Historic Landscape Archaeology: Approaches, Methods and Beneficiaries

## Trailer

What does the word ‘landscape’ mean? A magnificent mountain, a picturesque island, a tranquil lake? These are landscapes we can visit and admire. But landscapes are not only places we look at, they are also places where we live.

Ever since the Neolithic Revolution around 10,000 years ago, and even before, humans have used and shaped the landscapes around them through plant domestication, agriculture, animal breeding, and exploiting and modifying uncultivated places such as woods, rivers and marshes.

Over time, elements of landscapes have been created, re-structured, or abandoned, while others are used over centuries or millennia, resulting in landscapes which are now palimpsests reflecting many periods of history.

The layers of landscapes tell us stories of the past and so the term “historic landscape” evokes the time-depth of our seemingly “modern” countrysides and towns.

Archaeologists dig through these layers, unearth meaning, and reveal the histories of landscapes through different sources and methods.

By using innovative techniques of environmental archaeology such as soil or pollen studies, methods of remote sensing to identify landscapes from above, and more traditional sources like cadasters and historical maps and connecting this data with archaeological evidence and new dating techniques, we can understand how landscapes looked in the past and how they were managed and perceived by the people who lived in them.

I am Alexandra Chavarria, professor of Medieval Archaeology at the University of Padova and with me and other international expertsyou will learn about these methods for reconstructing and understanding historic landscapes and their dynamics of change. Focusing on southern Europe, we will explore the character of Mediterranean landscapes and also how knowledge of the history of a landscape can improve its protection and its sustainable use today. Finally, we will see how the involvement of local communities in the process of discovering, and managing their own landscapes can be crucial not only to their cultural, social and economic development but also to the research itself.

Journey with us and together, let’s dig deep into the fascinating history of Mediterranean landscapes.

WEEK 1. Approaches: What are landscapes?

# Activity 1: Introduction to the course

*For thousands of years, humans have created, re-structured, or abandoned elements in landscapes. Some have been used over centuries or millennia, resulting in palimpsests reflecting many periods of history. By using innovative techniques of environmental archaeology, methods of remote sensing and more traditional sources like cadasters and historical maps and by connecting this data with archaeological evidence and new dating techniques, archaeologists can understand how landscapes looked in the past and how they were managed and perceived by the people who lived in them. But first of all, let’s define landscapes and explore their value for individuals, states and the international community.*

## 1.1. Why study historical landscapes?

Landscapes are not only places we look at because of their beauty, they are also places where people has lived for thousands of years.

Over time, elements of landscapes have been created, re-structured, or abandoned, while others are used over centuries or millennia, resulting in landscapes which are now palimpsests reflecting many periods of history. The layers of landscapes tell us stories of the past and so the term “historic landscape” evokes the time-depth of our seemingly “modern” countryside and towns.

Unfortunately all over the world, historic landscapes are vanishing due to rapid climatic, economic, and demographic changes. For this reason an awareness of the need to identify and protect these landscapes is also on the rise. Archaeologists can understand how landscapes looked in the past and even how they were managed and perceived by the people who lived in them through diverse sources and methods such as the study of cadasters and historical maps, methods of remote sensing, techniques of environmental archaeology such as soil or pollen analysis and new dating techniques among many others.

Focusing on southern Europe, in this course you will explore the main characteristics of Mediterranean landscapes and also how knowledge of their history can improve its protection and its sustainable use today.

My name is Alexandra Chavarria and I was born in Barcelona, Spain. I am currently a professor of Medieval Archaeology at the University of Padova in Italy. My interests include the analysis of the material culture of the past, the application of new scientific methodologies to answer historical questions, participatory archaeology, and above all the communication of knowledge as widely as possible.

I’m Tamara Lewit, an Honorary Fellow at the University of Melbourne in Australia. I research late antique archaeology, particularly wine and oil making, and Alexandra and I have worked together on research and teaching about ancient landscapes for more than 20 years. I am also interested in making Roman archaeology accessible to children and have been the researcher for two children’s novels by author Anna Ciddor - The Boy Who Stepped Through Time and A Message Through Time.

*We’d like to dedicate a space for us to get to know each other a little better*

*To introduce yourself to us and the rest of the learners, please tell us:*

Who you are - where you’re from and what you do?

What inspired you to take this course?

Post your answer in the Comments section below.

## 1.2. Glossary

Biodiversity - the existence of a variety of plant and animal life in a habitat.

Cadaster - an official register for tax purposes of land ownership and values

Charcoal - a substance formed from incompletely burned wood (not to be confused with coal, a fossil fuel produced by mining). Charcoal can be created from partial burning of wooden objects or wood used as fuel, or can be created deliberately using controlled burning in order to produce an improved fuel.

Common land - land used by anyone in a community, rather than reserved for one owner, such as woods or pastures, and in Europe usually associated with medieval farming practices.

Geographic information system (GIS) - a system which maps data recorded in an associated database

HLC Historic Landscape Characterisation - a method of identifying the historic character of an area based on a whole whole landscape.

LiDAR - a remote sensing technique that scans the ground to determine the distance of an object or surface by using a laser pulse.

Palimpsest - in landscape archaeology refers to the traces of multiple, overlapping activities over different periods of time and the intermittent erasing of earlier traces.

Pangea - a single super-continent which existed 250 million years ago.

Resilience - the ability of a system (ecological or human) to adapt and bounce back after trauma such as environmental change or war.

Salterns - A place or building for producing salt

Sustainability - the extent to which a practice can be sustained over a long time without degrading its environment or exhausting resources.

UNESCO - The United Nations Educational, Scientific and Cultural Organization

**1.3. What are landscapes? (Video)**

Where does the word “landscape” or words such as “paisaje” in different Romance languages come from? What did they originally mean?This video introduces general points linked to this terminology as well as other concepts such as cultural landscape, traditional landscape and historic landscape.

**1.4. Value of landscapes - international and local (Reading)**

In the mid-20th century, national heritage legislation in Europe evolved in direct response to destruction during World War II. The creation of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 1945 signaled a collective international reaction to the narrow nationalism that had led to world-wide conflict and a desire to build international collaboration through education, science, and culture. This humanistic focus on culture and heritage as a way to cement greater international unity was also emphasized by the founding principles of the Council of Europe in 1949. These specifically identified the need to safeguard and ensure access to a common European cultural heritage.

Since then, a proliferation of international conventions, recommendations, and declarations have been formulated and their provisions incorporated into many national legislations. These are all based on a concept of common (universal) heritage, the need for heritage protection and regulation, and recognition of the social value of heritage.

This concept of a universal cultural heritage prompted selection of natural and cultural heritage sites of outstanding universal value and measures sharing international responsibility for conserving and preserving these sites for future generations.

*1972 The UNESCO Convention*

Cultural landscapes were included in the 1972 UNESCO Convention concerning the protection of the world’s cultural and natural heritage, and the first World Heritage sites to be listed in 1978 included the Historic Centre of Kraków (Poland), the Wieliczka and Bochnia Royal Salt Mines (Poland), and the Rock-Hewn Churches, Lalibela (Ethiopia).

The initial UNESCO operational guidelines of 1977 explicitly distinguished natural from cultural heritage sites and set separate criteria for their selection. The only overlaps were the references to ‘man’s interaction with his natural environment’ and to ‘exceptional combinations of natural and cultural elements’ in criteria ii and iii for natural heritage sites.

Cultural landscapes representing “the combined works of nature and of man” were for the first time included as a category in 1992. The first two cultural landscapes to be listed were the Uluru-Kata Tjuta National Park (Australia) and the Tongariro National Park (New Zealand), on the grounds of their spiritual and cultural significance to First Nations peoples. Although they had previously been nominated as natural heritage sites, this represented a growing recognition of non-European cultural heritage.

Today, more than 120 cultural landscapes are inscribed on the World Heritage List.

*2000 The European Landscape Convention*

Politicians and planners were called to address the impact of human activity on the environment by the 1995 Dobris Assessment of the European Environment Agency. This document, which aimed to assist decision making and raise public awareness, led to the European Landscape Convention, adopted by the Committee of Ministers of Culture and the Environment and signed in Florence on October 20, 2000. In this significant document, the signatory states agreed to promote the identification of landscapes in their territories, analysis of their characteristics, and assessment of the dynamics and pressures changing them over time.

A huge change in perspective compared to previous agreements was that the assessment of landscapes should take into account the value ​​attributed to them by the local populations: landscapes were defined as “part of the territory, as perceived by the populations, whose character derives from the action of natural and/or human factors and their interrelations” (Chapter I, article 1.a).

Landscape today relates directly to key issues such as governance, health and wellbeing, place attachment, and climate change.

Working through a landscape perspective makes landscape archaeologists relevant to a wide range of social and environmental challenges, as we will see in the last steps of this course.

*Further readings:*

<https://www.coe.int/en/web/landscape/text-of-the-european-landscape-convention>

<https://www.coe.int/en/web/conventions/full-list?module=treaty-detail&treatynum=176>

**1.5. Cultural Landscapes (Reading)**

The World Heritage List includes as cultural landscapes properties that are representative of the different regions of the world, as they combine works of nature and humankind and express the relationship between peoples and their natural environment. They are part of our cultural identity.

