

**Applicant:** László Ferenczi, PhD

**Project title:** Monastic manors and the landscape impact of Cistercian estate management: A landscape archaeological and historical ecological study on Plasy Abbey

### ***Introduction - state of the art***

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Having spread into many regions of Europe, the medieval Cistercian order formed an impressive network, consisting of around 700 monasteries. Recognizing the importance of the Cistercians and the scale of their activities in shaping medieval landscapes, researchers in the UK and Western Europe have pioneered studies on medieval landscape archaeology and historical topography (see e.g. Aston 1993; Bond 2004; Donkin 1978, Williams 1990; Pressouyre 1994). Despite the significant advancement in this field, the overall environmental impact of the Cistercians remains, however, poorly understood, particularly in regions peripheral to the expansion of Cistercian monasticism, e.g. in the Baltic, or in Central Eastern Europe.

Studying the Cistercians can be of interest for different reasons: 1) From the viewpoint of landscape archaeological research, the better preservation of archaeological features at rural monastic sites should be underlined. Cistercian monasteries were essentially based in rural environments and their lands were often located in agriculturally marginal areas. 2) Their excellence in exploiting natural resources also renders the study of Cistercian landscapes particularly relevant for cultural-natural landscape management. 'Their role in managing water and reclaiming wetlands, reflecting the increasing intensity with which the landscape was exploited during the High Middle Ages, is relatively well known.' (Rippon 2004) 3) In a historical perspective, the Cistercian expansion went parallel to the emergence of urban centers. The monks were creating economic synergies, transforming their rural environment and exploiting various resources, while supplying urban centers. 4) In regard to the history of technology, there is evidence for knowledge transfers between monasteries. The Cistercians implemented innovative agrarian practices and new technologies, see e.g. the problem of woodland clearance and colonization (F.Romhányi 1994), the introduction of the open-field system (Götling 1990), or the use of innovative water technologies (Rynne 1989; Lucas 2010). Regarding this socio-economic context, it has been argued that the Cistercians played a significant role in modernization.

As recent research considers some of these themes as rather problematic (advocated traditionally by church historians, outlining 'grand narratives' of the history of the order), and their critical review has been proposed by many, the task to examine more closely the impact of Cistercian monasticism on historic environments is even more intriguing. Despite the incremental accumulation of historical data – primarily in the form of case studies focusing on individual Cistercian estates –, the main problems in the state-of-the-art remain:

- 1) the uneven availability of (locally available) archival materials to study the economic activities of the monasteries. Ideally, a range of written documents and cartographical sources would be needed to properly reconstruct the activities within a monastic estate), as well as to retrogressively analyze land-use patterns and their changes;
- 2) the lack of systematic, intensive research to gather scientific data for paleoenvironmental reconstructions. A recent, large-scale ERC project on 'the Ecology of Crusading' (<http://www.ecologyofcrusading.com/>) has clearly demonstrated the benefits of multidisciplinary research in this field, collecting archaeological-paleoenvironmental data for the environmental impact of the Teutonic Order during their colonization of the Baltic region.

As regards the Bohemian Cistercian (monastic) estates and the Abbey of Plasy in particular, there have been several case studies and monographs produced. These works primarily discuss historical sources from a topographical perspective, mapping monastic lands (see the works of K. Charvátová, and J. Čechura in the bibliography). The problem of monastic farm complexes and the topography of manorial properties have been of central importance in these studies. In written records, the manorial

farms were typically referred as *predium, curia, grangia*. These were usually large arable lands, but some were also functioning as industrial establishments. They had distinctive (sometimes fortified) building complexes similarly to 'Hausburg'-type sites (Charvátová 1987b). Plasy had about 10 such farms in other locations, including Kaznějov, Sechutice, Čečín, Mladotice, Olšany, Nynice, Hodyně, Lomany, Kopidlo. Importantly, there were also Premonstratensian, Benedictine and other Cistercian examples – see e.g. the Benedictines of Břevnov (Mirešice, Ruzyně, Třebestovice/Trzebostowicz, Bratkovice); of Polička (Martínkovice), of Kladruby (Honezovice); the Premonstratensians of Strahov (Chyně, Mnetěš, Tryskovice), Litomyšl (Tržek) and Teplá (Dolní Kramolín) and the Cistercians of Sedlec (Brežany, Ovčáry, Libenice), Vyšší Brod (Skláře, Hodonice), Zlatá Koruna (Chvalovice), or Zbraslav (Slapy, Břežany, Popovice, Neumětely) (Charvátová 1986, 1993, 2004).

