	3	rz	Roadsides	Kryłów GE88, Kosmów GE78, Ślipcze GE78, Husynne GE36, Dubienka GE47, Świerże GE26, Siedliszcze GE15, Wola Uhruska GE15, Stare Stulno GE05, Szostaki GD543, Kodeń GD54
43.	*Dianthus arenarius* L.	2	§§	Dunes, sandy roadsides	Bytyń GE15, Sobibór-village GD95
44.	*Dianthus armeria* L.	1	rz	Margin of a dry meadow	Stare Stulno GE05
45.	*Dianthus superbus* L. S. STR	2	§§	Wet meadows	Czumów GE77, Matcze GE57, Zagórnik GE57, Skryhiczyn GE47, Starosiele GE47
46.	*Diphasiastrum complanatum* (L.) HOLUB	2	§§	Dry coniferous forest	Kodeń GD44
47.	*Drosera rotundifolia* L.	1	§§	Forest peat bog	Dubnik GD94

48.	*Echium russicum* J.F.GMEL.	1	§§	Steep valley slopes	Kryłów GE88, Gródek GE77, Stare Stulno GE05
49.	*Eleocharis acicularis* (L.) ROEM. & SCHULT.	2	rz	Old riverbed edges	Kryłów GE88, Uchańka GE37, GE36, Husynne near Dorohusk GE36, Starzyzna near Dorohusk GE36, Kuzawka GD74, Sławatycze GD64
50.	*Elymus hispidus* (OPIZ) MELDERIS	2	rz	Steep valley slopes	Kryłów GE88, Czumów GE77, Gródek GE77, Teptiuków GE657
51.	*Epipactis helleborine* (L.) CRANTZ S. STR.	4	§§	Frequent along the valley section studied, on roadsides, at the edges of shrub communities and in forest communities	Along the entire bug valley section studied
52.	*Epipactis palustris* (L.) CRANTZ	1	§§	Wet meadow	Matcze GE57
53.	*Equisetum hyemale* L.	2	rz	Forest communities, roadside ditches	Dubnik GD94, Dołhobrody GD74
54.	*Equisetum ramosissimum* DESF.	1	rz	Roadside ditches	Dołhobrody GD74
55.	*Euphorbia villosa* WALDST. & KIT. EX WILLD. S. STR.	1	rz	Steep valley slopes	Kryłów GE88
56.	*Festuca rupicola* HEUFF.	2	rz	Xerothermic grassland	Gródek GE77
57.	*Festuca valesiaca* SCHLEICH. EX GAUDIN	2	rz	Xerothermic grassland	Gródek GE77
58.	*Galium odoratum* (L.) SCOP.	3	§	Hornbeam forests on valley slopes	Gołębie GE88, Kolonia Kosmów GE88, Kosmów GE78, Gródek GE77, Husynne near Hrubieszów GE67, Matcze GE57, Husynne GE36
59.	*Gentiana cruciata* L.	1	§§	Steep valley slopes	Czumów GE77
60.	*Gentiana pneumonanthe* L.	2	§§	Wet meadows	Hanna GD74, Kolonia Hanna GD74, Orzeł koło Hanny GD74, Jabłeczna GD64
61.	*Gladiolus imbricatus* L.	2	§§	Meadow communities, edges of shrub communities	Matcze GE57, Dubnik GD94
62.	*Gratiola officinalis* L.	2	§§	Old riverbed edges	Orchówek GD94, Jabłeczna GD64, Pniski GD64, Szostaki GD54, Łęgi GD54, Ryski GD54, Kostomłoty GD54
63.	*Gypsophila fastigiata* L.	2	rz	Valley slopes, sandy dune	Czumów GE77, Gródek GE77, Wola Uhruska GE15
64.	*Gypsophila paniculata* L.	2	rz	Valley slopes	Czumów GE77
65.	*Helichrysum arenarium* (L.) MOENCH	5	§	Dunes, sandy roadsides	Along the entire bug valley section studied
66.	*Hepatica nobilis* SCHLEB.	2	§§	Hornbeam forests on valley slopes	Husynne GE36, Okopy Nowe GE26, Hniszów GE25, Rudka GE25, Dubnik GD94
67.	*Hierochloë australis* (SCHRAD.) ROEM. & SCHULT.	1	§	Forest margin at the Bug edge	Świerże GE26
68.	*Hierochloë odorata* (L.) P. BEAUV.	1	§	Wet meadow	Dorohusk GE26

