

FORUM URBES MEDII AEVI VI.

Příspěvky ze 7. ročníku mezinárodní konference FORUM URBES MEDII AEVI konané v kongresovém sále Mendelovy univerzity 13.-16. května 2008 ve Křtinách
Proceedings of the 7th year of the FORUM URBES MEDII AEVI international conference held in the congress hall of Mendel University, Křtiny in 13th-16th May 2008

SUROVINOVÁ ZÁKLADNA A JEJÍ VYUŽITÍ VE STŘEDOVĚKÉM MĚSTĚ

—

THE RESOURCE BASE AND ITS UTILISATION IN THE MEDIEVAL TOWN

Vydává obecně prospěšná společnost Archaia Brno o. p. s.

Vydáno s podporou Grantové agentury AVČR (projekt č. 404/09/1966) / Published with the support of the Czech Foundation of Sciences (project No. 404/09/1966)

Brno 2011

ARCHAIA
BRNO
o. p. s.

ARCHAIA
BRNO
o. p. s.

FORUM URBES MEDII AEVI VI.

Recenzované periodikum/Reviewed periodical

Vydavatel/Published by: Archaia Brno o. p. s.
Adresa redakce/Address: Bezručova 15, 602 00 Brno
E-mail: brno@archaiabrno.cz
Http://www.archaiabrno.org
Http://www.fuma.cz
Tel./Fax: 515 548 650

Předseda redakční rady/Editor-in-chief: Prof. PhDr. Zdeněk Měřínský, CSc.

Výkonný redaktor/Executive editor: PhDr. Rudolf Procházka, CSc.

Členové redakční rady/Editorial board: PhDr. Peter Baxa, PhDr. Jiří Doležel, PhDr. Viktor Ferus, Mgr. Petr Hrubý, Ph.D.,
Mgr. Vojtěch Kašpar, David Merta, Mgr. Marek Peška, Mgr. Jaroslav Podliska, Ph.D.,
PhDr. Rudolf Procházka, CSc.

Technická redakce/Technical board: Mgr. Soňa Mertová

Recenzenti/Reviewers: Mgr. Jan Havrda, Mgr. Petr Kočár, prof. RNDr. František Krahulec, CSc., PhDr. Jiří Merta,
prof. PhDr. Josef Unger, CSc.

Překlady/Translations: Mgr. Irma Charvátová, PhDr. Jitka Seitlová

Jazyková korektura/Language editing: PhDr. Jitka Skorkovská, PhDr. Sonja Schürmann

Sazba a grafická úprava/Typesetting and graphic design: Archaia Brno o. p. s.

Obálka/Cover: Černá a fialová s. r. o.

Tisk/Print: Tiskárna Didot, spol. s. r. o.

Náklad/Print run: 500 ks

Brno 2011

ISBN: 978-80-903588-6-7

ISSN: 1803 1749

Slovo úvodem	str. 3
Introduction Einleitung Rudolf Procházka	
Úvod do problematiky středověkých technologických postupů opracování stavebního kamene	str. 4
Introduction to Mediaeval Technological Procedures in the Working of Building Stone Einführung in die Problematik mittelalterlicher technologischer Verfahren bei der Bausteinbearbeitung Michal Cihla – Michal Panáček	
Tehelne v slovenských mestách v stredoveku a novoveku	str. 26
Brickyards in Slovak Towns in the Middle Ages and the Modern Age Ziegeleien in slowakischen Städten im Mittelalter und in der Neuzeit Marián Čurný – †František Javorský	
Surovinová základna Pohanska u Břeclavi	str. 46
Resource Base of the Pohansko Settlement, near Břeclav Die Rohstoffbasis von Pohansko bei Břeclav/Lundenburg Petr Dresler	
Reste eines mittelalterlichen Wasserhebewerkes und eines aus der türkischen Zeit in Buda	str. 62
Remains of a Mediaeval Water Pump, Traces of Another, from Ottoman Buda Pozůstatky středověkého čerpadla a dalšího z tureckého období v Budě Gabriella Fényes	
Hutnictví kovů v podhradí Pražského hradu	str. 68
Metallurgy Below Prague Castle Das Hüttenwesen im Suburbium der Prager Burg Jan Havrda – Jaroslav Podliska	
K výrobě a variabilitě stavební keramiky ve středověkém a novověkém Brně	str. 98
The Manufacture and Variability of Building Ceramics in the Mediaeval and Modern-Age Brno Die Produktion und Variabilität der Baukeramik im mittelalterlichen und neuzeitlichen Brunn Petr Holub	
Ťažba a použitie baraneckých pieskvcov v stredoveku	str. 122
The Mining and Use of the Baranec Sandstones in the Middle Ages Abbau und Verwendung der Baranec-Sandsteine im Mittelalter Alžbeta Hornáčková	
Hornické a úpravnické areály na českomoravské vrchovině a jejich vztah k soudobým městským centřum ve 13. století	str. 128
Mining and Metal-Processing Areas in the Czech-Moravian Highlands and Their Connection with Contemporaneous Towns in the 13 th Century Beziehungen zwischen den Bergbau- und Aufbereitungsarealen und den Städten in der Montanlandschaft Českomoravská vrchovina (Böhmisch-Mährisches Bergland) während des 13. Jahrhunderts Petr Hrubý – Petr Hejhal	
Vápenka před branou svatého Benedikta	str. 176
A Lime Kiln Outside the St. Benedict Gate, Prague Kalkofen vor dem St.-Benedikt-Tor in Prag Petr Juřina – Jan Zavřel	
Zásobování města Brna železem v období středověku	str. 184
Supplying Brno with Iron in the Middle Ages Eisenversorgung der Stadt Brunn im Mittelalter Jiří Merta	
Mineralogicko-petrografická charakteristika pálenej strešnej krytiny z Bratislavského hradu	str. 194
The Mineralogical and Petrographic Characteristics of Bratislava Castle Fired Roofing Tiles Mineralogisch-petrographische Charakteristik der Dachziegel Peter Nagy – Miloš Gregor	
Historický kameňolom litavských vápencov v Devíne pri Bratislave	str. 204
A Historical Quarry of Leitha Limestone in Devín, near Bratislava Historischer Steinbruch Litauer Kalksteine in Devín bei Bratislava Daniel Pivko	