*Over to you*

What is your experience with UNESCO cultural landscapes? We’d like you to share your thoughts and experience by answering the following questions:

Do you live near any listed cultural landscapes?

If not, how many UNESCO cultural landscapes have you visited?

What was your experience and what do you think about their classification?

Look at the UNESCO webpage on cultural landscapes for further information.

# Activity 2: Defining landscapes

*In this section we will see how Mediterranean landscapes emerged and how they have been studied over the past 50 years. We will outline the evolution of methods for analyzing the complexity of landscapes in order to understand them from a historical point of view.*

## 1.6. From rocks to landscapes (Reading)

250 million years ago the Earth appeared very different: all the emerged land constituted a single super-continent, which has been termed Pangea, with a mainly tropical climate and on which animals - including reptiles, amphibians, and early mammals - could move from one end to the other without crossing seas or encountering oceans.

Ron Blakey, <https://deeptimemaps.com/>

Beginning 200 million years ago, the supercontinent Pangea began to break up into a system of separate land masses interspersed with seas. This ecosystem sank down to a thousand meters below sea level. The remains of this period can be precisely identified in calcareous stratifications characterized by the presence of fossil shells of ancient marine organisms.

After a hundred million years, roughly 60 million years ago, the continents of Africa and Europe, which had definitively separated, took on a mutually converging trajectory: as they approached each other, the interposed seabeds were crushed, corrugated and raised, so much so that already 30 million years ago the arm of the sea where the Alpine arc would later arise had already become extremely shallow and characterized by cliffs.

Tectonic activities underwent periods of particular dynamism due to the infiltration through cracks in the earth's crust of magma coming from the mantle, which have not only left substantial material traces in geological stratification in the form of volcanic rocks such as granites and basalts but, by releasing mineral acids into the soils, often also played a leading role in the development of some plant species which are important for humans. This was the case, for example, for the chestnut tree in the Alps, the cultivation of which was later spread by the Romans.

In the last 5 million years, Europe and Africa were united, and the former seabed that was the site of their collision became the mountain range in part known as the Alps. The converging of the European and African plates also closed the Strait of Gibraltar, making the Mediterranean a closed sea subject to a strong evaporation process, which is only partially offset by water supply from the great European and African rivers. The sea level therefore dropped by about 400-500 meters, and the rivers dug imposing valleys, today often partially submerged at their deepest point within the large lakes now at the foot of the Alps.

Around 20,000 years ago, this geomorphology was deeply modified by the Würmian Pleniglacial period: large glaciers advanced into the great river valleys such as the Adige Valley. Their retreat can still today be seen in northern Italy as it left moraines, cirques and gorges within an environment characterized by high mountains and a great variety of biomes. These range from low-lying agricultural land and marshes in the valleys to high altitude prairies, which correspond to different modes of human settlement and land use from nomadic exploitation to permanent agricultural settlements.

<https://www.youtube.com/watch?v=uLahVJNnoZ4>

<https://www.youtube.com/watch?v=OGdPqpzYD4o>

<https://www.youtube.com/watch?v=ADsjdu27WaM>

## 1.7. Changing approaches to landscapes (Reading)

From the end of the 19th century, geographers began to stress the importance of analyzing the interaction between humans and their environments. Later, mostly in the second half of the 20th century, the full potential of diachronic approaches to landscape history began to be realized with the development of methodologies for establishing the relative and absolute dating of field remains.

The term “landscape archaeology” was first used in Britain in the early 1970s, when Mick Aston and Trevor Rowley published the book *Landscape Archaeology: an introduction to fieldwork techniques on Post-Roman landscapes* (1974), encouraged by the development of field archaeology and the necessity of studying extensive, chronologically complex cultural landscapes.

The analytical approaches that they applied drew upon a wide range of sources and evidence (from maps, to written sources and material remains) in order to study the past of landscapes. Their research agenda moved beyond the study of fields and villages to examine expressions of power in the landscape, communications and boundaries, among other topics.

This approach recognised that landscapes are a product of many elements (including climate, soil, fauna and flora) but above all reflect the activities of humans: their social and economic organization, methods of farming, demographic growth or diminution of population and settlements, and their attitudes to nature.

Importantly, these pioneers recognised the significance of a deep time perspective. This went against traditional archaeological enquiry, which was firmly period-based and largely focussed on settlements, equating landscape with environment and considering it simply as a context for sites and monuments.

This is not to say that archaeologists ignored “landscapes” but from the 1970s and 1980s the “landscape” ceased to be simply a context for the “site” and became instead the subject of investigation in its own right.

The study of landscapes further developed in the early 1990s, within a predominant postmodernist approach which privileged ideological interpretation and social implications over economic and processual viewpoints. In relation to the emergence of post-processual approaches, the concept of space, as used in previous years, was challenged as being deterministic, modern and aculturally rational. As alternative, it was proposed that landscape should be understood as a social and cultural construction, something shaped, handled, appropriated and ordered in both material and conceptual terms. A Phenomenology of Landscape by C. Tilley (1994) is considered the landmark text, in which these ideas were developed in detail for the first time from an archaeological perspective. In this book, the relationship between humans and the landscape was no longer described in terms of adaptation or exploitation, but using different notions such as perception, experience or engagement.

*Archéogéographie*

Archéogéographie has developed mostly in France, based on or inspired by the *Annales* school of history. It focuses on analyzing the morphology of ancient fields (especially Roman and medieval) and their transformations over time and on reconstructing the social processes behind their formation. This archaeological tradition is based on the detailed reconnaissance and documentation of ancient structures currently visible in the landscape, with an intensive use of information sources such as aerial photography, the development of this tradition being closely related to their popularization in archaeology. Quite often, this is complemented with the use of documentary sources, such as historical cadasters. A large amount of archaeological research has been carried out within this framework, making it possible to reconstruct the forms of ancient agrarian spaces, especially for historical periods such as Roman or Medieval times, for which complementary written sources are abundant.

*Historic Landscape Characterisation*

In the 1990s, a particular research technique called Historic Landscape Characterisation came to the fore. HLC is a method of identifying and interpreting the historic character of an area that looks beyond individual heritage assets to understand a whole landscape and townscape. HLC is at the basis also for the methods used in Italy by landcape archaeologists.

HLC begins from the premise that all landscape is historic, and of interest and value. Therefore HLC studies and maps the predominant character of a specific area, whether that character is a product of the distant past or is of much more recent origin. This landscape character can range from field patterns, royal forests and common land to early twentieth-century conifer plantations, World War II airfields, 1960s golf courses, 1990s industrial estates and 21st century distribution complexes.

A review of the applications of HLC, *Using Historic Landscape Characterisation*, was produced by English Heritage (now Historic England) and the Lancashire County Council. It is available via the [Archaeology Data Service website](http://archaeologydataservice.ac.uk/archives/view/HLC/downloads.cfm) and an update is currently being prepared by Historic England.

Broad Historic Landscape Character Types employed are: enclosed land, unenclosed or unimproved land or woodland, orchards and horticulture, industrial activity, military, recreational, settlement, communications, and bodies of water.

The material HLC works with and produces is comprehensive and where a place has experienced much change it can be very complex. Consequently, HLC mapping is normally installed on a geographic information system (GIS). Attributes are recorded in an associated database that can be sorted to create custom-made maps that meet the needs of the user.

*Historic Urban Landscapes*

Since the beginning of the 21st century, the concept of landscape has also embraced study of large and small urban centers. As the result of a historic layering of cultural and natural values and attributes, this extends beyond “historic centers” (and their architectural elements) to include the broader urban context and its geographical setting. This wider context includes the site’s topography, geomorphology and natural features, built environment – both historic and contemporary – open spaces, land use patterns and spatial organization, as well as all other elements of the urban structure. Social and cultural practices and values, economic processes and the intangible dimensions of heritage are also at the heart of the identity and character of the city.

In 2011 the UNESCO General Conference adopted the Recommendation on the Historic Urban Landscape, which provides the basis for a comprehensive and integrated approach to the identification, assessment, conservation and management of historic urban landscapes. It promotes an holistic approach including awareness of chronological and therefore stratigraphic depth and of the link between natural and cultural factors in the conservation of the built environment.

<http://www.historicurbanlandscape.com/index.php?classid=5352&id=29&t=show>

*New Frontiers*

The discipline has expanded rapidly in the 21st century and has seen a boom in scientific approaches to environmental analysis, integrating paleoecology and geomorphology among other environmental sciences in order to better understand soil types and vegetation. At the same time, the evolution of dating techniques (which allow dating of terraces, for example) has also revealed the complex evolution of landscapes caused by anthropic and climatic change in the long term. Both elements have made it possible to incorporate archaeological perspectives into wider debates about landscapes, such as environmental change and human impact. In this sense, Landscape Archaeology can aspire to play a role in the politics of sustainability, contributing towards a participatory construction and management of landscapes as Cultural Heritage.

New techniques of remote sensing have also become increasingly popular for landscape archaeologists around the world. These are non-destructive tools based on aerial and satellite images which allow searching and mapping at multiple scales, and rapid analysis of multi-source data sets. They enable us to develop comprehensive research at the landscape scale with increasing levels of detail and accuracy, but at the same time pose challenging problems for data management and processing that AI has only just begun to address.

