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Preface

Today, raw materials have become a major factor of global importance and play a significant role in international policy. The raw material markets of today are indisputably a driving force of the world's economy, but this has a long development. Acquisition and supply of raw materials dominate the agenda of modern states, confederations and coalitions. We constantly encounter the effects in our everyday-life, and we cannot escape the products of the modern raw material economy as well as the ongoing cycle of production and consumption. This situation has its negative but also positive consequences for us.

Discussions on the restricted access to rare resources is not only an issue of academic circles and the feuilletons of newspapers, they have become common in all parts of modern societies. The production of crude oil must end one day and we daily observe the growing demand for noble metals, rare earth elements or building materials. The world market and its volatile trading conditions and price fluctuations led to enormous price increases that has its consequences for our natural and cultural heritage. The destruction of the oldest gold mine of humankind, discovered in Georgia in the mountains of the Lesser Caucasus, is one of the sad results of such a sharp rise in price, or "*hausse*", and the financial voracity of the owners and shareholders.

Now mining exploitation is able to manage and work at larger depths and in more difficult deposits than ever before. At Chucquicamata, one of the largest copper mines in the world, the craterlike opencast has been expanded to 4.3 kilometers in length and a depth of more than 1000 meters. With the help of modern techniques, humans are able to exploit the poorest of ores and deposits in a profitable way.

When considering the history of raw-material exploitation through historical and archaeological perspectives, it can be described also as a development of better extraction methods and the usage of ever decreasing grades of ores and raw material sources. What is exploited nowadays was not profitable more than 100 years ago! During antiquity and prehistoric times, humans only used the best and richest parts of deposits, especially when considering metal ores. Such comparisons allow us to recognize the history of raw material exploitation also as a history of an ongoing technical evolution that enabled the usage of remote and more complicated as well as new kinds of raw materials.

Yet, it would be one-sided to describe such a development *simply* as a continuous technical evolution. Such would resemble the thinking of the 18th and 19th

century, when Christian Jürgensen Thomsen (1788–1865) divided the early history of humankind into the ages of Stone, Bronze and Iron. Ideas such as these have imprinted our concepts, and still today we search for such material determinants within the discussions on early societies and cultural conditions. However, archaeologists have realized for a long time that such an angle of observation is inadequate and restricting: The material culture of ancient civilizations was based in varying degrees on their traditional heritage, which informed the use of materials and raw materials, but this was a complex, manifold and multifocal relationship.

Additionally, there is another aspect that hinders our perspectives in regard of raw materials in ancient societies: It is our own increasing distance to resources, both the regenerative and the non-renewable. This alienation seems to have evolved at a time when people realized the finite nature of many of their resources. We only can awaken our consciousness indirectly either by literary sources or by understanding historically the systems of shortage and surplus of raw materials. On the other hand, we observe a lack of consciousness in concern to the finiteness of resources in traditional societies. In some cases, their interaction with resources seems more integrated and holistic, which reflects a special relation to an animated or spiritually conceptualized nature. Resources are integrated and religiously embedded and thus part of a total system that ties humans with their own living environment. However, such relations are not necessarily harmonious and are not without conflict.

When describing a long-term change in our relation to raw materials, we have to accept that this relationship was complex at all times. There always were changes in exploitation modes, in producing objects and their trading and consumption. The role of societies to such processes has changed likewise and by this change such processes had an impact on cultures and conceptions of human beings. Therefore, it is important to investigate these relationships, and it is self-evident that not only technical aspects have to be discussed. It is an essential part of those questions to observe and consider the economic, cognitive and societal interplays over longer time periods. And this was and is one of the basic impetuses of the Bochum Graduate School "Raw materials, Innovation, Technology of Ancient Cultures" (Rohstoffe, Innovation, Technologie alter Kulturen) (RITaK) that was founded in 2011, after the Leibniz Association has granted three years of program funding in November 2010.

From the beginning onwards the Leibniz Graduate School RITaK has been focused on three essential aspects to be explored and discussed by the single empirical and methodological projects.

1. Technical knowledge was transferred between different societies through communication and interaction and by help of knowledgeable individuals, which induced the adoption of new raw material concepts (from production to consumption). Which pattern of implementation and mechanisms can be observed that were linked to the exploitation and exchange such goods and technological innovations?
2. Materials and objects saw various changes in the attribution of specific cultural, societal and economical values over time. Objects and materials can be regarded also as media/mediators of social representations and social constructions that amplified their role beyond a daily and ostentatious practicality. The social aspects and cognition behind the use of materials are to be explored.
3. The economical and societal factors that surround raw materials, such as applicability, efficiency and cultural practicality, that helped technologies and raw materials to be broadly introduced and accepted are to be explored.