Archeologické doklady výroby z 12.–13./14. století v jihovýchodní části Brna ve vztahu k vývoji zástavby	str. 212
Archaeological evidence of production in the 12 th –13 th /14 th centuries in the south-west part of Brno with relation to the development of the built-up area Archäologische Produktionsbelege aus dem 12.–13./14. Jahrhundert im Südostteil der Stadt Brno/Brünn im Bezug auf die Bebauungsentwicklung Rudolf Procházka	
„Wann es zw 7 jarn chumpt...“ Medieval and early modern woodland management in Moravia	str. 252
Středověké a raně novověké lesní hospodaření na Moravě Péter Szabó	
Archeologický výzkum pozůstatků zahloubeného pravouhlého objektu se vstupní šíjí na náměstí Jana Žižky z Trocnova v Čáslavi	str. 260
Archaeological Research into the Remains of a Sunken Perpendicular Building with an Entrance Spine in náměstí Jana Žižky z Trocnova Square, Čáslav Archäologische Untersuchung der Restbestände einer rechteckigen Grube mit einem rampenartigen Eingang vom Platz Jana Žižky z Trocnova in Čáslav Martin Tomášek – Jolana Šanderová	
Rostlinné zbytky jedním z pramenů pro interpretaci čáslavského středověkého objektu	str. 276
Vegetal remains as one of the sources for interpretation of the Čáslav Medieval object Věra Čulíková	
Pylová analýza vzorků z archeologického objektu 1502 v Čáslavi	str. 304
Pollen Analysis of Samples from Archaeological Site 1502, Čáslav Pollenanalyse der Proben aus dem archäologischen Objekt 1502 in Čáslav Vlasta Jankovská	
Zvonařská dílna na náměstí Republiky v Praze	str. 308
Bell Workshop in the Republiky Square in Praha (Prague) Glockengiesserei auf dem Republiky Platz in Praha (Prag) Martin Vyšohlid	
Seznam autorů	str. 324
List of Authors	

Medieval and early modern woodland management in Moravia 1)

Before the appearance of concrete, steel and fossil fuels, trees performed two basic tasks in European societies: they were used as building material and as fuel, of which the latter was the more important. Studies in many European countries prove that to meet the above needs most lowland woodlands were managed as coppice-with-standards in the Middle Ages and the Early Modern Period. Based on the example of the Mikulov estate woodlands, this paper argues that woodland management in Moravia shared in this common European tradition. When the first detailed sources are available in the 14th century, we already see the fully developed system with very intensive and highly rational coppice management, which produced considerable incomes. Coppicing was important also in the Early Modern Period, although its economic significance was lower. The birth of modern forestry in the 18th–19th centuries as well as non-intervention nature management in the 20th century resulted in the abandonment of coppicing. However, several signs of this management form (e.g. large coppice stools and woodbanks) are still visible in today's landscape and can, together with the testimony of written documents, provide important information necessary in the revival of traditional management, which is a key issue in current biodiversity conservation.

Introduction

1) This paper was written with the help of grant IAA600050812 and institutional long-term research plan AVOZ60050516, both from the Academy of Sciences of the Czech Republic.

2) *Institute of Botany of the Academy of Sciences of the Czech Republic, Department of Vegetation Ecology, Lidická 25/27, CZ-60200 Brno, Czech Republic.*
E-mail: szabo@policy.hu

3) *The yearly wood increment in the Mikulov estate woods was apparently similar. The estate account books from 1685 until the 19th century record that on average 1,100 fathoms (Klafter = ca. 3.5 m³) of firewood were produced yearly in the demesne woods, which comprised ca. 1,300 ha. (For these woods in general and references in particular, see below.)*

Before the appearance of concrete, steel and fossil fuels, trees performed two basic tasks in European societies. People needed to live somewhere and also had to cook and heat, therefore trees were used as building material (timber) and as fuel (firewood). Of these uses fuel was the more important, because it was needed constantly and in high quantities. While a well-built timber-framed house could last for centuries, its inhabitants had to make food every day, heat in winter, not to mention industrial fuelwood uses, such as the production of bricks, charcoal etc. An entire (but hypothetical) village of, say, 50 houses can be built by harvesting trees from a 37.5-hectare plot (with 300 timbers per house and 400 timbers per hectare of woodland), but the inhabitants of the same village need ca. 75–100 ha of woodland each year for firewood production (counting with the rough-and-ready values 5 people in each household, 3–4 m³ of yearly increment per hectare of woodland and consumption of 1.2 m³ of wood *per capita per annum* – for the numbers, see Warde 2006). 3)

How was all this wood produced? Woodlands today are dominated by modern forestry, which concentrates on timber production very often in the form of plantations, where pre-nursed trees are planted at sites that are prepared with agricultural methods (such as ploughing). Modern forestry, however, is approximately 200–250 years old (Puettmann – Coates – Messier 2009), and before its birth different methods of woodland management prevailed (Peterken 1981; Kirby – Watkins 1998; Rackham 2003; Smout – MacDonald – Watson 2005; Szabó 2005; Warde 2006; Keyser 2009). As evidenced by archaeology, much of medieval and early modern building timber comprised smallish standard trees (e.g. Méri 1952; Rackham 1976; Boháčová – Frolík – Tomková – Žegklitz 1988), rather like the younger trees one meets in woodlands today. Firewood, however, is an entirely different issue. Large trees can be turned into smaller pieces suitable



Fig. 1
The burning of Jan Hus in the Martinická Bible, ca. 1434. Note how the firewood is made of small coppice shoots tied up into faggots (Czech otýpka).