The comparative study of these sites – as a group of archaeological and topographical phenomena dating usually from the 12th-14<sup>th</sup> centuries – is essential for understanding the economic impact of monastic estate management and its differences (adopting to local conditions). The necessity for a comparative research framework has been already underlined by Charvátová and others (Charvátová 1994; Dobosz 1998). From this point of view, it is important to mention that the applicant wrote his PhD thesis on the economic historical and landscape archaeological context of Cistercian management in Hungary, focusing primarily on Hungarian examples, but surveying extensively the English, French and German literature concerning other regions of Central Eastern Europe and beyond. The results already illustrated the characteristic topography of these sites and the different functions of such farms and hinted on very interesting similarities in estate management strategies, despite the different socio-political contexts. However, these investigation did not probe into the environmental conditions, which is, nonetheless, similarly important to consider.

Currently, the applicant is also conducting a project at Charles University (end date: December 2021), looking at charter evidence and topographical data concerning the lands of those monasteries, where systematic collections of medieval charters survived in copybooks, i.e. the Cistercian monasteries of Vyšší Brod (Hohenfurt), Zlatá Koruna (Goldenkron), and Zbraslav (Königsaal). The Premonstratensian house of Hradisko was also selected, whose documents preserved in the archive of the Hungarian Premonstratensian house of Csorna (*Hungarian National Archive, OL DL 286280*; cf. Plánská 2013). Examples – potentially suitable for comparative research – include also monasteries from historical Hungary (Klostermarienbergr, Topuszko, Pilis), which have been studied in the framework of the PhD thesis, as well as from Poland (Lubiąz) and Germany, Brandenburg (Chorin).

Despite the abundance of (mainly historical) studies on Cistercian, or other monastic estates In summary, our knowledge concerning the industrial and agricultural activities of the Cistercians in the Czech lands remains fragmentary (Charvátová 2019), as the scope of the available historical-topographical information is limited. Therefore, landscape archaeological research is instrumental for bringing in new viewpoints and collecting relevant new data. Targeting the estate of Plasy Abbey to carry out a landscape archaeological and historical ecological case study is a feasible research project for multiple reasons: 1) the abbey was economically successful; as the oldest and the most prestigious among the royal Cistercian foundations, it had a considerably large and congruent estate within a radius of 10-15kms around the abbey site (including about 60 townships/settlements, and 11 granges), thus, it is a suitable area for a comparative morphological analysis of field-systems and land-use changes; 2) historical-topographical data have been extensively studied and discussed (mainly by Charvátová 1993; Rožmberský 1999), which allows us to focus on environmental and landscape archaeological data, 3) although some environmental aspects have been addressed, they were presented only in a narrative form, without systematic spatial analysis, which is now made possible by digital tools. Although a very recent project report (Seel 2020) – initiated in the framework of the European Cultural Heritage Year 2018 – discusses both the cultural heritage elements of the landscape

as well as environmental aspects (e.g. soil), and presents a few digital maps, GIS was used merely for visualization purposes, and the data remains a simple inventory with no analytical agenda.

As regards archaeological investigations, only some of the manorial farms of Plasy have been surveyed in the past; the scope of these investigations was limited to surface surveys and basic geodetic research in the vicinity of manorial buildings. The published results do not comply with modern standards (Anderle-Rožmberský-Švábek 1993, Charvátová 1993). Therefore, the present project also proposes to revise previous topographical and archaeological research and carry out more comprehensive investigations.

### ***Main objectives and methodological remarks***

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In sum, the project aims to carry out comprehensive and in-depth analysis of landscape archaeological and environmental phenomena, complementing historical-topographical studies. A single Cistercian estate will be in the focus, and we will be comparatively looking at several manorial sites, where monastic agency was supposedly the most intensive (including farm sites within the estate of Plasy and other sites, which are known to have belonged to other Bohemian houses, as indicated above). The primary goal is to closely examine their physical environments and historic landscape elements, and expand the knowledge base concerning economic activities and environmental changes related to land-use. It is, in a sense, a small-scale historic landscape-characterization project, seeking to understand how local environmental conditions influenced the site selection of monastic farms.

Much like historical ecologists, we will draw on a broad range of sources, integrating them in GIS. From a methodological perspective, it is important to highlight recent advancements in landscape archaeological research, the application of both GIS and non-intrusive techniques – especially the application of magnetometer and LiDAR surveys – since we also intend to use these techniques in the project. GIS is used in landscape characterizations, based on both physical (see especially the European Landscape Character Assessment Initiative (ELCAI) (<https://library.wur.nl/WebQuery/wurpubs/fulltext/1778>) and cultural parameters. In regard to the latter, Historic Landscape Characterization (HLC) was also pioneered in the UK (Fairclough et al. 2018). GIS provides a convenient technical background for not only visualizing, but also analyzing historical and environmental conditions on different scales, scaling up data, and connecting current and historic conditions or patterns, facilitating a long-term view on the landscape. As for landscape archaeological methods and the potentials of Airborne Laser Scanning (ALS), the advantages of this method have been recently demonstrated in the Czech lands in the framework of a 2010-2011 project founded by GAČR (Gojda-John 2013). A combination of methods – including also magnetometer surveys – has been also instrumental at several other sites (Křivánek 2015). It has been emphasized that the identification and mapping of archaeological features within woodlands using LiDAR is the first step towards an improved understanding of woodland landscapes (cf. High Woods, Chichester, UK - Manley 2016).

