

University of Vienna

ERC STG Project “Sustained Concerns: Administration of Mineral Resource Extraction in Central Europe, 1550-1850” (SCARCE)

A Project on Early Modern Resources

The extraction of mineral resources has sharply increased over the past hundred years, and the ongoing transition to “green energy” is driving demand for minerals such as lithium, nickel, and cobalt. SCARCE provides a critical history of today's stakeholder conflicts by showing how contradictory principles of resource management – economic development, sustainability, and technological innovation – were forged in proto-industrial settings. It explores alternative, historical ways of provisioning for communities, making them available for current debates on environmental degradation and climate emergency.

SCARCE will analyse thousands of archival documents about mining in proto-industrial (East) Central Europe, using automated text recognition and a new method based on historical epistemology. Mining is high-stakes case that sits squarely at the intersection of debates in the history of science and technology, social and economic history, and environmental history. In Central Europe, the sector entered a crisis around 1550, prompting the rise of specialized bureaucracies staffed with skilled scientists and expert workers. This provided a rare socio-economic niche in which theoretical and practical knowledge interacted and merged. Through collaborations, SCARCE will establish how Central Europe compared with Iberian America, West Africa, and East Asia, and explore how metal-mining regions across the early modern world were increasingly entangled through trade and colonial extraction.

This case, within its European and global entanglements, allows us to answer urgent questions across a range of fields: How did labour rationalization and joint ownership – building blocks of modern capitalism – emerge in locations outside of Atlantic commercial societies? How did administrative procedures (accounting, reporting) shape scientists/technicians' understanding of natural processes? And how did the contradictions of extracting non-renewable resources shape modern sustainability thinking?

We are recruiting! You'll soon find the job ads on the University's Recruiting Tool.

- 1 Postdoc (100%, up to 4 years)
- 2 PhD (75%, 4 years)
- 2 Student assistants (50%, up to 4 years)

SCARCE is hosted by the [History Department](#), which in turn is part of the [Faculty of Historical and Cultural Studies](#). Team members will work closely with colleagues from the [Key Research Area History of Science](#).

The advisory board consists of Pamela Smith (Columbia University), Oscar Gelderblom (University of Antwerp), Ulinka Rublack (University of Cambridge), and Andrew Mendelsohn (Queen Mary University London).

The text of this homepage is adapted from the grant proposal and serves to inform collaborators and prospective team members about our objectives, approach, and structure. Download the project homepage as a PDF document [here](#).

Contact: PI Sebastian Felten, sebastian.felten@univie.ac.at



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Aim

Early modern mining was often a drama in three acts: I. Ores are Discovered, II. Communities Flourish, III. The Mines Collapse. Across Central Europe, the third act was suspended as expert administrators, working for emerging territorial states, found ways of postponing the collapse of mines. They managed to maintain them over centuries – despite low profits, a chronic lack of investment, and wavering political support.

Understanding why and how early modern experts prolonged the lifespan of mines has great potential to push forward debates in economic history, environmental history, and the history of science and technology. The rough outline of this story is known through specialist work in mining history, but new questions and detailed interdisciplinary research are needed to understand its broader implications. With fresh archival material, SCARCE will make interventions that are relevant far beyond the area and period of investigation. The principal aim is to develop the history of resource management as an innovative field at the intersection of history of science and technology, social and economic history, and environmental history. Central European metal mining serves as a high-stakes case to prove the viability of such an history. Specifically, we will

- show how an industry managed by state officials shaped two important building blocks of modern economies: the rationalisation of labour, and the accumulation of capital. State-run mines and refineries were laboratories for both; a fact which has been overlooked in existing accounts of capitalist development.
- transform our understanding of innovation in proto-industrial settings. State-run mines and refineries established new ways of knowing nature through geology, chemistry, and engineering. SCARCE will show how administrative procedures (accounting, reporting) shaped scientists/technicians' understanding of natural processes.
- develop a new genealogy for modern sustainability. By shifting the focus from managing forests and fields to the contradictions of extracting non-renewable resources, SCARCE shows that modern technologies and arguments for resource management emerged in a polyphonic early modern debate about the costs and benefits of mining.