for burning only through much hard work, as anyone who has chopped wood in their weekend houses will know. People, however, realized very early on that trees have a useful characteristic that can help overcome this problem. If a broadleaved tree is cut down, it does not die but grows back from the stool (the part of the tree that remains in the ground) or the root system. When the young shoots reach the desired size, they can be cut down, and the whole process starts all over again. Cutting and regrowth can be repeated many times. Coppicing, as this method of woodland management is called, has been practiced in Europe since the Neolithic (Rackham 1979; Pétrequin 1996; Crone – Mills 2002; Gardner 2002; Billamboz 2003; Haneca – Van Acker – Beeckman 2005), and was basically the only way of producing firewood in European lowlands until the appearance of heavy machinery with which large trees can be easily chopped up. The coppice cycle (the time between the harvesting of individual stands) was short in the Middle Ages (7–10 years) and got progressively longer in the Early Modern Period. Nonetheless, the produce was always large quantities of thin shoots that could easily be turned into firewood. Shoots were typically tied up into bundles called *faggots* (Fig. 1). To obtain building timber as well as firewood at the same place, in many woods coppice stools were topped by a layer of taller standard trees, which grew from seed and were left to stand for several coppice cycles. This system was known as coppice-with-standards (Fig. 2).

This paper examines how this system of woodland management worked in medieval and early modern southern Moravia. As a case study, I will mostly use the woodlands of the former estate of Mikulov (Szabó 2010a), with occasional references to other estates.

The Middle Ages

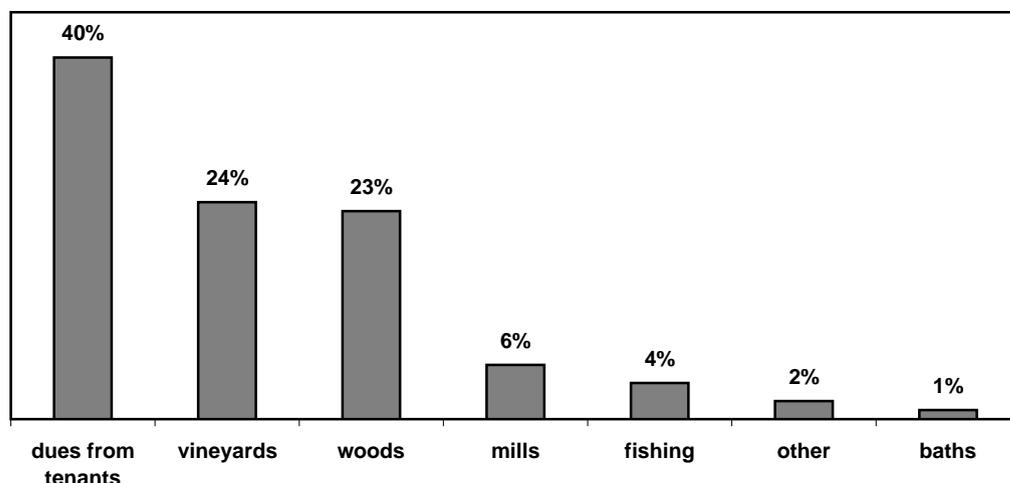
The estate (Czech *panství*, German *Herrschaft*, Latin *dominium*; Cerman – Luft 2005) of Mikulov was one of the largest and richest estates in Moravia. From the 13th to the 16th centuries it was owned by the Lichtenstein family, after that (following a short period of hectic changes in ownership) by the Dietrichstein, who possessed it until the mid-20th century (Řezníček 1966; Honc 2000). Not least because of the long-term stability of ownership, the estate has outstandingly detailed written sources that enable us to follow woodland management in the local woods from the 14th century onwards. At our disposal are *urbaria* from 1414 (Bretholz 1930), two from 1560 (MZA F18 inv. č. 6792, 6793; analysed in Řezníček 1966), 1574 (MZA F18 inv. č. 6794), 1579 (MZA F18 inv. č. 7703), 1590 (MZA F18 karton 1250) and 1629 (MZA F18 karton 1250; analysed in Kryčer 1954), a woodland survey from 1692 (MZA F18 inv. č. 7679), a forestry management plan from 1807–1808 (MZA F72 karton 1124–1125) with the accompanying maps, and yearly account books of woodland-related incomes and expenditures from 1685 to the 20th century (MZA F18 inv. č. 10362–10598, F72 inv. č. 3353–3429).

Fig. 2
Coppice-with-standards
in operation, first year after
cutting. Bradfield Woods,
England. October 2008.
Photo by the author.



The 1414 *urbarium* (in which the woodland survey dates from 1384) informs us that in the late 14th century the estate woods were managed as coppices with a seven-year rotation. For most of the 90 woods on the estate, details were given about the age of the stand (in 1384), and the amount of money it could be sold for when it reached seven years („wann es zw 7 jarn chumpt“ was the general formula used). The seven-year rotation was strictly observed, for example several woods around Strachotin were older than seven years, and were therefore annotated as “mit fawllen uberwachsen.” This, according to the source, was problematic, because older age reduced the price or made the stands altogether impossible to sell. Although this might seem strange to the modern eye, in light of what was argued above about the functions of woodland management it was perfectly logical: no one was willing to waste energy on chopping up large pieces of wood into firewood. That the estate administration should have been concerned with the price of firewood to this extent is explained by the amount of money firewood sales generated. In 1414, the Mikulov estate had three major sources of income. The most significant was dues from tenants in money, which provided ca. one third of the total amount. The second and third places, responsible for one fourth each, were occupied by vineyard tithes and firewood sales (Fig. 3). The contribution of woodland incomes was high, but by medieval standards not unusually so. As described in the same *urbarium*, the neighbouring estate of Falkenstein (in Austria) derived 55 % of its incomes from wood-sales. On the Horn and Göllersdorf estates (also in Austria) in the mid-15th century wood-sales generated 40 % of all incomes (Knittler 1992), while on the estate of Choustnik (in Bohemia) at the same time 15 % (Šimůnek 2004).