Introducing these methods, the proposed research expands the traditional approaches of landscape archaeological and historical topographical studies on monastic landscapes (as outlined in the above introduction). Multidisciplinary investigations using GIS to integrate different types of data became more of a standard in recent landscape research. We may refer to this as a “historical ecological” framework, i.e. not as a discipline, or theory (cf. Crumley 2018). This methodology and objective are in line with current trends of research “to re-explore the role of the natural environment in shaping cultural landscapes.” (Holata and Světlík 2015, based on Rippon et al 2014). On the other hand, one should also emphasize the principle that knowing the social and cultural contexts is also relevant when interpreting landscape archaeological, environmental evidence (Svensson-Gardiner 2016). For this reason, monastic estates are ideal for this kind of investigation.

Combining these methodological principles, our project will investigate the character of the physical environment in order to reflect on the socio-economic division of the monastic landscape, namely in regard to its essential segmentation into villages and manorial farms (Gutsherrschaft vs Grundherrschaft), and the different use of the environment as an economic resource. It is also possible to think of these landscapes and the differences as “environmental ramifications of technologies”, since technological differences may result in spatially “distributed” landscapes (Michael 2000). Thus, studying the heterogeneity of the landscape can potentially enlighten the problem of technological differences in farming. (E.g. does the available evidence indicate that Cistercians introduced new techniques of cultivation/exploitation?) Putting this in a chronological perspective – on a local scale, the problem of internal colonization of the estate can be also revised (including the interpretation of grange farms as “green field” or “brown field” investments). Applying a broader comparative framework, involving a group of monasteries “colonizing” this part of Europe, could even highlight significant regional differences in how landscapes were managed, which could underline that agrarian innovations were implemented unevenly or selectively (Svensson – Gardiner 2016).

### **Themes**

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More specifically, the project will explore a few key themes/economic activities/, which have been of central importance in the discussions on Cistercian (monastic) estate management:

(1) the siting of manorial centres and (agricultural) farmlands; the common assumption in the traditional literature is that Cistercians had expert knowledge as land managers; the hypothesis will be tested whether agricultural farms (*curiae, predia, grangia*) were located to capitalize on more favorable soil conditions in comparison to their broader geographical environment, i.e. non-manorial lands

(2) the morphology of fishponds and water management: water management was an essential activity and apparently the most visible (and often very extensive) element of landscape transformations related to Cistercian farms (see Aston 1988, Bond 2004); the morphology and physical geography of fishponds and water systems will be looked at to see how physical conditions (catchment area, soil, relief) influenced their distribution (location) and morphology

(3) the role of woodland economy is usually obscured, however, the common assumption is that Cistercians had a considerable interest in pastoral economy as well as in the industrial use of woodland resources; data concerning changes in woodland cover (during the post-medieval period) complemented with LiDAR data will be used to study the age of woodland zones, the intensity of surface features (LiDAR), areas locations of wood pastures and other potential sites associated with economic activities will be mapped to see if there are different zones, particularly in the vicinity of the farms and in those areas which have been identified by previous research as woodland clearances potentially attributed to the Cistercians.

### **Tasks (data collection)**

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The project will be organized around desk-based analyses (using GIS) (I-III) and fieldwork (IV):

#### (I) documentary sources (medieval, post-medieval)

I.a. municipal and estate boundaries, historic settlement network, place names and land use based on medieval charters and secondary literature (e.g. Charvátová 1993), as well as on the systematic reading of the 18th century chronicle of the abbey (by M. Vogt, *Tilia Plassensis in horto nostro, sive Chronicum Plassense privatum* (1723))

I.b. cadastre data from the *Tereziánský katastr* (1748), published by Chalupa 1966 and 1970, primary data are also digitally available at <http://oldcadasters.com/>; the *Wald Fassion* in the Josephine and Stable cadastres, concerning woodland types and soil suitability indexing

#### (II-III) satellite, LiDAR and cartographical surveys

II.a. present-day woodland cover (CORINE/Copernicus data) (cf: <https://land.copernicus.eu/faq/clc-1>; <https://www.eea.europa.eu/data-and-maps/>)

II.b. historic woodland cover (I-II military surveys, available at mapire.eu)

