Knowledge, Resilience and the Environment in the Mediterranean, 1-1000 CE

Tuesday 8th September

11.00: Resilient landscapes

Thomas Meier (Universität Heidelberg): Planned adaptation or evolution by change? A conceptual perspective on landscape resilience and landscape change

The conceptual framework for relations between local changes and changes at the macro-level remains partly underdeveloped: Analyses typically claims local, often planned adaptations to shifts of “the wider world”, reflecting our own techno-functional and rationalist worldview. Local communities are often denied any insights into and capability of such macro-changes, reducing them to passive victims.

Such approaches fail to understand the realities and logics of small worlds and local knowledge that is grounded in an intimate, deep-time acquaintance with the local landscape, often stored more in the body and oral traditions than in explicit and reflective analyses of the environment. It typically follows the logic of non-market subsistence strategies and alternative ideals of a life worth living than the modern, capitalist worldview. Crucially, it centers the local community and its lifeworld, recently termed “small worlds.”

This paper develops an alternative perspective on the relationship between local and macro-level changes. It draws on an understanding of evolution as a process of random variation without purpose or direction. These variations may or may not prove advantageous in the face of later, unanticipated changes. Evolution, therefore, is not driven by adaptation, but by chance.

Applying this logic to small worlds, I argue that their resilience, survival, or collapse depends on structures and processes that emerged randomly – or at least for entirely different purposes – long before an external change occurred. This approach transcends the model of macro-stimuli and local reactions. It partially decouples the local and macro-levels and opens the way to understand local change and resilience as a powerful and knowledge-rich level of action in its own right.

***

Sam Turner (Newcastle University): Early Medieval Mani: shaping a sustainable and resilient landscape

With a particular focus on small-scale societies, we are examining the environmental appropriateness and effects of decisions made at the local level in the context of broader environmental and societal changes in short- and long-term perspectives.

We investigate the extent to which local communities purposefully invented new modes of landscape practices, or on the other hand whether existing practices and material features proved useful under new conditions. As landscape archaeologists our approach is via the material record, i.e. from specific features like field boundaries, trackways, terraces and water infrastructure. Can adaptations to changes be detected? What features proved to be useful under new conditions? Were changes planned and effective, or were they implemented in a more chaotic way?

In this paper I present initial results from the Mani in the southern Peloponnese. With its famous history of feuding and violence, the wild landscape of Mani appears to have shaped not only the form of settlements but also the fundamental outlook of their people. Virtual desertion remains the key narrative for early medieval times. However, new evidence has begun to force a re-evaluation of this landscape. Since 2022, our team has completed pilot studies in Mesa Mani, to the west of the Taygetos mountains. Using innovative fieldwork techniques, we have surveyed settlements and cisterns, scanned buildings and caves, dated the construction and development

of agricultural terraces. In contrast to previous research, which suggested the region was virtually deserted at that time, we have shown that the basic structure of this landscape survives from Byzantine times. We are now examining how people developed the strategies they used to thrive in Mani during the early Middle Ages.

***

Athanasios Vionis (University of Cyprus): Landscape approaches to resilience and 'capacity-to-change' in late antique and early medieval Cyprus (5th-10th century CE)

This contribution explores how Cypriot rural communities in the 5th-10th centuries CE mobilised different forms of knowledge to cope with (and adapt to) pressures on land and resources in a changing Mediterranean environment. Focussing on the Xeros River valley and its wider hinterland as a microregion, this presentation combines intensive field survey (SeSaLaC project), geoarchaeology, palaeoenvironmental proxy data and ceramic studies to reconstruct longterm trajectories of land use, settlement choice and agrarian strategies from Late Antiquity to the Early Middle Ages. Drawing on the concept of insularity and the dynamic adaptability of microregions, this contribution reassesses the 'boom' phase of Late Antiquity, when early Byzantine bishoprics structured agrarian catchments and supported intensified agricultural production within a highly 'global' world. The succeeding 'bust' cycle is also considered, investigating whether contraction reflects collapse or a conscious rebalancing of human-environment relations in response to land exhaustion, climatic fluctuation and shifting political regimes. By combining landscape archaeology, environmental science and materialculture analysis, this paper attempts to showcase how resilience is associated with the capacity to change while retaining core functions, moving us beyond narratives of catastrophe, towards historically specific understandings of knowledge, resilience and the management (or mismanagement) of the rural landscapes in historical Cyprus during the second half of the First Millennium CE.

***

14.00: Rural and urban resilience

Andrew McNey (University of Oxford): Living Reciprocally with the Desert: Investigating the Hamlets of the Negev as Sites of Resilience During the Late Antique Little Ice Age

Paleoclimate evidence of a sharp climate cooling in the early sixth century (referred to as the Late Antique Little Ice Age) has encouraged scholars of Late Antiquity to reconsider the role of climate as an historical agent. Despite being perhaps an intuitive question in the wake of improving paleoclimatic data resolution, a growing body of "consilience" research threatens to undermine alternative knowledge construction extraneous to scientific ways of knowing. This paper seeks to offer an alternative approach to studying climate change in the past from a "bottom-up" perspective. The landscape of the late antique Negev offers unique potential for studying resilience as the product of individual and community action. While the economic decline of the Negev towns and villages in the late sixth century have been well documented, the parallel preservation of the hamlets and farmsteads in the late sixth and early seventh century Negev Highlands have received limited attention. This paper will explore the resilience of the late antique Negev hamlet through the lens of reciprocity. Material evidence from these sites is sparse, suggesting that these communities were economically poor. Survival was thus a product of a different kind of wealth: community and knowledge. This paper will employ evidence from archaeological surveys and archaeobotanical assemblages to investigate the structure of community settlements in the desert and how they may have lived reciprocally with the natural world. Farming in a desert environment was challenging, however, through deep understanding of one's physical environment, and a pooling of community resources, a life could be cultivated that was not only resilient but thrived in otherwise challenging conditions.

