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The load of invasive plant species in the Labe riverbank vegetation

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Abstract

The aim of this article is to summarize actual results of the field research of invasive neophytes' occurrence in the riverbank vegetation of the Labe River from Špindlerův Mlýn to Těchlovice (Děčín district). In total more than 190 km of the riverbank vegetation was mapped using author's own method. The occurrence of 22 most important invasive neophytes (17 taxons) was registered for each of the 500 m long segments (in total 284 segments was mapped). The number of specimen was registered using a logarithmical scale and both simple and weighted index of total load of invasive neophytes was calculated for each segment. Results are presented for series (i. e. groups of neighbouring segments with similar geographical and ecological conditions) and also the comparation with other water courses in the Czech Republic is presented. The occurence of invasive neophytes is near of the average for other water courses, but the number of specimen is lower. The most frequent taxons were *Solidago sp.* and *Impatiens glandulifera*. Mutual dependence between occurence of invasive species and the vertical position of the segment of the watercourse wasn't confirmed. Development in the years 2006 and 2007 was compared, but only small changes was discovered in this short time horizon.

Key words: biogeography, vegetation mapping, riverbank vegetation, biological invasions, invasive neophytes

1. Introduction

At present, dissemination of invasive species is an important environmental problem. The effect of introduced species in recently occupied ecosystems is considered to be the second most important reason of biodiversity loss after natural environment destruction (Plesník, Roth 2004).

Richardson et al. (2000) defines an introduced (alien, non-indigenous) species as one that was not naturally present in certain geographical region and it has come with people or with human activities. The introduction could be deliberate (by planting) or accidental. An introduced species able of self-reproducition without human help and self-dissemination in a particular area is considered to be invasive. Invasive species could be divided into two groups: archeophytes (introduced before the discovery of America, because it was the most important turning point for introduced species mobility) and neophytes (introduced after the discovery of America).

Water courses and their flood plains are considered to be one of the most important vectors for dissemination of invasive species. River flood plains and riverbank vegetation is very often habitat of these species due to their specific features summarized by Lipský (2002) and Prach (2003). These features are extraordinary dynamics of their development, considerable spatial heterogenity, high nutrient consumption, high productivity, chronic disturbances caused by regular floods and usually great concentration of human settlement and economic activities, which increase frequency and intensity of disturbances in river flood plains.

The dissemination invasive species in river flood plains and a riverbank vegetation was studied by Hood, Naiman (2000), Richardson et al. (2007), Stohlgren et al. (1998), Tickner et al. (2001) and other authors. The situation in the Czech Republic it was studied by Nováková, Rydlo (1980), Rydlo (1999), Trenčianská (2000), Kovář et al. (2002), Blažková (2003), Kadubec, Švec (2007) and others. Usually only one or a few species were mapped at the same time or the research was limited to a relatively small area. Therefore a complex study examining occurence of larger number of species in a larger area is yet to be conducted. The aim of this article is to summarize actual results of a field research of the most important invasive neophytes' occurrence in riverbank vegetation of the Labe River from Špindlerův Mlýn to Těchlovice (Děčín district). In total more than 190 km of the riverbank vegetation was mapped.

2. Methods

Invasive neophytes were mapped using own original methodology (Matějček in Langhammer 2005). 500 metres long segments were defined using river navigation and important points of orientation (e. g. bridges or weirs). Results are expressed for series, for more tabular interpretation. Series are groups of neighbouring segments with similar geographical and ecological conditions. Boundaries of the series are defined by the most important bridges, weirs, river confluences and other important points. The minimal length of one series is 3 000 metres.

The riverbank vegetation was defined according to Novák et al. (1986) as the vegetation belt along a water course with boundaries represented by the water surface and the riverbank edge. In practice, the width of this belt was usually from 5 to 15 metres.

The occurence of 22 most important invasive neophytes (sensu Pyšek et al. 2002) was registered using a logarithmical scale (1 = 1–9 specimen, 2 = 10–99 specimen, 3 = 100–999 specimen etc.). Some related species were not recognized (following species were aggregated together: *Galinsoga parviflora* and *G. ciliata*; *Solidago gigantea* and *S. canadensis*; *Parthenocissus quinquefolia* a *P. inserta* and *Reynoutria sp.*: *Reynoutria japonica*, *R. sachalinensis* a *R.* × *bohemica*). In total, occurence of 17 taxons was registered. The field research was conducted during the summer period of 2007.

Total number of taxons (NT), total number of specimen (NI), simple index of invasive neophytes load (Is) and weighted index of invasive neophytes load (Iw) were

calculated for each segment. The number of specimen was derived from registered values such as the mean value of the interval (for the interval 1–9 the value 5 was used, for the interval 10–99 the value 50 etc.).

