

The UNESCO Dolni Morava Biosphere Reserve – A model for cultural landscape management

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Abstract

The Dolni Morava Biosphere Reserve (BR) is located in the southeast corner of the Czech Republic. Covering nearly 350 km², the area includes sites of great natural and cultural value, and of national and international importance. Among the sites are numerous protected areas. The whole region is known for its rich folklore traditions, wine production and intensive agriculture. The Dolni Morava BR is the most recent and the smallest of the six Czech BRs, and the only one not situated completely within a National Park or Protected Landscape Area. It strives to combine various protection goals with sustainable development. In 2014, the reserve was declared a model for stakeholder-based management structure within UNESCO's World Network of BRs.

Profile

Protected area

Dolni Morava BR

Mountain Range

Pálava Hills, Czech

Republic



Figure 1 – Ruins of the Orphan castle (*Sirotičtí brádek*) situated in the original Pálava BR © Lena Vacenonska



Figure 2 – Floodplain forest of *Soutok*, work of generations of foresters. © Petr Cupa

Small area with high diversity

Biosphere Reserves (BRs) differ from other types of reserves mainly due to the fact that they are not focused solely on nature conservation: they also respect and support those human activities that lead to the sustainable use and development of the landscape. The Dolni Morava (Lower Morava) BR (DMBR) presents a combination of various ecosystems, archaeological sites, historical man-made landscape (carefully designed mainly in 19th century, in the era of romanticism), and contemporary, highly managed agricultural land with settlements. The DMBR includes Special Protection Areas and Special Areas of Conservation (Natura 2000 network categories); 31 other special protection areas, including the Pálava Protected Landscape Area; one World Heritage site; two Ramsar sites (Wetlands of International Importance); two Nature Parks, and various other sites.

The area is unique in being located on the borders of two European bio-geographic provinces: Central-European broad-leaved forests and Pannonian steppes. The diverse habitats include outcrops of the outer Western Carpathians, which form calcareous cliffs and karst that host several rare plant species. Caves present some of the most important hibernacula for bats within the Czech Republic. Other habitats include primary and secondary dry grasslands, and thermophilous oak forests. Very rich in biodiversity are hard-wood and soft-wood floodplain forests (Madera et al. 2011, 2013, 2018; Vicherek et al. 2000), while floodplain meadows have an abundance of unique plants. The landscape mosaic also includes fishponds and other standing-water habitats, rivers, saline meadows and marshlands, and vineyards and other agricultural land (see Table 1).

The municipalities in the BR are grouped into three *micro-regions*, each representing potential for natural and