***

Helene Simoni (University of Patras), **Kostas Papagiannopoulos** (University of Cyprus; Institute of Local History): Archaeological insights from rescue excavations and probabilistic modelling into urban resilience in the Pelopponese during the first millennium CE

This paper uses archaeological evidence to explore urban resilience in Patras during the first millennium CE. Situated along a coastal strip and adjoining foothills, and intersected by seasonal watercourses, Patras occupied a seismically active and geomorphologically unstable environment. Destruction layers, once attributed to invasion, are increasingly interpreted as earthquake-related, inviting reconsideration of how communities understood and responded to recurrent environmental shocks.

Drawing on a dataset of 570 rescue excavations from the historic centre, this study applies fuzzy-logic modelling to address chronological uncertainty and reconstruct long-term spatial trends. Evidence of repeated rebuilding, monument repair, debris reuse, and reconstruction of river crossings suggests mobilisation of accumulated technical and social knowledge. In the surrounding hinterland, extensive flood-control infrastructures—including a canal channeling multiple streams—demonstrate collective understanding of hydrological dynamics, enabling sustainable land use and agricultural management despite environmental volatility.

Such knowledge encompassed practical understanding of flood-prone zones, building repair strategies, material reuse, and the organisation of economic activities in the city and the countryside. Rather than collapse, the archaeological record points to adaptive transformation and possibly increasing polycentricity, comparable to developments in Ancient Corinth and Messene. By foregrounding knowledge—technical, spatial, and communal—as a driver of resilience, this paper contributes to wider debates on how Mediterranean societies adapted to environmental instability without succumbing to narratives of inevitable decline.

***

Madeleine Duperouzel (University of Oxford): ‘For I know such properties’: women and resilience in rural communities and landscapes, 4th-7th centuries AD

Rural women in the Late Antique Mediterranean remain woefully under-studied and under-evaluated, especially when it comes to assessing their clear role in formulating and constructing familial and communal resilience strategies in the face of environmental change.

However, it is clear from the sources that women played a central role across Mediterranean rural communities and landscapes, anchoring the essential socio-economic unit of rural zones, the oikos/domus (broadly conceived). Notably, in the Egyptian documentary record, women can be found clearly expressing their knowledge of specific environmental and socio-economic challenges associated with their communities and landscapes, as well as self-fashioning their place in resilience structures.

The aim of this paper is, therefore, to read these more explicit statements of women’s roles in resilience strategies alongside the archaeological and material evidence from other Mediterranean rural communities, to articulate a general framework within which rural women can be more fairly positioned. Adopting a longue durée approach ensures this paper captures critical moments of environmental and social change, often tightly linked, such as the rise of Christianity, the ‘Late Antique Little Ice Age,’ and the Justinianic Plague.

In effect, I will utilise archaeological evidence from Sicily as a comparative case study. I will demonstrate that reading the evidence of women’s rural resilience in the archaeological record alongside explicit statements made in the documentation offers a framework for theorising and interpreting women’s epistemological status in resilience structures throughout Late Antiquity.

***

16.00: Agriculture in the Islamic Mediterranean

Jakub Sypiański (Università Ca' Foscari, Venezia): Nile yields: LLM-powered computational analysis of the Islamic Green Revolution in Egypt

This paper presents *Harvesting the Corpus*, a computational pipeline for extracting agricultural evidence from multiple textual corpora spanning the medieval Mediterranean and Near East. Sources include the OpenITI corpus of Arabic literary texts (9th–15th centuries CE), Greek and Coptic documentary papyri (DDbDP), the Cairo Geniza (PGP), Arabic papyri (APD), classical Latin and Greek agronomic treatises, the Digital Syriac Corpus, and the *Kitāb al-Filāḥa al-Nabaṭiyya*. The pipeline uses large language models to identify, classify, and contextualise mentions of crops, cultivation practices, irrigation infrastructure, and agronomic knowledge across these corpora — with a particular focus on Egypt. Among the results, the database provides rich attestation of Andrew Watson's eighteen "Green Revolution" crops, though the pipeline is designed for agricultural history broadly rather than diffusionist questions alone.

A core challenge in applying LLMs to multilingual historical sources is hallucination and false-positive extraction. Arabic homographs such as *al-burr*, *quṭn*, and *tīn* are in fact handled more reliably by LLMs than by keyword-based methods, since the model reads context rather than matching strings. The primary quality risks lie elsewhere: biographical anecdote, legal metaphor, and geographic coincidence generate systematic false positives that require dedicated post-processing. The pipeline addresses these through a multi-pass false-positive cleanup, near-duplicate detection across overlapping text chunks, and spot-verification of quotes against source manuscripts. Extracted evidence is further scored along five evidentiary dimensions — temporal precision, geographic specificity, authorial proximity, agronomic actuality, and detail level — enabling weighted analysis rather than simple counting.

The resulting database contains over 57,000 attested agricultural mentions, feeding directly into empirical parameter sets for agent-based modelling of Nile-valley agriculture (in collaboration with Olga Palacios, Durham). The paper reflects on what computational methods can and cannot reliably extract from premodern multilingual corpora, and on the epistemic status of LLM-assisted historical evidence.