The simple index of invasive neophytes' load was calculated for each segment using the Is = log NI + NT formula, where NI = total number of invasive species specimen and NT = number of registered taxons. This index shows the total invasive species load for each segment taking into account the number of present taxons and number of specimen (the values of NT and NI have similar importance in this calculation).

The weighted index of invasive neophytes' load takes into account plant size, it's stability and potencial risk for indigenous flora or people and human activities. The number of specimen of each taxon is weighted by certain coefficient (see table 1). The value of weighted index of invasive neophytes' load was calculated using the following formula: $Iw = \log (\Sigma NI_x . k_x)$, where NI_x = number of specimen of the taxon x and k_x = coefficient of the taxon x.

Tab. 1: Coefficients of registered taxons used for counting of the weighted index of the invasive neophytes load. The plant size: 3 = trees and shrubs higher than 5 m, 2 = plants between 1–5 m, 3 = small plants below 1 m; the residence stability (life history): 0 = annual, 1 = biennial or perennial; a potencial danger: 1 = species considered to be dangerous by Křivánek, Sádlo (2004), 2 = species usually considered to be the most dangerous (*Reynoutria sp.*, *Heracleum mantegazzianum* and *Impatiens glandulifera* – see Křivánek 2003), 0 = other species

	Plant size	**Danger**	**Life history**	**Coefficient**
Acer negundo	3	1	1	**5**
Ailanthus altissima	3	1	1	**5**
Conyza canadensis	1	1	0	**2**
Erigeron annuus	1	0	0	**1**
Galinsoga ciliata, G. parviflora	1	0	0	**1**
Helianthus tuberosus	2	1	1	**4**
Heracleum mantegazzianum	2	2	1	**5**
Impatiens gladulifera	2	2	0	**4**
Impatiens parviflora	1	1	0	**2**
Lupinus polyphyllus	1	1	1	**3**
Lycium barbarum	2	1	1	**4**
Parthenocissus inserta, P. quinquefolia	2	0	1	**3**
Quercus rubra	3	1	1	**5**
Reynoutria japonica, R. sachalinensis, R. bohemica	2	2	1	**5**
Robinia pseudacacia	3	1	1	**5**
Rudbeckia laciniata	2	1	1	**4**
Solidago canadensis, S. gigantea	2	1	1	**4**

3. Results

3.1 Results of the field research in 2007

15 from 17 taxons were found in the riverbank vegetation; *Lupinus polyphyllus* and *Rudbeckia laciniata* were not found. The average number of specimen per segment was 516, the average number of taxons per segment was 2.65. Registered invasive neophytes were not found in 11.6% of the segments. The value of simple index of invasive neophytes' load (Is) was 4.67 and the value of weight index of invasive species load (Iw) was 2.63.

In comparison with other studied water courses in the Czech Republic (for further informations see Matějček 2008) the number of specimen per segment is below average (the value for other rivers is NI = 1 039), the number of taxons per segment is slightly above the average (other rivers NT = 2.00). Values of both simple index of invasive neophytes' load (Is) and weighted index of invasive neophytes' load (Iw) are above average (other rivers Is = 3.90, Iw = 2.31). The share of segments without registered invasive neophytes was lower in the Labe river (the value for other rivers is 17.32%).

The share of occupied segments and the average number of specimen in one occupied segment for each taxon are presented in Fig. 1, 2. The highest share of occupied segments was recorded for both *Solidago canadensis* and *S. gigantea* (62.3%) and *Impatiens glandulifera* (52.1%). *Conyza canadensis*, *Erigeron annuus* and *Robinia pseudacacia* were recorded in more than one third of segments.