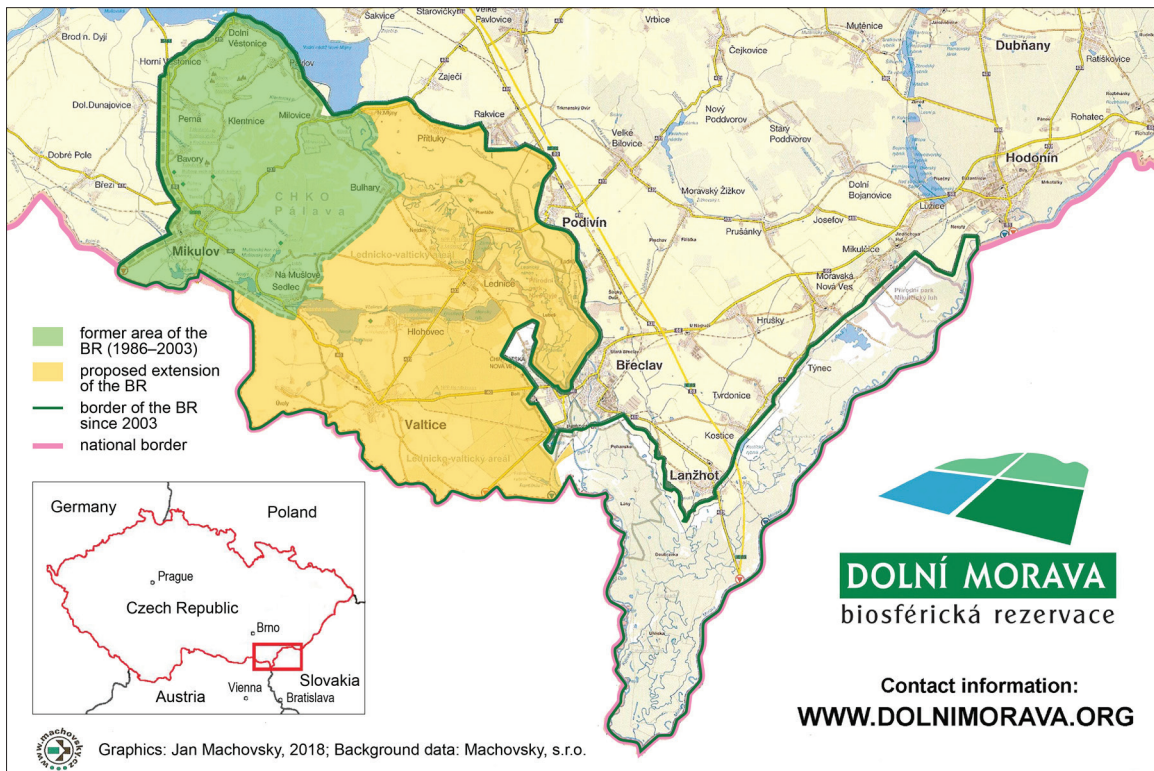


Figure 2 – The location of the Dolní Morava Biosphere Reserve.

cultural development. The Mikulovsko region, located in the northern part of the BR around the border town of Mikulov, was the home of the original Pálava BR (see Figure 1 & 2). In 2003, the Committee of the International Coordination Council of UNESCO's Man and the Biosphere (MAB) programme approved the extension of the former Pálava BR (designated in 1986) to include the Lednice-Valtice Cultural Landscape and the floodplain forests at the confluence of the Morava and Dyje rivers. The newly designated area, covering nearly 350 km², was renamed the Dolní Morava (Lower Morava) BR.

The landscape is dominated by the limestone Pálava Hills. At its highest point, the BR reaches 550 m above sea level (the lowest point is just 148 m above sea level). The Lednice-Valtice region forms the centre of the BR. It consists of nearly 180 km² that were formerly part of the Liechtenstein estate. This historical man-made landscape was declared a UNESCO World Heritage Site in 1996. The southernmost part of the BR is covered by the floodplain landscape of the Podluží region.

The BR numbers approximately 20 000 permanent inhabitants; the annual number of visitors to the region is in excess of 500 000.

Floodplain landscape

In addition to the vineyards and Pálava Hills, the floodplain forests are the BR's most significant landmarks, covering over 30% of its total area. A quarter of all the Czech Republic's areas of floodplain for-

Table 1 – Important species within habitats of the DMBR.

Habitat	Species	
Calcareous cliffs and karst	Large-flowered sandwort	<i>Arenaria grandiflora</i>
	Austrian bedstraw	<i>Galium austriacum</i>
	Livelong saxifrage	<i>Saxifraga paniculata</i>
Caves	Horseshoe bat	<i>Rhinolophus hipposideros</i>
Primary and secondary dry grasslands	Oat Grass	<i>Helictotrichon desertorum</i>
	Hungarian ground beetle	<i>Carabus hungaricus</i>
Thermophilous oak forests	Downy oak	<i>Quercus pubescens</i>
	Turkey oak	<i>Q. cerris</i>
Thermophilous oak-forests: herb layer	Dittany	<i>Dictamnus albus</i>
	Purple gromwell	<i>Lithospermum purpurocaeruleum</i>
Oak-hornbeam forests	Hornbeam	<i>Carpinus betulus</i>
Oak-hornbeam forests: shrub layer	European bladdernut	<i>Staphylea pinnata</i>
	Wonder violet	<i>Viola mirabilis</i>
Oak-hornbeam forests: herb layer	Snowdrop	<i>Galanthus nivalis</i>
	European beaver	<i>Castor fiber</i>
Hard-wood and soft-wood floodplain forests	European tree frog	<i>Hyla arborea</i>
	Golden eagle	<i>Aquila chrysaetos</i>
	Summer snowflake	<i>Leucjum aestivum</i>
	White cuckoo bitter-cress	<i>Cardamine dentata</i>
	Thin-spiked wood sedge	<i>Carex strigosa</i>
	Common hedge hyssop	<i>Gratiola officinalis</i>
Floodplain meadows	Black rush	<i>Juncus atratus</i>
	Marsh gentian	<i>Gentiana pneumonanthe</i>
	Spear-leaved skullcap	<i>Scutellaria hastifolia</i>
	Shining spurge	<i>Euphorbia lucida</i>
Psammophilous vegetation	Grass-leaved iris	<i>Iris graminea</i>
	Purple mullein	<i>Verbascum phoeniceum</i>
	Carthusian pink	<i>Dianthus pottederae</i>
Fishponds and other standing-water habitats	Water violet	<i>Hottonia palustris</i>
	Spotless watermeal	<i>Wolffia arrhiza</i>
	Water chestnut	<i>Trapa natans</i>
	Spiny water nymph	<i>Najas marina</i>