***

Carlo Scardino (Heinrich Heine Universität Düsseldorf): Old Knowledge for New Conditions? Agronomic Compendia and Environmental Variability in the First-Millennium Mediterranean

This paper explores whether agricultural knowledge preserved in late antique and early medieval agronomic compendia can be understood as a form of environmental knowledge relevant to resilience in the first-millennium Mediterranean. Although ancient agricultural handbooks do not address climate change in modern terms, they stress that successful cultivation depends on close attention to soils, water, winds, seasonal timing, and regional ecological variation.

Focusing on Palladius, the *Geoponika* and especially Anatolius of Berytus and Cassianus Bassus, whose Greek works are largely lost but survive through later reworkings and eastern translations, the paper examines how agronomic compendia preserve and transmit practical knowledge across changing historical contexts. Through selected examples, it asks to what extent this inherited knowledge may have remained usable under changing environmental conditions, and whether differences in agronomic recommendations reflect adaptation to environmental variability or rather the conservative logic of textual transmission. The value of these texts lies less in direct evidence for climatic adaptation than in the transmission of practical environmental knowledge across time.

***

Dominique Aviñó McChesney (Regional Ministry of Education, Valencia): The trace of the Nabatean Book of Agriculture in the landscapes of Al-Andalus

The southernmost palm grove in Europe is located in the municipality of Elche, in the southeast of the Iberian Peninsula, and is part of UNESCO's World Heritage List as an example of a cultural landscape inherited from Al-Andalus (Medieval Islamic territory). Establishing an agricultural area like Elche's, where date palm trees cultivation is the main crop, but not the only one, required both theoretical and empirical knowledge of the necessary conditions for these crops. These conditions have proven crucial, as reflected in the agronomic treatises written by agronomists from Al-Andalus to systematize and disseminate the science of the land and thus contribute to achieving maximum yields. Through the analysis of agronomic texts, I have been able to confirm the importance of palm trees cultivation for al-Andalus society, which possessed firsthand knowledge of the meticulous and complex agricultural practices associated with this species. The climatic and soil conditions of the region, and specifically the issue of soil and water salinity, play a particularly prominent role in this regard. Drawing on the Nabataean Book of Agriculture, a book written by Ibn Wahshiyya in the 10th century based on ancient Mesopotamian texts, Al-Andalus' agronomic school addressed with special interest and from a highly practical perspective not only the tolerance of certain species to salinity, including the palm tree, but they also established measures for the recovery of lands affected by this problem, specifically referencing crops documented in Elche since medieval times.

***

Wednesday 9th September

09.00: Agriculture and resilience strategies

Conor Dube (University College London): Staple Goods as Structural Resilience in Early Islamic North Africa

Early Islamic jurists distinguished a category of 'staple goods,' essential foodstuffs and other provisions, which received special legal protections owing to their importance to the least well off and least secure in society. This paper will consider such goods as they appear in the legal thought and historical record in early Islamic North Africa. Among other roles, staples were central to the distribution of mandatory alms, were stockpiled by both the state and private merchants, were used as a metric of poverty, and were employed in an exchange economy in places where, or times when, metal money was not available. Indeed, as one 9th c. North African jurist explains, shipmasters who were transporting staple goods—such as wheat, barley, olive oil, or vinegar—across the Mediterranean were required to provide a guarantee on them, because the public awaiting their ships must be protected against the loss of such vital goods.

Owing to the dearth of contemporary sources from this region, studying social responses to environmental change or climatic fluctuations is difficult, especially outside of the major cities. I argue that staples give us one metric with which to trace a wider legal economy of resilience. The laws and principles covering such goods demonstrates how the early Islamic legal bureaucracy incorporated flexibility in response to hard times, including environmental vacillations, failed crops, and human-instigated deprivation such as warfare. Thus, moments of famine, drought, or poverty appear in juridical modifications to otherwise unyielding legal principles, while evolving lists of staple goods reflect changing relationships between agriculture production, market preferences, and local environments.

***

Anastasia Nikulina (Universiteit Leiden): Simulating Rural Resilience and Vulnerability: Agricultural Decision-Making in the Mediterranean throughout the First Millennium CE

Climate and environmental changes are often used to explain societal crises and transformation. Yet past populations were not passive: they made decisions depending on environmental, social, economic and political factors. The relative importance of these factors remains debated, as does how to integrate agricultural knowledge from historical texts into a single framework for formally testing factors' impacts on rural settlements.

This study asks how rural communities in the first-millennium Mediterranean made agricultural decisions under different environmental and socio-political conditions, and when these decisions produced resilient/vulnerable settlements. We use a generic agent-based model (ABM), which makes assumptions about human decision-making explicit and links household choices to emergent settlement-level socio-environmental patterns.

The model includes adjustable parameters for environmental (e.g. temperature and precipitation), and socio-economic (conflict frequency and severity, market access, household sizes) conditions. These parameters allow us to test different scenarios and assess how households' decisions manifest in resilience/vulnerability of a settlement system.

The relative success of a given set of parameters can be assessed via the following outputs: changes in rural population size, household survival rates, production diversification and surplus. Statistical analysis of the modelling outputs (currently in progress) identify which factors most strongly affect these outputs.

By formalising agricultural knowledge as explicit decision rules, this study treats information from historical written sources not as background context, but as evidence for the active decisions

which shaped the emergence of rural resilience/vulnerability. The model also provides a flexible framework that can be further applied to specific Mediterranean case studies.