II.c. available at <https://archivnimapy.cuzk.cz/uazk/pohledy/archiv.html>)

II.d. wood pastures (based on Google Earth imaging, ortophoto data, military surveys)

III.a. the 19<sup>th</sup> century mosaic of agricultural parcels (based on I-II military surveys; cadaster maps vs modern topographic maps; available at <https://geoportal.cuzk.cz>;

<https://archivnimapy.cuzk.cz/uazk/pohledy/archiv.html>)

III.b. medieval field boundaries defined by hedgerows (based on Google Earth imaging, I-II military surveys)

III.c. other (relict) landscape features, currently covered by woodland based on LiDAR data:

<https://geoportal.cuzk.cz>)

#### (IV) archaeological surveys/fieldwork

IV.a. revision of earlier archaeological excavations/surveys, mapping available archaeological site inventories (e.g. concerning the farm at Hodyně)

IV.b fieldwork: ground truthing of LiDAR data, geodetic surveys

IV.c fieldwork: soil data collection/sampling

#### (V) dissemination of research results

In addition to academic conferences and science journal papers, a webpage and facebook/wordpress profiles will be created for the project to inform the broader public about the results, including web based, interactive visualization of data (such as cf. <https://aopkcr.maps.arcgis.com>), using R Markdown for processing statistical data. We will also use this platform to provide a lookout on the policy aspects of our work, explain its relevance for the preservation of cultural and natural landscapes.

#### ***Methods of analysis***

In connection to Task (II), the data collection will rely on the methodology of the Longwood ERC project (Institute of Botany of the Academy in Brno), summarized by Szabó et al. 2018; [http://longwood.cz/?page\\_id=109](http://longwood.cz/?page_id=109)). We will proceed with the analysis by intersecting land-cover data from different periods (3-4 snapshots), which will allow us to produce different categories of polygons (intersections) each representing particular sequences of land-use changes. Based on this, we will be also able to produce a zonation for woodlands, including an inventory of ancient woodlands (AWI) within the area of the whole estate. Woodland cover will be also categorized according to species distribution (apparently responding to both human and natural factors). While our focus remains on the neighborhood of the manorial farms, it should be noted that – as the first step of retrogressive studies –, this spatial reconstruction of land-cover/land-use changes in the post-medieval period (based on mostly cartographical sources – 18<sup>th</sup> – 19<sup>th</sup> c.) serves as a general starting point for more in-depth analysis of agrarian systems, offering the perspective of integrating socio-economic data concerning the history of the estate (cf. Klír 2013)

As regards Task (III), LiDAR DTM 5G data will be used to identify not only the extant elements of the agricultural mosaic, but also relict traces of cultivation – mostly medieval features –, currently covered by the woodland. In addition to deserted medieval villages (DMV) and mining sites, such features typically include various linear features connected to cultivation, i.e. hedgerows, field boundaries, tracks (as noted by Holata and Světlík 2015). We will rely on the methodology and classification used in other regional studies near Plzeň and elsewhere (see Dohnal 2011; Molnárová 2008; Sklenička et al 2009; cf. their NAKI funded project at <https://www.fzp.czu.cz>). We basically follow the analytical steps described by Holata and Světlík 2015, interpolating LiDAR data to DEM, identifying micro-relief

features; carrying out ground truthing and geodetic surveys (Task IV) and comparing the observed results to the LiDAR data.

The role of Task (IV) will be complex: in addition to validating the results of the LiDAR analysis, we will conduct fieldwork in order to produce fresh surface surveys of archaeological phenomena at those sites, which had been previously identified as the centers of manors, where remains of certain structures were clearly visible on the surface. The main goal will be to complement earlier surveys, and comprehensively map landscape features, identified either through the LiDAR survey or with the help of cartographical materials in the vicinity of the farms. This will more promptly delineate monastic farmlands. Finally, it is also important to refresh the archaeological database concerning settlement phenomena prior to Cistercian activities – notably, Charvátová 1993 reported that the evidence is very fragmentary.

In sum, a combination of desk-based and on-site methods will be used in order to identify relict anthropogenic features in the landscape, focusing on the neighborhood of manorial centers. The distribution and density of surface phenomena will be – in itself – informative. We will also use physical environmental data as “explanatory variables” to interpret these patterns, to understand the site selection of manorial sites, to characterize environmental conditions regarding lands in direct management and contrast this to other parts of the estate. Regarding environmental variables, we will follow Holata and Světlík and focus on topographical and hydrological character (calculating slope gradients; reconstructing the potential water catchment areas, calculating topographic wetness indexes) in connection to potential sites/areas of interest. On the other hand, we also look at other factors: the geological, pedological situation of the respective phenomena. In addition to soil maps, we will analyze chemical data from soil samples (cores/test pits). In addition to methods tested and used already by the members of our research team (see publications in Part D1), pedological analysis will probe into Pb and Cs isotope concentration (dating) and soil organic carbon content (Alcántara et al 2017; Houfková et al. 2015). From these results, we expect to have answers concerning the often problematic issue of whether these farms were “green field” or “brown field” investments – whether the history of cultivation predates Cistercian settlement or not?