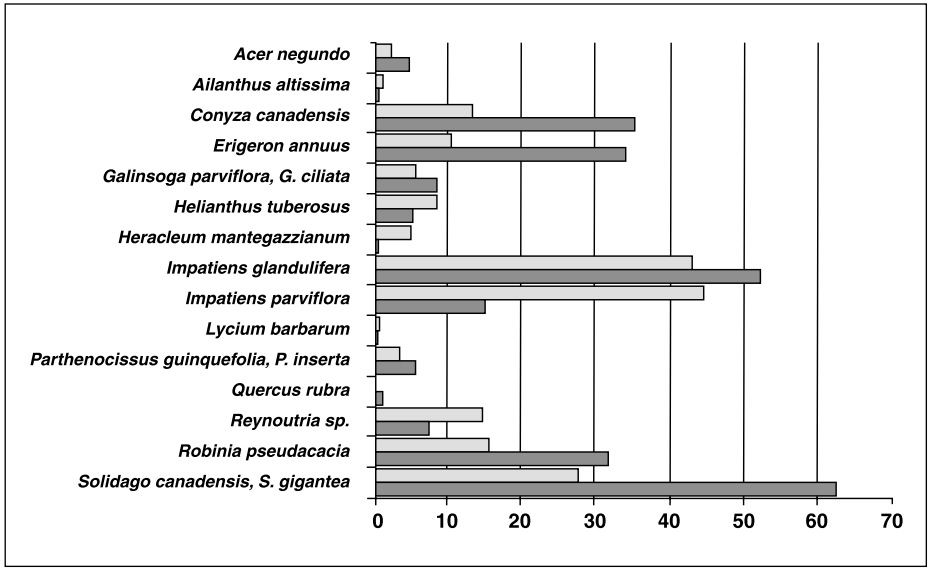

Fig. 1: The share of segments with the presence of each taxons (grey = average of all mapped water courses, black = the Labe river)

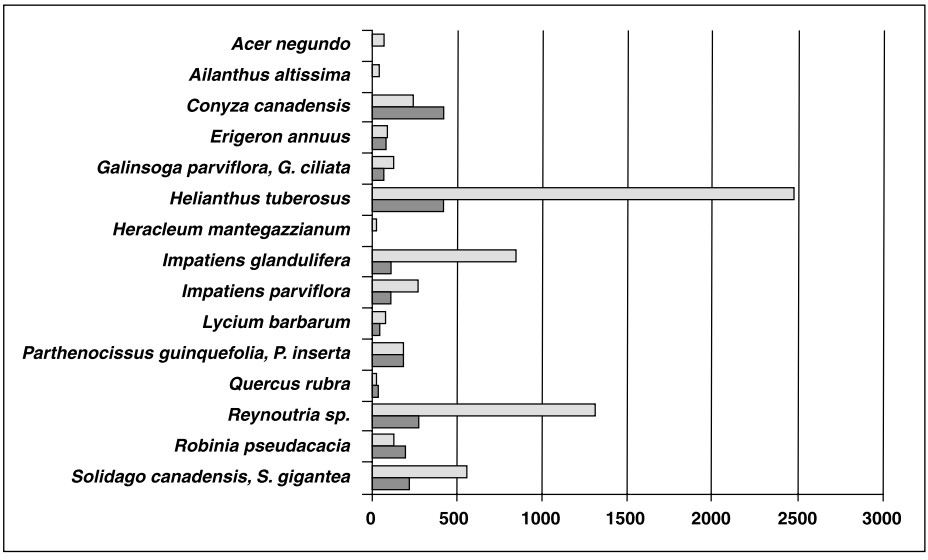

Fig. 2: The average number of specimen in one occupied segment (grey = average of all mapped water courses, black = the Labe river)