69.	*Hippuris vulgaris* L.	2	rz	Old riverbeds	Uchańka GE37, Husynne GE36, Starzyzna near Dorohusk DE36, Okopy Nowe GE36, Siedliszcze GE15, Wola Uhruska GE15, Bytyń GE15, Kuzawka GD74
70.	*Hyoscyamus niger* L.	3	rz	Roadsides, rubble heaps	Kryłów GE88, Starosiele GE47, Dubienka GE47
71.	*Inula helenium* L.	1	rz	Edge of a roadside ditch	Gołębie GE88
72.	*Iris aphylla* L.	1	§§	Xerothermic grassland on the valley slopes	Czumów GE77
73.	*Iris sibirica* L.	2	§§	Wet meadows, old riverbed edges	Matcze GE57, Zagórnik GE47, Dubnik GD94, Hanna GD74, Orzeł koło Hanny GD74, Jabłeczna GD64, Szostaki GD54, Zalewsze GD54
74.	*Juncus acutiflorus* EHRH. ex HOFFM.	1	rz	Old riverbeds	Stulno GE05, Zbereże GE05, Różanka GD84, Parośla GD64
75.	*Koeleria glauca* (SPRENG.) DC	2	rz	Dunes	Dubnik GD94, Sobibór-village GD95, Hanna GD74
76.	*Laserpitium prutenicum* L.	2	rz	Wet meadows	Kryłów GE88, Gródek GE77, Dubienka GE47
77.	*Lathyrus latifolius* L.	2	§§	Herbaceous communities	Teptiuków GE88, Skryhiczyn GE47, Okopy Nowe GE36
78.	*Lathyrus palustris* L.	4	rz	Abundant in rush communities and on wet meadows	Along the entire bug valley section studied
79.	*Legousia hybrida* (L.) DELARBRE	1	rz	Arable field	Kryłów GE88
80.	*Lemna gibba* L.	4	rz	Old riverbeds	Along the entire bug valley section studied *
81.	*Lemna turionifera* LANDOLT	5	rz	Old riverbeds	Along the entire bug valley section studied *
82.	*Libanotis pyrenica* (L.) BOURG.	3	rz	Valley slopes, roadsides	Gołębie GE88, Prehoryłe GE88, Kosmów GE88, Teptiuków GE67, Bereźnica GE58, Matcze GE57, Skryhiczyn GE47, Uchańka GE37, Husynne GE36, Siedliszcze GE15, Bytyń GE15, Orchówek GD94, Kuzawka GD74, Liszna GD64, Kostomłoty GD44
83.	*Lilium martagon* L.	2	§§	Hornbeam forests on valley slopes	Rudka GE25, Dubnik GD94
84.	*Linosyris vulgaris* CASS.	1	§§	Xerothermic grassland on the valley slopes	Gródek GE77
85.	*Listera ovata* (L.) R. BR.	1	§§	Shrub communities	Matcze GE57
86.	*Lycopodium annotinum* L.	2	§§	Forest communities	Zbereże GE05, Dubnik GD94, Sugry GD54
87.	*Lycopodium clavatum* L.	3	§§	Forest communities, dunes, sand mining pits	Kosmów GE78, Hniszów GE25, Zbereże GE05, Sugry GD54, Kodeń GD54
88.	*Melittis melissophyllum* L.	3	§§	Hornbeam forests on valley slopes	Husynne GE36, Dubnik GD94
89.	*Menyanthes trifoliata* L.	2	§§	Peated terrain depressions	Zagórnik GE57, Dubnik GD94, Szostaki GD54, Zalewsze GD54

