ECOLOGICAL NETWORK CREATION IN THE CZECH REPUBLIC

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Abstract
An ecological network in the landscape consists of all existing and proposed landscape segments of ecological significance that can contribute to the conservation of landscape's biodiversity. The conception of creating the territorial systems of ecological stability applied in the Czech Republic corresponds to the latest landscape ecological knowledge and landscape planning procedures used abroad. Biocorridors interconnect the biocentres thus enabling migration, contacts and spread of organisms. Unlike biocentres they need not provide for a permanent existence of all species of the represented communities. Thanks to the interconnection of biocentres by means of biocorridors there is an ecological network coming to existence in the landscape. Development of local biocorridor Vracov and regional biocorridor Věstonice in south Moravia is presented.

Key words: ecological network, biocorridor development, primary succesion

1. Introduction

An ecological network in the landscape consists of all existing and proposed landscape segments of ecological significance that can contribute to the conservation of landscape's biodiversity. Cultural landscapes are often observed to miss a sufficient amount of these stabilizing elements. The observation became a basis for the Czech conception of creating the territorial systems of ecological stability of the landscape as an integrated network of interconnected patches providing at least a minimum of spatial conditions for the conservation of the biodiversity (BUČEK, LACINA1992). These ecologically significant landscape segments (territorial systems of ecological stability) are by their function subdivided into biocentres, biocorridors, buffer zones and interacting elements, and by their biogeographical significance (size, degree of biodiversity, representativeness, rareness or the occurrence of endangered species and communities) classified at the following levels: local, regional, supra-regional, provincial, biospherical (BUČEK, LACINA 1996). The territorial systems of ecological stability of the landscape are proposed according to five basic criteria : the diversity of potential natural ecosystems, the spatial relationship of biota in the landscape, spatial parameters, the existing condition of the landscape, socioeconomic limits, and the planned use (BUČEK, LACINA, MÍCHAL 1996).

The conception of creating the territorial systems of ecological stability applied in the Czech Republic corresponds to the latest landscape ecological knowledge and landscape planning procedures used abroad. Very similar concept is utilized in Slovakia (RUZICKOVÁ, ŠIBL 2000). In Germany, there is a network of biotopes /*Biotopvernetzung*/ (JEDICKE 1994) created in the landscape. In the Netherlands, a national ecological network /*Ecologische hoofdstructuur*/ (LAMMERS, ZADELHOF 1996) is coming to existence. Some of the United States of America develop a network of biocorridors under the name of *Greenways* (LABAREE 1992; SMITH, HELMUND 1993). In the countries of European Union, a pan-European ecological network is being gradually built within the EECONET (*European Ecological Network*) programme (BENNET 1994; NOWICKI et al. 1996; JONGMAN 1998), consisting of a system of core areas – biocentres of European significance, interconnected by means of biocorridors with adjacent zones of enhanced landscape management.

2. Creation of the territorial systems of landscape ecological stability

The objective of planning and developing the territorial systems of ecological stability (TSES) in the Czech Republic is to stop the hitherto unfavourable trend in the development of ecological stability and to permanently provide for the sustainable biological diversity of the landscape. Law no. 114/1992 Gaz. on nature conservation and landscape protection defines TSES as an interconnected system of both natural and altered but still near-natural ecosystems which maintain the natural balance. According to this Law, the demarcation and assessment of TSES is one of the fundamental obligations in general nature conservation to be carried out by physical planning and nature conservation authorities in cooperation with institutions of water management, conservation of agricultural land resources and state administration of forest management. The protection of the system of ecological stability is mandatory for all owners and tenants of land properties forming its basis with its creating being a public concern shared by land owners, municipalities and government.