Table 2 – Typical species in the soft- and hardwood floodplain forests.

Habitat	Species	
Softwood floodplain forest		
Alder-willow forests	White willow	<i>Salix alba</i>
	Common alder	<i>Alnus glutinosa</i>
	White poplar	<i>Populus alba</i>
Alder-willow forests: shrub layer	Gray willow	<i>Salix cinerea</i>
	Glossy buckthorn	<i>Frangula alnus</i>
	European spindle	<i>Euonymus europaeus</i>
Hardwood floodplain forest		
Oak-ash & hornbeam-elm-ash communities	Pedunculate oak	<i>Quercus robur</i>
	Narrow-leaved ash	<i>Fraxinus angustifolia</i>
	European white elm	<i>Ulmus laevis</i>
Drier hornbeam-elm-ash communities	Field maple	<i>Acer campestre</i>
	European hornbeam	<i>Carpinus betulus</i>
	Small-leaved linden	<i>Tilia cordata</i>
Drier hornbeam-elm-ash communities: shrub layer	English hawthorn	<i>Crataegus monogyna</i>
	European spindle	<i>Euonymus europaeus</i>
	Gelder rose	<i>Viburnum opulus</i>
	Common dogwood	<i>Cornus sanguinea</i>

est are found in the DMBR. More than 90% of the floodplain forests are owned by the government and managed by the Forests of the Czech Republic, a state enterprise. Situated on the floodplains of the Dyje and Morava rivers, these forests and meadows are among the richest ecosystems of Central Europe. The beginnings of the development of these ecosystems, whose present shape has most crucially been influenced by man, can be traced back to approximately 10 000 years

Infobox 1

The list of stakeholder-agreed priorities = Strategy for Biosphere Reserve (BR) project planning:

- clear the landscape of all dangers (old environmental burdens, WWII ammunition...);
- protect landscape from water and wind erosion (infiltration belts, wind-break hedges...);
- enhance landscape's habitat diversity (more greenery around settlements, more forests...);
- improve hydrological aspects of the landscape (revitalization, restoration or construction of fishponds, wetlands);
- respect the traditional landscape professions and support basic industry in its efforts to sustainably use natural resources (farmers, foresters, fish-farmers, hunters...);
- improve tourist infrastructure and logistics;
- co-operate with municipalities and support their efforts for sustainable development;
- promote the area's cultural and folkloric uniqueness;
- co-operate with universities, schools, research institutes and other institutions;
- co-operate with entrepreneurs to promote sustainable development;
- consider nature conservation as part of sustainable development and a healthy lifestyle.

The Dolni Morava BR provides a platform for discussion between experts and the general public – a space where optimal harmony between various perspectives and differing interests can be reached.

ago, after the last Ice Age. Although the landscape is managed economically, nature here is not under threat: the management of the area developed in a way that encompasses all the components of the sustainable management of a cultural landscape.