90.	*Myosurus minimus* L.	3	rz	Arable fields-wet terrain depressions	Kryłów GE88, Łydyny GD74, Dołhobrody-Baje GD74, Patochy GD74, Hanna GD74, Kolonia Hanna GD74, Szostaki GD54, Kodeń GD 54, Łęgi GD44, Ryski GD44
91.	*Najas minor* ALL.	1	§§	Old riverbed	Uchańka GE37
92.	*Neottia nidus-avis* (L.) Rich.	1	§§	Forest communities	Zbereże GE05, Dubnik GD74, Sugry GD54, Kodeń GD54
93.	*Nepeta pannonica* L.	2	rz	Steep valley slopes	Kryłów GE88, Czumów GE77
94.	*Nesslia paniculata* (L.) DESV.	2	rz	Arable field	Kryłów GE88
95.	*Nuphar lutea* (L.) SIBITH. & SM.	5	§	Very abundant in old riverbeds	Along the entire bug valley section studied
96.	*Nymphaea alba* L.	5	§	Very abundant in old riverbeds	Along the entire bug valley section studied
97.	*Nymphaea candida* C. PRESL.	1	§§	Old riverbed	Sławatycze GD64
98.	*Ononis arvensis* L.	5	§	Abundant on dry meadows, valley slopes, and along roadsides	Along the entire bug valley section studied
99.	*Ophioglossum vulgatum* L.	2	§§	Wet meadows	Kryłów GE88, Matcze GE57, Zagórnik GE57, Husynne GE36, Starzyzna GE36, Sosnowiec GE25, Szostaki GD54
100.	*Orchis militaris* L.	3	§§	Dry meadows, valley slopes	Gródek GE77, Matcze GE57, Zagórnik GE57, Starosiele GE47
101.	*Orchis morio* L.	2	§§	Dry meadows	Dołhobrody GD 74 Pawluki GD74, Hanna GD74, Kolonia Hanna GD74
102.	*Orobanche caryophyllacea* SM.	1	§§	Valley slopes	Czumów GE77
103.	*Pedicularis palustris* L.	2	§§	Wet meadows	Matcze GE57, Starosiele GE47, Hanna GD74, Jabłeczna GD64
104.	*Peplis portula* L.	1	rz	Fields-wet terrain depressions	Kodeń GD54
105.	*Petasites spurius* (RETZ.) RCHB.	3	rz	The lower dunes' edges.	Jabłeczna GD64, Kodeń GD54, GD64, Kostomłoty GD45
106.	*Peucedanum alsaticum* L.	3	rz	Grassland	Gołąb GE88, Kryłów GE88, Kolonia Kosmów GE88, Czumów GE77, Gródek GE77, Teptiuków GE67, Jabłeczna GD64
107.	*Phleum phleoides* (L.) H. KARST.	2	rz	Xerothermic grassland	Czumów GE88, „Grybienowa Mount" near Stare Stulno GE05
108.	*Phyteuma orbiculare* L.	1	§§	Wet meadows	Matcze GE57, Zagórnik GE57
109.	*Plantago arenaria* WALDST. & KIT.	2	rz	Dunes	Dorohusk GE36, Wola Uhruska GE15, Stulno GE05, Orchówek GD94
110.	*Polypodium vulgare* L.	1	§§	Forest communities	Turka GE36, Dubnik GD94
111.	*Portulaca oleracea* L.	1	rz	Roadsides	Kryłów GE88, Sławatycze GD64
112.	*Potentilla alba* L.	3	rz	Forest and shrub communities	Zagórnik GE57, Dubnik GD94, Różanka DG84, Stawki GD84