Most important components of the territorial systems are biocentres. Biocentre (the centre of biological diversity) is an area that should enable with its size and ecological conditions the permanent existence of species of the landscape's natural genetic resources. The biocentres are demarcated so as to include a range of natural and man-made natural communities of agricultural landscape in a certain territory. The biocentres are further divided into existing and planned. The already existing biocentres with natural and near-natural ecosystems of the high degree of ecological stability have proven to be optimally functional across the entire demarcated area and this has to be the target state of all biocenters included in the territorial systems of ecological stability. A biocentre can be for example natural oak woodlands, beech woodlands, scree-maple woods, herb-rich grasslands or ponds surrounded with wetland grass communities. In areas with an entire shortage of remainders of natural and near-natural communities, the biocentres must be newly created. Areas booked in the landscape in TSES plans for the future establishment of a biocentre are referred to as proposed biocentres. At the present time, the territories of proposed biocentres can contain ecosystems with a low degree of ecological stability, heavily changed by humans such as fields, a Norway spruce monoculture or a landfill. In the future, these areas will have to be transformed to provide conditions favourable for species of the natural gene-pool of the landscape.

Biocorridors (biotic corridors) interconnect the biocentres thus enabling migration, contacts and spread of organisms. Unlike biocentres they need not provide for a permanent existence of all species of the represented communities. Thanks to the interconnection of biocentres by means of biocorridors there is an ecological network coming to existence in the landscape. The most continuous and high-density network of biocorridors in the rural landscape is formed by riparian stands stretching along water courses and streams, in which natural communities of willows, alders and ashes with the undergrowth of wetland and hydrophilic species often reach a length of several kilometers. In the intensively used agricultural field landscape the function of biocorridors is fulfilled by newly planted forest belts and also by natural communities on hedgerows, stone mounds and agrarian terraces interconnecting the biocentres. The importance of biocorridors is different for different groups of organisms in dependence on their different schemes of movement and spread. Similarly as biocentres, the biocorridors are either existing or proposed in the TSES plans at places where new biocorridors will have to be established. Best functioning are continuous biocorridors consisting of natural communities with the high degree of ecological stability along their whole length. Functionality of biocorridors is conditioned by their space parameters (length and width), by the status of permanent ecological conditions, structure and species composition of biocoenoses (SMITH, HELLMUND 1993).

Basic types of TSES components at local level are interaction elements. The term is used for small areas of natural communities with favourable conditions for the existence of some plants and animals significantly affecting the functioning of ecosystems in the cultural landscape. The interaction elements are smaller in size than biocentres and biocorridors and they are often spatially isolated. Typical interaction elements are for example shrub communities on forest edges, game refuges in fields and groups of hardwoods in coniferous monocultures.

Planning of the territorial systems of ecological stability is based on the diversity of potential natural ecosystems, i.e. on the diversity of communities that would have developed in the landscape without the impact of anthropogenic activities. The diversity of natural ecosystems in a certain landscape depends on the diversity of permanent ecological conditions, namely on the character of geological bedrock, relief, soils and climate. The diversity of potential natural ecosystems in the landscape is described in the typological map of geobiocoene type groups (BUČEK, LACINA 1999). The representation of existing communities occurring in the skeleton of ecological stability shows if the biocentres contain all characteristic geobiocoene types and what communities are to be added and newly created in the territorial system. The location of biocentres and biocorridors prefers a continuous interconnection of biocentres with identical or similar communities.

3. The Vracov local biocorridor development

One of the first plantations of elements of the local TSES implemented in South Moravia within the Programme of Environment Revitalization funded by the Ministry of Agriculture after the year 1990 was the biocorridor of Vracov (ÚRADNÍČEK 2004). Regarding the fact that there was no experience in the Czech Republic with the design, planting and growth of these green belts on arable land, the study aimed at an assessment of the biocorridor woody component development at the initial stage, particularly at a growth of woody species on the formerly used rural land, and at an evaluation of changes in the species composition during the period under study.