At first sight, a floodplain forest reveals an ecosystem that is full of life and bears witness to the forces of natural processes. Yet, the characteristics of the forests in which giant oak trees dominate are the result of the economic intentions of foresters since the end of the 18th century. The beauty and ecological stability of the floodplain forests are safeguarded only by an ample supply of water and by appropriate forest management, which are prerequisites for an even distribution of all tree-age categories.

The original floodplain forests had vastly different characteristics from the one we know today. The present form of these forests, which are dominated by *Quercus robur* and *Fraxinus angustifolia*, was created by the Liechtenstein foresters in the 19th century. They planted large numbers of acorns in agriculturally prepared soil, which was simultaneously used for the growing of field crops. Usually after 7–10 years, the growing of crops was terminated and a forest prevailed (Hřib & Kordiovský 2004). Few people today realize that the monumental floodplain forests, with their rich plant and animal communities, are in reality a man-made natural ecosystem (van der Maarel 1975).

Based on the occurrence of tree species, we distinguish two types of floodplain forests in the BR – softwood and hardwood (Maděra 2001), see also Table 2. The softwood floodplain forest has a high groundwater level throughout the year and is often subject to floods. Terrain depressions and river floodplains are home to tree communities which consist predominantly of alders and willows, so-called alder-willow forests. The dominant communities in the hardwood floodplain forest are oak-ash and hornbeam-elm-ash communities (Klimo et al. 2008). The characteristic main tree species in both types of communities are *Q. robur*, *F. angustifolia* and *Ulmus laevis*. In the drier hornbeam-elm-ash communities, we also find *Acer campestre*, *Carpinus betulus* and *Tilia cordata*.

Alluvial meadows, which evolved into a number of types depending on underground water levels, are further habitats, hosting some rare species (e.g. Lesser celandine (*Ficaria vernalis*) and Siberian iris (*Iris sibirica*), Vicherek et al. 2000). Nutrient-rich alluvial soils and the abundance of water in the floodplain forests provide ideal conditions for the development of massive trees (Rychtecká & Dreslerová 2009). Examples of primeval forest communities can be seen in two National Nature Reserves – Ranšpurk and Cahnov-Soutok (Vrška 1997, 1998).

The forests, meadows and wetlands of the floodplains of the Morava and Dyje rivers have been and still are among the most important ecosystems of the DMBR. Vast floods used to be a typical feature of the floodplains in the lower reaches of the Morava and

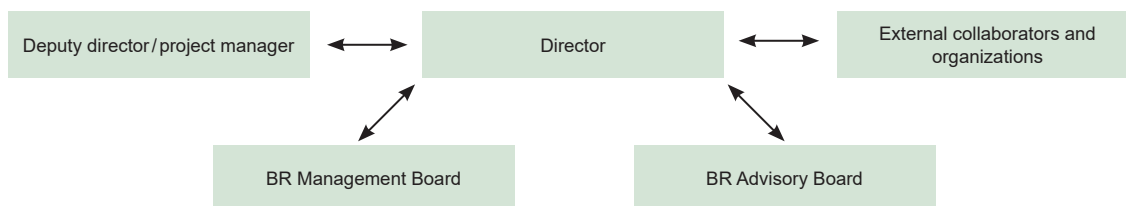


Figure 1 – The administrative structure of the Dolni Morava Biosphere Reserve.

Dyje. The flood areas of both rivers consisted of a great number of wetlands, of various types. However, past centuries brought human activity that resulted in ever-more conspicuous changes in the character of the original landscape. The changes started with meliorations, particularly in small stream basins. These resulted in a shift from indigenous meadows and pastures to arable land. The outcome was the devastation of the natural character of the small streams. As the pressure to use the land for intensive agriculture grew stronger, in the course of time a significant part of the flood area was transformed into meadows and fields, resulting in the loss of most wetlands. Today, consequently, various projects in the BR are focused on restoring water courses and wetlands.