## 1.8. Quiz

What is landscape archaeology?

A) The study of changes in natural elements such as climate, soil, fauna and flora.

B) The study of landscapes as products of human activity, including social and economic organization, methods of farming, demographic trends, and attitudes towards nature.

C) A form of archaeology that equates landscape with the environment and considers it simply as a context for sites and monuments.

Answer: B) It is a form of archaeology that studies landscapes as products of human activity, including social and economic organization, methods of farming, demographic trends, and attitudes towards nature.

Prompts for incorrect answers:

these are fields of natural sciences not archaeology, although archaeology should take them into account

C) this is a more traditional approach, which preceded the development of landscape archaeology

What is Historic Landscape Characterisation (HLC)?

A. A method of identification of different cultural heritage assets within a region

B. A geographic information system for creating maps

C. A method of research which examines the character of a landscape based on its history

Answer: C. A method of research which examines the character of a landscape based on its history

Prompts for incorrect answers:

HLC looks beyond individual heritage assets to understand the whole landscape and townscape

Although HLC can include mapping, it goes beyond this

3. landscape archaeology can be of most relevance to which current global issue?

migration

climate change

political conflict

gender equality

Answer: B. Correct. Environmental analysis through time can be important to understanding climate change and human impact in both past and present.

Prompts for incorrect answers:

Incorrect. Although landscape archaeology may reflect the impact of past migration, there is another contemporary issue to which it is more directly relevant.

C. Incorrect. Although landscape archaeology may reflect the impact of past political conflicts, there is another contemporary issue to which it is more directly relevant.

D. Incorrect. Although landscape archaeology may reflect the impact of past gender roles, there is another contemporary issue to which it is more directly relevant.

# Activity 3: Deconstructing landscapes

*In this section we will see how landscapes are made of many different elements, and how these can emerge, develop, change, disappear, or alter in form over time. We will outline methods for deconstructing and reconstructing the complexity of landscapes in order to understand them from a historical point of view.*

## 1.9. Deconstructing landscapes (Reading)

A “historic landscape” is not just a collection of individual elements, but a "Gestalt", a whole that is more than the sum of its parts. Each element of the landscape can be analyzed separately, but gains its meaning and value only in connection with the surrounding elements.

Historic landscapes exist in relation to specific natural environments. They consist of a complex system of exploitation of resources (agricultural land, pasture, woodland, or mining) made possible by connective infrastructure (paths, roads and canals), settlements (farms, villages and cities) and centers of administration (which can sometimes take the form of fortified settlements), and by social and cultural interaction, often represented by religious buildings or spaces with particular significance. All these elements of the complex system gain added meaning when considered in relationship to each other rather than individually.

*Infrastructures*

Infrastructure defines the connectivity of a territory and consists mainly of road and river networks, for which we first need to establish a hierarchy. In written sources and maps, roads are classified according to the routes within or connecting large territories such as countries, shared paths managed by owners of adjoining land and, finally, private routes inside individual properties. Similarly, river networks have their own hierarchy: rivers with regional or inter-regional courses are managed by the state, while smaller rivers may be the responsibility of a city. Finally, water systems such as irrigation channels were managed by local communities or intercommunal consortia.

Infrastructure determines the degree of interconnection between different places within a region, across regions and at the national level.

In other words, infrastructure defines nodality (at the intersections of a communication network) or marginality .

*Settlements*

Settlements, the core interest of geographers from the 19th century and archaeologists from at least the 1930s, are often classified as dispersed (one or more buildings to a rural property) or nucleated (more or less complex and with more functions). They can be studied as a sequence, including attention to such topics as architecture and town planning.

It is possible to outline various stages of evolution of complex settlements, such as towns and cities. The history of many cities of Western Europe saw progressive phases of urban planning (particularly during proto-historic and Roman times), followed by fundamental transformations that led to the development of the towns and cities of the medieval and modern ages. In many cases, medieval cities still survive today as historic town centers within a wider megalopolis on a very different model.

Defense systems also create and mold landscapes. In cities, they separate a central urban space from suburbs. In the countryside, defensive elements are sometimes the center of new landscapes or divide them, for example by blocking routes.

*Agricultural areas*

In order to survive, if it is not to be totally dependent on other places, a settlement must have its own resources including agricultural and uncultivated land, and potential for craft production and exchange.

Agricultural landscapes are easily identifiable and have been the focus of great interest. Initially studied in terms of land divisions of the Roman period (centuriation), agricultural landscapes are now increasingly studied from a diachronic perspective and distinctions can be made according to those who managed them:

(a) a higher authority (city or state) if the area concerned is very large (and involving many communities) or if there are technical issues of land management (e.g. drainage) or the aim of controlling particular resources such as mines, salt or wood.

Private entities such as monasteries were also able sometimes to achieve large-scale reorganization of land;

(b) local communities, carrying out smaller initiatives. A new village can be founded when land is brought into cultivation to feed its new inhabitants. Alternatively, the agricultural landscape can result from progressive interventions, land clearance and reclamation. In agrarian landscapes of medium size we can seldom identify the community or aristocratic agents and frequently only written sources can inform us;

(c) individuals, in proportion to their economic power.

*Uncultivated areas*

More recently researchers have begun to study uncultivated areas, where a large variety of economic activities were carried out: animal pasturing and foraging; hunting; the exploitation of woodlands for wood, resin, fruits, nuts, etc., and of wetlands for fishing and salt; foraging for wild dye and food or medicinal plants; and mining and quarrying.

Woodland has always played an important role in society, fulfilling a variety of needs. Woodland has had an economic function, providing wood for construction and fuel for domestic, craft or industrial use; recreational use for hunting, hiking, sports, mushroom picking, etc.; or even functioned as a refuge and place of protection, both for humans (as in the tales of Robin Hood) and for biodiversity.

Before the industrial revolution, wood was an essential element in everyday life. Conflicts over the supply of timber to meet the needs of society were numerous, so forestry regulations and concrete institutions to manage the exploitation of this essential raw material developed. Like meadows or agricultural land, woodlands are necessary to society, and woodland landscapes are still evolving today as social pressures contribute to their transformation.

Historically, management of uncultivated areas required rules and coordination at different levels, which are evident from written sources and from customs that were maintained until very recently in mountain areas.

Authorities dictated the rules of transhumance and the seasonal driving of flocks. Similarly, fishing in rivers and lakes was subject to annual concessions or auctions. On the other hand, it was local communities which often established the ownership of uncultivated areas as property and their mode of exploitation.

Individuals could freely engage in activities which were not regulated, such as the collection of berries or edible herbs.

*Production processes and power sources*

Production processes differ according to the form of energy used: animals (as in olive mills), water (in water mills), wind (in windmills) or fire (in metallurgical furnaces or forges, often combined with use of water power). The impact of production facilities on the landscape is sometimes remarkable: water wheels used basins and channels to harness water power. Furnaces were not located near the source of the raw material to be processed, but close to fuel (wood) sources, often found far away and which represented about half of the final cost of a product. Quarries and mines impact equally on landscapes and require special access roads, disrupting substantial areas, particularly in mountainous regions where significant residues accumulate on slopes.

*Sacred and symbolic landscapes*

The durability of an economic system depends on the organization of a settlement and its social cohesion, which in turn is based on religion and on a common identity. Places full of symbolic meanings construct the identity of a historic landscape. For example, since the Iron Age, in the alpine areas and foothills of northern Italy, places of worship were built on high ground in a dominant position. This not only gave them greater visibility, but also marked out the different communities that had built them. In the Middle Ages, churches were not only a form of Christian topography, but were places to meet and socialize. The impact of churches was even stronger in urban landscapes but major agricultural and engineering works were also developed by large monasteries in land reclaimed from forests and wetlands. Churches, however, were not the only symbolic elements in a given place: place of assembly or judicial sites, funerary places, mountain summits, river sources, springs and other natural elements often together form a theater of narratives that consolidate local memories.

## 1.10. Landscapes through time (Discussion)

Look at this image (i) and try to identify different features of this landscape (land use patterns, infrastructure, settlements, religious buildings, natural features). If you think you know the answers, post some hints for your fellow students!

Look at this second image (ii). Again, try to identify different features of this landscape, but also observe how the features have changed through time and why. If you think you know the answers, post some hints for your fellow students!

Can you identify the chronological period of each phase? If you think you know the answers, post some hints for your fellow students!

## 1.11. Synthesis and feedback (Discussion)

Since the last decades of the 20th century, landscapes have ceased to be seen simply as a context for separate sites studied by archaeologists (a mere “container” for archaeological elements) and have instead become the subject of investigation in their own right, based on new scientific approaches to environmental analysis, the evolution of dating techniques and new methods for creating detailed images of landscapes using remote sensing tools.

Historic landscapes are today understood as a complex system of exploitation of resources (agricultural land, pasture, woodland, or mining) made possible by connective infrastructure (paths, roads and canals), settlements (farms, villages and cities), central places, and by social and cultural interaction, often represented by religious buildings or spaces with particular significance for the population. All these elements of the complex system gain added meaning when considered in relationship to each other rather than individually.