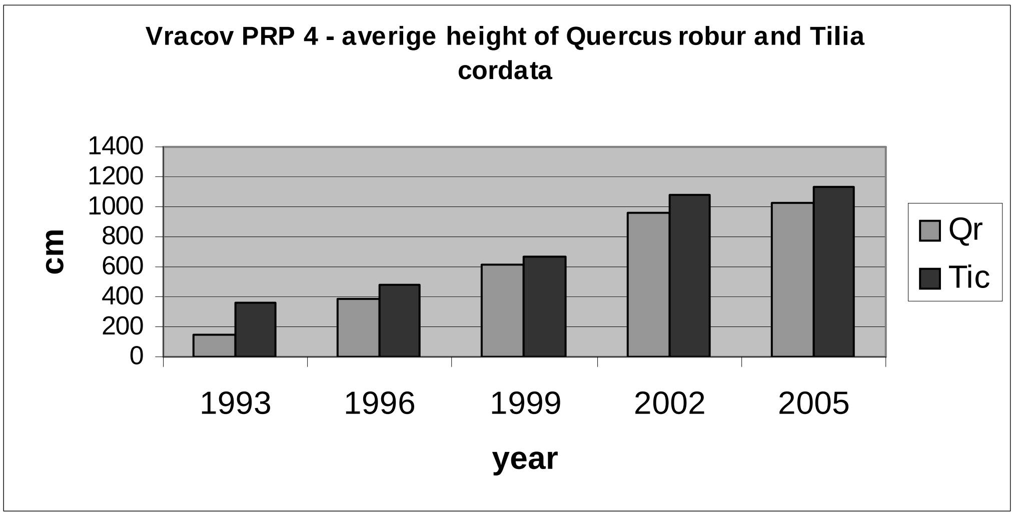
The investigation proper was made in the local biocorridor of Vracov which is situated in South Moravia, Hodonín district, cadastral area Vracov. Being established in 1991, the biocorridor runs perpendicullary to the main motorway from Kyjov to Veselí nad Moravou, some 2 km NW of Vracov. Its total length is 1 830 m, width 15 m. It was planted in a territory with no original vegetation, on arable land. Target community is to be of the forest environment character. The biocorridor is located in the warmest part in the Czech Republic, with expressively warm climate of medium to mild humidity (mean annual temperatures 9.1°C, precipitation 569 mm/yr), growing period about 165 days. Poor in nutrients sands are dominated by light unsaturated arenic Cambisols up to acidic Rankers, which pass into arenic Chernozems at places with a greater admixture of cleyey and loamy loes fractions. Parent rock consists of terrace gravel-sands of the Morava River, with drift sands dwelling on them. Marginally, there are alluvia, peat bogs and moors of Vracov, partly calcareous. Typical are water-logged interdune depressions (CULEK 1996).

Evaluation of the growth of individual woody species was carried out in 1993-2005 on permanent research plots (PRP). There were 4 PRPs aligned in the fenced biocorridor, each of 50 m in length and 16 m in width. Each of PRPs have 8 rows at an average distance of 2 m, row spacing is 1.0 – 1.6 m in dependence on woody species. Total number of trees monitored on the PRPs was about 1 100. The PRP4 was used as an example here only.

Complete inventories of the whole biocorridor were carried out in 1996 and 2002. In addition to the initially planted woody species, natural regeneration was recorded of both vegetative and generative origin.

PRP 4 is situated near a communication connecting the villages of Vracov and Vlkoš, easily accessible, with a possibility of short excursions. The skeleton species of *Quercus robur* - represented by 34 individuals - exhibited a more rapid growth, average tree height increased from the original 145.2 cm in 1993, by 883.6 cm in 2005, reaching an average of 1028.8 cm. Average diameter was 123 mm. The species did not show any game damage, the trees are already grown-up and any danger to their development is not to be expected. *Tilia cordata* was another species to exhibit a considerable increase of average tree height and diameter. Today's lime trees are higher than oaks, their average tree height being 1 137 cm (Fig. 1). *Cerasum avium* achieves excellent growth parameters on this plot, too. Its average tree height is 1 015.1 cm and the tallest individual reaches up to a height of 1 250 cm. Diameter at breast height of the most sizeable cherry tree was 237 mm. Sizeable are also trees of *Padus racemosa* – average tree height 669.7 cm. Shrub layer once again consists mainly of the species *Ligustrum ovalifolium* (average height of 33 trees being 314 cm). Next taxon *Cornus sanguinea*, average height increased from the original 116.1cm in 1993, by 233.1 cm in 2005, reaching an average of 349.2 cm.