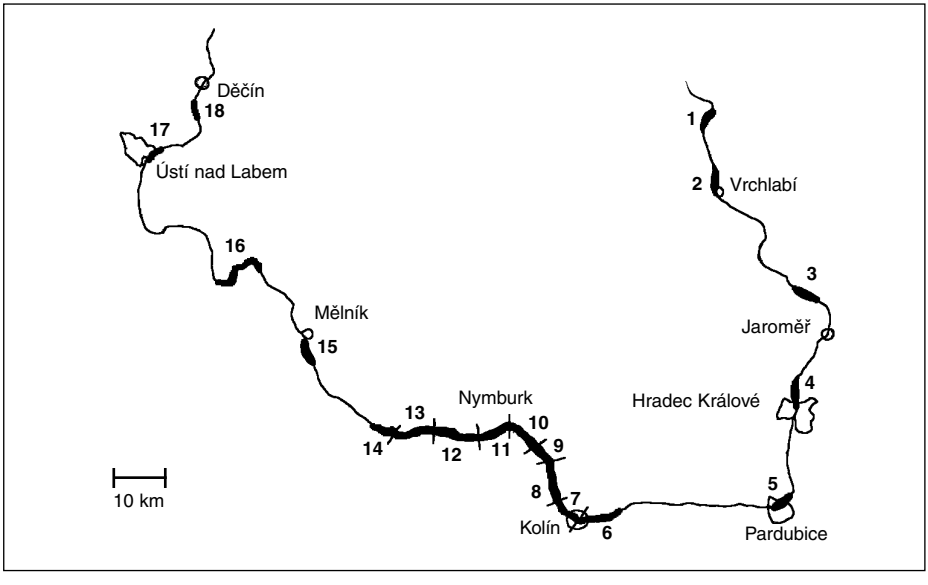

Fig. 3: The position of mapped series – 1 = above Špindlerův Mlýn; 2 = from Herlíkovice to Vrchlabí; 3 = from Kuks to Brod; 4 = from Předměřice nad Labem to Hradec Králové, Plácky; 5 = Pardubice and surroundings; 6 = from Veletov to Kolín; 7 = from Kolín to Klavary; 8 = from Klavary to the confluence with the Cidlina river; 9 = from the confluence with the Cidlina river to Poděbrady; 10 = from Poděbrady to Nymburk; 11 = from Nymburk to Hradištko; 12 = from Hradištko to Lysá nad Labem, Litol; 13 = from Lysá nad Labem, Litol to Čelákovice; 14 = from Čelákovice to Brandýs nad Labem; 15 = from Obříství to Mělník; 16 = from Štětí to Roudnice nad Labem; 17 = Ústí nad Labem and surroundings; 18 = near of Těchlovice

Tab. 2: The average number of specimen of each taxon (data for series)

Number of series	*Acer negundo*	*Ailanthus altissima*	*Conyza canadensis*	*Erigeron annuus*	*Galinsoga sp.*	*Helianthus tuberosus*	*Heracleum mantegazzianum*	*Impatiens glandulifera*	*Impatiens parviflora*	*Parthenocissus sp.*	*Parthenocissus sp.*	*Quercus rubra*	*Reynoutria sp.*	*Robinia pseudacacia*	*Solidago sp.*	the average value of total number of specimen	the average value of total number of taxons	the simple index of the invasive neophytes load (Is)	the weighted index of the invasive neophytes load (Iw)	number of registered segments	share of segments without invasive neophytes
1	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	8.8	0.3	0.59	0.39	12	75.0%
2	0.0	0.0	12.9	0.0	0.0	0.0	0.0	0.0	141.7	0.0	0.0	0.0	262.5	0.0	87.5	504.6	1.9	4.46	3.09	12	0.0%
3	0.0	0.0	0.0	0.0	0.0	0.8	0.0	350.0	41.7	0.0	0.0	0.0	258.3	0.8	175.8	827.5	3.5	6.31	3.42	6	0.0%
4	0.0	0.0	0.0	16.7	0.0	0.0	0.0	35.0	0.0	0.0	0.0	0.0	0.8	10.0	25.8	88.3	2.7	4.58	2.47	6	0.0%
5	0.0	0.0	5.0	5.0	0.5	0.0	0.0	7.0	0.5	0.0	0.0	0.0	50.0	0.0	0.5	68.5	1.1	1.86	1.11	10	40.0%
6	0.0	0.4	830.8	0.0	0.4	0.0	0.0	13.1	0.0	0.0	0.0	0.0	3.8	8.5	569.2	1426.2	2.8	5.31	3.06	13	0.0%
7	0.9	0.0	723.5	17.9	8.8	5.9	0.6	76.5	100.3	0.0	32.4	6.2	0.0	759.1	441.5	2173.5	4.8	7.83	3.54	17	0.0%
8	0.4	0.0	242.9	62.1	0.0	0.0	0.0	79.4	23.3	0.0	19.2	1.9	0.0	52.5	231.0	712.7	3.4	5.86	2.97	26	3.8%
9	0.0	0.0	3.9	0.4	0.0	3.6	0.0	78.9	0.0	0.0	0.0	0.0	0.0	0.4	8.6	95.7	1.1	2.20	1.42	14	35.7%
10	0.0	0.0	11.5	15.5	3.4	0.0	0.0	31.9	3.5	0.0	11.3	0.0	1.6	3.9	31.6	114.2	2.5	4.21	2.08	31	12.9%
11	0.0	0.0	56.7	10.9	2.2	0.0	0.0	7.0	2.2	0.0	0.0	0.0	0.0	55.4	189.3	323.7	2.1	4.12	2.51	23	4.3%
12	0.0	0.2	30.6	10.4	0.0	0.0	0.0	16.8	0.0	0.0	0.2	0.0	2.0	54.8	166.2	281.2	2.6	4.84	2.82	25	0.0%
13	0.8	0.0	44.4	0.3	2.8	3.1	0.0	14.2	2.8	0.0	2.8	0.0	0.0	0.3	131.9	203.3	2.2	4.15	2.50	18	0.0%
14	4.6	0.0	411.5	23.8	3.8	4.2	0.0	108.1	0.8	0.0	80.8	0.0	0.0	0.4	181.2	819.2	3.9	6.49	3.09	13	0.0%
15	0.0	0.0	1.7	25.0	91.7	0.0	0.0	192.5	8.3	0.0	83.3	0.0	0.0	0.0	18.3	420.8	3.2	5.56	2.79	6	0.0%
16	0.0	0.0	40.4	80.5	1.3	0.1	0.0	58.5	7.5	1.3	0.0	0.0	0.0	15.9	25.9	231.3	2.6	4.28	2.04	40	22.5%
17	0.8	0.0	350.0	175.8	109.2	1.7	0.0	92.5	0.0	0.0	0.0	0.0	9.2	0.8	0.0	740.0	4.0	6.78	3.03	6	0.0%
18	1.7	0.0	10.0	8.3	41.7	1008.3	0.0	425.0	0.8	0.0	0.0	0.0	83.3	0.0	116.7	1695.8	4.7	7.65	3.57	6	0.0%
total	**0.40**	**0.04**	**148.01**	**27.68**	**6.76**	**22.29**	**0.04**	**59.33**	**17.39**	**0.18**	**10.58**	**0.55**	**20.81**	**62.90**	**138.59**	**515.5**	**2.65**	**4.67**	**2.63**	**284**	**11.6%**