Fig. 3
The incomes of the Mikulov
estate in 1414.



We can work out certain details of wood harvesting. Woodlands were divided into compartments, if a wood was small it comprised a single compartment. Each such compartment was cut all at once every seven years. As much as can be told, compartments were surprisingly large. Woodlands around the town of Mikulov (today's Děvín and Milovice Woods, commonly referred to as Pálava, ca. 2,700 ha) comprised 25 compartments. According to these data, one compartment equalled ca. 108 ha, which, by today's forestry standards, is a huge area. The calculation itself is based on two assumptions: that all existing woodlands were included in the source and that the woodland area has not changed significantly since the 14th century. Regarding the first assumption, we have no reason to doubt that all woodlands are mentioned in the very detailed *urbarium*. As for woodland area, we are left with educated guesses. Nonetheless, because the settlement pattern of the area has practically not changed since the High Middle Ages and the topographic descriptions in the source itself by and large correspond to current conditions, we can reasonably safely argue that the overall amount of woodlands in Pálava has not change drastically.

The *urbarium* provides no information about the social organisation of woodcutting, but the method probably used was the following: the buyer was shown the area to be cut by local woodmen, and he also cut and transported the wood himself. In addition to the price of the wood, buyers on the Mikulov estate had to pay a special tax, called 'leitchauff'.

We do not know if there were any standards trees in the Mikulov woods, because the *urbarium* makes no mention of them. Considering that the source is very detailed and includes minor incomes as well, standards would have been mentioned if they had produced any money. The first source (a woodland account book) to provide detailed financial information on individual types of woodland products comes from three centuries later, 1685 (MZA F18 inv. č. 10362). At this point standards generated practically no income, because what was harvested was distributed to the neighbouring villages for free. In lack of information we cannot tell if this was typical already in the Middle Ages. The coppice-with-standard system was certainly known in the Czech lands in this period: for example the mid-15th–century woodland account books of Choustník explicitly mention standards, which were much more expensive than firewood (Šimůnek 2004). As for the very short coppice cycle, sources from elsewhere in Europe (Rackham 2003, Keyser 2009) indicate similar values. Other Czech sources also include short cycles. For example, in ca. 1500 the coppice woods around Pardubice were cut on a 9-year rotation (Kalousek 1899, 448).

The Early Modern Period

The next detailed source about the management of the Mikulov woodlands comes from 1692, when, for an unknown reason, a complete survey of all the trees and woods on the estate was carried out (MZA F18 inv. č. 7679). This survey included a description of the age and/or coppice cycle as well as the number and kind of standards for every wood. In addition, all timber trees in the possession of individual tenants were conscribed. It is clear that at the end of the 17th century all woods were coppiced, although the cycle went up from the medieval seven years to 11–13 years. This was a general European trend (Johann 2008, Warde 2006). As opposed to the 14th century, we have firm knowledge about the existence of standard trees, in other words most woods were managed as coppice-with-standards. The number of standard trees, however, was rather small. Some woods (for example Kolben Wald – today Kolby) did not have any standards. Tucht (today submerged in the Nové Mlýny pond, in the 19th century it was ca. 100 ha) had 80 oaks, 80 aspens and 30 elms, which means ca. 2 standards per hectare. Děvín Wood (ca. 210 ha) had 100 standards (1 tree per two hectares). Altogether ca. 3,200 standard trees were counted on the estate. When compared to the approximately 3700 ha of estate woodland (as surveyed a century later, in 1789: MZA F18 inv. č. 7615), the result is less than 1 standard tree per hectare. These numbers in general are very low. In Champagne (France) at the end of the 13th century 40–60 standards/ha were reported, and in 1376 the French bureau of Eaux et Forêts set 20–25 standards per hectare as a normative target (Keyser 2009). In England in 1543, 35 standards/ha were reported, and also in England in the 18th century 55 standards/ha (Rackham 2003). We should note, however, that the number of standards was variable not only between woods but also in time. Standards were not harvested with the kind of regularity characteristic for coppice stools. As we have seen above, there were altogether ca. 3200 standard trees on the estate in 1692. However, the estate woodland accounts tell us that in the winter of 1684/85 as many as 616 standards were cut for the inhabitants of Sedlec alone to help rebuild the settlement after a fire (MZA F18 inv. č. 10362). As regards Děvín Wood, here the 1692 survey explicitly mentions that many standards were cut recently and hardly any were left to stand.

Fig. 4
Changes in the amount of Holzgeld through time. Sources: 1560 – MZA F18 inv. č. 6792, 6793; 1579 – MZA F18 inv. č. 7703; 1629 – *urbaria*, MZA F18, karton 1250; 1689 – MZA F18 inv. č. 7637; 1807 – MZA F18 inv. č. 7616; 1832 – MZA F18 inv. č. 7637.