***

Olga Palacios (Durham University): Modelling the Drivers of the Islamic Green Revolution across Egypt

The Islamic Green Revolution (IGR) represented a crucial transformation in agricultural production across Islamic territories, involving new infrastructure, market networks, and social and legal frameworks. However, growing archaeological evidence has demonstrated that the impact of these changes varied considerably across regions. Egypt is particularly relevant in this regard, as its agriculture was shaped by Nile River floods, pre-existing irrigation systems, and a highly diverse regional landscape.

This study uses agent-based modelling (ABM) to investigate agricultural and demographic changes in the Delta and Fayum regions before and during the IGR, using their ecological and socioeconomic differences to assess the relative importance of different drivers. It pursues two main objectives: first, to quantify the demographic impact of the Revolution; and second, to identify the mechanisms behind it, by exploring four competing hypotheses: whether change was driven primarily by the integration into international trade networks under the Caliphate, the introduction of novel agricultural species, changes in the taxation system, or the development of hydraulic infrastructure that reshaped farming strategies across these distinct landscapes.

To address these questions, we apply the generic ABM developed by Nikulina et al. (in progress) within the framework of the ERC-funded project SSE1K: Science, Society and Environmental Change in the First Millennium CE. The generic ABM was originally designed to explore environmental, economic, and social change across the Mediterranean during the first millennium CE. Here we have adapted key parameters to Egyptian historical and ecological conditions. The model is informed by historical textual sources and captures the active agency of households to make decisions regarding crop selection, market exchange, and resource strategies, strategies shaped by social knowledge, institutional context, and environmental conditions. By formalising these assumptions within a simulation framework, we test how fiscal pressure, market access, environmental variability, and household-level strategies interacted to produce diverse resilience trajectories across regions and periods.

***

11.00: Crisis and community

Greta Hawes (Macquarie University, Sydney): Mythic connections under crisis

This paper examines the effects of communal crisis, social change, and depopulation on mythic knowledge in 2nd c. CE Greece. Its case study is the region of Arcadia, which was notable for its large number of abandoned poleis. Strabo had largely passed over the region, describing it as largely empty of people and dotted with ruined cities (8.8.1-5). Pausanias delves more deeply into its traditions, but the 30 poleis that he describes there as entirely depopulated nonetheless set the tone. The residents of many of these had moved -- willingly or unwillingly – to Megalopolis during the synoecism of the fourth century.

The romanticism that is so often read into Pausanias' Arcadia makes it easy to miss an obvious observation: this is a landscape of epistemicide. The rustic, nostalgic idiosyncrasies mask a quantifiable paucity of myths; I argue that this should be directly connected to its history of political disintegration and centralisation. This paper will deploy network analyses on MANTO (https://manto.unh.edu/viewer), a dataset of Greek myth that focusses on place-based storytelling. These analyses will reveal how the myths of ruined Arcadian cities show both quantitative and qualitative depletion, and how the relevance of the mythic knowledge that is in

evidence relies on connections to still-thriving cities, and to traditions that, rather than being highly idiomatic, are in fact quite conventional in their panhellenic borrowings. This paper will conclude with some observations on the difficulty of understanding local storytelling in the smaller poleis of antiquity, and how we might use techniques from graph theory to model cumulative patterns and spot – if not fill in – gaps in our own knowledge.

***

Sebastian Hanstein (Universität Siegen): Interpreting Crisis, Sustaining Society: Salvian of Marseille, Religious Knowledge and Community Resilience in Fifth-Century Gaul

My paper examines how Salvian of Marseille, in Ad ecclesiam and De gubernatione Dei, uses biblical judgment narratives to make sense of crisis in fifth-century Gaul and to derive normative responses to social dislocation. It focuses on two connected forms of instability: first, acute violence (invasion, massacre, destruction, displacement), and second, the everyday structural violence of elite domination, visible in fiscal pressure, legal inequality, and the exploitation of the poor, coloni, and slaves.

The paper argues that Salvian's exegesis should be read not only as moral criticism, but as the production of religious knowledge about crisis. By reworking narratives such as the Flood, Sodom, and the Exodus in a late antique setting, he offers a theological account of causality that links social disorder to moral failure, above all among the powerful. At the same time, his demand for conversio and for a reform of social practice outlines a set of responses intended to preserve communal order under severe pressure and thus to support community resilience.

The aim is not to use Salvian for climatic reconstruction. Rather, the paper asks how a late antique Christian author made crisis intelligible within a changing and insecure human environment, and how that interpretation shaped expectations of conduct, responsibility, and reform. In this sense, Salvian's writings illuminate the social and intellectual work of resilience: they show how religious interpretation and moral reasoning could serve as resources for sustaining communities, while also exposing the perceived limits of those resources.

***

Vicky Manolopoulou (Università Ca' Foscari, Venezia): The Euchologion in context: Ritual, Emotion and the Agricultural Landscape in Byzantium

This paper examines the Byzantine Euchologion as a repository of societal knowledge about the environment and as a mechanism of community resilience in the first-millennium Mediterranean, drawing on the earliest surviving manuscripts (Barberini gr. 336, 8th c.; Paris, Coislin 213, 1027). The Euchologion preserves an annual cycle of occasional prayers, each keyed to a specific moment in the agricultural year. Read alongside the cultivation calendar of the Geoponika and the liturgical Typikon, these prayers reveal how communities structured and transmitted collective knowledge about their environment through the rhythms of ritual and practice embedded in the landscape.