The highest average number of specimen per segment was recorded for *Conyza canadensis* (148 specimen per segment) and *Solidago sp.* (139 specimen per segment), the highest average number of specimen per occupied segment was recorded for *Helianthus tuberosus* (422 specimen per segment) and *Conyza canadensis* (420 specimen per segment).

There are some differences in comparison to other studied water courses in The Czech Republic (Matějček 2008). The Labe river is characteristised with rather high presence of *Solidago sp.* (Labe: 62.3%, other rivers: 27.5%), *Conyza canadensis* (Labe: 35.2%, other rivers: 13.4%), *Erigeron annuus* (Labe: 33.8%, other rivers: 10.5%) and *Robinia pseudacacia* (Labe: 31.7%, other rivers: 15.6%). On the other hand, the presence of *Impatiens parviflora* is very low (Labe: 15.1%, other rivers: 44.7%) and rather low is also the presence of *Reynoutria sp.* (Labe: 7.4%, other rivers: 14.7%). For the comparison of occupied segments for the Labe river and other water courses in the Czech Republic see Fig. 1.

The average number of specimen per occupied segment (see Fig. 2) was below average for the majority of taxons. No areas extensively covered with invasive neophytes were registered in the Labe riverbank vegetation like those found in the banks of some another rivers (Bečva, Tichá Orlice, Sázava or Odra – Matějček 2008). High values were registered only for *Conyza canadensis* (Labe: 420 specimen per segment, other rivers: 252 specimen per segment) and *Robinia pseudacacia* (Labe: 198 specimen per segment, other rivers: 137 specimen per segment).

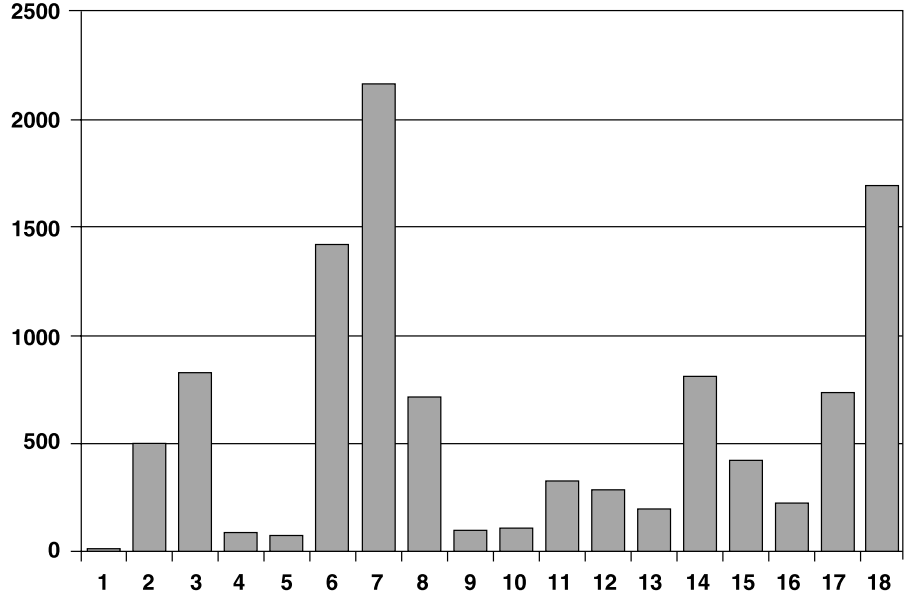

Fig. 4: The average number of specimen per segment for series (the position of series – see Fig. 3)

Relatively high is the differentiation of some parts of the Labe course. In the Tab. 2 the values presented for series of segments are presented. In total 18 series was defined (see Fig. 3).

The highest average of both the number of specimen and the number of taxons per segment was registered in series No. 7 (below Kolín) and No. 18 (near of Těchlovice, Děčín district). High number of specimen was registered in the series No. 6, but the number of taxons was near the average. All these series have no segment without registered invasive neophytes.