In regard to soil types, a broader comparative analysis can be also carried out relying on publicly available soil maps (1:25000 / 50 000), exploring the distribution of similar farm sites, and using national scale soil maps, for Germany, see e.g.

[https://www.bgr.bund.de/DE/Themen/Boden/Informationsgrundlagen/Bodenkundliche\\_Karten\\_Datenbanken/BUK200/buek200\\_node.html](https://www.bgr.bund.de/DE/Themen/Boden/Informationsgrundlagen/Bodenkundliche_Karten_Datenbanken/BUK200/buek200_node.html)

In addition to national level data, European databases (resolution: 1km raster) collected by the European Soil Data Centre (ESDAC) can be also exploited. Although such maps are less detailed, the 1km raster fits for large-scale comparative analysis. Derived from a complex of environmental variables (including soil maps) agricultural suitability and land use intensity – as of present – can be also relevant indices to retrospectively characterize the location of monastic manorial farmlands:

<https://www.environmentalgeography.nl/site/data-models/data/agricultural-land-use-intensity-data/> Although such analyses might seem more speculative, it is not without precedents (cf. Andersen et al 2014), and it might be instructive in preparation for proposing more comprehensive environmental investigations, which we envisage in the final phase of our project.

#### ***Project schedule (see also details on project output in Part C2)***

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| M1 | webpage for the publication of project reports for the public, and for data visualization  |
| M2 | internal deadlines for annual reports/publications based on research conducted in the previous years – case studies [see the preliminary selection of journals and titles below the table] |
| M3 | conference papers: [see the preliminary selection of conferences below]  |

- M4 interim workshops (exploratory/project design)
- M5 ERC proposal submission preparations: by the end of the project we expect to set the agenda for a project to be implemented at a European scale in order to more comprehensively assess the environmental strategies of monastic expansion into the Central Eastern European region. The workshops to be organized during the project will be aimed not only to bring together a broader community of local researchers to share their insight and introduce preliminary results, but also to work out the details of scaling up this research to the next level. We envisage scientific cooperation with foreign partners, potentially from Hungary, Romania, Croatia and Poland.

Tasks (team members-see below)	Year1				Year2				Year3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
I.a-b (LF, JK)												
IIa-b-c (LF, MJ)												
IIId (LF)												
IIIa-b-c (LF, MJ)												
IV.a-b-c (LF, MJ, JH)												
V (full, team TBA)	M1	M3	M3		M2	M3	M3		M2	M3	M3	
(full team)	M4			M4				M4				
(full team)									M5	M5	M5	

### ***Institutional and personal background***

The Archaeology Department of Charles University has a long-term interest in settlement- and landscape archaeological studies. It has all the necessary technical tools to conduct fieldwork, i.e. field equipment, processing tools (graphic- and analytic software, i.e. R, R-bridge, (<http://r-arcgis.github.io/>) ArcGIS Pro, AutoCAD; Topcon Tools). Processing of samples will be done in cooperation with other laboratories (Czech University of Life Sciences in Prague, Faculty of Science at Charles University in Prague), eventually professional teams of geodesists and geologists.

#### Team members

**Tomáš Klír**, PhD – archaeologist – scientific advisor, investigator – he is a Docent (associate professor) (2020) at the Department of Archaeology of the Faculty of Arts at Charles University, where he completed his PhD in archaeology; he is going to be responsible for quality assessment, but also actively contributing in the evaluation of field data and publications; -- work capacity: 10%

**Martin Janovský**, PhD student – environmental archaeologist, investigator – he studied archaeology at Charles University under the supervision of dr. Klír. His postgraduate research project (2016-2017) focused on medieval human-environment interactions (Horák et al. 2018; Janovský and Horák in press). He is currently finishing his PhD at the Czech University of Life Sciences under the supervision of prof. Michal Hejcman; he will be responsible for LiDAR, GIS and soil analysis (in cooperation with laboratories), fieldwork and publications; -- work capacity: 50%.

**Jan Horák**, PhD – historical ecologist, archaeologist, investigator – currently working at the Department of Ecology of the Czech University of Life Sciences Prague (CULS); as an expert in soil analysis, he will plan and conduct field research, statistical analyses, contribute to spatial, archaeological and pedological interpretation of the data; -- work capacity: 20%

**Jan Kremer**, PhD student – historian, data archivist – investigator – he is currently finishing his PhD on Premonstratensian monastic network in CEE, under the supervision of Prof. Kateřina Charvátová; working at the Centre for Medieval Studies at the Czech Academy of Sciences; his focusing on monasticism, knowledge transfer and digital humanities; he will assist in database design, archival

data collection, project communication (web management); work capacity: 10% (disclaimer: his responsibilities will not interfere with workload due to his involvement (team member) in the 2019–2021 GAČR project “Sázava - archeology of the Benedictine monastery”.