113.	*Primula veris* L.	3	§	Dry meadows, valley slopes	Gołębie GE88, Kryłów GE88, Kolonia Kosmów GE88, Kosmów GE78, Czumów GE77, Gródek GE77, Teptiuków GE67, Matcze GE57, Zagórnik GE57, Stare Stulno GE05, Dubnik GD94, Stawki GD84, Szostaki GD54
114.	*Pulicaria vulgaris* GAERTN.	2	rz	Pastures	Kryłów GE88, Uchańka GE37
115.	*Ranunculus circinatus* SIBTH.	3	rz	Old riverbeds, ditches, canals	Czumów GE77, Husynne GE36, Stulno GE05, Zbereże GE05, Sobibór-village GD95, Kolonia Hanna GD74, Sławatycze GD64, Jabłeczna GD64, Kodeń GD54, GD44
116.	*Rhynchospora alba* (L.) VAHL	1	rz	Forest peat bog	Dubnik GD94
117.	*Ribes nigrum* L.	4	§	Abundant in forest and shrub communities	Along the entire bug valley section studied
118.	*Salsola kali* ssp. *ruthenica* (ILJIN) SOÓ	1	rz	Sandy dune	Wola Uhruska GE15
119.	*Salvia verticillata* L.	1	rz	Valley slope	Czumów GE77
120.	*Sambucus ebulus* L.	2	rz	Roadsides	Kryłów GE88, Matcze GE57, Gródek GE77
121.	*Sambucus nigra* L. ssp. *laciniata*	1	rz	Forest on a steep slope at the old riverbed	Kosmów GE78
122.	*Scorzonera purpurea* L. S. STR.	1	§§	Xerothermic communities on the valley slopes	Gródek GE77
123.	*Scutellaria hastifolia* L.	3	rz	Rush communities, edge of shrub communities	Husynne GE36, Dorohusk GE36, Stulno GE05, Zbereże GE05, Mościce Dolne GD64, Pniski GD64, Jabłeczna GD64, Kostomłoty GD44, GD45
124.	*Senecio erucifolius* L.	2	rz	Fallows, sandy roadsides	LadeniskaGE 36, Hniszów GE25, Wola Uhruska GE15, ZbereżeGE05
125.	*Silene chlorantha* (WILLD.) EHRH.	2	rz	Dunes, sandy roadsides of field and forest tracts	Sobibór-wieś GD95, Zalewsze GD54, Ryski GD44
126.	*Silene lithuanica* ZAPAŁ.	3	§§	Dunes, sandy roadsides of field and forest tracts	Stulno GE05, Zbereże GE05, Sobibór-wieś GD95, Ryski GD44
127.	*Silene otites* (L.) WIBEL	3	rz	Sandy dunes, sandy roadsides	Czumów GE77, Łydyny GD74, Sławatycze GD64, Mościce Dolne, Szostaki GD54, Zalewsze GD54, Ryski GD44, Łęgi GD44, Kostomłoty GD44, GD45
128.	*Silene tatarica* (L.) PERS.	3	rz	Dunes, sandy roadsides	Zagórnik GE57, Orchówek GD94, Włodawa GD94, Sławatycze GD64, Mościce Dolne GD64, Szostaki GD54, Zalewsze GD54
129.	*Succisella inflexa* (KLUK) BECK	3	§§	Edges of herbaceous and shrub communities	Matcze GE57, Zagórnik GE57, Starosiele GE47, Husynne GE36, Starzyzna near Dorohusk GE36, Dorohusk GE36, Okopy Nowe GE36, GE26, Sosnowiec GE26, Hniszów GE25, Rudka GE25, Stulno GE05, Jabłeczna GD 64, Szostaki GD54

130.	*Thesium linophyllon* L.	2	rz	Gramineous valley slopes	Czumów GE77
131.	*Thymus marschallianus* WILLD.	2	rz	Gramineous valley slopes	Czumów GE77, Gródek GE77, Kryłów GE88, Kosmów GE88
132.	*Trollius europaeus* L.S.STR.	1	§§	Wet meadows	Matcze GE57
133.	*Utricularia vulgaris* L.	4	§§	Old riverbeds	Along the entire bug valley section studied
134.	*Veratrum lobelianum* BERNH.	2	§§	Wet meadows	Matcze GE57, Zagórnik GE57
135.	*Verbascum blattaria* L.	1	rz	Meadow margin	Zagórnik GE57
136.	*Verbena officinalis* L.	1	rz	Steep valley slopes	Kryłów GE88, Czumów GE77
137.	*Veronica austriaca* L. S. STR.	1	rz	Steep valley slopes	Gródek GE77
138.	*Veronica prostrata* L.	1	rz	Xerothermic communities on the valley slopes	Gródek GE77
139.	*Vicia lathyroides*	1	rz	Sandy roadsides	Orchówek GD94
140.	*Vinca minor* L.	3	§	Forest communities, anthropogenic localities	Kryłów GE88, Gródek GE77, Husynne near Hrubieszów GE77, GE67, Szostaki GD54
141.	*Viola hirta* L.	2	rz	Steep valley slopes	Kryłów GE88, Czumów GE77
142.	*Wolffia arrhiza* (L.) HORKEL EX WIMM.	3	rz	Old riverbeds	Along the entire bug valley section studied *

