NATURA 2000 HABITAT MAPPING IN THE CZECH REPUBLIC: METHODS AND GENERAL RESULTS

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Abstract

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Natura 2000 is the most important European biotope compound network, that has been established for comprehensive nature conservation and habitat protection. This system consist of two major streams: (i) Special Protection Areas, SPA, cover areas according the Birds Directive, (ii) Special Areas of Conservation (SAC) cover the land reserves according the Habitats Directive. The Habitats Directive Annex 1. habitats (Natura 2000 habitats) have been interpreted by the national system of biotopes in the Czech Republic. The most extensive field habitat mapping covering the entire Czech Republic in the fine-scale 1:10.000 has been finished in 2004. In Central Europe this is an absolutely unique approach, that has resulted to the largest actual database about nature. The paper covers the methodological approach of habitat mapping, and the general results (biotope types in 601960 segments, 9383.7 km^2).

Key words: Natura 2000 habitats, habitat mapping, GIS

Introduction

The most important European act for protection of endangered species and their natural habitats is surely the Habitats Directive (92/43/EEC), enacted since 21 May 1992. The general objective of this guideline is the establishment of Natura 2000 network of sites/reserves. The synoptic system of natural habitats was established for the member states of the European Community (European Commission, 1999). In Eastern Europe this system of habitats was enlarged, and especially was focused on the local (endemic) habitats (European Commission, 2003). The classification of habitats was established on the base of CORINE-Biotopes typology (Devillers et al., 1991), and therefore it was not originated as strictly hierarchical classification. The national interpretation of Natura 2000 habitats for the Czech Republic has been prepared, and the new national typology of biotopes, usually sub-types of habitats sensu Habitats Directive, was discovered (Chytrý et al., 2001). Similar national interpretation of habitats was prepared also in Slovakia (Stanová, Valachovič, 2002), methodology and general results were published by Šeffer, Lesák (2004).

The major critical step was the field habitat mapping of all natural habitats into the map with enough fine-scale resolution. It was necessary to collate large amount of field data of all biotopes, mainly about their distribution, spatial dimensions, and qualities. This map layer generally improve the process of preparation and building of Natura 2000 networks, esp. an exact definition of SAC areas, directions of borders, inventory of localities, and evaluation of their habitat quality, etc. Also the endangerment value, general statistics, and threatened plant and animal species occuring in habitats/biotopes have been described in check list (Kučera 2005).

Some new applications have been actually finished, based on the biotopes mapping. Detailed analysis of distribution of scree habitats in the Czech Republic was reported by Zacharda, Boucníková, 2006. The GIS biotopes layer should be used as strong power tool for the exact spatial specification of financial evaluation of nature, esp. in small sized areas (Cudlín et al., 2006). The biotopes mapping can also help with the interpretation of CORINE Land cover changes. Boucníková, Kučera, 2006 have distinguished the degradation of natural biotopes in coincidence of land cover changes over the last 15 years. All these examples show the high potential of biotopes/habitats mapping for nature conservation and biodiversity oriented landscape planning.

Methodology

There are two levels of biotopes mapping. The main aim of (i) the detailed biotopes mapping was to discover all biotopes (which means natural ones as well as so called anthropogenic biotopes) in natural areas, and to collect all the characteristics such as representativity, conservation status, and so on. In contrast, the general aim of (ii) the contextual biotopes mapping was to find out occurrences and dimensions of all natural biotopes on the whole territory of the Czech Republic, moreover to select advisable areas for detailed mapping.

Detailed biotopes mapping was made only on pre-selected areas which are supposed to contain major or high proportion of natural and seminatural biotopes. Contextual mapping serves to complete detailed mapping whenever there is yet any assumption of natural biotopes occurrence. Particularly some sites were not mapped at least; such as large areas devastated by mining, agriculture and forestry areas without any natural values, and continuously built-up and otherwise urbanized areas, mainly inner sites of settlements, etc. (Fig. 1).