The paper develops three arguments. First, the Euchologion's agricultural prayers constitute a form of societal knowledge about environmental conditions. The various prayers included express shared seasonal expectations and agronomic awareness, encoded within liturgical performance and passed on through its yearly repetition. Second, the emotional register of performative texts (e.g. thanksgiving, supplication, lament) represents a distinct dimension of how communities processed their relationship with the environment. The affective language was not incidental but constitutive: it shaped how environmental conditions were collectively understood and experienced. Third, the Euchologion contains prayers responding to environmental crises such as drought, earthquake, and unseasonable weather, which functioned as resilience responses when anticipated rhythms were disrupted. Reading liturgical prayer in conjunction with agronomic practice, the paper argues that resilience in the Byzantine

countryside rested on two distinct but complementary forms of knowledge: the practical management of what lay within human control, and the religious and emotional response to what lay beyond it. The Euchologion preserves evidence for the second, and for its centrality to a community's capacity to respond to environmental disruption.

***

14.00 Environment and Society

Ismini Lypiridou (Universität Basel): Hydroclimate reconstruction from Uzuntarla Cave (Thrace, Türkiye) and the connection to the water supply of Constantinople

Large ancient cities depended heavily on reliable water sources. However, the climatic conditions under which major hydraulic systems developed remain poorly constrained. Constantinople (modern Istanbul), one of the largest cities of Late Antiquity and the medieval world, relied partially on an extensive aqueduct network that transported water from the Thracian mountains to the city (Crow, 2019) . Investigating the hydroclimatic background can provide valuable insights into the relationship between climate variability and societal responses to population growth and increasing water demand.

Speleothems are mineral deposits that form within caves from water percolating through the soil and epikarst and serve as natural archives of past environmental conditions. They can reveal information about changes in local conditions (soil, vegetation and climate variations) and regional or global climate patterns (Fairchild and Baker, 2012) . Because speleothems grow in layers, they can preserve long and continuous records of hydroclimate variability. In addition, precise uranium-thorium (U-Th) dating can provide robust chronological control.

In this study, we present a high-resolution semi-annual speleothem record from Uzuntarla Cave in Thrace, Türkiye, located near the aqueducts that supplied water to Constantinople. The chronology of the record is constrained using U-Th dating, radiocarbon measurements and indicators associated with historically documented earthquakes. Stable isotope analyses (δ 13 C and δ 18 O) are used as proxies to investigate hydroclimate variability. By comparing the most recent section of the speleothem isotopic record with ERA5 climate reanalysis data, we explore potential relationships between isotopic variability, precipitation patterns and groundwater recharge.

***

Giacomo Vinci (Università degli Studi di Padova): What follows ancient industrial abandonment? Landscape dynamics in Roman coastal Friuli

This contribution examines the rewilding dynamics that followed the abandonment of a large Roman industrial complex at Chiamana of Carlino, along the rim of the Grado-Marano Lagoon, in north-eastern Italy, about 10 km west of the city of Aquileia. The site preserves the remains of an extensive pottery workshop associated with a quarrying area of almost 2 km2, where more than 300 clay extraction pits were present. With an average side of 10-15 m and a depth of 1-2 m, the majority of these pits lies beneath a semi-natural forest untouched by agriculture since Roman times — making this an exceptionally promising context for detailed palaeoenvironmental reconstruction. Through multidisciplinary geo-archaeological and palaeoecological investigations, we show how systematic clay extraction led to the formation of waterlogged depressions that, soon after their use, functioned as small basin lakes. These anthropogenic features became effective sediment traps, accumulating stratified peat sequences that preserve with exceptional resolution the pollen signature of the surrounding vegetation and the regional trend through time. Pollen data reveal a clear succession of landscape phases. During an initial stage, spanning the late Republican and Imperial periods (circa 1st century BCE – 5th century CE), an open landscape of cultivated fields alternating with oak-dominated woodland reflects intense human activity, with sustained timber exploitation directly linked to workshop production. Following

abandonment in the Early Middle Ages, a marked rewilding process transformed the former quarry basins: aquatic and semi-aquatic plants colonised the waterlogged pits, and semi-natural wetland and woodland conditions were progressively restored across what had been an industrial landscape.

***

Massimiliano Borroni (Università Ca' Foscari, Venezia): Society and the Environment in Early Islamic North African Legal Literature

Early Islamic legal literature preserves a significant corpus of implicit environmental knowledge. This paper discusses how these jurists understood and attempted to order the rural world and the risks and structurally associated with agricultural production. It focuses on the early Islamic Maghreb (eighth–ninth centuries CE) through a thematic reading of Mālikī and Ibāḍī legal literature. The main source is the al-Mudawwana al-Kubrā by the Qayrawanese scholar Saḥnūn b. Saʿīd (d. 240/854), a foundational Qayrawānī fiqh text in North Africa and al-Andalus, which is here contrasted with contemporary and later Ibāḍī literature. While the former text offers a sample of cases concerning agricultural regulations from an urban perspective, the latter originate fom the socio-political contexts and landscapes of the margins of Ifrīqiyya, in the pre-Saharan zone characterised by expanding terracing and oasis agriculture. These cases are hypothetical and idealised yet meant to be realistic and to offer actionable guidance. The social structures and legal doctrines they incorporate thus reveal two distinct approaches to the management of environmental risk in the agricultural sphere, the relationship between commerce and agricultural production, and anthropogenic environmental change. Jurists concerned themselves with a variety of relevant subjects. The analysis highlights several key jurisprudential concerns, such as what constituted appropriate compensation for produce loss due to calamities, soil degradation in rented lands caused by soil-intensive crops, and water management infrastructure. In doing so, learned elites worked towards a reconciliation between agricultural uncertainties and the requirements for order within legal doctrine and society at large, translating the physical realities of drought, crop failure, and soil exhaustion into a structured intellectual system designed to mitigate damage and contain risk in the Early Islamic Mediterranean.