### ***Innovative aspects of the proposal***

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Archaeological research on rural settlements in the Czech Republic has a notable emphasis on the early medieval period. This is well illustrated by scientific projects focusing on the landscape and settlement archaeology of e.g. Němětice (GA404/98/0055) (1998-2000); Hrdlovka (IAA8002201) (2002-2004); Budeč (GA404/04/0269) (2004-2006), Mikulčice (GAP405/11/2258) (2011-2015); or the royal acropolis at Vyšehrad (GAP405/10/2334) (2010-2015) [source: <https://starfos.tacr.cz>]. This is understandable, given the importance of high-status sites, as well as the lack of documentary evidence concerning the respective period. In our case, however, it has to be stressed that it is particularly the availability of both the archaeological-topographical and the documentary (written, cartographical) evidence that makes this project feasible, as our approach will focus on the geospatial and chronological contexts of settlements and manorial farms, applying a retrogressive analysis of land-use patterns in combination with environmental data.

The proposed study will be the first to carry out integrated and systematic historical and environmental research in connection to Cistercian landscapes in the Czech lands. It will improve our understanding of the environmental impact of 12-13th century monasticism, in a region marginal to Cistercian expansion. We plan to demonstrate that the present day ecological-physical character of the landscape character can be used when interpreting economic activities in the past. The results will advance knowledge on cultural landscapes (with respect to the above described themes) and strengthen the scientific background of policy making/strategy development concerning heritage sites/historic landscapes. Notably, woodlands around Plasy function as protected habitats and partly as NATURE 2000 reserves (cf. <https://aopkcr.maps.arcgis.com>), while other monastic landscapes have been nominated as UNESCO WH sites, or Biosphere Reserves. Upon successful completion of the project, an ERC proposal is planned, including more intensive environmental data collection, landscape archaeological surveys, as well as archival research to map out also the “social landscapes” of monastic communities.

### ***References***

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- Alcántara et al. 2017: Alcántara, V. and Dona, A., Well R., Nieder, R. “Legacy of medieval ridge and furrow cultivation on soil organic carbon distribution and stocks in forests.” *Catena* 154 (2017): 85-94.
- Anderle – Rožmberský – Švábek 1993: Anderle, J., Rožmberský, P., Švábek, V., *Výsledky povrchového průzkumu cisterciáckých dvorů na Plzeňsku*. *Castellologica bohemica*: 261-270.
- Andersen et al. 2014: Andersen, T.B. – Sandholt, P.S. – Skovsgaard, C.V.: *The Heavy Plough and the Agricultural Revolution in Medieval Europe*. internet publication available at: [http://www.ehes.org/EHES\\_70.pdf](http://www.ehes.org/EHES_70.pdf)
- Aston 1993: Aston, M. *Monasteries. Know the Landscape*. London: Batsford, 1993.
- Bond 2004: Bond, C. J. *Monastic Landscapes*. Stroud: Tempus, 2004.
- Čechura 1984: Čechura, J. *Liber antiquus kláštera v Plasech z let 1339–1441 – Der ‚Liber antiquus‘ des Klosters Plass aus den Jahren 1339–1441*, *Časopis Národního muzea v Praze, Řada historická* 153 (1984): 166–179.
- Čechura 1988: Čechura, J. *Dvě studie k sociálně ekonomickému vývoji klášterního velkostatku v předhusitských Čechách – Zwei Studien zur sozialökonomischen Entwicklung des Klostergrundbesitzes im vorhussitischen Böhmen*, *Sborník Národního Muzea v Praze, řada A – Historie* 42 (1988): 1–72.
- Čechura 1994: Čechura, J. *Die Struktur der Grundherrschaften im mittelalterlichen Böhmen unter besonderer Berücksichtigung der Klosterherrschaften (Quellen und Forschungen zur Agrargeschichte, 39)*. Stuttgart: Gustav Fischer, 1994.