Fig. 1. – Averige hight of some trees



Open areas of the plot exhibit a more intensive natural regeneration of woody species such as *Sambucus nigra* or *Cerasus avium*; suckers and self-seeding of *Rosa multiflora* were found here similarly as on other plots. The road vicinity affects the plot in a negative way and there is even an illegal landfil here. This part of the biocorridor is occasionally entered by wildlife as well but the busy traffic on the road would not encourage the animals to do so and the losses on woody species due to game are nearly negligible. The greatest damage was recorded in the species *Rhamnus cathartica* and *Cornus sanguinea*. Some species suffered a mechanical damage by humans. The amount of woody plants is decreasing in last years, see Tab 1.

Tab.No. 1 – Number of woody plants on PRP 4

Species on PRP 4	number of plants (p) in year				
	1993	1996	1999	2002	2005
Acer campestre – ACC	47	45	41	36	29
Cerasus avium – CA	41	41	40	38	38
Corylus avellana – COR	7	7	6	7	9
Cornus sanguinea – COS	38	38	38	38	38
Ligustrum ovalifolium - LIGO	93	93	83	33	10

Lonicera tatarica – LOT	3	3	3	3	3
Padus racemosa – PAD	31	31	33	31	27
Populus tremula – POT	1	1	1	1	1
Prunus spinosa – PS	3	3	3	3	4
Quercus robur – QUR	38	38	34	34	33
Rhamnus cathartica - RHC	3	3	3	3	1
Rosa multiflora – ROM	3	0	4	3	2
Sorbus aucuparia - SOAU	1	1	1	1	1
Tilia cordata – TIC	8	8	8	8	8
Viburnum lantana – VL	8	7	6	6	6
Sum	325	319	304	245	210

The whole line community was subjected to an assessment of 11 072 specimens of woody species in the year 2002. The inventory detected in this locality as many as 32 taxa of both domestic and introduced woody species, i.e. by 4 species less than in 1996. An alphabetical list was made including the used abbreviations, and the numbers of respective taxa were subjected to an assessment. Results were compared with the inventory made in 1996 (Table 2). Full inventory exceeds the limited space of this paper.

It was concluded at this research once again that in the biocorridor which should contain only domestic -preferably autochthonous- woody species, there is a great number of non-autochthonous (introduced) species. Nevertheless, the situation has improved since the year 1996. The representation of non-autochthonous species in 1996 was 4 594 pcs (35.42% of all woody species occurring in the biocorridor). In 2002, the occurrence of the introduced species decreased by 1 798 pcs (by 39.14%) to 2 796 pcs ("only" 25.25% of all woody species occurring in the biocorridor); this indicates that in the course of 5 growing seasons the representation of introduced woody species was reduced by 10%. The largest decrease was observed in the Asian species *Ligustrum ovalifolium* in which only 2 072 specimens (2002) survived from the original 3 708 pcs in 1996, the loss being 1 636 pcs, i.e. more than 44%. Despite the above facts, the results clearly justify further measures aimed at a removal of some invasive exotic woody species such as *Rosa multiflora* which spreads across the area, and to support some specimens of domestic species on the other hand. The monitoring included also the natural regeneration of woody species. The highest number of woody species from self-seeding was found in the species of *Sambucus nigra* – over 200 pcs.

Ligustrum vulgare - LIGV	86	49
gen - Ligustrum vulgare	0	5
Lonicera tatarica - LOT	554	496
gen - Lonicera tatarica	16	0
Lonicera korolkowii - LOK	10	9
Malus domestica - MAL	1	0
Padus racemosa - PR	1505	1372
gen - Padus racemosa	15	6
Padus racemosa - veg	3	194
Pinus sylvesris - PIN	1	2
gen - Pinus sylvestris	2	0
Populus nigra - PON	15	15
gen - Populus nigra	1	1
Populus tremula - POT	9	9
gen - Populus tremula	24	0
Populus tremula - veg	8	3
Prunus spinosa - PRS	187	266
gen - Prunus spinosa	25	2
Prunus spinosa - veg	31	45
Pyrus communis - PYR	1	0
Quercus robur - QRR	1214	1138
gen - Quercus robur	2	5
Rhamnus cathartica - RHC	200	152
gen - Rhamnus cathartica	1	1
Rosa canina - ROSC	0	5
gen - Rosa canina	1	1
Rosa multiflora - ROSM	156	82

The layer of woody species in the biocorridor Vracov is gradually achieving enclosed canopy and shaded individuals are observed to die, this is why the total number of trees is decreasing. The tree layer (*Quercus robur, Tilia cordata, Acer campestre*, etc.) is properly grown-up which means that the skeleton of the line community is stable. The shrub layer and fillers are at many places heavily crowded, cramped, not allowing the succession of other woody species and especially herbs, preventing the development of a greater species diversity in the biocorridor. Additional planting is not necessary so far since the original planting was too dense and oversized with respect to the growth of individual species used.