Determination of biotopes

Primary the physiognomical vegetation approach was recommended for the biotopes determination , secondly the ecological, and at least the floristic ones were used. The highest accent was put on the diagnostic species and later on the dominant species. Determination of vegetation as impartible constituent of concrete biotope does not depend only on the presence of all diagnostic species sensu Chytrý et al. (2001). Vegetation that resembles more than one biotope was assigned to the most similar one, but the level of representativity has been lowered (see later). For the best filing of such vegetation it was necessary to take account of habitat characteristics and the proportion of occurred diagnostic species. If nor physiognomy neither species diversity had indicated any natural biotope, the vegetation was classified as an appropriate type of form group X (anthropogenic habitats). Dots and lines were mapped in selected natural biotopes in particular. With respect to unnatural biotopes dot and line segments are registered only in reasonable cases when it could have protecting importance for conservation of adjacent natural biotopes.

Aggregation of dot segments or small polygons was mapped as one polygonal “mosaic” segment. Also two parallel line biotopes, however different in their physiognomy and ecology, were allowed to be mapped as mosaic segment. The mosaics usually consist of two or exceptionally more components; minor components without any conservation value should be excluded. Mosaic parts always created different biotopes, not single biotope of several representativity classes (if there is biotope with different levels of representativity, it is necessary to “average” the levels). Artificial borderlines should be delineated within area overlay of two mosaic components which are adjacent in a locality.

Estimation of age structure

The quality of forest stands was evaluated by the age and/or spatial structure of tree layer: (1) heterogeneous stands of age, where age structure is similar to natural state (P), (2) semidifferentiated stands, where a major group of the same age (of plantation origin) is completed by other trees of quite variant age range (Q); also even-aged stands which are little more differentiated, low structured or composed of disconnected lower storey, (3) age heterogeneous mosaics of several even-aged stands which are different from each other (such as gaps, etc. – this fact should be comment in the remarks) (R), and (4) age homogeneous stands (S).

Degree of representativity

Representativity degree gives a measure of 'how typical' is a habitat type in the segment due to its definition in Catalogue (Chytrý et al., 2001). While assessing the representativity transition or even prompt of transition to another mapped unit (esp. occurrence of diagnostic species of different unit) have to be noticed. The following degrees of representativity are defined:

A –vegetation fully corresponds with the description from the viewpoint of physiognomy, presence of diagnostic species, ecological conditions, and other characteristics

B – level of representativity is lowered by degradation or occurrence on the edge of the area of natural distribution) or the vegetation tends to belong to another unit

C – as B in the stronger manner

D –vegetation is not typical particularly because of high degradation, moreover because of plentiful occurrence of invasive, expansive and other non native species, and other negative influences disturbing ecosystem structure and function.

In fact, this parameter given wider information, not only the level of anthropogenic degradation of biotope, but also the level of depletion, which does not have to be caused by biotope degradation (geographically distant or marginal area of natural distribution, when its classification is evident, nevertheless, some characteristic species are absent). It can also improve an information about the fact that the locality has converted into the different natural biotopes under the external influences. Unusual ecological variability of ecotope can act as another additional factor.

Estimation of conservation status

Conservation status shows qualitative value of natural biotopes from the conservation management point of view. Reasons of lowered conservation status can be, for example, the occurrence of invasive and expansive species, disturbance of water regime, inappropriate way of farming, or in contrary, absence of suitable way of farming – in consequences it can be detected by lower number of characteristic species. Each type of vegetation is influenced by the same factors that can lower the conservation status. Deteriorating factor of one vegetation type can be crucial for an another type. It is important to consider this particularly for succession series.

First of all, contemporary conservation status was considered. If it is not optimal (as for saturation level of diagnostic species and area conditions), future outlooks (for the recorded biotope!) are valued. In case these "future outlooks" do not correspond with desired evolution (in direction of the status described in Catalogue), possibilities and demands of contingent restoration via directed care (conservation management) are considered. Short-term prospect is taken in years, medium-term prospect in tens of years and long-term prospect happens in more than a hundred of years. The statement of individual subcriteria is made in order (1) present status, then (2) outlooks and in the end (3) restoration possibilities (Table 1). Levels of conservation status A, B, C are resulted by combination of three subcriteria portion.