***

16.00: <u>Knowledge and risk</u>

Rocío Suárez Vallejo (Universität Innsbruck): Landscape as a sensor of environmental risk in the late antique west (6th century)

Against prevailing narratives of crisis, collapse and catastrophe, Late Antique sources show that many communities developed complex repertoires of response that enabled them to manage environmental uncertainty and maintain social continuity. This paper examines the relationship between knowledge and resilience through the analysis of ritual practices linked to specific elements of the landscape.

This intervention will argue that, in contexts such as Visigothic Hispania or Merovingian Gaul in the 6th century CE, certain components of the environment can be understood as ritual and ecological "sensors": points in the landscape to which communities attributed the capacity to translate climatic, agricultural or social uncertainty into comprehensible and socially operative signals, such as trees believed to predict good harvests, flowers that affirmed saintly protection or fluids emerging from the earth that were taken as signs revealing the fertility of the coming year. These elements did not function merely as settings of the sacred, but as devices through which accumulated experiential knowledge about risk and prosperity was materialised and activated. Taken together, these examples show how the ritualised reading of the landscape helped reduce uncertainty and coordinate collective responses to environmental risk.

However, the effectiveness of some of these strategies of resilience depended not only on the knowledge embedded in the landscape, but also on the social authority capable of interpreting and mobilising it, thereby underscoring the central role of institutional mediation in the management of environmental risk in the post-Roman West.

***

Sara Baldin (Universität Basel): Constrained Resilience: Agricultural Knowledge, Environmental Variability and Risk Management in Roman Egypt's Fayum (2nd-3rd century CE)

This paper explores the relationship between agricultural knowledge, environmental variability, and resilience in the Fayûm region of Roman Egypt during the second and early third centuries CE. Rather than treating climatic and environmental fluctuations as external shocks leading inevitably to decline or collapse, it approaches agriculture as a socio-environmental system in which knowledge, institutions and environmental conditions interacted to manage risk over time.

Drawing on papyrological evidence alongside environmental and spatial analysis, the paper examines how cultivators and administrators responded to uneven water availability, seasonal variability, and local ecological constraints. Practices such as flexible agricultural calendars, crop diversification, and collective responsibility for marginal land are interpreted as forms of situational and shared knowledge that supported resilience without eliminating uncertainty.

At the same time, the paper considers the limits of these resilience strategies, highlighting how persistent environmental pressures produced uneven outcomes and selective adjustment rather than uniform stability or sudden collapse. By focusing on process rather than endpoints, the Fayûm case contributes to broader discussions of how knowledge and lived experience shaped adaptive responses to environmental change in the Mediterranean.

***

Marsha McCoy (Southern Methodist University, Dallas): Knowledge and Resilience in a Volcanic Environment: Pliny, Vesuvius and the People of the Bay of Naples

The eruption of Vesuvius in 79 CE brought devastation to the towns around the Bay of Naples, particularly those on the slopes of Vesuvius (Herculaneum) and south of the volcano, where heavy ash blew (Pompeii). An earthquake had hit here 17 years earlier, causing significant damage; despite this, residents were rebuilding even in the face of a possible volcanic eruption. When Vesuvius exploded, the subsequent lava and ash layers forced a change in the resiliency response in relation to the even more devastating environmental conditions.

This paper uses archaeological evidence as well as the contemporary letters of Pliny the Younger to analyze how residents of this area deployed knowledge and resilience to respond to a changing and challenging environment. It establishes three ways residents met these environmental setbacks. First, rebuilding devastated towns for rehabitation was attempted where possible (Pompeii, Stabiae). Second, moving to different towns in the area less affected by the volcano (Puteoli, Neapolis) was another response. Finally, one of the most successful of the survivor families moved north to Ostia, to found the Temple of Serapis there and change the religious face of that city.

All three responses arose from the repertoire of situational processes developed in reaction to the societal and political disruptions caused by previous environmental challenges (the earthquake among others). They reflect the social and intellectual aspects of knowledge accumulated over time in combination with religious and emotional responses that created conditions for the complex and nuanced but extraordinary resilience, persistence, and continuation of the people of the Bay of Naples in the face of powerful and consequential environmental events and changes.

***

Thursday 10th September

09.00: Settlements and resilience

Mauro Buonincontri, Giovanna Bianchi (Università degli Studi di Siena): Settlement, environment and resilience in northern Maremma (Tuscany, central Italy): a multidisciplinary approach to landscape knowledge (1st-11th centuries CE)

The northern Maremma, along the Tyrrhenian coast of Tuscany, offers an exceptional case study for examining how environmental knowledge shaped human resilience in the central Mediterranean during the first millennium CE. Characterised by an unstable and dynamic landscape, where a shifting coastline, lagoons, marshy plains and flood-prone alluvial corridors created a challenging yet resource-rich environment, this area demanded continuous adaptation from its inhabitants. Drawing on the multidisciplinary dataset of the nEU-Med project (ERC AdG 2015; ID 670792), integrating geoarchaeological analysis, XRF geochemical proxies, microcharcoal data, archaeobotanical and palynological records, and alongside systematic archaeological survey, this paper reconstructs the long-term interplay between environmental dynamics and settlement strategies between the Roman period and the Early Middle Ages.