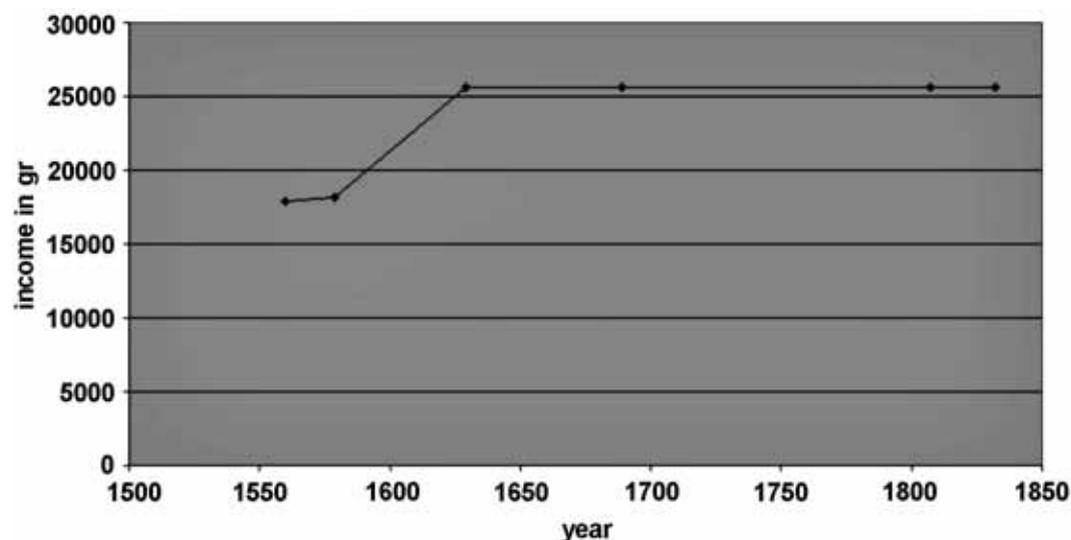
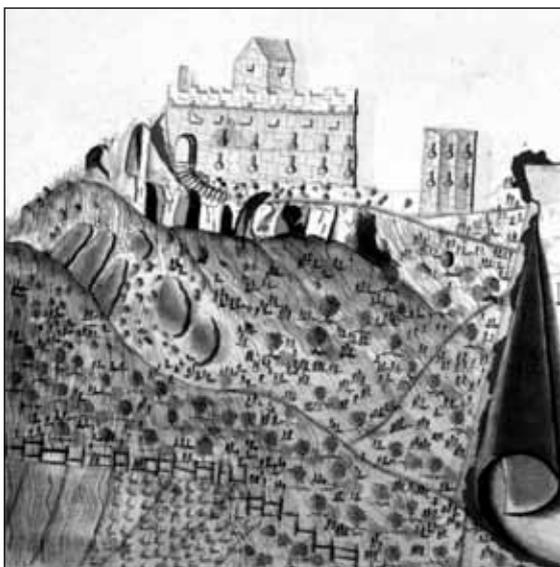


Fig. 5

The coppice-with-standards system as recorded on a map from 1807. Note the bushy coppice stools, the standard trees, the castle of Děvičky and the way the wood and the vineyards are separated by a fence. Indeed, there are no woodbanks at this section of the woodland perimeter.



By this time if not the actual management, but the usage conditions somewhat changed in the Mikulov woods. Some time around 1500 in the majority of the woods the right to cut firewood was leased out to the neighbouring villages and to the town of Mikulov. These woods were called *Gemeindleiten*. The villages paid a set amount of money (called the *Holzgeld* 'wood-money') every year for the use of the underwood. Standard trees in all woods remained in the possession of the overlord, which created endless tension; the overlord wanted to grow more standard trees, which in turn overshadowed the coppice stools compromising regrowth. Successive *urbaria* and other surveys (MZA F18 inv. č. 7637, MZA F18 inv. č. 7616) show that the amount of *Holzgeld* as set before 1560 was raised significantly only once (some time between 1579 and 1629) and after this it remained unchanged until it was finally abolished in the 1840s (Fig. 4). The first time when we can assess how much money the *Holzgeld* meant in relation to firewood prices is the 1680s. A source from 1689 (MZA F18 karton 1235) informs us that firewood in the demesne woodlands (those managed directly by the estate) was sold in a way that the buyer had to cut the wood himself and pay 15 gr. per fathom (German Klafter, the most common measurement of firewood in the Early Modern Period). Late seventeenth-century account books confirm that one fathom of firewood cost ca. 15 gr. This means that the ca. 25,600 gr. of *Holzgeld* paid by the villages each year was equal to 1,707 fathoms of firewood. This figure is higher than contemporary values given for yearly harvests of firewood on demesne woods of the estate (ca. 1,100 fathoms), which covered a somewhat smaller territory than those leased out to the settlements. It appears, then, that at this time the *Holzgeld* was a reasonable substitute for wood-sales. However, as time went by, inflation and changing wood prices made most of the value of the unchangeable *Holzgeld* disappear. Generally speaking, in the Early Modern Period the income from woodlands lost its former economic significance. The proportion of woodland incomes in the overall budget of the Mikulov estate fell from one fourth in the 15th century to a mere 3 % by 1590 (including direct firewood sales and the *Holzgeld*) and stayed at that level in the 17th century (as evidenced by *urbaria*, for references see above).

The 1692 survey clearly indicates that the existence of the *Gemeindleiten* had some bearing on the details of woodland management as well. Those woods that remained in the demesne use of the overlord were often cut as a whole (just like in the Middle Ages), but the *Gemeindleiten* were subdivided into 11–12 compartments, of which one was cut every year. The reason behind this was the constant need for firewood. The overlord had more woodland and therefore could afford to cut larger areas at once, but the villages had a much smaller territory at their disposal, which they had to manage in a way so that it produces the same amount of wood every year.

The most detailed survey ever made about the Mikulov woodlands was carried out in 1807–1808 (MZA F72 karton 1124–1125). This document not only described the boundaries, age and tree composition of each wood-lot but also listed every single standard tree. The coppice cycle in this period in the demesne woods was considerably longer than before, 25–30 years. In the *Gemeindleiten*, however, the cycle remained 11–13 years. There were many thousand standard trees, for example 6,779 in Děvin Wood alone. However, the average value for this wood (33 standards per hectare) was still not particularly high. On one of the accompanying maps of the survey, a little picture (intended as decoration) depicts the coppice-with-standard woods in Děvin Wood under the castle of Děvičky (MZA F18 mapa 27 – Fig. 5).



Fig. 6
Giant lime coppice stool in Děvin Wood with the author and a dog as scale objects. This is all one tree. December 2003. Photo by Radim Hédl.