<u>Present status:</u> A – excellent (optimal status from nature-conservation point of view; it corresponds with the original description while taking account of present level of representativity), B – good (satisfactory), C – adverse (serious doubts whether to map the segment as natural biotope at all or as an area of form group X).

Outlooks (presumptions of next development without any care or other interferences): A – excellent (stabilization or improvement of state in short-term or medium-term prospect, negligible risk of deterioration from outside), B – good, C – adverse (threat of state deterioration in short-, medium- or long-term prospects; high risk of outside impacts).

Restoration possibility: A – accessible and effective (by known methods and available means), B – objectively possible (higher effort is to be expended), C – difficult (very long-term prospect or financially and technically exacting management).

As about meadows, ponds and other biotopes which are obviously or directly based on continuation of human influences, it is only exceptionally possible to mark the biotope in a "good" state as the biotope with "excellent" outlooks. Outlooks are usually said to be "good" in situations when there is obvious continuation of contemporary state (common way of farming) and when a wide range of outside bed influences is not considered.

Phytosociological relevés of selected area and natural biotopes were made because of two reasons: 1) needfull documentation of biotope occurrence, 2) troubled, temporary or insufficiently developed vegetation. The relevé had to be taken if new biotope type is "discovered", i.e., its occurrence was not drawn down in the concrete square of network mapping or adjoining squares and when its occurrence is not even supposed (both red and pink dots in Catalogue maps, respectivelly).

Data processing

Segment characteristics were processed into database (DBF format) using the input programme NDS (Agency for Nature Conservation and Landscape Protection of the Czech Republic, 2001-2003). Database structure is common for detailed and contextual mapping. Specification of database fields (see Table 2) focuse the information about mapping type (detailed or context), biotope code according Catalogue, segment order number, shape (polygon, line or dot), spatial dimensions, homogeneity (simple structure or mosaic), age structure of forest (P, Q, R, S), representativity of given natural biotope segment (from A to D), conservation status (from A to C) and finally a remark (with list of dominant species, occurrence of invasive or expansive species, vegetation classification to forms or higher phytosociological units – usually alliances, human impacts, occurrence of threatened or especially protected or other eminent plant species, and other information which help to describe segment such as specific physiognomy, biotope intra-segment variability, etc.).

Report should include (a) basic identification and quantitative data, (b) enumeration and description of mapped biotopes, and (c) landscape characteristics, such as –brief description of relief and note on geology and other abiotic characteristics (as for climate etc.). Moreover there should be a paragraph about potencial vegetation (Mikyška, 1968-1972 and/or Neuhäuslová, Moravec, 1997; Neuhäuslová et al., 1998), phytogeographical classification and (d) description of influences and activities in mapped area, and its direct surroundings – list of activities and their codes as shown in the standard data form according to decision 97/266/ES, (e) occurrence of important vascular plants - taxa from reduced version of Black and Red List of Vascular Plants in the Czech Republic, (Holub, Procházka, 2000, Procházka, 2001), occurrence of alien plants (Pyšek et al., 2002), (f) vulnerability, (g) documentation, (h) phytosociological relevés in standard format and content e.g. according to Moravec et al., 1994.

Results

Although the comprehensive analyses should be made on the layer of biotopes mapping in GIS consequently, we present some preliminary results that could be concluded simply from the general statistics table (see Table 3).

The total number of described segments of all natural and seminatural biotopes was 1 143 104 that cover the area of 20 766 km^2. The total database is larger than 1.8 GB. The Natura 2000 habitats cover nearly half of all biotopes segments, that have been mapped, in concrete 601 960 segments (52%) covering 9383.7 km^2 (45%). As for the area of occurrence, the rarest biotopes are i) still waters with *Aldrovanda vesiculosa*, ii) annual halophilous grasses, iii) *Prunus tenella* thickets and iv) *Salix lapponum* subalpine scrub. On the other hand, the largest biotopes are mesic *Arrhenatherum* meadows, beech forests (both herb-rich *Eu-Fagenion* and acidophilous *Luzulo-Fagion*) and Hercynian oak-hornbeam forests. As for the number of localities, there are very rare also i) natural lakes with *Isoëtes* stands (in the Šumava Mts), ii) *Cladium mariscus* dominated fens and iii) cliff vegetation in the Sudeten cirques, while to those mostly frequent ones belonging to mesophilous shrubs, streamline ash-alder alluvial forests and wet *Cirsium* meadows.

