

Foreword

In this volume Volker Soßna presents the results of settlement studies undertaken during a multi-year research program, the “Nasca-Palpa Archaeological Project”, between 1996 and 2015. In fact, what evolved into a long-term research project, originally had been planned as a limited research endeavor focused on the world-famous geoglyphs of the Nasca culture (200 BC – 600 AD) in southern Peru, better known as the “Nasca lines”. In 1994 the Swiss Liechtenstein Foundation for Archaeological Research Abroad (FSLA) started an initiative with the aim to protect and to investigate the endangered geoglyphs of the Nasca culture on the south coast of Peru, which had been declared World Heritage Site by UNESCO in the same year. After several meetings with sponsors and representatives of FSLA, I was commissioned to organize an archaeological research project in the Nasca region with the aim to document, protect, and investigate the Nasca lines systematically. Due to my contacts from previous projects in Peru I was able to engage Johny Isla, the most experienced Peruvian archaeologist of the south coast of Peru, as a co-director for this project. From our first reconnaissance campaign in 1996 onwards, Johny Isla and I directed several phases of the Nasca-Palpa project, which until 2001 was financed by the Swiss Liechtenstein Foundation for Archaeological Research Abroad (FSLA). Thanks to this non-profit organization, a solid basis for a long term and multidisciplinary research program was established, which has contributed in several ways not only to the archaeology of Peru and South America, but also to the development of archaeological methodology in general. In July 2015, the last project phase ended and Johny Isla was appointed the director of the “Nasca Special Project” of the Peruvian Ministry of Cultural Affairs.

At the start of the Nasca-Palpa project, the basic idea was to produce for the first time a comprehensive and detailed documentation of the world famous geoglyphs of the Nasca culture. An additional goal of the project was to contribute to the understanding of the geoglyphs in their cultural context. This was possible only by studying the archaeology, especially the set-

tlement history, of the Nasca region. Therefore, from the first major field campaign in 1997, the archaeological research project consisted of two pillars: 1) the documentation of the geoglyphs with modern technologies and 2) the archaeological investigation of pre-Hispanic settlements.

The documentation of the geoglyphs was carried out with photogrammetric methods by the Institute of Geodesy and Photogrammetry (IGP) of the Swiss Technical University (ETH) of Zurich, under the direction of Armin Grün. The archaeological research was directed by Markus Reindel, based at the Institute for American Archaeology of the University of Bonn, and from 1999 onwards at the Commission for Archaeology of Non-European Cultures (KAAK) of the German Archaeological Institute (DAI). For our research we focused on the valleys in the Palpa region, in the northern part of the Rio Grande de Nasca drainage, because in this region geoglyphs were closely associated with ancient settlements. We were convinced that only through this association of ancient settlements and the nearby geoglyphs we could find the clue for the explanation of the geoglyphs in their wider cultural context.

During our surveys we recorded not only settlements and geoglyphs, but also cemeteries, petroglyphs and many other cultural remains. It was impossible to limit our investigations to only one time period. Instead, we recorded archaeological sites and materials from all periods, beginning from the Archaic (approx. 8000 BC) until the colonial period in the 16th century. In this way we were able to reconstruct almost the entire pre-Hispanic occupation history of the Palpa valleys, and locate the geoglyphs and settlements within this chronology.

In 2002, a new phase of research activities started with the establishment of a follow-up project financed by the German Federal Ministry of Education and Research (BMBF) with the title “Nasca: Development and Adaptation of Archaeometric Methods and Technology for Cultural History”. The goal of this project was to develop new methods for archaeological investigation in several disciplines: geoarchaeology, geophysical prospection, remote sensing and

3D-modelling, archaeometry, palaeogenetics and isotope analysis. Archaeology, however, continued to be the backbone of the project activities. During the settlement surveys, hundreds of new sites were added to the existing records.

With this new project phase a strong geoarchaeological approach began to be part of our research activities. The change of settlement patterns over time, as well as the geoarchaeological evidence discovered in archaeological excavations and geoarchives, indicated climate changes in the past. The hypothesis that climate fluctuations influenced the cultural history in the research region was the starting point of the next project phase, and also the major motivation of Volker Soßna's research, which finally resulted in his doctoral dissertation project and the publication of the present volume.

The next project phase was established with the title "Andean Transect: Climate Sensitivity of Pre-Columbian Interaction between Man and Environment" and was also financed by the German Federal Ministry for Education and Research (BMBF) from 2008 until 2011. In contrast to the previous projects, whose limits were confined to the coastal regions, the research area for this new project was expanded to the highlands, thus encompassing the whole range of ecological levels from the Pacific coast to the snow-capped mountains of the western cordillera of the Andes. Again, settlement surveys constituted an important part of this project, adding hundreds of new sites, especially in the middle reaches of the Palpa valleys and in the highlands.

At the end of 2011, the body of archaeological data from many different time periods had increased considerably. However, only the Nasca period (200 BC – 600 AD) had been studied in detail in the first phases of our project activities. After several years of interdisciplinary work and numerous excavations at sites of different time periods, it seemed necessary to concentrate archaeologically again on one specific chronological segment. Therefore we chose one of the most emblematic time slices, the Paracas period (800 – 200 BC), in order to obtain detailed insights into the socioeconomic structure and cultural values of one pre-Hispanic period. With the financial support of the German Research Foundation (DFG) and in cooperation with a French team of archaeologists of the Research Centre for Pre-Hispanic America (CeRAP) of the School of High Studies of Social Sciences (EHESS) in Paris under the direction of Christian Duverger, we started the most recent phase of our research activities in the Palpa area. The

Paracas project revealed the important ties and socioeconomic interactions between highland and coastal sites and added a new facet to our archaeological research results.