- Chalupa 1966: Chalupa, A. et al.: Tereziánský katastr český - Theresianischer Kataster Bohmens - Le cadastre theresien de la Boheme, vol. 2. Praha, 1966
- Chalupa 1970: Chalupa, A. et al.1970: Tereziánský katastr český - Theresianischer Kataster Bohmens - Le cadastre theresien de la Boheme, vol 3. Praha.
- Charvátová 1986: Charvátová, K. "Vztah dvorů k vesnickému osídlení na panstvích cisterckých klášterů v Čechách" [Die Beziehungen der Meierhöfe zur ländlichen Besiedlung auf den Herrschaften der Zisterzienserklöster in Böhmen]. *Archaeologia historica* 11 (1986): 461–467.
- Charvátová 1987a: Charvátová, K. "Le modèle économique cistercien et son application pratique en Bohême." *Cahiers de civilisation médiévale* 30 (1987): 65-70.
- Charvátová 1987b: Charvátová, K. "Hospodářské dvory klášterů ve světle písemných pramenů ve světle písemných pramenů. Ke stavební podobě dvorů řádů benediktinského, premonstrátského a cisterckého." [Wirtschaftshöfe der Klöster im Lichte Schriftquellen (Zur Bauform der Höfe des Benediktiner-, Prämonstratenser- und Zisterzienserordens in Böhmen)]. *Archaeologia historica* 12 (1987): 287–299.
- Charvátová 1993: Charvátová, K. "Settlement patterns within the domain of Plasy abbey, Bohemia 1100–1400 a.d." *Památky archeologické* 84 (1993): 120–147.
- Charvátová 1994: Charvátová, K. "Mindful of Reality, faithful to traditions. Development of Bohemian possessions of the Cistercian Order from the twelfth to the thirteenth Centuries." In *L'Espace cistercien*. Paris: CTHS 1994, 355–375.
- Charvátová 2004: Charvátová, K. "Early Cistercian Economy in Bohemia (c. 1150-1300): The mysterious affair of the granges." *Questiones medii aevi novae* (2004): 283–296.
- Charvátová 2019: Charvátová, K. "The mining and metallurgical activities of the Cistercians of the medieval kingdom of Bohemia." In: *L'industrie cistercienne (XIIe-XXIe siècle)*. Eds. Benoit, P., Baudin, A., Rouillard, J. Troyes: Somogyi, 2019: 147-156.
- Comet 1997: Comet, G. "Technology and Agricultural Expansion in the Middle Ages: The Example of France North of the Loire." In Langdon, J., Astill, G., and Myrdal, J. (eds). 'Medieval Farming and Technology', Leiden, Netherlands: Brill, 1997.
- Crumley 2018: Crumley, C. (ed), *Issues and Concepts in Historical Ecology. The Past and Future of Landscapes and Regions*. Cambridge: Cambridge U.P., 2018.
- Dobosz 1998: Dobosz, J. "Die Kleinpolnischen Zisterzienser - ihr Platz in Wirtschaft und Kultur Polens im 13. Jahrhundert. (Cistercians in Little Poland. Their Role in the Thirteenth Century Economy and Culture)" In: Knefelkamp, Ulrich.(ed.) *Zisterzienser. Norm, Kultur, reform 900 Jahre Zisterzienser*. Berlin: Springer, 1998. 127-136.
- Dohnal 2011: Dohnal, M. "Středověké plužiny Velké Británie a jejich význam pro poznání zemědělského vývoje v Českých zemích." *Český lid* Vol. 98, No. 4 (2011): 337-357.
- Donkin 1978: Donkin, R. A., *The Cistercians. Studies in the geography of medieval England and Wales*. Toronto: Pontifical Institute of Medieval Studies, 1978.
- F. Romhányi 1994: F. Romhányi, B. "The role of the Cistercians in medieval Hungary: political activity or internal colonization?," *Annual of medieval studies at Central European University Budapest* (1993/94): 180–204.
- Fairclough et al 2018: Fairclough, G. and Herlin, I.S. , Swanwick, C.: *Routledge Handbook of Landscape Character Assessment Current Approaches to Characterisation and Assessment*. London: Routledge, 2018.
- Faltýnová and Pavelka 2013: Faltýnová, M and K. Pavelka "Relics of mining activities in West Bohemia - mapping by airborne laser scanning." In: *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Volume XL-5/W2, 2013, 261-263.
- Götlind 1990: Götlind, A. *The Messengers of Medieval Technology? Cistercians and Technology in Medieval Scandinavia*. Stockholm: Viktoria bokförlag, 1990; See also the review by E. Christiansen in *The English Historical Review* 109 (1994): 411.