The factors that were decisive during periods of change can only be investigated through a broader interdisciplinary framework in which archaeological, archaeometric and historical sources are investigated in unison.

This was one of our general aims of the Leibniz Graduate School RITaK. Eight PhD students as well as several associated colleagues participated in RITaK between June 2011 and the autumn of 2014. They came from various disciplines of the humanities and natural sciences. Most of them came as archaeologists, some as scientists and some as historians. All of the students were trained with the expertise of members of the graduate school and were therefore confronted with several other fields and points of view. In several case studies, our PhD candidates investigated innovation processes, raw material production, trade and markets in a broad period that spanned from the Neolithic to the Medieval and stretched from Central and Western Asia to Northern and Western Europe.

Seventeen partners from nine institutions encouraged our PhD-candidates to progress with their studies and thus greatly supported the Leibniz Graduate School RITaK. This is gratefully remembered especially in respect of the colleagues who accompanied the project as Advisory Board. Prof. Em. Dr. Barbara Ottaway, Exeter, and Dr. Béatrice Cauuet shall be mentioned especially as they continually provided the students with advice and gave access to their broad knowledge. Other colleagues joined meetings and discussions, helping to identify theoretical and logical inconsistencies and to synthesize

some of the most probing question. Many of these colleagues took part in our annual Milestone-meetings and contributed with their experience.

The PhD group, but also the external and internal partners, have collaborated in an excellent way: There was always a good mood and a favoring atmosphere between the candidates – neither contention nor jealousy. They worked eagerly together and supported each other in the frame of profession but also in their personal relations. In the meanwhile, nearly all of the PhD-studies that have been begun in 2011 are finalized. The publication of the studies as monographies shall appear in the form of a RITaK series of *Der Anschnitt Beiheft*.

The Leibniz Graduate School RITaK found its foundation in a well-established collaboration between the Deutsches Bergbau-Museum Bochum (DBM) and the Ruhr-University Bochum (RUB). The collaboration between both institutions became closer in recent years: It spans from joint university teaching and lecture series to research projects that are carried out mutually and in a collegial atmosphere. In 2017 the foundation of the *House of Archaeologies*, an institute for archaeological research and learning is operated jointly by the RUB and the DBM, can be seen as a sign of the fruitfulness of this collaboration. This institute of research and learning is in immediate proximity to the laboratory and the exhibition buildings of the DBM.

Research, academic teaching and the transmission of research results to the broader public have found a home in the center of Bochum. This step induces the idea of Science-Campus that incorporates the RUB, DBM and the University of Technology Georg Agricola at a location where the academic world now can meet the general public in Bochum. It is an area where the discussion about the history and future of raw materials and their societal appropriations and exchange can be intensified and new concepts found.

It is therefore important to show my appreciation for the financial support that was granted by the Leibniz Association in the frame of their competitive SAW-program in 2010 that enabled the start of this collaborative program. I would like to thank furthermore the DMT-LB e.V. as well as the DBM, its directors Prof. Dr. Rainer Slotta and Prof. Dr. Stefan Brüggerhoff, as well as Rectorate of the RUB, for their constant and technical support.

Here we present the first volume of the RITaK monograph series that gives an overview about scientific contributions that were presented in Bochum during the RITaK project in 2013 and 2014. In 2013 (22th to 23rd of November) several scientists joined to discuss “Perspectives of an Economic Archaeology” in a broad interdisciplinary framework. Arne Windler, at that time one of the PhD-students of the RITaK-project, initiated and stimulated the workshop in Bochum. Michael Roos and I joined his initiative. During two days, we dealt with forms of trade and exchange, with resource-management and with social and economic structures. The basic question was if the “homo oeconomicus”-conception as a dominant notion of

macroeconomics and social studies still could be used as a central model to explain economic behavior.

This workshop originally was planned to be published separately but finally was joined with a second conference held at the end of 2014 in Bochum (27th to 29th of November). It was the final RITaK conference that was organized by the RITaK organizers, Petra Eisenach and Thomas Stöllner together with all PhD students from the Leibniz Graduate School RITaK: The conference followed a general theoretical section at the beginning and was then directed to the various fields the PhD students dealt with in their studies. Several colleagues from various European countries and the USA participated and enriched the discussions with their scientific expertise.

The volume “The RITaK-conferences” resembles some of the fruitful and collaborative work of the RITaK School between 2011 and 2015. I finally want to thank Petra Eisenach for her dedication, motivation and hard work that drove our Graduate School RITaK forward. She was invaluable for the program and always was a communicative partner for all of us. Thank you Petra!

Finally, I am looking forward to the response by the academic community of this volume and the ideas within. This response and impact will be the greatest outcome for us from all those years of mutual collaboration.