To achieve these aims, four researchers (1 PI, 1 Postdoc, 2 PhD) will analyse thousands of archival documents from across Central Europe. The resulting histories of resource management will give us tools to better understand long-term consequences of policy decisions. SCARCE will sharpen our sense of when risks are tamed, and when they are externalised; when harm is prevented, and when it is merely moved out of sight.

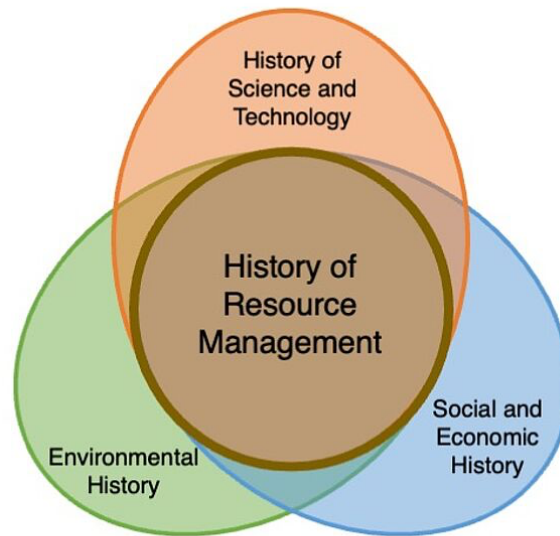


Figure 1 : SCARCE at the intersection of three fields

Case

Central Europe is an ideal case for this investigation. It has a long tradition of state-managed mining which resulted in an excellent archival record. Central Europe is a complex historiographical term; here it refers pragmatically to territories between the Baltic and the Mediterranean Sea. This includes, among others, the Carpathians, the Ore Mountains, the eastern Alps, and the Harz. In this region, mining flourished around 1500 when rich silver deposits were exploited to meet a soaring global demand. By 1550 it was in decline as the best ores were exhausted, and competition from Spanish American mines stiffened. Nascent territorial states across Central Europe began to maintain mines when many of them suffered and perished. They were inclined to do so as mining-related income (taxes, rents, sales) made monarchs more independent from parliamentary control and supplied funds for military campaigns. A legal framework based on princely rights to mineral resources, similar across the region, allowed state officials to assume active management roles. An emerging cadre of technical expert-administrators included: managers and foremen who organized the everyday allocation of labour; technical experts (e.g. mechanics) and office clerks who maintained and expanded regional infrastructure; and legally-trained councillors who reported to the monarch. This process occurred most notably in the territories of Habsburg Lower Hungary, Saxony, and Brunswick, but not, until around 1800, in Prussia.

Central Europe's internal diversity enables SCARCE to make fine-grained comparisons with mining regions across the early modern world. Globally, it was not unusual for states to be concerned with mining as metallic resources were often considered the ruler's prerogative. Notably in Spain/Spanish America, Tokugawa Japan, Qing China, and the West African Asante empire, state officials were concerned with the management of mineral resources, often by granting concessions and collecting taxes. The value of placing Central Europe in a comparative framework

is enhanced by the fact that early modern mining regions were increasingly entangled through movements of books and manuscripts, displaced workers and travelling experts. Integrated payment systems for trade and colonial extraction relying largely, if not exclusively, on silver/gold currencies emerged as a global matrix for the management of metallic resources in the early modern period.

Approach

SCARCE will put special emphasis on administrative writing as a rich and polyphonic genre that speaks to all issues equally. Reports were written by administrators at all levels of the hierarchy. They often describe a situation from multiple angles, and use maps, diagrams, and accounting to make their arguments more persuasive. They tend to integrate knowledge of different origins (scholarly, artisanal, archival, personal) and usually have a clear practical aim. They contain information about the views of investors and workers. Several thousands of these reports are available in public archives that today house the paperwork of historical mining administrations, including those in Banská Štiavnica (Slovakia), Prague (Czech Republic), Freiberg, Dresden, Clausthal-Zellerfeld (Germany), Vienna, and Innsbruck (Austria). The selection of archives will be based on the requirements of the individual projects. Each investigator will use additional materials to answer their individual research questions. This may include, for example, investors' family papers and notarial archives, lore recorded in the 19th century, as well as material culture that is preserved and catalogued in museums and local history collections.