Almost one third of forested area in the CR has been recorded as “natural” – in total, 781 446 ha, i.e. ca 29.,5%. Some habitats of “priority” importance for the EU could be considered common in the CR (e.g. 6230 – Species-rich *Nardus* grasslands, 9180 – *Tilio-Acerion* forests, and 91E0 – Ash-alder alluvial forests). Willow-poplar forests of lowland rivers seem to be significantly more fragmented and human-influenced then the hardwood ones (average segment area 0.8 and 2.5 ha, subsequently).

Discussion

Stands of *Aldrovanda vesiculosa* are considered the most rare biotope. Although the species have become extinct in the Czech Republic many localities were reported. All the current localities are unnatural and originate from planting specimen from eastern Poland populations (Adamec 2005). Therefore we suppose the salt meadows, inland salt marshes, and calcareous fens are most endangered biotopes/habitats. Halophilous grasses together with fen-sedge beds (*Cladietum marisci*) are extremelly threatened by anthropogenic activities and natural degradation, i.e. by overgrowing by expansive salt-tolerant species. The natural stands of *Prunus tenella* are only in southern Moravia, in Pannonic biogeographical region, localities in Bohemia are secondary, mostly originated by cultivation (Hejný, Slavík, 1992). *Salix lapponum* occurs only in the alpine vegetation belt of the Krkonoše and Jeseníky Mts. This biotope is formed by *Salix lapponum, S. silesiaca* and *Betula carpatica* (Chytrý et al., 2001). It is extremelly rare, but not threatened vegetation, because it grows in glacial cirgues, where anthropogenic impact is supressed by nature protection. The riverbanks with *Myricaria germanica* are extremelly rare and threatened, because of high human impact and natural disturbance, that are destructional factors in naturally meandering streams and wildwater rivers.

The beech and oak-hornbeam forests are the most common forest biotopes. This result corresponds to the potential natural vegetation (Neuhäuslová, Moravec, 1997). The highest number of small-sized woody segments was recorded for ash and alluvial alder forests. These fragments of low quality occur mostly along streams and small rivers, near fishponds etc., and they mostly represent successional stages after abandoned moist tall herb and sedge meadows.

Both sedge and tall herb meadows are still relativelly common, but their quality decrease under eutrophication, intensification or reforestation, because the management of meadows has rapidly changed over the last 15 years (land cover/use changes are reported by Boucníková, Kučera, 2006).

Conclusions

The Natura 2000 habitats mapping was in the Czech Republic realized by the most extensive field mapping covering the entire area of the Czech Republic in the fine-scale 1:10.000. The mapping consisted of two major parts: (i) detailed, and (ii) contextual resolution. The Habitats Directive Annex 1. habitats (Natura 2000 habitats) have been interpreted by the national system of biotopes. In central Europe this is an absolutely unique approach, that has resulted in the largest and more accurate actual database about natural biotopes than anytime before. The methodological approach of the habitat mapping is described, and the summary characteristics of biotope types from 601 960 segments, covering 9383.7 km^2, is reported. Based on biotopes mapping results, the comprehensive and sophisticated monitoring scheme of habitat types in the Czech Republic is just being designed. Nature conservation practice and the landscape and vegetation research use both the database and the map.

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Guth J., Kučera T.: **Mapování habitatů Natura 2000 v ČR: metody a hlavní výsledky.**

V příspěvku je předložena zkrácená verze metodiky mapování biotopů pro soustavu Natura 2000, tak jak bylo celostátně v ČR realizováno. Celkem bylo v měřítku 1:10.000 zpracováno celé území ČR, vymapováno a detailně popsáno bylo 1 143 104 segmentů pokrývajících plochu 20 766 km^2, databáze má velikost přes 1,8 GB. Nejohroženější jsou vodní a mokřadní habitaty s *Aldrovanda vesiculosa*, slaniska a křoviny s *Prunus tenella* a *Salix lapponum.* Nejhojnější jsou ovsíkové louky, dubohabřiny a bučiny. Z hlediska počtu lokalit jsou extrémně vzácné porosty šídlatek (*Isoëtes* sp.) na Šumavě, porosty s *Cladium mariscus* a vegetace sudetských karů, zatímco nejčastěji jsou zastoupeny mezofilní křoviny, aluviální lesy podél toků a mokré pcháčové louky a lada. Některé prioritní habitaty jsou v ČR poměrně běžné (např. 6230 druhově bohaté smilkové trávníky, 9180 suťové lesy sv. *Tilio-Acerion* a 91E0 pobřežní olšiny a jaseniny).