Some elements of landscapes were at different times abandoned, re-occupied or re-structured, others were newly created, while some features have continued to the present day, resulting in a palimpsest with features of many periods, although they coexist in our seemingly “modern” countryside and townscapes. By using stratigraphic methods, these elements and changes to them can be deciphered and understood by landscape archaeologists.

Look out your window (or walk out your front door) and think about what you are seeing as a “historic landscape”. What elements can you see? Do they have economic, social, religious/cultural functions , or a combination? How do they relate to each other? How old are the different elements? Are they all the same age, or is there a palimpsest of different periods of creation and use or changed use?

## 1.12. Annotated reading list (Discussion)

During recent decades there has been a huge number of publications related to landscape archaeology, including handbooks and syntheses.

Among many others, we recommend the general perspective with international authors in A. Chavarria Arnau and A. Reynolds (eds.), *Detecting and Understanding Historical Landscapes*, Mantova, 2015. This provides a synthesis of some of the main methods and perspectives that have been developed in this MOOC. Many papers in the handbook have also been added as further reading in the different chapters.

To deepen your understanding of tools and methodologies currently used in landscape analysis, see: C. Corsi et al. (eds.), *Good Practice in Archaeological Diagnostic*s, Natural Science in Archaeology, 113, Springer International Publishing Switzerland 2013.

An easy and beautifully illustrated introduction to LiDAR is provided in *The light Fantastic. Using Airborne Lidar in Archaeological Survey*, by Simon Crutchley.

We personally very much like the British landscape historical studies published by Stephen Rippon.

A good provocative discussion on the role of official institutions and discourse around cultural heritage can be found in: Meskell, L. 2018. *A Future in Ruins. UNESCO, World Heritage, and the Dream of Peace*. Oxford: Oxford University Press.

Many papers developing methods, tools and reflections on the beneficiaries of

landscape archaeology, including community and participatory approaches, have been published in the open access journal *Post-Classical Archaeologies*, which you can find at [www.postclassical.it](http://www.postclassical.it).

Week 2: Tools and Methods

# Activity 1: Stratigraphy in landscape archaeology

*Stratigraphy is a fundamental concept in* [*archaeological*](https://en.wikipedia.org/wiki/Archaeology) *theory and practice, whether for excavation, building analysis or historical landscape reconstruction. Therefore learning how it functions is a key step in understanding landscape archaeology.*

## 2.1. Documenting a sequence (Reading)

Scientific archaeological excavation is based on the concept of stratigraphy. Pioneered particularly by British archaeologist Sir Mortimer Wheeler in the first half of the 20th century, the concept is based on two fundamental principles ultimately derived from geology:

* Firstly, the [principle of superposition](https://en.wikipedia.org/wiki/Law_of_superposition), according to which in any series of layers the upper layers are younger and the lower layers are older, with each layer of archaeological material deposited on top of older material or created by its removal.
* Secondly, the principle that the “terminus post quem” (time after which) of each layer is the date of the most recent artifact discovered in that layer, and therefore it can only be dated to this date or later.

From these two principles, relative dating of artifacts and their typologies can be established, even in the absence of absolute dating.

This approach to stratigraphy relied on the stratigraphic profile, a system by which layers were represented in a technical diagram showing their physical - and therefore chronological - relationship.

A further development to the concepts of stratigraphy was set out by [E.C. Harris](https://en.wikipedia.org/wiki/Edward_Harris_(archaeologist)) in 1979 in his seminal work, *Principles of Archaeological Stratigraphy*. Harris aimed to develop methods for recording more complex site stratigraphies in terms of depth of deposits, length and width of surface areas, and relative time sequence.

In a 1979 issue of *World Archaeology*, Harris further proposed three additional “laws” of stratigraphy:

The Law of Original H[orizontality](https://en.wikipedia.org/wiki/Principle_of_original_horizontality) - “any archaeological layer deposited in an unconsolidated form will tend towards a horizontal disposition. Strata which are found with tilted surfaces were so originally deposited, or lie in conformity with the contours of a pre-existing basin of deposition”.

The Law [of Original Continuity](https://en.wikipedia.org/wiki/Principle_of_lateral_continuity) - “any archaeological deposit, as originally laid down, will be bounded by a basin of deposition, or will thin down to a feather-edge. Therefore, if any edge of the deposit is exposed in a vertical plane view, a part of its original extent must have been removed by excavation or [erosion](https://en.wikipedia.org/wiki/Erosion): its continuity must be sought, or its absence explained”.

The Law of Stratigraphical Succession - “any given unit of archaeological stratification takes its place in the [stratigraphic](https://en.wikipedia.org/wiki/Stratigraphy) sequence of a site from its position between the undermost of all units which lie above it and the uppermost of all those units which lie below it and with which it has a physical contact”.

Link to Harris 1979 (download book free) <http://harrismatrix.com/about-the-matrix/>

Archaeology first established the chronological relationships between the layers of buried deposits; later, this stratigraphic method was adapted to apply to standing buildings in order to identify their transformations, and, finally, to the study of historic landscapes.

All the elements of historic landscapes have an origin (their construction), a duration (their period of use), and an end (although in some cases an element such as a road or a cultivated field may still be in use, although changed, after many centuries or even millennia). Traces of multiple, overlapping activities over variable periods of time and the variable erasing of earlier traces is what archaeologists call a palimpsest.

Each element can be investigated in terms of its whole “life”: an agricultural land division can be traced from its construction until its end, a transhumance path from its inception to decommission. Agricultural and uncultivated landscapes that no longer exist can be recognized only through survey or excavation. Structures preserved above ground, whether individual buildings or entire settlements, can be studied using the methods of the archaeology of buildings.

As with excavation or building stratigraphy, all elements of a given historic landscape must be identified and numbered progressively, in order to establish the stratigraphic relationships between them.

Finally they can be ordered in a sequence diagram, based on historical data (the field data, information such as a local name, and written sources).

The ultimate goal is to build a diachronic sequence of roads, paths, field systems, villages and isolated farmsteads, craft buildings and uncultivated areas.

## 

## 2.2. Think like an archaeologist: Find the layers

Look at the drawings and number the different stratigraphic units that you see. Remember you can identify them by their color, consistency and components.

Then try to construct a diagram to order the numbers in a chronological sequence.

# Activity 2: Maps

*Ancient cartography, mostly that created from the 18th century onwards, is the basis for retrospective analysis and reconstruction of ancient landscapes. Therefore understanding what to look at and how to read maps is fundamental to any historical landscape study*

## 2.3. Reconstructing historic landscapes: From maps to remote sensing (Video)

The validity of our reconstruction of a certain historic landscape depends on the quantity and quality of data available and on our capacity to integrate information from different sources and use various methods, from remote sensing to ancient maps, surveys and analysis of soils, archaeological material and preserved architecture from the past.

Many landscape archaeologists begin research with “retrogressive analysis” applied to the study of field systems, field-names and settlement plans. The process starts with the most recent maps, and as one moves retrogressively back through the earlier sources, modern features are gradually peeled away, and older features that have been lost can be restored to view.

Through written sources and historical cartography, especially land registers and summaries of the late nineteenth century, landscape studies can reconstruct the characteristics of the various properties.

The nineteenth century summaries indicate on a map each parcel of land, with a number, the initials of its owner, how it is used and its census income. The study of these documents therefore allows us to understand the extent of individual properties and to make a quantitative analysis of the land parcels.

Place names found in historical cartography also allow the identification of geographical characteristics of a region, its flora and fauna and the presence of buildings for worship or relating to its religious life, and therefore provide us with useful data for understanding the historical landscape and its evolution

LiDAR (an acronym for Light Detection and Ranging or Laser Imaging Detection and Ranging) is a remote sensing technique that scans the ground to determine the distance of an object or surface by using a laser pulse. This generates a digital reconstruction of the surface by identifying relief elements relating to landscape features or archaeological sites.

LiDAR is extremely useful in areas with dense vegetation as it penetrates the wood mantle and identifies terracing, roads and buildings in the landscape. Using LiDAR enables us to establish the extent of settlements and locate their built structures in order to plan field surveys or excavations.

On the other hand, the use of archaeological excavation and trenches helps us to deepen our understanding of the historical sequence of sites by understanding its chronology and analyzing soils and therefore to learn more about the particular features of agricultural and forested land.

## 2.4. Historical maps and place names (Reading)

From the eighteenth and particularly the nineteenth century, the technical ability to create precise and detailed maps of a territory was developed. There was increasing awareness of the strategic importance of having reliable representations of territories, both for military purposes, such as planning the movements and disposition of troops, and for civil purposes, such as planning the reclamation of an area, or taking a census of land properties for more efficient taxation.