1 – sporadic, 2 – very rare, 3 – rare, 4 – frequent, 5 – very frequent;
Status – species protection: §§ – strict, § – partial; rz – rare in the country;
* list of localities in the paper by Wójciak and Urban [2009]

The following plants listed as threatened with extinction and endangered species of vascular plants in the Lublin Upland, Western Volhynia, and Polesie Lubelskie Region [Kucharczyk and Wójciak 1995] were found in the section of the Bug valley studied: 1 critically endangered species – CR (*Echium russicum*), 5 endangered species EN (*Cirsium pannonicum*, *Gypsophila paniculata*, *Hierochloë odorata*, *Phyteuma orbiculare*, *Scorzonera purpurea*), 12 vulnerable species – VU (*Achillea setacea*, *Adonis vernaalis*, *Asplenium ruta-muraria*, *Astragalus dannicus*, *Astragalus onobrychis*, *Chamaecytisus albus*, *Dianthus arenarius*, *Iris aphylla*, *Linosyris vulgaris*, *Prunus fruticosa*, *Rhynchospora alba*, *Teucrium scordium*), and 9 low-risk species – LR (*Arctostaphylus uva-ursi*, *Clematis recta*, *Equisetum ramosissimum*, *Iris sibirica*, *Salvinia natans*, *Silene lithuanica*, *Silene tatarica*, *Trollius europaeus*, *Wolffia arrhiza*).

New localities of rare and protected species were discovered during the field study. Interestingly, the localities of the following species: *Alopecurus mysuroides*, *Corispermum leptopterum*, *Equisetum ramosissimum*, *Euphorbia villosa*, *Juncus acutiflorus*, *Lathyrus latifolius*, *Legousia hybrida*, *Lemna turionifera*, *Orchis morio*, *Phyteuma orbiculare* and *Verbascum blattaria* have not been included in species distribution maps in Poland [Zając and Zając 2001]. With the exception of *Lemna turionifera* [Wójciak and Urban 2009] and *Euphorbia villosa* [Wójciak and Urban 2011], the localities have not been reported in the literature so far. The population of *Orchis morio* with its ca. 2000 individuals is particularly valuable. Currently, it is being investigated in detail and the result with be published in a further report.

Occurrence of many species is clearly related with a specific geographical region. For instance, rare and legally protected continental species, e.g. *Adonis vernalis*, *Chamaecytisus ruthenicus*, *Echium russicum* and *Iris aphylla* as well as southern thyme species e.g. *Thymus marschallianus* can be found in the Bug valley within the Volhynian Upland.

The flora associated with peat bogs is equally interesting. There are only few peat objects in the study area. Larger bog complexes are located near Matcze-Starosiel and Dubnik (small forest peat bog). In the peat bogs near Matcze and Starosiel, localities of rare and protected wetland and meadow plant species were found e.g. *Angelica sylvestris*, *Dactylorhiza incarnata*, *Epipactis palustris*, *Iris sibirica*, *Orchis militaris*, *Pedicularis palustris*, *Trollius europaeus*, and *Veratrum lobelianum*. Special attention should be paid to the abundant (over 1000 individuals) locality of a mountain species *Phyteuma orbiculare.* In turn, transitional mire species *Drosera rotundifolia* and *Rhynchospora alba* have their localities in small forest peat bogs near the village of Dubnik.