Box 1: **Terminology of habitat mapping**

Locality – usually spatially connected area, which was mapped in detail as a whole. Upper level term used in the way of contextual mapping was "mapped area".

Segment – the basic mapping unit; a homogeneous part of area which was covered by a biotope of homogeneous quality (both representativity and conservation status). Exceptionally the segment has a mosaic character (see lower), which means that is covered by more biotopes. Segments are polygons (larger than cca 2.500 m^2), lines (one dimension shorter than 50 m, contrary the second one longer than 50 m) and points (cca 25 – 2.500 m^2). It is possible to note even smaller segments (as points) in reasonable cases, for example grass cover of rock terraces, springs, etc.

Biotope – mapping unit defined by the classification of habitats and vegetation (Chytrý, et al. 2001).

Natural biotope – biotopes without influence or semi-influence of human activity. It is terrestrial or water area, which is defined by geographical character and biospheric and lithospheric disintegration as well.

Anthropogenic biotope – does not remind nature, and is defined for needs of this mapping. These types of biotopes are described as formation group X (Chytrý, et al. 2001).

Diagnostic species – plant species typical for the concrete biotope, they distinguish this biotope from the others by their presence, mainly at the level of the same formation group.

Dominant species – the most frequent plant species in the biotope, in respect of their biomass and ground cover.

Expansive species – original native plant species from the geographical point of view, which spread, increase biomass and in consequence influence biological diversity in bad way.

Invasive species – geographically non native species, which spread spontaneously to the detriment of original species and so that influence biological diversity in negative way.

Box 2: Field practice

Basic (1:10.000) or forestry outlined map (1:10.000) had been used. Detailed mapping covered entire area while by the contextual one only natural biotopes have been recorded.

Main steps of terrain mapping:

1) Determination of biotope – always the lowest hierarchical level described in the Catalogue.
2) Demarcation of segment borders in the field and drawing them to the map. In the case of mosaic segment estimation of percentage of single biotope types present.
3) Estimation of dimensions in case of dot and line segments and also complete all segment characteristics (representativity), conservation status, age structure).
4) Recording eminent plant species present in the segment and other relevant notes.
5) Taking photos or making phytosociological relevés.

Nomenclature**:** preferently were used the names recorded in Kubát et al., 2002 resp. in Hejný, Slavík, 1988, 1990, 1992 and Slavík, 1995, 1997, 2000. Names of syntaxa correspond to Moravec et al., 1995 or Chytrý et al., 2001.

T a b l e 1. Conservation status (A, B, C are resultant values consequent upon all subcriteria, for details see text)

OUTLOOKS	Excellent			Good			Adverse		
Possibility of restoration	accessible and effective	objectively possible	difficult	accessible and effective	objectively possible	difficult	accessible and effective	objectively possible	difficult
STATUS									
EXCELLENT	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
GOOD	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**C**
ADVERSE	**B**	**B**	**C**	**B**	**C**	**C**	**C**	**C**	**C**