Fig. 7
Woodbank on the northwestern edge of Děvín Wood. August 2007. The curve of the bank and the ditch is highlighted. The map in the bottom left corner shows the Wood as it stood in 1841/1842. The black dot indicates the position of the woodbank. Note that in the 19th century there was a pasture next to the Wood (hence the woodbank) which has now been overgrown. Photo by the author. Map downloaded from <http://oldmaps.geolab.cz/>. © 2nd Military Survey, Section No. 12, Austrian State Archive/Military Archive, Vienna, © Geoinformatics Laboratory geoinformatiky of the University of J. E. Purkyně, Ústí nad Labem © Ministry of the Environment Ministry of The Czech Republic (Ministerstvo životního prostředí ČR).



Fig. 8
Woodbank in Hodoninská Důbrava, created in the late 1780s. Unlike most woodbanks, this one can be precisely dated. April 2009. Photo by the author.

There are many woodbanks also in Moravia. On the Mikulov estate, woodbanks exist for example in Děvín Wood and Milovice Wood. These woods are not entirely surrounded by banks and ditches but rather those parts that abutted on pastures (Fig. 7). The best example of a datable woodbank is from Hodoninská Důbrava. Here, the woodbank – which is ca. 30 km long! – was created in the late 1780s, when the originally larger wood was subdivided between the overlord and the neighbouring villages (MZA F5 kniha 232 – Fig. 8). Those parts outside the woodbank were given over to common pasture. In many (but not all) places the wood has since expanded and the woodbanks are now within the wood. The research on woodbanks in Moravia has begun only recently, therefore little is known about the details. The woodbank in Hodoninská Důbrava is very straight, which fits into the general development framework of European woodbanks: early (medieval) woodbanks are usually winding, while later ones are straight.

The remains of traditional woodland management in the landscape today

Coppicing has died out in Moravia in two main ways. First, it was strongly opposed to by modern foresters, who usually replaced it with high-forests or plantations. This was a long process that started in the 19th century. Second, in a few woods nature conservation agencies banned coppicing, which was seen as human intervention into 'natural' ecosystems, *ipso facto* harmful. By the mid-20th century, coppicing, which was practiced in the region for at least 650 years and probably much more, was all gone.

With the help of landscape archaeology, however, many still existing features of former coppice woods can be located and studied. The most important of these are giant coppice stools and woodbanks. Large coppice stools are formed by the repeated cutting of shoots for firewood. With every cycle, the new shoots appear on the outside of the stool making it slightly wider. Stools that have been cut dozens of times can grow to immense sizes. The perimeter of these stools is usually broken and some parts rot away, but they are often still recognizable as a single tree. The largest known coppice stool can be found in Gloucestershire in England and is relic of the medieval Silk Wood. It is 15 metres(!) in diameter and reportedly has the same DNA (Rackham 2006, 253). It would be very difficult to tell the age of such a tree but it can be measured in thousands rather than in hundreds of years. Large stools occur in Moravia as well. For example in Děvín Wood lime stools can be up to three metres in diameter (Fig. 6). I would estimate such stools to be around 300 years old, which makes them a living connection with the 1692 survey. Standard trees (especially in woods, where they tend to be cut down) do not live this long, but they can still be interesting archaeologically for two reasons. First, some are in fact former coppice stools. It was a common method to 'single-out' stools by leaving only the straightest shoot to grow into a standard tree thus promoting the formation of high-forests. On the Mikulov estate this method was recommended to the local foresters already in 1672 (MZA F18 inv. č. 7679). Second, in abandoned coppice woods standards were often also abandoned. By counting these standards, the researcher can gain information about their density in the last active coppicing period, which then can be compared to earlier densities such as those shown in this paper.

Woodbanks were created around coppice woods to protect them from grazing animals (Szabó 2010b). The young shoots of trees are very sensitive to browsing. If animals get into coppice woods when the shoots are still tender, they can cause huge devastation. As a result, coppice woods were generally surrounded by ditches and banks, with the ditch always on the outside. Such woodbanks would also stop wheeled access and therefore largely reduce stealing. The earliest firmly datable European woodbanks are from the Middle Ages (Rackham 2006) and many more were made in the Early Modern Period (Szabó 2010b). These woodbanks very often survive and are awaiting investigation in today's landscape. They can be of very different sizes and robustness. Some woodbanks resemble earthwork fortifications with an overall width of up to ten metres, while others are merely visible. This has to do partly with the original structures and partly with erosion. Probably the most challenging task in the research of woodbanks is dating. It is a very rare occasion that a written source describes the construction of a woodbank that still survives. However, a typology for woodbanks can only be set up this way. So far the only country with a workable woodbank typology is England (Rackham 2003).

Conclusions and outlook

Based on the example of the Mikulov estate, it can be argued that traditional woodland management in Moravia was similar to that observed in other Central and Western European countries. When the first detailed sources are available in the 14th century, we already see the fully developed system with very intensive and highly rational coppice management, which produced considerable incomes. Coppicing was important also in the Early Modern Period, although its economic significance was lower. In Moravia, excellent sources (woodland account books) provide detailed information about the fate of individual woods from the 17th century onwards. The Mikulov estate is by no means an exception: for example on the estate of Moravský Krumlov, half-yearly woodland accounts start in 1650 (MZA F177 karton 741). Traditional management was practiced until the 19th–20th centuries, when it was either replaced by the high-forests of modern forestry or banned by nature conservation. At present, woods that still preserve their original coppice structure are typically found in nature reserves. These woods are usually surrounded (at least partly) by banks and ditches, which were originally created to prevent animals and wheeled traffic from entering.

The study of traditional woodland management is especially important, because it is strongly connected to biodiversity conservation. There are many rare birds, beetles as well as thermophilous woodland plants that once flourished in the rapid cycles of light and darkness typical of coppice woods (Konvička – Čížek – Beneš 2004, Hermy – Verheyen 2007). Nowadays, however, neither high-forests nor abandoned coppices provide suitable conditions for them. As a result, in many countries coppicing is being reintroduced into selected woods in order to save these plants and animals. In the Czech Republic, a similar experiment has recently begun in Děvín Wood.