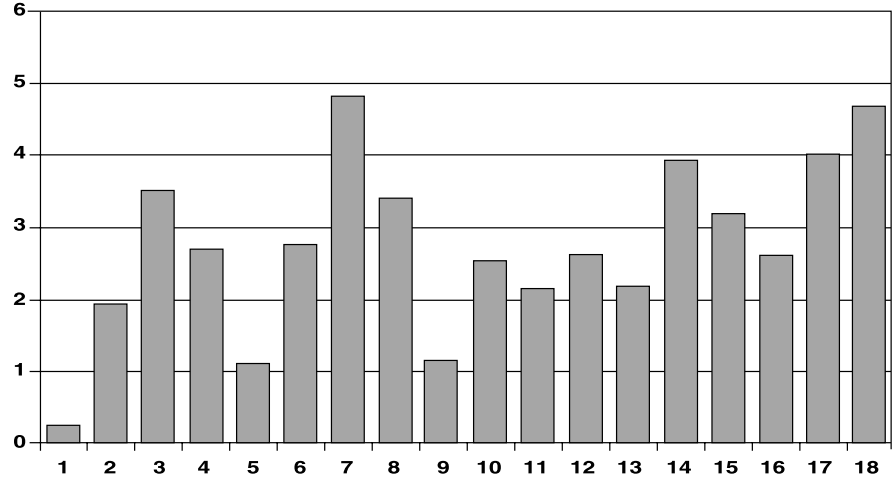

Fig. 5: The average number of taxons per segment for series (the position of series – see Fig. 3)

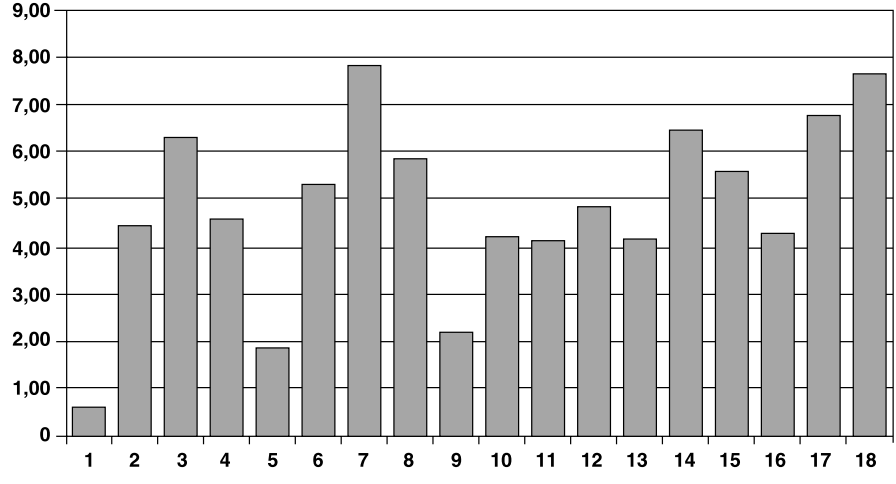

Fig. 6: The average value of the simple index of the invasive neophytes load (Is) for series (the position of series – see Fig. 3)

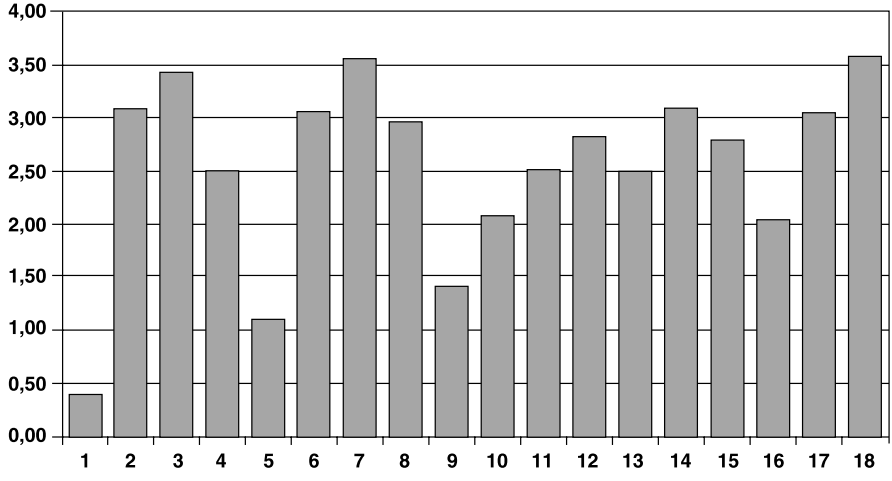

Fig. *7:* The average value of the weighted index of the invasive neophytes load (Iw) for series (the position of series – see Fig. 3)

On the other hand, the lowest number of specimen and taxons of invasive neophytes was recorded in the series No. 1 (above Špindlerův Mlýn) and 75% segments of this series have no registered invasive neophytes.