Today, we have rich collections of these old maps, which are outstanding in quality and clarity, showing us territories in which the cities were still enclosed within circles of walls, the roads radiating from them, and uncontrolled rivers run through the countryside with often wide and changeable riverbeds. Maps of the first half of the twentieth century still document rural landscapes prior to the great demographic expansion, in some respects closer to those of the Iron Age, Roman and medieval periods than to those of the present. In historical cartography, many natural landscape features such as ancient river beds can still be recognized, as well as anthropic ones, such as ancient castle ditches, which have been irretrievably erased by recent decades of economic development

Historical place names - also known as toponyms - tell us about the details of a past landscape and therefore represent a very valuable source for the landscape archaeologist. Place names help us to reconstruct landscapes, the economic activities carried out within them, their social or religious significance and also give us an insight into how people understood and interacted with their environment.

Place-names were developed on the basis of local conditions and social structures, and to communicate meaningful information about how people experienced their landscape to those who encountered them.

In the contemporary world, many place-names have lost these meanings and have become simply labels for a geographic location. Only what are termed “major-names” – those of towns and villages, parishes, rivers etc. - are widely known. The minor names which used to be applied to individual landscape features such as local fields are mostly lost, along with their underlying meaning, due to complex processes of transmission and phonetic evolution which have altered the form and pronunciation of names and therefore their general understanding.

In using place-names, landscape archaeologists recognise that their meanings were once of great importance.

Place-names found on historical maps identify the individual elements of an ecosystem: morphology, vegetation, climate and environmental evolution; resources such as springs, marshes, quarries, woods, arable land, animal pastures or hunting land; road networks; land reclamation; water regulation, canalization or irrigation; and parcelization of land, whether planned, as in the case of Roman centuriation, or ad hoc.

Place-names on maps also refer to residences and changes of ownership in the case of micro toponyms; defensive structures such as castles, fortresses, or fortified places; religious buildings; productive elements such as paper mills, spinning mills, tanneries, brick kilns, forges, limekilns, kilns or piles for making charcoal; and the locations of structures associated with hunting, such as barriers formed by wooden branches, nets, snares for fowling or fish traps.

## 2.5. Think like an archaeologist: Map the past (Discussion)

In this discussion, you’ll have to think like an archaeologist!

Use the drawings, Italian names, or abbreviations on these historical maps to find toponyms which refer to landscape features such as a lake, valley, mountain or hill, plain, tower, bridge, water mill, woodland, church or monastery, field, thermal springs, rocky prominence, or vineyard. Post some answers or hints for your fellow learners.

## 2.6. The Domesday Book (Reading)

### *What is the Domesday Book?*

The Domesday Book is an invaluable record of British landscapes in the 11th century. In December 1085, nearly 20 years after his conquest of the kingdom of England, King William I commissioned a survey of all land holding in the kingdom. Its purpose is debated, but was perhaps to calculate what taxes or perhaps feudal dues and services were owed to him. When completed it was stored in the Royal Treasury.

A first and most detailed draft survives for the counties of Essex, Norfolk and Suffolk, in 475 parchment pages known as “[Little Domesday](https://www.nationalarchives.gov.uk/domesday/discover-domesday/little-domesday.htm)”. An edited and more summarised draft, which includes more counties but is unfinished, survives in 413 parchment pages known as “[Great Domesday](https://www.nationalarchives.gov.uk/domesday/discover-domesday/great-domesday.htm)”. Radiocarbon dating has confirmed that these are original copies dating to the 11th century. The name “Domesday” (or Doomsday), referring to the idea of a final judgement, was first used about a century later, but at the time it was simply called a “descriptio” (description) or the “King’s book”. It is written in Latin.

### *What does the Domesday Book tell us?*

Information recorded included the name of each manor (the main unit of land holding); its owner and size; the number of its slaves, and of free and bound peasants of various statuses (who owed the lord rents in kind or a number of days of labour each week but who also farmed land for themselves); how much land each farmed; what woods, meadows, pasture land, mills, and fisheries existed on the manor land; and the worth of the manor. According to these records, the Church held over one quarter of the land in England and another quarter was held by about a dozen leading noblemen. The records also included changes over time between the reign of the previous King Edward (1066) and the date of the survey (1086).

An example of a Domesday Book entry with explanation is provided [here](https://www.nationalarchives.gov.uk/domesday/discover-domesday/interpreting-domesday.htm):

<https://www.nationalarchives.gov.uk/domesday/discover-domesday/interpreting-domesday.htm>

### *What does the Domesday Book tell us about landscapes?*

Some of the landscapes listed in the Domesday Book include:

* Meadows - open grassland used for hay, usually alongside a river or marsh
* Pasture - land used to graze animals (mainly sheep and oxen), including land with common grazing rights;
* Ploughed land - approximately 35% of land is listed as arable land under cultivation for crops
* Woodland - approximately 15% of land is listed as 'wood for fuel', 'wood for fences', 'wood for salt-pans' or as land to fatten pigs
* Wasteland - lands where farming had been destroyed by warfare or deliberately set aside for elite and royal hunting.
* Fortified towns and salt-working towns
* Castles - 48 are recorded in Great Domesday, perhaps the most important royal castles
* Vineyards - 45 re recorded, some newly-planted in response to elite Norman demand, since beer was the more common drink in Anglo-Saxon and earlier England
* Fisheries - both fresh-water and coastal, with eels,salmon and herring the most noted products
* Water mills - more than 6000 mills for processing grain are recorded
* Lead mines - only a few are noted but more must have existed
* Stone quarries - only a few are noted but more must have existed

### *To learn more:*

Further details and discussion can be found here <https://www.nationalarchives.gov.uk/domesday/world-of-domesday/landscape.htm>

<https://www.nationalarchives.gov.uk/domesday/world-of-domesday/towns.htm>

and here

<https://www.domesdaybook.net/home>

You can see maps of all the fisheries, meadows, mills, salthouses and woodlands listed here

<https://opendomesday.org/map/>

and also access a searchable database and facsimiles here

<https://opendomesday.org/>

## 2.7. Reading between the lines of the Domesday Book (Discussion)

### Extracts from the section of the Domesday book for Patcham in the administrative region (“hundred”) of Preston (in the county of Sussex):

In Preston Hundred:

William [of Warenne] holds Patcham as his manor …

in his demesne 8 carucates.

163 *villani* and 45 *bordarii* with 82 carucates;

A church;

6 slaves;

10 shepherds;

84 acres of meadowland;

Woodland [for] 100 pigs …

### Vocabulary:

Acres - approximately 4000 square meters

*Bordarii*: peasants farming a small amount of land, of slightly lower status than *villani*

Carucate: the amount of cultivated land that can be plowed by a team of eight oxen, equivalent to approximately 100 acres

Demesne: the area of land retained by the lord as a home farm for his own use (pronounced “domain”).

Meadowland: grassland used for hay

*Villani*: peasants farming a small amount of land

### Questions:

What different types of land-use are recorded?

What landscape elements apart from farming are recorded?

What animals are either directly or indirectly attested?

What is the relative proportion of land dedicated to meadows and to cultivation of crops?

What is the average area of land cultivated by *villani* and *bordarii?*

How big is William's demesne?

Post your answers or hints to your fellow learners in the chat

# Activity 3: From paper to computer

## 2.8. Seeing without digging: Remotely sensed imagery and ground based non-invasive subsurface mapping techniques

There are different techniques and cartographical sources which can be used to survey landscapes and locate archaeological sites, features, and artifacts without excavation. Many of them have been used since the mid 20th century, while others have been developed more recently. Today, constitute the essential toolkit to analyze and understand large portions of land.

Aerial photography is a productive archaeological prospection method, which in favorable circumstances can identify a wide range of site types, assist landscape management, and provide environmental information. It often provides the principal record and hence framework for different types of archaeology and for understanding spatial relationships within particular landscapes.

Because aerial photography relies on sunlight for illumination, shadows can be problematic. Successful photography is limited to the time of year and time of day, when the sun’s angle is right to reveal the archaeological site, which may occur only infrequently.

One way out of this problem is the use of airborne laser altimetry, also known as LiDAR (Light Detection And Ranging), a system that uses laser light to produce high-resolution digital models of a terrain and subsurface. LiDAR works by emitting laser pulses and measuring the time it takes for the pulses to bounce back to the sensor, collecting data on topography and other physical features which might sometimes be buried, and which can be used to create 3D maps. It can be extremely useful in large wooded areas as it makes trees virtually disappear, showing not only architectural features belonging to settlements or fortifications, as well as terracing, ditches, irrigation channels, land divisions etc.

Multispectral imagery (MSI) is a remote sensing technology that collects and analyzes data from multiple spectral bands or ranges of the electromagnetic spectrum. MSI data can be collected from satellites or aircraft, making it useful for large-scale prospection and for mapping. The multiple spectral bands allow for the detection of different materials and their variations in reflectance, which can reveal features associated with soil disturbances: crop-marks, walls, or buried artifacts.

Satellite imagery can also play an important part in providing information for areas of the world that are difficult to access or lack detailed conventional topographical mapping, and thus provide a supporting role in archaeological surveys. Satellite imagery has been used to examine archaeological sites (and their destruction) in regions which are inaccessible to air or ground-based survey due to warfare or political conflict. It can also be a means of investigating areas which are inaccessible due to the nature of the terrain, such as tropical forests. It has proved particularly useful for the investigation of desert environments due to their lack of vegetation.