Keywords/klíčová slova

Forestry/lesní hospodářství – Mikulov demesne/panství Mikulov – high Middle Ages/vrcholný středověk.

References

- BILLAMBOZ, A. 2003**
Tree rings and wetland occupation in southwest Germany between 2000 and 500 BC: dendroarchaeology beyond dating in tribute to F. H. Schweingruber, *Tree-Ring Research* 59, 37–49.
- BOHÁČOVÁ, I. – FROLÍK, J. – TOMKOVÁ, K. – ŽEGKLITZ, J. 1988**
Předběžné výsledky výzkumu Pražského hradu v letech 1980–87, *Archaeologia historica* 13, 173–198.
- BRETHOLZ, B. ed. 1930**
Das Urbar der Liechtensteinischen Herrschaften Nikolsburg, Dürnholz, Lundenburg, Falkenstein, Feldsberg, Rabensburg, Mistelbach, Hagenberg und Gnadendorf aus dem Jahre 1414. Reichenberg und Komotau.
- CERMAN, M. – LUFT, R. ed. 2005**
Untertanen, Herrschaft und Staat in Böhmen und im „Alten Reich“: sozialgeschichtliche Studien zur Frühen Neuzeit. München.
- CRONE, A. – MILLS, C. M. 2002**
Seeing the wood and the trees: dendrochronological studies in Scotland, *Antiquity* 76, 788–794.
- GARDNER, A. R. 2002**
Neolithic to Copper Age woodland impacts in northeast Hungary? Evidence from the pollen and sediment chemistry records, *Holocene* 12, 541–553.
- HANECA, K. – VAN ACKER, J. – BEECKMAN, H. 2005**
Growth trends reveal the forest structure during Roman and medieval times in Western Europe: a comparison between archaeological and actual oak ring series (*Quercus robur* and *Quercus petraea*), *Annals of Forest Science* 62, 797–805.
- HERMY, M. – VERHEYEN, K. 2007**
Legacies of the past in the present-day forest biodiversity: a review of past land-use effects on forest plant species composition and diversity, *Ecological Research* 22, 361–371.
- HONC, J. 2000**
Rozpad jednotného lichtenštejnského majetku do linií 1504–1585, *Genealogické a heraldické listy* 20, no. 4, 31–38.
- JOHANN, E. 2008**
Wirtschaftsfaktor Wald. Am Beispiel des österreichischen Alpenraums, *Das Mittelalter* 13, 28–38.
- KALOUSEK, J. ed. 1899**
Archiv český XVII, Praha.
- KEYSER, R. L. 2009**
The transformation of traditional woodland management: commercial sylviculture in medieval Champagne, *French Historical Studies* 32, 353–384.
- KIRBY, K. – WATKINS, C. ed. 1998**
The ecological history of European forests, Wallingford: CABI Publishing.
- KNITTLER, H. 1992**
Grundherrschaftliche Etats um die Mitte des 15. Jahrhunderts. Das Beispiel der Dominien der Familie Puchheim zu Horn-Göllersdorf, *Unsere Heimat. Zeitschrift des Vereins für Landeskunde von Niederösterreich* 63, 5–22.
- KONVIČKA, M. – ČÍZEK, L. – BENEŠ, J. 2004**
Ohrožený hmyz nížinných lesů: ochrana a management, Olomouc: Sagittaria.
- KRYČER, R. 1954**
Mikulovské panství za posledních let kardinála Fr. Dietrichštejna, *Vlastivědný věstník moravský* 9, 110–118.
- MÉRI, I. 1952**
Beszámoló a tiszalök-rázompusztai és türkeve-mórici ásátások eredményeiről. I. (Report on the results of the excavations at Tiszalök-Rázompusztai and Türkeve-Móric: part 1), *Archaeologiai Értesítő* 79, 49–65.
- PETERKEN, G. F. 1981**
Woodland conservation and management. London: Chapman and Hall.
- PÉTREQUIN, P. 1996**
Management of architectural woods and variations in population density in the fourth and third millennia B.C. (Lakes Chalain and Clairvaux, Jura, France), *Journal of Anthropological Archaeology* 15, 1–19.

PUETTMANN, K. J. – COATES, K. D. – MESSIER, C. 2009
A critique of silviculture: managing for complexity, Washington, Covelo and London: Island Press.

RACKHAM, O. 1976
Trees and woodland in the British landscape, London: Dent.

RACKHAM, O. 1979
Neolithic woodland management in the Somerset Levels: Sweet Track I, Somerset Levels Papers 5, 59–61.

RACKHAM, O. 2003
Ancient woodland: its history, vegetation and use in England, 2nd edition, Colvend: Castlepoint Press.

RACKHAM, O. 2006
Woodlands, London: Collins.

ŘEZNÍČEK, J. 1966
Dva mikulovské urbáře z roku 1560, Jižní Morava 1, 7–25.

ŠIMŮNEK, R. 2004
Lesní správa na panství Choustník v polovině 15. století (s edicí rejstříku prodeje dřeva z roku 1447), Táborský archiv 12, 87–150.

SMOUT, T. C. – MACDONALD, A. R. – WATSON, F. 2005
A history of the native woodlands of Scotland, 1500–1920, Edinburgh: Edinburgh University Press.

SZABÓ, P. 2005
Woodland and Forests in medieval Hungary, Oxford: Archaeopress.

SZABÓ, P. 2010a
Driving forces of stability and change in woodland structure: a case-study from the Czech lowlands, Forest Ecology and Management 259, 650–656.

SZABÓ, P. 2010b
Ancient woodland boundaries in Europe, Journal of Historical Geography 36, 205–214.

WARDE, P. 2006
Ecology, economy and state formation in early modern Germany, Cambridge: Cambridge University Press.