The preceding account of our archaeological research activities should give the reader insight into the richness of archaeological information and the great potential for reconstructing the cultural history, especially settlement history, of the Palpa region. At the same time, the outcome of the Nasca-Palpa Archaeological Project confirmed the statement of the great Peruvian archaeologist Toribio Mejía Xesspe, whose archaeological excavations in the region in the 1950s were the precursors of all later archaeological research in the Palpa region: "Palpa is an archive of the prehistory of Peru".

The enormous amount of data gathered in the different phases of research in Palpa constituted a challenge for the recording and the organization of the data. From the beginning of the research, the data were organized in a computer-aided database. The volume and the complexity of this database grew from year to year. The archaeological sites, and among these specifically the settlements, constituted the most important category of these data. The settlements carry an enormous potential for archaeological analysis, especially in combination with all the recorded and dated artifacts, as well as the numerical datations produced with different methods (^{14}C , AMS).

The problem of an archaeological database, however, is that the analytical categories cannot be established until the research has reached a certain point of completeness and until the research data can be organized in clearly defined and significant classes. On the other hand, once the project has reached this point, painstaking work is needed to clean the data and to further organize the database. This work requires a deep knowledge of the archaeology of the research area, of data management, and of statistical analysis. And, of course, it requires a lot of patience to analyze such a huge and complex data set such as is the case of the settlement data of the Nasca-Palpa project.

We are extremely happy that we met Volker Soßna, an engaged archaeologist who has all these qualities, who is extremely interested in the application of digital technologies in archaeological research, and who accompanied the most important steps of the Palpa project, beginning with the large interdisciplinary work in 2002, until 2015. Building on previous versions of the database, he reviewed and cleaned the datasets, organized and improved constantly the database

structure and added analytical tools. He visited most of the sites recorded in the database, adding missing data and resolving many questions that arose during the handling of the data in the database. Subsequently he organized the data for their use in a geographical information system (GIS) and analyzed the settlement data in order to get an answer regarding the most pressing research questions: 1) How did settlement patterns change through time? 2) What are the reasons for the changes in settlement patterns in the Palpa area? 3) Are changes in climate and landscape responsible for changes in settlement patterns in the Palpa area?

The first question might be answered relying mainly on archaeological evidence. Although archaeological interpretation depends always on the quality of the evidence, and although interpretation itself is always a factor of insecurity in archaeological analysis, the results of Volker Soßna's work impressively show how settlement patterns and cultural behavior changed through time in the Palpa area. Without doubt, this is the most comprehensive and most detailed settlement study ever performed in South America. By providing the complete data on the accompanying DVD, Soßna enables the critical reader to check and reproduce his analyses and to pursue additional questions.

For the second and especially for the third question Soßna had to rely much more on secondary literature. Most of the studies in neighboring regions of the southern Andes do not provide such a detailed and numerous corpus of data like the Nasca-Palpa project. Therefore the author in these cases is right to be more cautious with his interpretations. In the case of geoarchaeological interpretations he must rely on the respective work of the project partners or even on the results of geoarchaeological studies performed in distant regions. In contrast to previous interpretations, Soßna reaches the conclusion that only in certain periods did palaeoecological changes significantly influence major changes in settlement behavior, while in other cases sociopolitical or cultural reasons were responsible for the changes in behavior of the societies in the research area.

The present book is the fourth volume in a loose series of publications about the archaeological results of the Nasca-Palpa project. The first, "The Geoglyphs of Palpa, Peru: Documentation, Analysis and Interpretation" (Karsten Lambers, FAAK 2, Lindensoft Verlag) was published by the Commission for the Archaeology of Non-European Cultures of the German Archaeological Institute in 2006. A sec-

ond volume, "New Technologies in Archaeology: Multidisciplinary Investigations in Palpa and Nasca, Peru" (Markus Reindel, Günther A. Wagner eds., *Natural Science in Archaeology*) was published by Springer Editorial in 2009 and contained the results of the interdisciplinary research between 2002 and 2008. Niels Hecht published in 2013 his study on Nasca ceramics from excavations in Palpa, "A Relative Sequence of Nasca Style Pottery from Palpa, Peru" (VVB Laufersweiler Verlag). With the present publication of Volker Soßna, "Climate and Settlement in Southern Peru: The Case of the Northern Río Grande de Nasca Drainage between 1500 BCE and 1532 CE", the German Archaeological Institute continues its engagement with the archaeology of Latin America and its support of the publication of the archaeological research results of the Nasca-Palpa project.

This publication is a vivid example not only of a state-of-the-art, interdisciplinary archaeological research project, but also of a major cooperative research program that has been supported by multiple institutions and financial sources. The investigations of the Nasca-Palpa project, coordinated by the German Archaeological Institute, would not have been possible without the generous funding by the Swiss-Liechtenstein Foundations for Archaeological Research Abroad (FSLA), the German Federal Ministry of Education and Research (BMBF) and the German Research Foundation (DFG), but also by the contributions of the German Federal Ministry of Foreign Affairs (AA), the Society Theodor Wiegand (TWG), the UNESCO Commission of the Swiss Federal Department of Foreign Affairs (EDA), and the Japan Maria Reiche Fund. We are also extremely grateful for the fruitful cooperation with the Graduate School Human Development of Landscapes of the University of Kiel, under the direction of Johannes Müller, who accepted Volker Soßna as his doctoral student and allowed him to develop, with a dissertation grant from the Andrea von Braun Foundation, his doctoral thesis on which this publication is based. And finally, of course, we would like to thank Volker Soßna that he has faced the challenge to gather, to organize and to analyze this enormous amount of archaeological settlement data of the Nasca-Palpa project and to accomplish this truly admirable scholarly publication that is now available for the scientific community.

Markus Reindel
(Coordinator of the Nasca-Palpa Archaeological Project)