Although the inventory revealed a larger amount of non-autochthonous species in the woody species composition – such as *Ligustrum ovalifolium*, taxa of the genus *Lonicera*, which should not occur in the planting – the biocorridor did very well in the period under study. At this stage of biocorridor's development, when the number of woody species is observed to fall, it is necessary to see that the stock of non-autochthonous species is decreasing and the stock of domestic species is supported and maintained. The studied Permanent Research Plots exhibit an obvious development of the skeleton species, which provides good pre-requisites for a further future of the biocorridor. It can be concluded that nearly all woody species grow very well and the biocorridor is fully enclosed. There is no danger of massive game damages, the process of regeneration occurs rapidly with the biomass increment being high enough to resist any game damage. The condition of the biocorridor can be generally evaluated as very good. At this stage of development, the biocorridor is already capable of fulfilling the required functions.

4. Utilisation of primary succession for creation of regional biocorridor Věstonice

The hydroengineering structure of Nové Mlýny was built in 1975-1989 within the framework of complex hydrotechnical regulations in South Moravia. It consists of three lakes of which the middle one was decreed as the Nature Reserve of Věstonická nádrž (Věstonice Water Reservoir) due to the occurrence and nesting of abundant waterfowl species. The middle water reservoir of the Nové Mlýny hydroengineering structure is situated some 40 km south of Brno on the former confluence of rivers Svratka, Jihlava and Dyje. Seen from the viewpoint of landscape ecology, however, the hydraulic structure on the confluence of Dyje, Jihlava and Svratka Rivers disrupted the connectivity of floodplain biotopes between the Dyje-Svratka R. and the Dyje-Morava R. alluvial plains. Rare biotopes of floodplain forests, alluvial meadows, bog wetlands, riverine lakes, meandering water courses and xerotherm communities of sand dunes ceased to exist under the reservoir's water surface.

After 1989, the Ministry of Environment of the Czech Republic adopted a policy for the ecologization of the Nové Mlýny middle reservoir within the framework of which the water level was lowered in July 1996 by 85 cm to a spot height of 169.50 m a.s.l. and a construction of two artificial islands was launched that would serve as a part of the regional biocorridor (FORMAN 1983; BUČEK, LACINA 1996) running through the floodplain. The islands are meant to abridge the distance over the reservoir's water surface which is for many organisms too large to pass.

The water level lowering caused denudation of sediment loads in the Jihlava and Svratka Rivers mouth tracks, enlargement of the existing holms area in the reservoir and denudation of border dam bases – all this on an area of several tens of hectares. FLAMIKOVÁ (1996) mentions approximately 70 ha of newly denudated surfaces. These newly denudated surfaces provided optimal conditions for the oecesis of soft floodplain communities. At the time of water surface lowering in July 1996, seeds of soft floodplain tree species could not have been any longer present in the air, especially those of anemochoric willows. Nevertheless, seedlings of white willow, black poplar and interspersed seedlings of other willow species emerged on the sediment loads in high population densities of up to 45 individuals per a square meter (KOVÁŘOVÁ 2003).

Vitality of white willow seeds is described as very short in literature. If the seeds fail in finding a suitable place for germination, they would lose their germinative capacity within a few days (CHMELAŘ,MEUSEL 1986). White willow is ranked in the group of species with an orthodoxically short viability of seeds also by MARODER et al. (2003). Our experiments show that the seeds can keep a nearly 100% germinative capacity for 3 days that are followed by a rapid decrease, though. The last seeds germinated after 17 days of dry storage. This indicates that the above mentioned advance growths could not have emerged from a seed bank. According to our phenological observations, in 2003, the fruits of white willow in the area of the middle reservoir started to ripen on 23 May while in 2004 the capsules ripened after a very cold month of May as late as from 5 June. The seed rain duration was two weeks in the both years. It was retrospectively documented that the rain of seeds lasted until max. 20 June also in 1996, and that the oecesis of seeds was not likely to have had occurred by means of the seed rain. In what way did white willow communities oecesis in nature reserve Věstonická nádrž run up?