A substantial role in the plant cover of the Bug valley section is played by species that are characteristic for valleys of large rivers; these include *Achillea salicifolia*, *Euphorbia lucida*, *Scutellaria hastifolia*, *Teucrium scordium*, *Thalictrum flavum*, *Senecio paludosus,* or *Cuscuta lupuliformis. Hierochloë australis*, *Hierochloë odorata*, *Equisetum ramosissimum,* and *Gratiola officinalis* were found in only few localities.

Species belonging to aquatic communities associated with the current riverbed and the old riverbeds (the so-called Bug River ranges) are represented by a variety of species in the study area. This is related to the azonal character of aquatic vegetation whose presence is associated with the availability of specific habitats. Protected species, e.g. *Nuphar lutea*, *Nymphaea alba,* and *Utricularia vulgaris* were often found in the old riverbeds. Especially interesting are the two newly discovered (2012) localities of *Salvinia natans*, a species that had not been found in the Bug River valley for a long time. In 2008 [Wierzba *et al*.] and 2011 [Marciniuk *et al*. 2012], several *Salvinia natans* localities were found in the Bug valley south of Terespol. Rare species growing in the riverbeds include numerous Lemnaceae rare species, e.g. *Lemna gibba* and *Wolffia arrhiza*, and *Lemna turionifera* – a new species in the Polish flora. Localities of these species were described in detail in the papers of Urban and Wójciak [2006], and Wójciak and Urban [2009]. *Cyperus fuscus* can frequently be found on the exposed bottom sediments of the old riverbeds and riverbeds of the Bug River. *Hippuris vulgaris* and *Eleocharis acicularis* can be found less frequently. Localities of *Bolboschoenus maritimus* (halophytic species) and *Juncus acutiflorus* were reported from the rush communities developing in old riverbeds and in terrain depressions. The latter species was found in the Bug valley in 2010. Localities of *Juncus acutiflorus* had been reported exclusively from western and north-western Poland [Zając and Zając 2002].

The investigations carried out in 2002–2012 show that, compared to the years 1998–2001, invasive species e.g. *Echinocystis lobata*, *Impatiens glandulifera*

(particularly near Kryłów, Dubienka, Uchańka, Rudka), *Rumex confertus*, *Solidago sp.*, and *Helianthus sp.* have spread significantly. Such invasive plants also include tree and shrub species, e.g. *Acer negundo* (spreading in the riparian communities along the Bug riverbed), *Padus serotina* (species planted in poor coniferous forest habitats), *Sambucus racemosa* (species planted at forest edges) and *Robinia pseudoacacia* (growing along communication routes). These species contribute to degradation of indigenous plant communities and displace native species from their natural habitats. *Geranium sibiricum* is an anthropophytic species that is rare in the Bug valley (localities near Kryłów). The study conducted by Głowacki *et al*. [2002a] shows that the species was only found in the valley near Brześć. *Datura stramonium*, *Hyoscyamus niger* and *Onopordum acanthium*, which used to be common around buildings, can currently be found in only few localities. The localities of *Asclepias syriaca*, *Althaea officinalis*, *Echinops sphaerocephalus* oraz *Aster sp.* are noteworthy as well, as the species have been spreading in the Bug valley for the last 10 years. In 2011–2012, several localities of *Asclepias syriaca*, *Echinops sphaerocephalus,* and *Aster sp.* were found on wasteland, roadsides, and shrub land edges. In turn, *Artemisia annua* (e.g. near Kryłów, Bytyń, Kodeń), *Elsholtzia ciliata* (near Kodeń and Ryski), and *Heracleum sosnowskyi* (near Rudka) were relatively seldom found on rubble heaps and along roadsides. Segetal species are of interest as well, e.g. *Alopecurus mysuroides* rapidly spreading near Kryłów, and *Legousia hybrida*, which has appeared recently in sugar beet fields.