To ensure comparable results, we work with a shared methodical framework based on historical epistemology. The fundamental method is hermeneutical: we will read texts, visuals and objects in order to reconstruct the meaning that historical actors would have drawn from them. We will study offices and on-site inspections as epistemic settings for governance, just as laboratories and field work that are settings for science (= history of bureaucratic knowledge). We will continue to work on a shared method as we carry out the different research projects.

To structure the area of investigation, SCARCE will combine methods of microhistory and global history. Mining administrations were more or less powerful vis-à-vis investors, depending on the territory. The selection of cases will be guided by the institutional framework that they represent. This will allow us to compare Central European territories to other important early modern metal mining regions in Iberian America, West Africa, and East Asia.

To divide the task into manageable research projects, SCARCE will focus on four interlocking processes that sustained mining in Central Europe: pooling capital, scaling plans, reproducing labour, and managing health and pollution (see Themes). Historiographically, each topic is placed at a different intersection between history of science and technology, social and economic history, and environmental history. This allows SCARCE to integrate debates across these fields. Conceptually, this four-pronged approach explores an intersection of labour, capital, and scale: A survival strategy of Central European state-managed mining was to increase the scale of planning and investment, which created tensions with the rhythms and exigencies of labouring bodies not unlike to those in modern manufacturing. A fifth project, led by the PI, contextualises Central European state-managed mining as it establishes

comparisons and entanglements of Central Europe with other mining regions of the early modern world.

To enhance our ability to process manuscript materials quickly, SCARCE will transcribe and annotate administrative reports using Transkribus (<https://readcoop.eu/>). This tool's core capability is optical character recognition (OCR) that automatically transcribes historical handwriting into digital text. It has proved promising for files of the Swedish Bureau of Mines. For selected documents, we will use Transkribus' annotation function to mark up places and persons. This data will then be exported into a custom-built relational database which will allow us to keep track of historical actors as we work our way through a lot of administrative paperwork.

Research themes

A note for potential candidates for the research positions: Please develop a project proposal that reflects your own interests and expertise. Be specific about the locations (in Central Europe broadly construed, within its European and global entanglements) and the sources (archival, printed, objects) you like to work on. The following descriptions are model projects which, together, would realize SCARCE's overall objectives. Your own project may build on them and/or combine their themes. If you are unsure if the project that you want to propose would fit the overall framework, feel free to contact the PI for an informal meeting.

Pooling capital

Mining often prompted actors to pool capital in joint-ownership arrangements. In Central Europe, this was done predominantly through public institutions provided by emerging states. This research project seeks to answer the question of how capital was accumulated and managed in Central European mining. This question cannot be answered with available research on investors and their portfolios, which is especially sparse for the period after the 16th-century boom period. This is not for a lack of sources, as tax lists and ownership records tend to be better preserved from 1600 onwards than for the period before. A promising research avenue is to complement a quantitative approach with the microhistorical analysis of salient individuals and families, tracing their strategies through personal papers. Collecting and analysing this data can reveal where capital originated, how much dividend was returned, and how investors' commitment reacted to cameralist policies of 'sustainable' mining, i.e. administrators' attempts to retain profit for reinvestment in the mines. This project will result in a fuller history of early modern capitalism by shedding light on private-public interactions in Central Europe. It is an unexplored question whether and to what extent investors in Central European mines knew, and were able to comprehend, the practical-technical and increasingly scientific basis for managerial decisions. To what extent did Central European mining after 1550 depend on 'savant entrepreneurs' who had enough technical knowledge to endorse innovation, and not 'vote with their feet' by stopping their contribution payments?