A site born in conflict

The DMBR was created by extending the already existing Pálava BR (created in 1996) and the Protected Landscape Area of the same name, both of which were managed by the Nature Conservation Agency of the Czech Republic. In 2002, the Ministry of the Environment put forward a proposal to enlarge the site further by including the whole Lednice-Valtice Area (Lednice-Valtice Cultural Landscape World Heritage Site), the management of which would fall entirely to nature conservation authorities. The proposal was prepared without the proper participation of the state-owned Forests of the Czech Republic, one of the largest stakeholders in the region, or of other important stakeholders representing businesses and the farming community. Despite local objections, the proposal was sent by the authorities to the MAB Secretariat in Paris. At the same time, the stakeholders made it known officially that the UNESCO MAB Programme philosophy was very appealing to them, but pointed out that they had not been included in the initial stages of the extension process. These facts led to the refusal of the proposal by MAB's representatives. However, the stakeholders went one step further and prepared their own proposal, which involved a much larger area than originally anticipated by the authorities. They proposed a form of site management that involved direct participation, and in which nature conservation authorities would be just one of many stakeholders. This idea was eventually endorsed by the Czech Ministry of the Environment and accepted by the International Coordinating Council of the UNESCO MAB

Programme in July 2003. The original BR grew from 83 km² to 349 km², and the administrative body took the form of an NGO – a *Public Benefit Company*.

Management of the Dolni Morava BR

The management of a BR should be essentially a *treaty* between local communities and society as a whole. The local people should act as the landscape's everyday *guardians* – people who use the landscape and protect its values. The management of the DMBR is based on equal participation of the local communities, government authorities, business representatives, the NGO sector and a scientific panel. The DMBR Public Benefit Company was founded as the BR's administrative organization in August 2004 by Forests of the Czech Republic, the Ministry of the Environment, MND (Moravian oil-drilling company, a joint-stock company), Breclav County Chamber of Commerce, and the Czech Union for Nature Conservation. In 2012, the Ministry of the Environment, for internal and organizational reasons, waived its founder status

Infobox 2

Dolni Morava Biosphere Reserve

Designation as biosphere reserve in: 2003

Major ecosystem types: temperate broad-leaf forests, fields, grassland, vineyards

Major habitats & land-cover types: forest (39.05%), arable land (36.53%), vineyards (6.18%), water bodies (3.34%), orchards (3.21%)

Bioclimatic zone: temperate continental

Location (latitude & longitude): 48°46'34.42"N 16°48'50.04"E (central point)

Total Area: 34 900 ha

Core area(s): 2 695 ha

Buffer zone(s): 15 804 ha

Transition area(s): 16 401 ha

Altitudinal range: 148–548 metres above sea level

Czech biosphere reserves (BRs) came into being within the geographic and political context of the former Czechoslovakia. The first two BRs were approved in 1977. There are six BRs in the Czech Republic today (Sumava BR, Krkonose BR, Krivoklatsko Protected BR, Trebonsko BR, Bile Karpaty BR and DMBR). While some states adopted specific laws relating to BRs, in the Czech Republic, as in many other countries, there is no reference to MAB or BRs in national legislation.

and withdrew from all its positions in BR bodies. The Ministry's cooperation with the BR now takes the form of an informal partnership, and the BR's Management Board has created a *permanent guest position* for representatives of nature conservation authorities.

The administrative bodies of the Public Benefit Company are: a management board, an advisory board and a director (see Figure 1). The management structure is based on the broad participation of major stakeholders in the DMBR. The management board is a nine-member BR governing body. It includes representatives of the company founders, representatives of the communities of the three regions covered by the BR, one representative of the farming community, and one from Mendel university in Brno, who also acts as the main scientific consultant of the DMBR. The advisory board is a six-member supervisory body. It includes representatives of the company founders, one member representing the communities of the three regions covered by the BR, and one from Mendel university.

The staff consists of 2–3 full-time employees, who take care of administration, projects and fundraising. The management bodies meet every two months or more frequently if necessary. Funding comes mainly from stakeholder donations, the BR's own activities, and various project funds (EU, Norwegian Funds etc.).

UNESCO stipulates an obligation to submit a review every ten years to the MAB Secretariat. The report should enable MAB's International Coordinating Council to review how each BR is fulfilling the criteria of the Statutory Framework, and its three basic functions in particular (for the basic functions, see Infobox 3 below). The DMBR submitted its first periodic re-

view in 2014. The ICC considered that the site was meeting the criteria, and furthermore recommended that the DMBR be used as a model for a stakeholder-based management structure. This was for the first time that any Czech BR had officially been declared a model for the World Network of BRs.