The evidence reveals a complex sequence of adaptations rather than simple narratives of decline. Roman expansion into flood-prone areas reflects a strategic mobilisation of hydraulic and agricultural knowledge, sustained by infrastructure investment. The subsequent late Roman contraction triggered forest recovery, documented by pollen data, while fire records indicate deliberate burning as a land management tool. From the 9th century CE, reorganisation under royal authority introduced diversified productive strategies (livestock farming, salt production, fish farming and small-scale agriculture) showing how wetlands and coastal resources, far from being mere constraints, became the very foundation of long-term socio-economic resilience.

***

Michele Abballe (Università Ca' Foscari, Venezia): Reconstructing population dynamics in the Italian Peninsula: a focus on the first millennium CE

Archaeological proxies are increasingly employed to reconstruct palaeodemographic trends and investigate the relationship between societal trajectories, environmental changes, and climatic variability. Such studies have largely relied on radiocarbon dates, particularly through Summed Probability Distributions (SPD), despite inherent methodological concerns. By contrast, archaeological site databases remain comparatively rare because of the inherent difficulties in collecting, standardising, and dating settlement evidence, particularly at large spatial scales. This is also the case in Italy, where archaeodemographic reconstructions based on archaeological settlement data have so far remained limited to specific regions, such as Etruria.

This paper presents the first multiproxy and multimethod archaeodemographic reconstruction of the Italian peninsula from Protohistory to the Middle Ages, combining radiocarbon dates and archaeological site data on a peninsula-wide scale. The study also compares four different radiocarbon summarisation methods: Summed Probability Distributions (SPD), Kernel Density Estimation (KDE), Dirichlet Process Mixture Models (DPMM), and Poisson Process models (PP).

Particular attention is devoted to regional and supraregional settlement trajectories during the first millennium CE, in order to assess how climatic trends, environmental changes, and socio-political transformations influenced settlement patterns, with a focus on processes of resilience, adaptation, and reorganisation.

***

David Laguna Palma (Universidad de Granada): Landscape, Resilience and Settlement Dynamics in Roman and Late Roman Crete: A socio-ecological approach

Mapping human-environment interactions involves understanding complex systems based on material and non-material flows. These interactions are linked to the ecological context and encompass both physical and social dynamics. The present work explores such interactions in ancient Crete during the Roman and Late Roman periods (67 BC–565 CE), with a specific focus on the entanglements that contributed to the formation of patterned landscapes. This research is part of the PERAIA project, which integrates principles from Human Ecodynamics and Human Ecology with digital research methods such as site mapping and spatial analysis, combined with quantitative methods, including spatial statistics and percolation analyses, to shed light on emerging spatial patterns arising from the interconnectedness of specific social (human) and environmental (non-human) variables within ancient Cretan landscapes. The results reveal recurrent configurations that point to sustained adaptive strategies and long-term ecological knowledge embedded in settlement organisation, reflecting how Cretan communities responded to and persisted within changing environmental conditions. By situating these results within the broader Eastern Mediterranean context, this paper contributes to current debates on societal resilience in the first millennium CE.

***

11.00: Resilience in the sixth century

Mateusz Fafinski (Universität Erfurt): As per my last letter: Gregory the Great and local resilience at the end of late antiquity

In the last decades of the sixth century, the Bishop of Rome, Gregory, was faced with a major problem. Environmental pressures and the weakness of local administration left many monks, nuns, and people in the territories he administered for the Church of Rome destitute and unable to work or fulfil their duties. This resulted in a constant stream of minor and major complaints, issues and questions that he had to address. His letters contain an echo of these issues in the form of his responses. This paper examines the body of his 'administrative' letters to see how Gregory tried to educate and prepare his small group of high-level administrators in Sicily and Southern Italy to foster local resilience. Rather than focusing solely on administrative measures, this paper will attempt to view Gregory's strategy for resilience more broadly. Orthodoxy — or rather, the concern for attaining and maintaining it — lies at the heart of Gregory's framework. In his letters, he firmly believes that practical measures are deeply connected with the idea of keeping communities within the bounds of orthodoxy and orthopraxy. Separating these two approaches, the practical and the spiritual, diminishes our ability to understand how leading figures at the end of the sixth century envisaged fostering local resilience. This comprehensive analysis reveals a “resilience pedagogy” that is deeply embedded in the spiritual values Gregory considered central to his mission. The paper concludes by attempting to reconstruct practical behaviours in local communities under Gregory's supervision based on these findings.

***

Helen Foxhall Forbes (Università Ca’ Foscari, Venezia): Knowledge, resilience and acorns in the sixth-century CE

Acorns are mentioned in late antique and early medieval texts as an important food source for pigs, but are also recorded as being emergency food for humans in times of famine. Prokopios records, for example, that during a severe famine in 539 CE acorns were used as famine food in some areas. Acorns are not straightforwardly edible for humans, however, since they have a high tannin content and are extremely bitter: in large amounts, unprocessed acorns are toxic to humans. In order to be edible for human consumption they need to be boiled or leached to remove the tannins and then dried. Although there is significant evidence for consumption of

acorns in prehistory, by late antiquity a number of textual sources recorded that acorns were eaten in the earliest days of humankind, but are no longer eaten, as well as the maxim that acorns are for pigs and are not human food. Clearly, however, the knowledge of how to process and use acorns continued to be transmitted, which is why they could be used as human food in emergency situations. This paper takes as its starting-point Prokopios' reference to acorns as famine food in 539 CE and uses acorns as a case-study to raise questions about the kind of knowledge which was essential for human survival in adverse conditions, but which is rarely fully visible in textual or archaeological evidence, as well as how that knowledge was transmitted. It also considers how various aspects of subsistence farming practices may be hypothesised to have functioned as resilience mechanisms, even when not all aspects of those practices in the distant past are now recoverable.