Relevant fields/expertise: social history, economic history, financial history, legal history, history of science, history of technology

Scaling plans

This project complements “Pooling capital” by investigating concepts and paper tools that allowed administrators and investors to make decision on increasingly larger scales. It will analyse how time (and space) was organised for extraction in Central European mining. Salient forms of long-term and large-scale planning emerged in the context of resource extraction that underpinned political power, such as tax offices, chartered trading companies, and forests supplying timber for navies. As local representatives of their princes’ sovereign power, mining administrations built and maintained large technical systems of mines, adits, hammer-works, refineries, forests, lakes, canals, and granaries. As in other contexts of resource extraction, mining administrators surveyed and mapped these systems, made accounts, and kept good archives. The analysis of administrative reports can usefully be combined with the analysis of historiographical practices of the period, and astrological works that relate to mining. This project will result in a fuller history of modern sustainability by putting the focus on long-term thinking in the extraction of non-renewable resources. Which scholarly and vernacular concepts and new data practices were used to lift the temporal horizon of decision-making? Time-making practices seem to have fed into the rationality specific to Central European ‘sustainable’ mining: that even unprofitable mines should be preserved for the common good. The circulation of time-making practices across religion, astrology, history, and geology may explain why administrators argued for sustaining mining, even when this was questionable in financial terms.

Relevant fields/expertise: history of science, history of technology, environmental history, history of the humanities, history of economic thought

Reproducing labour

Labour in mines and refineries was harmful and hazardous, and governments took measures to retain workers in the mines. They offered wage guarantees, tax reductions, and exemptions from military service throughout the period, valorising mining labour in contradistinction to farming and artisanal work. Workers, in turn, defended these privileges through petition and revolt. This project asks how labour was preserved and reproduced in Central European mining, which would break new ground in two ways. First, analyzing the paper tools of administrations would establish whether the rationalisations of state administrations built on, or differed from, those of private entrepreneurs. Second, it would take a more holistic approach than is usual by embedding waged productive labour in the context of reproductive labour in households, families, and kin groups, especially that performed by women. Men worked at prominent steps in the production, such as mining and refining, while women were relegated to auxiliary and reproductive labour such as washing ores, housekeeping, home manufacture, and subsistence farming. Mining administrators sought to attract workers through colonisation and migration but also took measures to increase the local workforce through child-bearing and -rearing. In what ways, then, did mining administrations shape and reinforce gender roles? A promising avenue for tackling these questions would be to analyse relevant regulations in mining law and administrative reports. Seeing these discourses, norms, and regulations in action requires analyzing them alongside visual and material culture (including working tools) that is accessible through library, museum, and archival collection.

Relevant fields/expertise: social history, gender history, cultural history, history of science, history of technology

Managing health and pollution

Mining made soils infertile, its effluents killed fish, trees and livestock, and workers were exposed to disease and accidents. This research project seeks to establish how workers' health and pollution was managed in Central European mining, using a two-pronged approach. It would, on the one hand, investigate medical professionals in the context of administrative concerns about preserving the labour power of mine and refinery workers. Approaching mines as a medical trading zone would establish whether administrations provided a matrix for creating, compiling, and applying work-related medical knowledge. This project would thus help explain how occupational and environmental medicine emerged from concerns about labour and health. On the other hand, it would embed the work-place for wage-earning male labourers in a context of waged and non-waged reproductive labour in urban and rural households (as "Rationalising Labour"). The household has been established as a site of medical practice and experimentation, highlighting the role of women in preserving the health of their dependants. Combining the perspectives of households and the mining administration will bring into contrast stakeholder conflicts around the pollution of the air, soil, and water. Relevant sources include administrative reports about the (lack of) safety in mines and refineries and measures planned and implemented; physicians' expert opinions and paperwork documenting their medical practice; the papers of miners' associations dispensing medical aid and insurance; medical treatises in print and manuscript; mining lore and material culture as it is preserved in museum and library collections.

Relevant fields/expertise: history of medicine, environmental history, gender history, history of science, history of technology

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