Projects and research activities

The DMBR has successfully completed many projects over the past 15 years. Some of them the DMBR initiated and led, while in others it actively participated. It is not possible to mention all of them in this article, but the largest two focused on environmental burdens. The South Moravia region has important deposits of crude oil and gas, the extraction of which has been taking place since the late 19th century. Over the past 100 years, various companies carried out prospecting and drilling activities, with no concern for how the drill sites would eventually be closed and made safe. Nowadays, these sites represent so-called old environmental burdens whose poor condition poses a threat to the environment. Consequently, in 2005–2007, in cooperation with its stakeholders, the BR implemented two projects of *Elimination of Environmental Burdens Caused by Oil and Gas Extraction in the Lower Morava Biosphere Reserve*. The projects' general objective was the disposal of 31 old drill holes and remnants of waste from localized oil and gas extraction, and the remediation and reclamation of the affected sites. The technical works connected with the environmental burden elimination and land restoration were carried out by a specialist company. The BR acted as the manager of the projects, both of which were co-funded by the European Union Structural Funds and the State Environmental Fund of the Czech Republic.

The DMBR's activities include cooperation with UNESCO's World Heritage programme. Every UNESCO World Heritage Site (WHS) has an obligation to establish a Management Plan, the aim of which it is to preserve, improve and promote the development of the site. The BR staff drew up the Management Plan for the Lednice-Valtice Cultural Landscape WHS, the only WHS of its kind in the Czech Republic.

The DMBR management cooperate closely with municipalities. A series of projects has established and restored biocentres and elements of a Territorial System of Ecological Stability (TSES) in six communities so far. The areas where the projects were implemented have been subject to long-term intensive farming and, particularly in the 1960s–1970s during the socialist transformation of rural areas, were transformed into a cultural steppe with limited biodiversity and susceptibility to wind erosion. The key objective of this landscape project was to establish and enhance the existing TSES system functions along with the restoration of a number of habitats in the originally diverse cultural landscape. The vast areas of farmland were intersected by interaction elements (biocorridors,

Infobox 3

Man and the Biosphere (MAB) Programme and Biosphere Reserves (BR)

An intergovernmental scientific programme, MAB was established by UNESCO in 1971. The MAB Programme focuses on improving the relationship between people and their environment. The philosophy of MAB is to combine sustainable development with the use and protection of natural and cultural resources, through examples gained in selected model areas – the biosphere reserves. The goal of each BR is to solve the problem of how to match environmental conservation with sustainable socio-economic development (i. e. finding ways to protect the environment through wise everyday human activities). The BRs serve as *living laboratories* for testing and demonstrating the integrated management of land, water and biodiversity. All BRs must fulfil the three basic functions:

1. Conservation of natural and cultural diversity
2. Support of sustainable economic and social development
3. Logistics: support of education, research and information exchange

Each site has its own 3-level zonation. Zones present a tool to help fulfil all the functions equally; they are not gradational levels of nature conservation. The World Network of Biosphere Reserves currently comprises 686 sites in 122 countries worldwide, including 20 transboundary sites.

windbreaks etc.), which enhanced the biodiversity as well as the aesthetic functions of the landscape. The BR, in close cooperation with the regional office of the Nature Conservation Agency of the Czech Republic, initiated the projects, prepared documentation, applied successfully for funding from the State Environmental Fund of the Czech Republic and EU Operational Programme *Environment*, and provided project management during the implementation phase. The BR acted as a full service agency to the communities.