***

Mischa Meier (Universität Tübingen): Strategies of Resilience in the sixth century

In the Eastern Roman Empire the 6th century was marked by natural disasters, epidemics, and military defeats. Despite this ongoing series of upheavals, which were accompanied by economic problems and a widespread expectation of the end of the world, there was – which is surprising – no political or social collapse. The reason for this can be found in a phenomenon that scholars since the 1970s refer to as "liturgification"— a comprehensive permeation of Eastern Roman society with Christian symbolism and Christian forms of expression that began around 540. This lecture will use selected examples to explore how the "liturgification" contributed to the resilience of the Eastern Roman order and society. It will first address the conditions: On what foundation could "liturgification" develop? In a second step, some single sources will be discussed that illustrate the consequences of "liturgification" at various levels (imperial level, local societies). Finally, the lecture will address the fundamental question of what role "liturgification" played in the resilience of the Eastern Roman political order and Eastern Roman society. A concluding outlook into the 7th century will help to assess the significance of the process of "liturgification" more precisely.

***

14.00: Disaster and crisis

Nidanu O'Shea (University of Oxford): Catastrophic Tremors: Calamity Responses in the Chronicle of Zuqnīn

"Whenever they went out, the hand of the Lord was against them for evil." *Chronicle of Zuqnīn*, (trans. Harrak 2017, 390). Following an earthquake in Nicopolis (present-day Koyulhisar, Turkey) in 499 AD, a series of catastrophic events rippled throughout parts of the eastern Byzantine empire, as detailed in the Syriac *Chronicle of Zuqnīn*: pestilence, famine, plague, war, and divine phenomena. The eighth-century narrative explains these events by framing them as punishments for the peoples' sin by the judicial hand of God, thereby weaving a theme of visceral purification of society through calamity into the text.

Overall, the chronicle illustrates a bleak image. The disasters occur in relentless succession, at times causing desperation so severe that individuals are stripped of their humanity, resorting to their baser instincts for survival. However, there are also glimpses of community, resilience, and adaptability that suggest determined and flexible responses to these events. In this paper, I will trace how the catastrophes are constructed narratively in the *Chronicle of Zuqnīn*, and the different types of responses present in the text. By doing so, this paper aims to illuminate the complex dynamics following the earthquake of Nicopolis, and what the chronicle can tell us about how these events were understood contemporaneously, in the eighth century.

***

Jacob Lollar (Durham University): Foreign Waters: Understanding and Responding to the Floods of Edessa in Late Antique Historiography

Late antique Edessa had problems with flooding. The river Daisan that was channeled through the city had predictable periods of influx for which citizens were prepared. They also had unpredictable floods that caused significant amounts of damage to the city. These latter occasions are mentioned in various sources, both ecclesiastical and non-church affiliated histories/chronicles. Curiously, the representations of these occasional floods between the two types of sources tend to be different, privileging certain perspectives. The Christian sources (e.g., John of Ephesus, the *Chronicle of Zuqnīn*) frame these floods in theological terms: they are punishments for the sins of the (Christian) community of Edessa. The non-ecclesiastic sources (e.g., Procopius and the *Chronicle of Edessa*), although certainly written by Christians, tend to emphasise economic dimensions of the floods: the city was unprepared, poor strategic planning, poor building structures. In this paper, I will compare the accounts of these various histories and chronicles to highlight the ways in which late antique historians in the Eastern Roman Empire presented accounts of Edessa's periodic flooding in ideologically strategic ways, depending on the motives of the authors involved. There is no doubt that Edessa was subjected to destructive flooding. Why that was the case is contested, depending on what sources one reads.

***

Kristina Sessa (Ohio State University): Everyday Disasters in Late Antiquity

When we engage with disaster in Late Antiquity, we typically telescope the spectacular: earthquakes, tsunamis, plagues, and lengthy sieges. These kinds of phenomena grab our attention because they fit our definition of catastrophe: highly unusual, large-scale phenomena that strike vulnerable populations with little warning. But as scholars in the field of Disaster Studies have long underscored, the identification of an event or process as a disaster is itself an interpretive act – theirs and ours. In my talk, I'll discuss catastrophes that neither we nor our late ancient counterparts conventionally label(ed) as such. These are disasters that, in environmental humanist Rob Nixon's words, "are slow moving and long in the making, disasters that are anonymous and that star nobody…" (Slow Violence and the Environmentalism of the Poor (2011), 3.) Specifically, I'll focus on responses to more routine types of health and environmental crises, namely seasonal and chronic disease (e.g., malaria and helminth infection) and impacts from regionally inflected climate change, such as the documented flooding in the Po Valley and western Balkans. My paper will demonstrate that late Romans lived with hazards and deleterious environmental conditions, and will explore both their social responses to this quotidian reality and material evidence for their mitigation techniques, from dredging and building construction to ritual remedies.

***