Středověké a raně novověké lesní hospodaření na Moravě

Dřevo mělo v tradičních společnostech zásadní význam zejména pro stavební účely a jako palivo, poslední účel byl patrně nejdůležitější. Moderní hospodaření plantážního charakteru trvá asi 200–250 let, předtím se uplatňovaly jiné formy. Nejrozšířenější bylo tzv. výmladkové hospodaření, které využívá schopnosti poraženého stromu obrůstat z pařezy. Praktikovalo se již od neolitu. Zmlazovací cyklus, tzv. obmýti, se ve středověku pohyboval mezi sedmi až deseti lety, později se prodloužil. Mezi obrůstajícími pařezy byly ponechávány solitérní, tzv. výstavkové stromy po dobu několika cyklů pro stavební účely.

Studie se zabývá tradičním lesním hospodařením na panství Mikulov na jižní Moravě. V kombinaci s terénním výzkumem studie danou problematiku zkoumá na základě údajů z dochovaných urbářů a jiných písemných pramenů, z nichž nejstarší byl sepsán již roku 1414. Díky nim víme, že počátkem 15. století zdejší obmýti trvalo sedm let. Starší dřevo již pro palivový účel klesalo v ceně vzhledem k rostoucí obtížnosti při jeho zpracování. Příjmy z palivového dřeva se v rámci urbářů vyskytují na třetím místě.

Jednotlivé lesy byly rozděleny do oddělení, přičemž se každé po sedmi letech zcela vysekal. Solitérní stromy nejsou v urbářích zmiňovány – byly asi káceny bez poplatku pro účely okolních vesnic. Podle detailního pramene pro mikulovské panství byly zmlazovány všechny stromy, ovšem v cyklu o trvání 11–13 let, což odpovídá obecnému evropskému trendu. Některé lesy měly výstavky v průměru jeden na hektar lesa, což ovšem bylo v evropském srovnání málo.

Již kolem r. 1500 byla většina lesů s právem prořizky výmladků pronajata sousedním vesnicím za poplatek (*Holzgeld*), výstavky ale zůstaly v držení vlastníka panství. To vedlo k neustálému napětí. Podíl příjmů za palivové dříví postupem času klesal, r. 1590 dosahoval pouhých 3 % vrchnostenských příjmů.

Podle popisu z let 1808–1809 se obmýti panských lesů prodloužilo na 20–25 let, v případě obecních zůstalo na tradiční délce, značně vzrostl také počet výstavků, až na 33 ha.

Proces zániku výmladkového hospodaření začal v 19. století, v polovině 20. století se již ve sledovaném regionu neprovozovalo. Zasloužilo se o to moderní lesní hospodaření prosazující vysoký les rázu plantáže.

Krajinná archeologie může však dodnes nacházet stopy výmladkových lesů. Lze najít velké pařezy dokládající opakované vyřezávání výmladků; největší takový v anglickém Gloucestershire dosahuje průměru 15 m. V Děvinském lese se setkáme s pařezy o průměru okolo tří metrů, které mohou být zhruba 300 let staré. Kolem výmladkových lesů byly budovány valy s vnějším příkopem, které měly bránit spásání zvířem. Měly význam také proti krádežím, neboť omezovaly vstup vozům. Lze je pozorovat i na jižní Moravě, kde nejdéle z osmdesátých let 18. století dosahuje délky 30 km. Vně příkopů byl terén ponechán k vypásání dobytčím.

Detailní informace o lesním hospodaření na mikulovském panství umožňují rekonstruovat tradiční hospodaření od vrcholného středověku. Tato forma umožňovala zachovat vysoký stupeň biodiverzity s bohatou faunou i termofilní flórou, kvetoucí ve střídavých cyklech světla a tmy. Dnešní lesy srovnatelné podmínky neskýtají, proto na některých místech dochází k obnově výmladkových lesů ve snaze zachovat specifické druhy rostlin a živočichů. Podobný experiment začali v Děvinském lese.

Popisy obrázků

- Obr. 1**
Upálení Jana Husa v Martinické bibli, kolem roku 1434. Palivové dřevo sestává z výmladkových výhonů svázaných do otýpek.
- Obr. 2**
Pařezina s výstavky (střední les), první rok po profízce. Bradfield Woods, Anglie, říjen 2008. Foto autor.
- Obr. 3**
Přijmy mikulovského panství v roce 1414.
- Obr. 4**
Změny v množství Holzgeld. Prameny: 1560, MZA F18 inv. č. 6792, 6793; 1579 – MZA F18, inv. č. 7703; 1629 – urbář, MZA F18, karton 1250; 1689 – MZA F18 inv. č. 7637; 1807 – MZA F18 inv. č. 7616; 1832 – MZA F18 inv. č. 7637.
- Obr. 5**
Pařezina s výstavky (střední les) v mapě z r. 1807. Lze si všimnout výmladkových pařezů, solitérních stromů, hradu Děvičky a plotu oddělujícího les a vinice. V tomto lesním perimetru chybí ochranné příkopy.
- Obr. 6**
Obrovský lipový výmladkový pařez v Děvinském lese s autorem a psem jako měřítky. Vše je jeden strom. Prosinec 2003, foto Radim Hédl.
- Obr. 7**
Lesní příkop v severozápadním rohu Děvinského lesa, srpen 2007. Je vyznačena křivka valu a příkopu. Mapa v dolním levém rohu ukazuje les v letech 1841–1842. Černý bod označuje místo příkopu. V 19. století byla vedle lesa pastvina (proto ten příkop), která je nyní zarostlá. Foto autor, mapa stažena z <http://oldmaps.geolab.cz/>. © Laborator geoinformatiky, Univerzita J. E. Purkyně, Ústí nad Labem © Druhé vojenské mapování, sekce č. 12, Österreichisches Staatsarchiv, Militärarchiv, Wien. © Ministerstvo životního prostředí ČR.
- Obr. 8**
Lesní příkop v Hodonínské Důbravě, vytvořený v pozdních osmdesátých letech 18. století. Na rozdíl od většiny příkopů lze tento přesně datovat. Duben 2009, foto autor.