Fig. 4, 5, 6 and 7 show the differences of invasive neophytes' distribution in the vertical profile of the Labe river from Špindlerův Mlýn to Těchlovice. Values of the average number of specimen, number of taxons and both simple and weighted index of invasive neophytes' load are presented for each series. There is no obvious correlation of the numbers and the position of the series. The only exceptions exception are very low values for the series No. 1 and very high values for the series No. 18. The high level of oscillation is obvious. The similar situation is in the level of taxons (see Tab. 2).

3.2 Changes between the years 2006–2007

Development of invasive neophytes' presence was studied in 76 segments from Poděbrady to Lysá nad Labem (river navigation: from 66.5 km to 43 km, series 10–12). Data from the year 2006 were available for these segments. The index of inter-year changes was calculated for each taxons (only taxons that are present in this part) and for basic indicators. Results are summarized in Tab. 3.

Slight increase of the majority of invasive neophytes was recorded between years 2006–2007. The highest increase was showed by *Erigeron annuus* and *Parthenocissus sp.*, but the total number of specimen of this species was very low. On the other hand the most numerous taxons in this part (especially *Solidago sp.* and *Conyza canadensis*) were stagnating or declining. The total number of specimen stagnated too; the average number of taxons increased a little.

Tab. 3: The index of inter-year (2006–2007) changes of invasive neophytes presence. (2006 = 1.00)

	The index of inter-year changes
Ailanthus altissima	2.00
Conyza canadensis	0.68
Erigeron annuus	5.56
Galinsoga ciliata, G. parviflora	0.10
Impatiens gladulifera	1.02
Impatiens parviflora	2.00
Parthenocissus inserta, P. quinquefolia	5.07
Reynoutria japonica, R. sachalinensis, R. bohemica	1.82
Robinia pseudacacia	1.31
Solidago canadensis, S. gigantea	0.98
number of specimen per segment	1.02
number of taxons per segment	1.11
simple index of the invasive neophytes load	1.10
weighted index of the invasive neophytes load	1.07
the share of segments without invasive neophytes	0.83

4. Discussion

An original method for invasive neophytes' mapping was used. This method is used for riverbank vegetation of other rivers in the Czech Republic. The adventage of this method is it's simplicity, which enables encompassing of relatively extensive area. It is important to take into consideration, that the numbers of specimen are only estimated values. For this reason, the logarithmical scale is used.

The indicator "number of specimen" might be discussed, because the term "specimen" is difficult to define (Herben, Münzbergová 2002). The most problematical taxon from this point of view are *Reynoutria sp*. In this research each stem was considered to be one individual in spite of the fact that it is no truly independent specimen.

Methods of data processing might be discussed too, especially the construction of both simple and weighted index of invasive neophytes' load. This indicators represent only one possible approach to interpretation of the registered data. Simple index of invasive neophytes' load was constructed in a way to increase the importance of the number of registered taxons. This is based on the idea that the presence of a taxon in certain segment means potencial for its dissemination in future. The most important weakness of this index is the fact, that it's value depends on selection of the mapped taxons.

Weighted index of invasive species' load is less sensitive in this respect. This indicator puts special emphasis on different level of importance of each taxon. Higher weight emphasize potencially dangerous species and perennial species. The plant size is included too.

The interannual changes should be looked at with caution because one year is rather short time for studying large changes. Results of this comparison must be regarded as a start of a time series, which can be used in the future to reveal some natural relations of the invasion processes' dynamics. One of the aims of this article is to find methodical basis for these records.

5. Conclusions

The majority of registered invasive neophytes was registered in the Labe riverbank vegetation. The level of their presence is near the average for other water courses in the Czech Republic, that were mapped until now. The number of registered taxons is above average (the scale of registered taxons is wider a little), but its frequency is lower, in the case of some taxons rather markedly. The share of segments without registered invasive neophytes is lower in comparation with other water courses. The difference among different parts of the water course is striking.

The share of segments with presence of *Solidago sp.*, *Conyza canadensis*, *Erigeron annuus* and *Robinia pseudacacia* was above average, the share of segments with presence of *Impatiens parviflora* and *Reynoutria sp.* was deep below the average. The number of specimen per occupied segment was below the average in majority of registered taxons, values above average were recorded for *Robinia pseudacacia* and *Conyza canadensis*.