Non invasive investigation and mapping can also be carried out on the ground, with techniques known as ground-based noninvasive subsurface mapping techniques. These techniques include geomagnetic (magnetometry and topsoil magnetic susceptibility), geoelectrical (earth resistivity and electrical imaging), and electromagnetic survey, including georadar (ground penetrating radar).

Magnetometry is a technique that measures the Earth's magnetic field to detect changes in the soil caused by buried artifacts or structures. Landscape archaeologists can use this method to identify structures such as grain silos or food storage pits, hearths and ovens, and craft activities such as metallurgy or pottery production.

Structures can also cause magnetic enhancement of the topsoil, which can be recorded through Topsoil Magnetic Susceptibility. However, this is only possible where there has been intense occupation over a long period, and is less successful in identifying temporary or non-settlement activity such as funerary sites. (image 2.8.18)

Soil resistivity works by passing an electric current through the ground and mapping areas of high electrical resistance or low electrical resistance compared with background levels. Dense and dry features such as stone will resist the electric current, whereas porous wet features such as ditches will conduct the electric current more readily.

Ground Penetrating Radar (GPR) works by sending electromagnetic pulses into the ground. Their reflection from interfaces indicates changes in the electromagnetic properties of the subsurface. This can detect and map stone structures and also empty spaces such as ditches and pits. (images 2.8.14, 2.8.15, 2.8.20, 2.8.21, 2.8.22)

Geochemical Survey can discover more than the physical features of a landscape, potentially indicating its past use. Inputs of organic matter result in the presence of phosphate. Sites can be sampled at different points to compare the natural soil profile with that of other samples in laboratory analysis. However, this can be a slow and physically demanding process. Although new portable X-ray fluorescence (XRF) instruments can be used in the field to analyze elements in the soil without its manual transportation to the lab in the field, these are expensive and potentially less precise.

Data collected by any or all of these methods can be used within a geographical information system (GIS) as the basis for moving on to a higher level of analysis and, arguably, more significant interpretation at the landscape level than any individual geophysical survey, aerial photograph, or satellite image can hope to achieve.

The extraction of archaeologically meaningful results from such large data sets without assistance from automated classification systems (to digitize all the information, for example) may be very - or impossibly - time-consuming, or even perhaps beyond human interpretative abilities, and so it is in this area that major advances need to be made if we are to reap the benefits of the comprehensive subsurface, air-borne, and satellite remote-sensing data that are increasingly becoming available to the landscape archaeologist.

Over the past decade, archaeologists have adopted more thoroughly automated object detection approaches or AI. These approaches include object detection methods such as machine learning (ML), and deep learning (DL) algorithms, as well as convolutional neural networks (CNN).

Currently, AI can be used in a variety of ways in order to:

analyze images from remote sensing methods (aerial or satellite photography and LiDAR) or cartographic sources (maps and cadasters) in order to identify patterns, anomalies, and potential archaeological sites;

create predictive models to identify areas with a high potential for particular elements, based on historical data, topographical information, and other relevant factors;

manage a large quantity of archaeological data, such as geospatial information, drawings, photographs, and excavation records, to facilitate searches and analysis;

create 3D reconstructions of landscapes, helping researchers to visualize and understand them.

By incorporating AI technologies, landscape archaeologists can automate some tasks and analyze large amounts of data, increasing their efficiency, reducing the time and cost involved in data analysis, and gaining new insights.

**2.9 Think like an archaeologist: See the past (Discussion)**

Look and compare these maps, aerial and LiDAR images and think about what they each show

# Activity 4: Case Study

## 2.10. Insular Mediterranean landscapes: The island of Rab (Video)

Islands have a particular character as self-contained microcosms, with clearly defined boundaries. From a historical and cultural point of view, Mediterranean islands have also been crucial nodes in commercial networks due to their location along maritime routes.

They are often dismissed as marginal because of their limited resources and productive capacity in comparison to the mainland.

However, their very marginality makes them ideal places to study the ways in which biological or human communities have adapted to their environment, as Charles Darwin showed in his revolutionary theory of evolution inspired by the Galapagos islands.

For these reasons, the island of Rab off the coast of Croatia is an excellent case study for the analysis of relict landscapes.

(Mia Rizner) This island is characterized by a variety of geomorphological ecosystems including eastern uplands with terraced slopes, central lowlands used for a mixed farming of grapevines, olive trees and cereals, and north-western areas which are only partially cultivable and are therefore used for sheep and goat breeding and the exploitation of bauxite.

During the 20th century, the traditional economy based on cultivation combined with sheep and goat pastoralism was abandoned, and the island’s economy, now based on tourism, is characterized by rampant urban development and seasonality. Mediterranean maquis vegetation now covers large areas of the island where the archaeological remains show that there were once flourishing agriculture, settlements and roads.

By using cadastral maps, aerial photographs, remote sensing and field survey, we can gather a wealth of evidence from different periods to reconstruct the historical landscapes of the island since prehistoric times, including its agropastoral systems.

We can start our study with the oldest preserved cadaster for the island, created during the 1820s by the Austrian government for fiscal use. The cadaster lists the crops cultivated at the time, and probably for hundreds of years previously since the rate of change in the landscape was incomparably slower than it is today.

Aerial photos acquired by the Italian Military Geographic Institute in 1941 reveal an impressive array of archaeological features such as field systems and fences attesting land exploitation.

Remote sensing analysis has also enabled targeted field survey to verify the nature of features, collect chronological evidence and to establish a relative sequence of land division.

The results of the investigations show a range of historic landscapes adapted to the topographical conditions of the island.

The first type of landscape is upland agro-pastoralism. An early example is a round Bronze Age hillfort in northern Rab, in the south-western area of ​​the Lopar peninsula. In the locality of Jamina, aerial photos from 1941 show structures and several retaining walls which suggest exploitation of the slopes for agriculture.

An extensive network of dry-stone walls forming different field systems has been mapped in the eastern uplands. The first land division in this region is attested by an early phase of sub-circular wall structures. A cluster of small structures has been interpreted as dwellings and animal pens. Small areas cleared of stones, enclosed by stone fences and close to a large pond of water, provided grazing for livestock. Some larger enclosures were cleared for cultivation of crops. Thus, the system reflects an agro-pastoral economy in which animal grazing was combined with subsistence agriculture.

Due to continual rebuilding, it is hard to date individual elements of this landscape system: although it possibly originated during the Neolithic, it was constantly adapted and was still in use relatively recently. The dry stone wall system is clearly shown in the early 19th century historical cadaster and is still visible in aerial photographs and field surveys.

In the flat or moderately sloped terrains of the island, the Roman presence is attested by a regular grid of land parcels, Roman villas and the towns of Lopar and Roman Arba (now Rab).

The island’s shallow coastal bays formed of flysch sediments are an ideal landscape for salt production. There were several documented [salterns](https://justpronounce.com/english/salterns) and three are well preserved, a fine example of a relict historic landscape. Salterns are the habitat of many bird species, so these areas have been declared natural reserves, which also protects their cultural heritage.

(Alex) Targeted excavations at different sites on the island have revealed the evolution of some landscapes after the end of the Roman Empire. The flatter terrains continued to be exploited, as evidenced by still surviving churches, of which Saint Laurence and Saint Cyprian can be dated to the 5th-6th centuries AD.

At Kamenjak, an upland landscape was formed around the 6th century fortified settlement or *castrum* of Saint Damian (Sv. Damijan). The slopes facing south-west were terraced using dry stone walls, while in less hilly areas the land was divided into irregular plots. This agrarian system could have been related to the development of the settlement and farmed by its population.

The construction of this *castrum* shows how Rab, like many other islands, became a strategic node in Justinian’s political program, assuring control over trade routes and supporting military operations in the Adriatic and the western Mediterranean.

The significant role of the island during this period is also attested by the renewal of the urban fortifications of the city of Rab, which have recently been identified and also dated to the 6th century.

The Kalifront Peninsula, now completely covered by dense forest, was probably exploited for farming by the 13 to 1400s. Many small churches dating from those centuries help us to assign a chronology to this agricultural landscape, which is clearly visible on the 19th century cadaster and in aerial photographs.

During this period, we can see the impact on the island of the rule of the prosperous city state of Venice and the urban landscape of the city of Rab was also completely transformed by new monumental residential architecture and an important extension to the north and east

Environmental data collected from excavations and further analysis of archaeological material such as the many burials found in churches could lead to a more accurate interpretation of the island's landscapes and a better overall understanding of Rab’s human history.