A working hypothesis was that seeds fallen into water at the time of seed rain would keep a longer germinative capacity than seeds fluttering in the air and fallen on the ground. Hence, that an analogy exists to the soil bank of seeds also in water – as a water seed bank composed of hydrochoric plant species, whose function -apart from the displacement of diaspores- consists also in the extension of seed vitality and thus in an enhanced chance for the plant establishment.

However, the reality was quite different. According to our field trials, the seeds stored in the water germinated promptly and seedlings lived on more than 40 days. The oecesis was made thanks to „a seedlings waterbank“. The seedlings were washed up on the uncovered depositions and lakesides. The white willow behaves in juvenile phase in water as a natant or submerged hygrophyte species and prolongs its ability to occupy a new territory.

This is how it happened that there were seedlings remaining on the denudated sediment loads and embankments during the gradual lowering of the water level in July 1996, or deposited there by means of surge, which would also explain the attendance of white willow communities in a more or less broad strip (up to 60 m) along the banks. Grassland and herbaceous communities were developing at a greater distance from the banks. A similar distribution of tree species seedlings in linear parallel strips along the Waal River in the Netherlands was observed by Van SPLUNDER et al. (1995). Along the Waal R. the seed dispersal occurred in the spring in a following sequence: *S. viminalis*, *S. triandra*, *S. alba* and *Populus nigra*. The seeds germinated in narrow belts parallel to the river; the seedlings of *S. viminalis* were found at a higher altitude than those of *S. alba*. The altitude of seedlings occurring on the river bank was related to the water level during the period of dispersal of *Salix* spp. but not of *Populus*. *nigra*. *P. nigra* showed a significantly longer seed viability than the *Salix* species and germinated at a lower soil moisture content.

The ascertained results may be useful for revitalization measures in alluvial plains. If the creation of soft floodplain ecotope occurs at the time of seed rain and the seed source is within the reach, the oecesis of communities will doubtlessly take place instantly. In the case that the period of seed rain is missed, the time for the establishment of communities can be extended by about a month. Then it is however necessary to flood the plots planned for the soft floodplain at the time of seed rain and to subsequently provide for a gradual lowering of the water level. development

The depositions without vegetation were covered by the white willow and black poplar seedlings in autumn. The population density reached as many as 45 specimens per square meter. The seedlings of white willow and black poplar exhibited a further successful development on the denudated sediment loads in 1996 although they might have been exposed to very extreme conditions such as drying out of the boggy substrate. This is in a good agreement with results presented by Van SPLUNDER et al. (1996) who detected a high drought resistance in the seedlings of white willow and black poplar, which is enabled by lower transpiration than for example in almond-leaved willow and osier willow in which a considerable drought-induced mortality was observed. On the other hand, GUILLOY et al. (2002) claim that the flooding of black poplar seedlings impairs their capacity of survival, which was fully corroborated in the studied area during the July flood in 1997 when black poplar disappeared from most research plots (BUČEK et al. 2004). BARSOUM (2002) recorded a 83% mortality in one-year old seedlings of black poplar after a summer flood, while the mortality of white willow seedlings was only 52%.

The next development of succession processes was monitored in 40 permanent research plots of an area 5x5m based in different distance perpendicular to the bank line (MADĚRA, PACKOVÁ 2004).

The described initial seral stages of willow-poplar alluvial forests are very monotonous in terms of their species composition with an absolute dominance of willows and prevailing traits of *Salix alba* L., only exceptionally with individuals classified as belonging in the genus *Salix* x *rubens* S ch r. In addition to the genus of *Salix*, the oecesion also included *Populus nigra* L. which however gradually fell out from the community (60-day flooding of seedlings in 1997) so that only 21 individuals were found in 2002 to occur on an area of 6.3 ha (BUČEK et al. 2002), and none of them was detected on the research plots.