- Holata and Světlík 2015: Holata, L. and R. Světlík, "Detailed digital terrain models in the research of deserted settlement: hydrological modelling and environment of settlement areas." In: Ružičková, K. – Inspektor, T.: Surface Models for Geoscience. Springer: NY, 2015. 113-124.
- Houfková et al. 2015: Houfková, P., Bumerl, J., Pospíšil, L., Karlík, P., Beneš, J., Bernardová, A., Hrabalíková, M., Molnárová, K., Hejcman, M.: "Origin and development of long-strip field patterns: A case study of an abandoned medieval village in the Czech Republic." *Catena* 135 (2015): 83-91.
- Klír 2013: Klír, T. "Agrarsysteme des vorindustriellen Dorfes. Zur Interpretation mittelalterlicher Ortswüstungen im Niederungs- und Mittelgebirgsmilieu," In: Theune, C. et al. (Hrsg.), Stadt – Land – Burg. Festschrift für Sabine Felgenhauer-Schmiedt zum 70. Geburtstag. (= Internationale Archäologie, Studia honoraria 34), Leidorf, 139-157.
- Lucas 2010: Lucas, A. "Narratives of Technological Revolution in the Middle Ages", in A. Classen (eds.) *Handbook of Medieval Studies: Terms, Methods and Trends*. Berlin: De Gruyter, 2010, 967–990.
- Manley 2016: Manley, J. (ed.), *Secrets of the High Woods. Revealing hidden landscapes*. London: South Downs National Park Authority, 2016.
- Michael 2000: Michael, M.: *Reconnecting culture technology and nature?* Taylor and Francis
- Molnárová 2008: Molnárová, K. "Hedgerow-defined medieval field patterns in the Czech Republic and their conservation – a literature review." *Journal of Landscape Studies* 1 (2008), 27 – 47.
- Plánská 2013: Plánská, P. *Liber monasterii Gradicensis klášterního archivu Csorna (Edice listin z let 1283 – 1310)*  
[https://is.muni.cz/th/361218/ff\\_b/Bakalarska\\_prace.pdf?fbclid=IwAR0muAIBA36FDI35PMV\\_1SSAC7WKpHml2HTqll8nGDdKws3xJBlyFIMyPXo](https://is.muni.cz/th/361218/ff_b/Bakalarska_prace.pdf?fbclid=IwAR0muAIBA36FDI35PMV_1SSAC7WKpHml2HTqll8nGDdKws3xJBlyFIMyPXo)
- Pressouyre 1994: Pressouyre, Léon (ed.), *L'espace cistercien*. Paris: Comité des travaux historiques et scientifiques, 1994.
- Rippon 2004: Rippon, S. "Making the Most of a Bad Situation? Glastonbury Abbey, Meare, and the Medieval Exploitation of Wetland Resources in the Somerset Levels," *Medieval Archaeology* 48 (2004): 91–130.
- Rippon et al 2014: Rippon S., A. Wainwright, and C. Smart, "Farming regions in medieval England: the archaeobotanical and zooarchaeological evidence", *Medieval Archaeology* 58 (2014): 195–255.
- Rožmberský 1999: Rožmberský, P.: *Dvory plaských cisterciáků. (The grange courts of the Plasy Cistercians) Zapomenuté hrady, tvrze a místa 21. Plzeň, 1999.*
- Rynne 1989: Rynne, C. "The Introduction of the Vertical Water-mill into Ireland: Some Recent Archaeological Evidence", *Medieval Archaeology* 33 (1989): 21–31.
- Seel 2018: Seel, E., "Vielfalt in der Einheit - Zisterziensische Klosterlandschaften in Mitteleuropa" *Klosterlandschaft Plasy*. Internet publication, available at: [file:///C:/Users/36304/Desktop/Prague/cistercscapes.eu/Plasy\\_KLI\\_Bericht.pdf](file:///C:/Users/36304/Desktop/Prague/cistercscapes.eu/Plasy_KLI_Bericht.pdf)
- Sklenicka et al 2009: Sklenicka, P. and K. Molnarova, E. Brabec, P. Kumble, B. Pittnerova, K. Pixova, M. Salek: *Remnants of medieval field patterns in the Czech Republic: Analysis of driving forces behind their disappearance with special attention to the role of hedgerows. Agriculture, Ecosystems and Environment* 129 (2009) 465–473.
- Svensson – Gardiner 2016: Svensson, E. and Gardiner, M.: "Agrarian technology in the medieval landscape – an introduction" In *Agrartechnik in mittelalterlichen Landschaften Technologie agraire dans le paysage medieval. Ruralia X 9th–15th September 2013 Smolenice Castle Slovakia. The Jean-Marie Pesez conferences on medieval rural archaeology.*, Turnhout: Brepols 2016. pp. XIII–XVIII.
- Szabó et al. 2018: Szabó, P. Suchánková, S., Křížová, L. Kotačka, M., Kvardová, M., Macek, M., Müllerová, J. & Brázdil, R., "More than trees: The challenges of creating a geodatabase to capture the complexity of forest history," *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, DOI: 10.1080/01615440.2018.1444523
- Williams 1990: Williams, D. H., *Atlas of Cistercian Lands in Wales*. Cardiff: University of Wales Press, 1990.