## 2.11. Quiz: What do historical maps and cadasters tell us about Rab (and many other places in the mediterranean)?

1. When can the oldest preserved cadaster for the island of Rab be dated to?
2. The start of the 21st century
3. After World War II
4. The 1820s

answer prompts:

1. - no, it is much older
2. - no it is even older than this
3. - correct

2. What was its function?

1. To extend colonial occupation
2. Fiscal use
3. Archaeological research

answer prompts:

1. Although it was created by the Austrian government, this was not its primary function
2. correct
3. Although it is very useful for archaeology, this was not its intended function

3. In comparison to what appears on historical maps, the forest mass of the island has grown in the last 30 years due to

1. Environmental activism
2. Return to a forest-based economy and hunting
3. Abandonment of traditional agricultural and pastoral activities

answer prompts:

A. - No, this unplanned growth has not been the result of deliberate environmental restoration

B. - No, the economy is now based mainly on tourism

C. correct

## 2.12. Synthesis and Feedback

Today, landscape archaeologists have many different sources from which to reconstruct how historic landscapes once looked and to uncover their features in our apparently modern landscapes. Maps, cadasters and aerial photographs are among those most used traditionally, but their use is now facilitated by digitalisation and online access. Web-based tools such as Google Earth can also be of use, at least in the preliminary stages of landscape analysis. Remote sensing images, whether for archaeological projects or initially intended for other purposes, allow the visualization of large areas and identification of landscape features and anomalies that would otherwise remain difficult to discern.

But such desk and computer-based archaeological research must always be complemented - when possible - by field surveys and sample excavations. The resulting laboratory analyses can clarify many chronological and historical issues that might otherwise remain only hypotheses.

**Over to you**

We’d like to know your experience when it comes to historical landscapes and maps.

Have you ever seen a historical map of the area where you live?

When does it date from?

How much has the landscape changed since the making of that map?

If you live in or have visited somewhere in Britain, is this place listed in the Domesday Book?

WEEK 3: Methods: From site to lab

# Activity 1: Archaeological Surveys and Excavations

*In the study of landscapes, archaeological field surveys and excavations are also fundamental to clarifying many chronological and historical issues that might otherwise remain unresolved.*

## 3.1 Surveys and excavations (Video)

In the study of landscapes, archaeological field surveys and excavations are also fundamental to clarifying many chronological and historical issues that might otherwise remain unresolved.

Since the 1950s, field survey has been of great importance to reconstructing settlement history, but its methods have been subject to a number of theoretical and critical assessments. Field survey can also only yield partial results if the earliest archaeological phases are hidden in stratified deposits below the surface or if meters of colluvial or alluvial deposits have covered plains or valley floors.

Where settlements were ephemeral – for example, built of perishable materials - structures may be eradicated by time and their traces difficult to distinguish, especially for very early periods.

Archaeological excavation, in contrast, can give us reliable information when there are well-preserved stratified deposits.

By excavating settlements, buildings used for production, fortifications, religious buildings, and cemeteries, we can get an idea of who was using a particular landscape and at what period, as well as the local products. Sample excavations of fields, orchards and walls, for example, can be crucial to understanding what crops were being cultivated or what animals kept at a particular time.

However where land has been used for agriculture, such deposits have often been damaged by plowing. Furthermore, large-scale excavation can be difficult due to the high cost in time and money, and sometimes bureaucratic hurdles.

This issue can be partly addressed by taking advantage of opportunities to record stratigraphic sections which have been accidentally exposed by works such as excavations for roads and buildings, pipe trenches, and so on.

From all these kinds of surveys and excavations, we can collect soil, pollen, seeds, charcoal and zoological samples, which as we will see can help us to discover phases of landscape use, their dating, and even environmental changes which may have triggered transformations.

## 3.2. Dating in landscape archaeology

Dating is a basic element of archaeological practice, as it helps to arrange objects and structures in their correct temporal sequence and also to see change and continuity over time. Dating methods therefore have been continuously developed: from object seriation to the most modern radioactive dating methods, which were applied first to organic materials but today can be used even for soils and rocks. Although sometimes referred to as “absolute” dating methods, this is a misnomer because every dating method has a degree of uncertainty. Generally, dating methods have been used for individual objects or structures but some can also be applied to entire landscapes.

Dendrochronology can be applied to wood from live or dead trees to determine the date of patterns of ring widths. In archaeomagnetic dating, the magnetism of minerals in rocks and sediments serves as a relative dating method, by using the variation of the earth's magnetic field over time. Organic remains such as wood, charcoal, bones, shells and seeds can be radiocarbon dated, as can some residues on artifacts and speleothems in caves.

A more recently developed method is OSL or optically stimulated luminescence dating, used to establish the age of sedimentary materials such as sand or silt, and other materials such as pottery, stone tools, or mortar in ancient buildings. It is also used to date agricultural terraces in landscapes. OSL dating works by measuring the amount of trapped electrons in sedimentary materials, determining how long ago the sediment was last exposed to sunlight

For historical periods, written sources which can provide the earliest references to villages, castles or churches, for example, can give a *terminus ante quem* (point before which) dating of a particular landscape feature.

## 3.3. Think like an archaeologist: Date the past

## How would you date these different types of finds?

## Look at the five numbered items in this simplified archaeological drawing. What dating method could be used to date each of these different types of find?

## Refer to the PDF in the downloads section for some answers.

# Activity 2: Environmental Analysis

*The study of landscapes has expanded rapidly in the 21st century and has seen a boom in scientific approaches to environmental analysis, integrating paleoecology and geomorphology among other environmental sciences in order to better understand soil types and vegetation as well as other remains such as animal bones. These elements have made it possible to incorporate archaeological perspectives into wider debates about landscapes, such as environmental change and human impact.*

## 3.4. Analysis of soils

Soil is one of the most important elements of cultural landscapes. It is the skin of the earth. It is of great importance since it contains within it the relationships between human beings and their natural environment. In this way, soil plays a particularly important role in human communities, for their population, and the management of productive activities associated with it (agriculture or livestock).

Soil is a thin, fertile layer that covers the surface of the earth. Below it is the geological level. On top of it lies a layer of vegetation. Soil is thus an essential component of the environment. It is in the soil where life develops, as it is the habitat of numerous organisms. Therefore, healthy soil ensures the nature and variety of the ecosystem.

The importance of the protection and conservation of soils has been a concern for numerous international organizations. The FAO (Food and Agriculture Organization of the United Nations) is one of the most important. These aims, based on the premise that soils are not only a country’s source of wealth but essential to the survival of its population, were set out in its 1982 World Soil Charter.

Soils, in the same way as the ecosystem they generate, are fragile elements that require a constant state of balance. Their extent is limited and due to their nature, once damaged they are only able to recover over a very long time. The development of inappropriate soil practices or their intensive exploitation can lead to their irremediable loss. Currently, 5 to 7 million hectares of cultivated land (0.3 to 0.5 percent of the total, an area roughly the size of Austria) are lost each year to soil degradation. These soils produce less and less, although there is more and more population to feed.

The main functions of soils include producing food, fibers, and biomass. Agriculture, pasturing of livestock, and forest management all depend on them. But soil is also closely related to hydrology and water resources. Through the soil, the water is filtered, decontaminated, and stored in aquifers. This water then supplies communities and largely conditions human settlement.

That is why soil studies are a fundamental part of understanding cultural landscapes. Through knowing what soils are like, how they have been formed, and how they have changed, we can better understand the ecosystems they support, as well as activities and thus how settlements are established.

Soil is a complex natural body formed from bedrock through the impact of various factors and agents - plants and animals, microorganisms, climate, water and air. The

discipline that studies soils is known as Edaphology. Edaphology has developed a series of terms to describe and define soils. The different levels within soils are known as horizons. Each of them has certain characteristics and a specific genesis. Horizons are observed in the field through profiles in the ground. Normally three properties are established to classify soil horizons: color, texture, and structure. The slightest change detected (in one or more of these properties) is enough to differentiate a new horizon. However, horizons must be characterized and confirmed in the laboratory, using analytical techniques.

## 3.5. Analysis of plants

Paleobotany is the study of past landscapes and societies through the analysis of preserved plant remains. Under certain conditions, the delicate, fragmentary remains of plants can survive for thousands of years. Such plant remains are often recovered during archaeological excavations, but they can also be found in naturally occurring deposits, such as lakes and peatlands. Archaeobotanical investigations reveal insights into how humans created, modified and exploited landscapes through space and time, and examine the role of plants in agricultural strategies, diets, medicines, textiles, structures and furnishings.

The concepts of sustainable agriculture and traditional agricultural practices are receiving increased attention in modern European societies. Archaeobotany can play an important role in recreating traditional farming practices and assessing the impact of human actions on ecosystems, thereby contributing in some way to modern social and landscape policies.

Many different types of plant remains can be studied in archaeobotany, including micro-remains and macro-remains. There is significant variation in how the different categories of material are collected, analyzed and interpreted. Micro-remains are those that require high-power magnification for examination, and they include pollen, phytoliths and starch grains.

Plant macro-remains are more often studied in archaeobotany. The term “plant macro-remains” usually refers to plant structures that can be seen with the naked eye when extracted from archaeological deposits, but which may not be discernible during excavation. The seeds and fruits of higher plants are often studied, including cereal grains, nuts and nutshells, pips and stones of fruits, and seeds of other plants such as weeds. Cereal chaff, although quite fragile, is sometimes preserved; this includes glume bases that enclose cereal grains, nodes and internodes from the rachis on the central axis of the cereal ear, and culm nodes from cereal straw. Cereal bran is part of the periderm of the grass caryopsis and is preserved in certain conditions. Other plant macro-remains include vegetative components of plants (such as leaves, bud-scales and thorns), parenchymatous tissues (underground storage organs of plants, such as roots and tubers, plant fibers, wood and lower plants, such as mosses and fungi.