The highest invasive species' load was recorded in series below Kolín and in series near of Těcholovice, the lowest values was recorded above Špindlerův Mlýn. The correlation between the invasive species load and the horizontal position of the segment or series of segments was not confirmed.

Relatively low level of changes was proved between years 2006 and 2007, only for some rare taxon stronger changes of presence were proved.

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Résumé

Zatížení břehové vegetace Labe invazivními rostlinnými druhy

Tento příspěvek shrnuje výsledky mapování invazních neofytů (v pojetí Richardsona et al. 2000, Pyška et. al. 2002) v břehové vegetaci Labe. Mapování bylo provedeno pomocí vlastní metodiky (Matějček in Langhammer 2005), a to v předem stanovených 500 m dlouhých úsecích, které byly obvykle vymezeny na základě říční kilometráže nebo byly odměřovány od významných bodů (mosty, jezy apod.). Celkem bylo sledováno 284 segmentů v úseku mezi Špindlerovým Mlýnem a Těchlovicemi (okr. Děčín). Za břehovou vegetaci byl podle Nováka et al. (1986) považován pás vegetace podél vodního toku, omezený na jedné straně vodní hladinou, na druhé straně břehovou hranou. Šířka tohoto pásu se v praxi pohybovala obvykle v rozmezí 5–15 m.

Výskyt 22 druhů (resp. 17 taxonů) nejvýznamnějších invazních neofytů byl zaznamenáván pomocí logaritmické stupnice. Pro jednotlivé segmenty a pro jednotlivé části toku byl vypočítán celkový počet zaznamenaných taxonů, celkový počet jedinců, prostý index zatížení invazními neofyty a vážený index zatížení invazními neofyty. Zatímco prostý index zatížení invazními neofyty přikládá podobnou váhu počtu přítomných druhů a počtu jedinců, vážený index zatížení invazními neofyty zohledňuje také velikost jednotlivých druhů, jejich stabilitu na stanovišti a potenciální nebezpečnost pro přirozenou vegetaci nebo pro člověka a jeho aktivity. Počet jedinců jednotlivých taxonů je při výpočtu vážen určitým koeficientem (viz tab. 1).

Z celkového počtu 17 sledovaných taxonů bylo v břehové vegetaci Labe nalezeno 15 taxonů. Průměrný počet jedinců na jeden segment byl 516, průměrný počet zaznamenaných taxonů v segmentu činil 2,65. V 11,6 % segmentů nebyl zaznamenán žádný ze sledovaných invazních neofytů. Hodnota prostého indexu zatížení invazními neofyty činila 4,67, hodnota váženého indexu zatížení invazními neofyty činila 2,63.

Ve srovnání s ostatními dosud sledovanými vodními toky (Matějček 2008) je v břehové vegetaci Labe spíše podprůměrný počet jedinců na jeden segment, naopak vyšší je průměrný počet zaznamenaných taxonů v jednom segmentu, prostý index zatížení invazními neofyty a vážený index zatížení invazními neofyty. Podíl segmentů bez invazních neofytů je spíše nižší.

Nejvyšší podíl obsazených segmentů byl zaznamenán u *Solidago sp. (S. canadensis* a *S. gigantea)* a *Impatiens glandulifera*, nejvyšší průměrný počet jedinců v jednom segmentu byl zaznamenán u *Conyza canadensis* a *Solidago sp.*, nejvyšší průměrný počet jedinců na jeden obsazený segment byl zaznamenán u *Helianthus tuberosus* a *Conyza canadensis*.

Ve srovnání s ostatními dosud sledovanými vodními toky v České republice je z hlediska podílu obsazených segmentů pro Labe charakteristické nadprůměrné zastoupení *Solidago sp.*, *Conyza canadensis*, *Erigeron annuus* a *Robinia pseudacacia*, výrazně podprůměrné je naopak zastoupení *Impatiens parviflora* a *Reynoutria sp.* Průměrný počet jedinců v obsazeném segmentu byl u většiny taxonů podprůměrný.

Poměrně značná je diferenciace výskytu invazních neofytů v jednotlivých částech toku, který byl pro přehlednost rozdělen do sérií (obr. 3). Jako úseky s nejvyšším zastoupením invazních neofytů byly shledány úsek těsně pod Kolínem a úsek u Těchlovic. Zcela zanedbatelný počet jedinců i taxonů invazních neofytů byl naopak zaznamenán v úseku nad Špindlerovým Mlýnem. S výjimkou těchto extrémních poloh však nebyla závislost zastoupení invazních neofytů na pořadí segmentu v rámci toku potvrzena.

V období let 2006–2007 došlo k relativně malým změnám v zastoupení invazních neofytů v břehové vegetaci Labe. Výraznější změny byly zaznamenány pouze u některých početně slaběji zastoupených taxonů.

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