T a b l e 2. Database structure of Natura 2000 habitat mapping

ID	Type: Number	Format: F7	Identification number
AREA	Type: Number	Format: F13.6	Area of segment
PERIMETE	Type: Number	Format: F13.6	Perimeter of segment
P_K	Type: String	Format: A1	detailed/contextual
MAPA	Type: String	Format: A6	Code of map 1:10.000
POR_C	Type: Number	Format: F4	Order number
STEJ	Type: String	Format: A2	Mosaic
BIOTOP1	Type: String	Format: A5	Code of biotop (up to six biotopes in mosaic segment)
BIOTOP2	Type: String	Format: A5	
BIOTOP3	Type: String	Format: A5	
BIOTOP4	Type: String	Format: A5	
BIOTOP5	Type: String	Format: A5	
BIOTOP6	Type: String	Format: A5	
STEJ_PR1	Type: Number	Format: F2	Proportion of biotop (up to six biotopes in mosaic segment)
STEJ_PR2	Type: Number	Format: F2	
STEJ_PR3	Type: Number	Format: F2	
STEJ_PR4	Type: Number	Format: F2	
STEJ_PR5	Type: Number	Format: F2	
STEJ_PR6	Type: Number	Format: F2	
ZAKRES	Type: String	Format: A1	Point/line/polygon
VEL_B	Type: Number	Format: F7.1	Size in sq-metres
VEL_L	Type: Number	Format: F7.1	Breadth in metres
VEK_S_L	Type: String	Format: A1	Tree layer age structure
REPRE	Type: String	Format: A1	Representativeness
ZACH	Type: String	Format: A1	Conservation status
DATUM	Type: Number	Format: DATE11	Date of field mapping
LOKAL	Type: String	Format: A25	Code of locality
LOCALITYAUTOR	Type: String	Format: A25	AUTHOR
POZN	Type: String	Format: A200	Notice
DILO	Type: String	Format: A8	Code of contract

T a b l e 3. Results of habitat mapping (number of segments and area) and the national habitat interpretation by biotopes (Chytrý et al., 2001)

HABITAT	DESCRIPTION	COUNT	AREA_HA	BIOTOP					
1340	*Inland salt meadows	175	128.63	T7					
2330	Open grassland with *Corynephorus* and *Agrostis* of continental dunes	1126	772.14	T5.1	T5.2	T5.3			
3130	Oligotrophic to mesotrophic standing waters of plains to subalpine levels of the Continental and Alpine Region and mountain areas of other regions, with vegetation belonging to *Littorelletea uniflorae* and/or to *Isoeto-Nanojuncetea*	1345	803.97	M2.1	M2.2	M2.3	M3	V6	
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* formations	173	40.55	V5					
3150	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation	8679	6772.00	V1A	V1B	V1C	V1D	V1E	V1F
3160	Natural dystrophic lakes and ponds	225	36.47	V3					
3220	Alpine rivers and the herbaceous vegetation along their banks	96	34.81	M4.3					
3230	Alpine rivers and their ligneous vegetation with *Myricaria germanica*	8	3.10	M4.2					
3240	Alpine rivers and their ligneous vegetation with *Salix eleagnos*	169	65.79	K2.2					
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	1224	1580.60	V4A					
3270	Muddy river banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation	482	109.41	M6					
4030	European dry heaths	5041	1997.76	T8.1B	T8.2B	T8.3			
4060	Alpine and boreal heaths	461	461.49	A2.1	A2.2				
4070	Bushes with *Pinus mugo*	278	1353.47	A7					
4080	Subarctic *Salix* spp. scrub	37	35.72	A8.1	A8.2				
40A0	*Subcontinental peri-Pannonic scrub	499	87.49	K4A	K4B				
5130	*Juniperus communis* formations on heaths or calcareous grasslands	578	410.40	T3.4A	T3.4B	T8.1A	T8.2A		
6110	*Rupicolous calcareous or basophilic grasslands (*Alysso-*	361	50.39	T6.2A	T6.2B				