The population density in the community decreases with the increasing distance from the bank line with average size of individuals growing at the same time. The fact is well documented also by diagrams in Figs 2 and 3. The groundwater table decreases with the increasing distance from the bank line. A variance of several centimeters in the ground water table has a pronounced beneficial influence on the growth of individuals. However, the larger the physiological depth of soil, the greater the intraspecific competition. The phenomenon has a response in an intensive self-thinning, which can be documented by a close dependence of stem diameter and density of individuals illustrated in graph see Fig. 4. From the germination of seedlings in 1996, mortality in the year 2002 reached up to 95% on plots which were most distant from the bank line. This mortality of individuals was certainly affected also by the 60-day flooding occurring in July and August 1997.

The initial stages of White Willow communities established in primary succession belong to high productive ecosystems (BUČEK, MADĚRA, PACKOVÁ 2004); this is given by highly fertile alluvial soils, sufficient moisture and long vegetation period. White Willow is a typical pioneer species of the riparian forest ecosystem, R-strategist (GRIME 1979) with a fast growth in juvenility.

The high light demands support the height increment, the average annual height increment on the research plots exceeds 1 m and by highest specimens approachs 2 m. The hydrological conditions influence significantly the rate of growth too. White willow belongs to short rotation species with significant volume increment. Our result reflect very high reserve of dendromass (on av. 150 m^3, max. up to 421 m^3) per hectare at an age of 7 years (age documented also by annual ring analysis). According to KLIMO, HAGER (2000) the reserve of dendromass is 200 až 300 m^3 per hectare for 25 to 30 years old White Willow stand and 400 m^3 per hectare for 40 years old stand in Don and Volga Rivers alluviums. The average annual increment of 7 years old stand on the our most productive research plot reachs 60 m^3 per hectare and the increment in 2003 reached even 105 m^3 per hectare.

The community of white willow in the locality produced 45–140 t DM per hectare, which was on average 75 t (MADĚRA, PACKOVÁ 2004). The production of DM (without leaves) per hectare per year is 16 t, including leaves 16.5 t. This value is very favourable exceeding the majority of species which are grown for energy purposes in Central Europe.

White willow is a strongly light-demanding species. Even at high population densities, the stand canopy closeness is relatively low in the crown space, i.e. the stand still transmits a high percentage of radiation 23–47%, on av. 33.6%. This is corresponded to by the low average LAI of 1.86 whose values on the research plots range from 0.29 to 5.14. Variability of radiation transmittance measured under the stand is higher than radiation measured in the open area this showing that the canopy is not homogeneous but more shaded places rather alternate with crown openings.

The observations of primary succession initial stages of willow-poplar floodplain forests confirmed the high rate of community development. The bioccoridor fulfiled its function very well already in 7 years. It reflects results of floristic survey (ŘEPKA 2004). It was found 77 herb species, six species of them are mentioned in Red list of endangered plants of Czech Republic (HOLUB, PROCHÁZKA 2000).

Interesting is certainly a possibility of using the initial stages of white willow communities for the implementation of energy stands on flood-control polders, making use of their high starting biomass increment rate, high vitality, very good resistance to long-term flooding. At the same time they fulfil a considerable ecostabilizing and corridors functions in the riverine landscape as a native type of plant communities.

In the Czech Republic, there are over 91 000 km watercourses and over 25 000 various water reservoirs. Hydraulic engineering using biological stabilization of riparian banks or the prospective utilization of temporarily flooded areas by suitable willows can represent the indispensable source of energy wood with respect to the engagement of the Czech Republic to increase the proportion of using energy from renewable resources. Moreover, yields for the dendromass can at least partly cover costs for the maintenance of bio-technical stabilization of riparian banks.

5. Conclusion

Projects for local, regional and supra-regional territorial systems of ecological stability are gradually being processed all over the Czech Republic. These projects will become an integral part of territorial plans, agricultural land-use plans and forest management plans. One of the most demanding tasks is the gradual addition of the missing biocenters and biocorridors. It will be several years before they begin to fully and positively influence the cultural landscape. And it will take much longer still, certainly several decadess, before the skeleton of ecological stability is succesfully completed so that the territorial systems of ecological stability function as a living ecological network providing good conditions for the existence of natural communities.

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