In the section of the Bug valley, species that did not occur in the lower course of the river were found (*Adonis vernalis, Achillea pannonica*, *Alopecurus mysuroides, Anagallis foemina, Astragalus onobrychis, Campanula sibirica, Chamaecytisus albus, Chaenorhinum minus, Cirsium pannonicum, Clematis recta, Dactylorhiza maculata, Dianthus superbus, Echium russicum, Elymus hispidus, Equisetum ramosissimum, Euphorbia villosa, Inula helenium, Irys aphylla, Juncus acutiflorus, Lemna turionifera, Libanotis pyrenaica, Linosyris vulgaris, Najas minor, Orchis morio, Peucedanum alsaticum, Phyteuma orbiculare, Silene chlorantha, S. lithuanica, Thesium linophyllum, Veronica austriaca*, *Veronica prostrata*) [Ćwikliński and Głowacki 2000]. The flora of the study area is composed of species that do not occur in the middle course of the Vistula River [Kucharczyk 2001] (*Gladiolus imbricatus, Gratiola officinalis, Gypsophila paniculata, Juncus acutiflorus, Lathyrus latifolius, Legousia hybrida, najas minor, Phyteuma orbiculare, Silene lithuanica*) or species that are considered extinct there (e.g. *Echium russicum, Orchis morio, Rhynchospora alba, Succisella inflexa, Veratrum lobelianum*).

CONCLUSIONS

1. The vegetation of the border section of the Bug River valley is highly diverse and undergoes dynamic changes. This is characteristic for valleys of

unregulated rivers, where species composition is adapted to variable water levels and accompanying extreme conditions.

2. In the Gołębie-Kostomłoty section of the Bug valley, 133 rare and legally protected species have been found, which constitutes ca. 12% of all vascular plant species occurring in the area.

3. Species listed in the „Polish Red Data Book of Plants" are represented by 8 species. 34 species from the „Red List of Endangered Vascular Plants in Poland" have been found in the area.

4. During the investigations conducted in 2002–2012, localities of new species that had not been reported from the border section of the Bug River valley were found. *Juncus acutiflorus* is a new species in eastern Poland.

5. Several species that had not been reported from either the lower course of the Bug River or the middle section of the Vistula valley were found. These are *Gypsophila paniculata, Juncus acutiflorus, Legousia hybrida, Lathyrus latifolius, Najas minor, Phyteuma orbiculare,* and *Silene lithuanica.*

6. Invasive species were found to spread significantly in the area.

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INTERESUJĄCE GATUNKI ROŚLIN NACZYNIOWYCH DOLINY BUGU (ODCINEK GOŁĘBIE–KOSTOMŁOTY)

Streszczenie. W pracy przedstawiono wyniki badań florystycznych prowadzonych w latach 2002–2012 w dolinie Bugu pomiędzy miejscowościami Gołębie i Kostomłoty (do granicy z gminą Terespol). Jest to głównie teren tarasu zalewowego i nadzalewowego doliny – do szosy tzw. nadbużanki. Uwzględniono tereny sąsiadujące z doliną i przyrodniczo z nią powiązane, tj. zbocza i krawędzie doliny. Spośród stwierdzonych gatunków na szczególną uwagę zasługują tu 142 gatunki rzadkie w kraju i objęte ochroną prawną. Do najbardziej interesujących należą takie, które nie były znane we wschodniej części kraju, nie były ujęte na mapach rozmieszczenia gatunków roślin naczyniowych w Polsce, a ich stanowiska nie były do tej pory publikowane (np. *Juncus acutiflorus*), gatunki, które nie występują w dolinie Wisły i dolinie Bugu w części od Niemirowa do Ujścia, np. *Gypsophila paniculata*, *Lathyrus latifolia*, *Echium russicum*, *Najas minor*, *Phyteuma orbiculare*, *Silene lithuanica* oraz gatunki o niewielkiej liczbie stanowisk, m.in. *Chaenorhinum minus*, *Corispermum leptospermum, Asplenium ruta-muraria*, *Euphorbia villosa*. Szczególnie cenna jest populacja *Orchis morio*, licząca około 2000 okazów. Zwrócono także uwagę na gatunki roślin charakterystycznych dla dużych dolin rzecznych oraz gatunki inwazyjne.

Słowa kluczowe: interesujące gatunki roślin naczyniowych, dolina Bugu (odcinek Gołębie–-Kostomłoty)