The DMBR is frequently used by scientists from different fields as their study area, as this relatively small area is of outstanding cultural and natural value, and home to many threatened plant and animal species. Therefore research and education also play important roles in the work of the BR. The main partner in this field is Mendel University in Brno. In addition to working regularly with students, the BR's staff have participated in the project *The Red Book of Woody Plants of the Czech Republic*, *The Red Book of Threatened Species of the Floodplain Forests of the Lower Morava BR* and *The Red List of Threatened Species of the Křtiny Training Forest Enterprise (TFE)*, which was successfully concluded in 2017. This project involved a team of experts from the entire country working under the supervision of scientists from Mendel University. The project was launched in 2015, and its initial stages focused on analysing the occurrence of threatened woody plants within the Czech Republic. In the following stages of the project, a survey of threatened species of different organisms (flora, invertebrates and vertebrates) was conducted in two selected areas (TFE Křtiny, and floodplain forests in the DMBR). The Red List of Plants of the DMBR, the Red List of Vertebrates of the DMBR, the Red List of Invertebrates of the DMBR, and the Red List of TFE Křtiny were drawn up. The project also included the creation of a map of the DMBR highlighting small-scale, specially protected areas, and descriptions of selected threatened species. The project partners were the DMBR and the *Masaryk Forest Training Forest Enterprise* of Mendel University.

International cooperation

Ever since its approval, the DMBR has taken its membership of the large international family of BRs very seriously. Its first international presentation took place during the EUROMAB conference in Austria, in 2005, co-organized by the BP Wienerwald. From this starting point, the DMBR became deeply embedded in the World Network of BRs. It would be difficult to mention all international activities, but close links with Austria, for example, have resulted in frequent consultations on various matters (e.g. zonation), and in the international Czech-Austrian project *Transboundary information exchange for revision and functional improvement of zonation in the Lower Morava Biosphere Reserve*. The output of this project, co-funded by the Austrian



Figure 2 – *Adonis vernalis* © Petr Cupa



Figure 3 – *Cerambyx cerdo* © Jan Vybíral

Academy of Sciences and led by E.C.O. – Institut für Ökologie, to which colleagues from BP Wienerwald contributed, was a plan for the DMBR's revised zonation. The plan stressed the importance of implementing practical experience from abroad, including feedback from the UNESCO MAB Programme, and of the active involvement of all stakeholders. Another international project, *Management of Natural Resources in the Tropics and Subtropics – Innovation in Study Programmes at Mendel University, Brno*, linked DMBR with Mendel University and other partners. The project modified the former, purely forestry-oriented approach to university education towards a broader environmental scope at landscape level, using two BRs, DMBR (Czech Republic) and Socotra BR (Yemen), as examples. The study programme introduced the specific aspects of natural resources management in tropical and subtropical regions and offered comparison with cultural landscape management in Central Europe. In the course of the practical training module, students carried out field projects in collaboration with indigenous inhabitants and employees of Socotra BR. The project

was funded by the European Social Fund and the state budget of the Czech Republic under the Education for Competitiveness Operational Programme.

The DMBR also aims to cooperate with similar sustainable development initiatives in order to amplify the effect of synergy. Thus in 2017 the BR became part of The International Model Forest Network. Originated by Canada, this worldwide network has been implementing a participatory, landscape-level approach to the sustainable management of natural resources for the past 25 years. The network includes 31 countries and covers more than 84 million hectares as part of 60 landscapes. The Czech Republic Model Forest is a cluster of four Forest Parks (areas designated for the promotion of sustainable forestry) and one BR, all of them presenting a long tradition of Central European forestry and cultural landscape management.

Conclusion

Everything that has taken place in the DMBR over the past fifteen years has been documented in detail in individual Annual Reports, where one can read about our numerous activities, interesting projects which have been implemented, friendly partnerships within the region and outside it, and the role played by the BR in raising awareness among the young generation about pressing conservation, municipal and social issues. The DMBR has become a sought-after partner, both locally and internationally. The staff and partners have proven that BRs can be active agents in nature and landscape conservation as well as in the process of finding the limits of the sustainable use of natural resources. The BR was developed thanks to understanding that participation in the UNESCO MAB Programme does not depend on authoritative power wielded by civil servants or their seals of approval. The DMBR illustrates how, in order for a BR to be seen as offering a meaningful participative landscape management tool, its philosophy must be based on the equality of stakeholders, their mutual respect, their willingness to learn and accept responsibility for the environment and human well-being, and the determination of all involved to solve problems as a team. Only then can a BR serve as a genuine *Sustainable Development Agency*.

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