HABITAT	DESCRIPTION	COUNT	AREA_HA	BIOTOP					
	Sedion albi)								
6150	Siliceous alpine and boreal grassland	489	1128.00	A1.1	A1.2	A3			
6190	Rupicolous pannonic grasslands (*Stipo-Festucetalia pallenstis)*	1568	426.99	T3.1	T3.2				
6210	Semi-natural dry grassland and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)	20231	16676.98	T3.3C	T3.3D	T3.4C	T3.4D	T3.5A	T3.5B
6230	*Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas, in continental Europe)	15926	9247.84	T2.1	T2.2	T2.3A	T2.3B		
6240	*Sub-Pannonic steppic grasslands	635	378.43	T3.3A					
6250	*Pannonic loess steppic grasslands	124	95.96	T3.3B					
6260	*Pannonic sand steppes	57	33.85	T5.4					
6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	8986	8295.65	T1.9					
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	1253	913.40	A4.1	A4.2	A4.3			
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	31859	16436.99	M5	M7	T1.6	T1.8		
6440	Alluvial meadows of river valleys of the *Cnidion dubii* alliance	482	1038.90	T1.7					
6510	Extensive hay meadows of the plain to submontane levels (*Arrhenatherion, Brachypodio-Centaureion nemoralis*)	126587	203802.88	T1.1					
6520	Mountain hay meadows	11137	18115.54	T1.2					
7110	*Active raised bogs	1285	826.68	R3.1	R3.3				
7120	Degraded raised bogs (still capable of natural regeneration)	338	589.60	R3.4					
7140	Transition mires and quaking bogs	10841	5116.41	M1.6	R2.2	R2.3			
7150	Depressions on peat substrates	65	12.31	R2.4					
7210	*Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	6	3.97	M1.8					
7220	*Petrifying springs with tufa formation	706	43.38	R1.1	R1.3				
7230	Alkaline fens	136	48.10	R2.1					
8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	417	210.99	A6A					
8220	Chasmophytic vegetation of siliceous rocky slopes	36	7.93	A5	A6B				
8150	Northern upland siliceous screes	361	114.51	S2B					

HABITAT	DESCRIPTION	COUNT	AREA_HA	BIOTOP					
8160	*Calcareous scree of hill and montane levels	105	22.37	S2A					
8210	Chasmophytic vegetation of calcareous rocky slopes	1275	189.62	S1.1					
8220	Chasmophytic vegetation of siliceous rocky slopes	23846	5728.55	S1.2					
8230	Pioneer vegetation on siliceous rock surfaces (*Sedo-Scleranthion, Sedo albi-Veronicion dillenii*)	1409	179.79	T6.1A	T6.1B				
8310	Caves not open to the public	133	3.22	S3B					
9110	*Luzulo-Fagetum* beech forests	79544	166336.74	L5.4					
9130	*Asperulo-Fagetum* beech forests	50509	119696.13	L5.1					
9140	Medio-European subalpine beech woods (with *Acer* and *Rumex arifolius*)	2051	3232.75	L5.2					
9150	Medio-European limestone beech forests (*Cephalanthero-Fagion*)	641	930.06	L5.3					
9170	*Galio-Carpinetum* oak hornbeam forests	82717	145371.60	L3.1	L3.2	L3.3B	L3.3C	L3.3D	
9180	**Tilio-Acerion* forests of slopes, screes and ravines	22945	25075.51	L4					
9190	Old acidophilous oak woods with *Quercus robur* on sandy plains	7118	11569.32	L7.2					
91D0	*Bog woodland	7346	17961.27	L10.1	L10.2	L10.3	L10.4	L9.2A	R3.2
91E0	*Mixed ash-alder alluvial forests of temperate and Boreal Europe (*Alno-Padion, Alnion incanae, Salicion albae*)	27612	32633.67	L2.1	L2.2A	L2.4			
91F0	Riparian mixed forests of *Quercus robur, Ulmus laevis* and *Ulmus minor, Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers of the Atlantic and Middle-European provinces (*Ulmenion minoris*)	9483	23796.73	L2.3A	L2.3B				
91G0	*Pannonic oak-hornbeam forests	2523	6801.92	L3.3A	L3.4				
91H0	*Pannonian white-oak forests	928	1217.25	L6.1					
91I0	*Euro-Siberian steppe oak woods	4067	8758.19	L6.2	L6.3	L6.4	L6.5A		
91T0	Central European lichen pine forests	765	1129.70	L8.1A					
91U0	Sarmatic steppe pine forests (*Cytiso-Pinetalia*)	196	247.85	L8.2					
9410	Acidophilous spruce forests (*Vaccinio-Piceetea*)	22265	69179.80	L9.1	L9.2B	L9.3			

Fig. 1. Distribution of both natural and seminatural biotopes counted in the Czech Republic (601 960 segments cover 9383.7 km^2).