Although most plant parts decay, some deteriorate less over time or can be preserved because they have been in an anaerobic deposit or other environment where decay is suppressed. In many cases archaeologists find plants because they have been subjected to a process which enables them to resist decay, such as charring or mineralization (fossilization). Generally ancient seeds are more resistant and have a greater chance than most other plant parts of surviving in an identifiable state. The preservation of plant remains depends also on plant species. Some plants produce many seeds, while others do not. The method of seed dispersal (by water, wind, animals or humans) can also affect the quantity of material recorded, as can burial and postburial processes, and the method of preservation: for example plants that are eaten raw are less likely to come into contact with fire, and less likely to be preserved. Statistical analysis on the quantity of recorded plants must always take into account all these aspects and potential biases.

Historical research questions that we can try to answer through the analysis of ancient plants may include: the presence and absence of specific plants at different times and locations; the ways in which certain contexts and areas of a site were used; agricultural strategies; how plants were harvested, stored, processed, prepared, and consumed; social and cultural aspects of food consumption; and the presence of non local plants that may reflect networks of communication and exchange.

Finally, stable isotope and genetic analyses can reveal new insights into plant growing conditions, land-use practices and provenance. Genetic studies will also refine understanding of domestication and movements of plants, thereby shedding light on agricultural management practices, and social and economic networks.

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## 3.6. Analysis of charcoal

Anthracology is a sub-discipline of archaeobotany which analyzes charcoal found on archaeological sites or in natural contexts, particularly wooden areas. Although mainly used for dating, charcoal can also be used to identify the type of trees or shrubs used as firewood and to give insight into broader archaeological questions such as past vegetation, specific cultural practices (the production of charcoal as energy), and of changing activities at a particular place within a landscape.

The reconstruction of past vegetation from charcoal analysis is generally limited to woody flora, and therefore archaeological finds will tend to be biased toward larger trees and toward trees that provide good firewood and good burning properties (including fragrance, heat output, smoky or smoke-free fire, etc). Archaeological charcoal assemblages reveal a “firewood culture”, including for example the types of wood available and selected or avoided, and fuel needs.

New methods of airborne laser scanning allow us to investigate the economic importance of charcoal production from wood, especially for metal extraction and processing as the structures which were used for this purpose are generally clearly seen and well preserved in current woodlands.

Although the production of charcoal from woods is an almost extinct practice, in recent decades landscape archaeology studies have given this practice a new life and charcoal producers often collaborate with archaeologists in the reconstruction of charcoal furnaces in order to reach a better understanding of past practices. We also participated in one of these experiences to build one and produce charcoal from the Colli Euganei not far from Padova.

## 3.7. Think like an archaeologist: Plant the seeds

Look at these images of modern plant parts and try to match each to the remains of the same plant found on an archaeological site.

Post your conclusions by listing pairs of letters and numbers, for example: A4 or D2. For the answers, refer to the PDF in the Downloads section.

## Activity 3: Animals and Landscapes

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## 3.8. Human-animal interactions (Reading)

Landscape is often conceived as a static setting for human activities, and the roles of plants and animals in the creation and experience of a landscape are frequently underestimated. But the archeological record is composed mainly of debris from the mutual interactions between humans, animals and landscape, such as bones of domestic animals or artifacts made of materials derived from the landscape. Archaeologists recognize human-animal interactions as a key source of information for understanding landscape and society.

*Domesticated and wild species*

In the case of domesticated species, humans interact with both animals and landscape by controlling grazing or collecting fodder for stalled animals, managing pastures, or practicing transhumance. Bone remains of domestic animals are usually found on archaeological sites in rubbish pits or middens, but they can also be found in natural deposits such as lakes or peat bogs. Analysis of these bones can give us valuable information about how ancient societies used their landscape.

The representation of wild species reveals cultural practices in relation to the natural world. For instance, a high percentage of deer bones indicates a landscape characterized by woods and uncultivated areas used for hunting. Conversely, scarcity of wild species in the zooarchaeological sample suggests a highly anthropized landscape used for agriculture and domestic livestock.

Small mammals, amphibians and reptiles can also reveal significant aspects of the ancient landscape. Although their remains can only be recovered if fine sieving is used, analysis of them can tell us about the natural vegetation of the area. Amphibians and reptiles in particular are sensitive to temperature and habitat changes, so their presence or absence tells us about aspects of climate and the natural environment which may also have impacted on or been impacted by humans.

The remains of animal feces can give us quite precise information about past environments and also historical human practices such as herding or foddering strategies and hunting. This data in combination with the study of pollen can provide information about animal husbandry, intensity of occupation or historical transhumance.

*Transhumance practices*

Transhumance is the practice of moving animals between grazing grounds with different climates and ecosystems. This also constitutes a way of life for their human herders. Land management, the rearing and feeding of the animals and the routes along droveways tracks are key factors in the relationship between humans and the environment. Transhumance is an activity of great ecological significance, as it promotes the protection of biodiversity, helps to prevent fires and makes sustainable use of pastures. Transhumance can be horizontal, where livestock are moved between pastures in flat or plateau areas, or vertical transhumance, typical of mountainous areas in which highland areas are used for summer pastures while the livestock spend the winter in lowlands. This may involve long journeys of several 100 kilometers with the herds.

Local transhumance, or “transterminance”, on the other hand, involves seasonal movements over short distances, generally within a range of less than 80-100 km. This also takes place between meadows in the valleys and the pastures in higher mountainous areas, but within the same geographical locality. The coexistence and cohabitation of both long distance and local transhumance practices, which may use the same pastures, livestock trails, watering places and shepherd's huts, generates a unique cultural identity and material presence in the landscape that in many cases has been preserved to this day.

From medieval and modern written documents and the classification of soils according to their edaphology and their current and historical uses, we know which areas were used for this economic and cultural activity. This is verifiable and can be studied by archaeology, specifically landscape archaeology. The landscape has preserved a great deal of evidence of this vitally important economic activity.

While it is important to know what plants were cultivated or what animals were reared in the past, it is even more important to understand the underlying reasons for the practice of transhumance or transterminance in specific areas. Some interesting questions concern the necessity of seeking resources outside a territory and whether livestock could obtain necessary sustenance throughout the whole year in a specific area.

Transhumance in Spain was recognised by UNESCO as Intangible Cultural Heritage of Humanity in 2017 and in Austria, Greece and Italy in 2019.

## 3.9. Animals and humans in the landscape: Identify these objects (Discussion)

## Each of these objects was used for an activity linked to fauna in the landscape.

## Can you identify each object and the fauna to which each was related? If you think you know the correct answers, post some hints for your fellow learners.

## 3.10. Synthesis and feedback

Although, as we saw in week 2, many new methods and tools allow us to study the surface of large areas without excavation, we can only precisely reconstruct how past landscapes looked at different periods through excavation. Analysis of excavated samples allows us to identify the characteristics of soils, cultivation, and the overall environment including the plants and animals which lived in a certain landscape. However, these kinds of analysis are generally very expensive and involve a large range of specialists and laboratories, often also including the application of different dating methods. Such projects are generally rarer than more traditional site-based excavations, which can, however, still be used to increase our understanding of their immediate environment.

**Over to you**

How do you think archaeologists can make relevant contributions to debates about climate and environmental change today?

# WEEK 4: Features of Mediterranean Landscapes: Earth, fire and water

# Activity 1: Earth

*Cultivated terraces are modifications of mountains and hills to obtain land for agriculture. They generally incorporate dry stone walls, a kind of built structure that can be found all around the Mediterranean.*

## 4.1. Terraced landscapes (Video)

Cultivated terraces are modifications of mountains and hills to obtain land for agriculture. These farming systems can be found in many regions of the Mediterranean and also across the world. They can be very ancient, some even possibly dating to the birth of agriculture during the Neolithic. Terraces have been built and used up to modern times, although ​​in recent decades many terraced landscapes around the world have been abandoned and are at risk of destruction. With their loss comes the loss of both their valuable environmental function and the intangible knowledge and heritage they embody.

Terraced landscapes are intimately linked to dry stone walling, the art of building without mortar, which has recently been declared to be part of the intangible cultural heritage of humanity, by UNESCO.

These structures optimize natural resources, representing a harmonious match of human traditions and nature, maintaining the soil and biodiversity by creating microclimates, and preventing landslides, floods, erosion and desertification.

Dry stone walls are so common that we can often forget their historical and social importance: they were used to separate estates and small properties and to flatten steep terrain at risk of erosion. In other areas, especially coastal regions, dry stone walls protect crops from atmospheric agents.

Although terraces and walls are among the most common forms of dry stone building, dry stone can also be used for many other landscape components: ditches, huts, corrals, paths, dams, irrigation channels, or shelters...

In sum, it is an old and popular technique, with a great variety of manifestations, and one which generates enormous benefits. An authentic work of peasant engineering, it maximizes the use of resources, using traditional methods which have proved to be enormously effective and sustainable over time.

Link to Unesco’s ‘Art of dry stone walling, knowledge and techniques’ web site

<https://ich.unesco.org/en/RL/art-of-dry-stone-walling-knowledge-and-techniques-01393>

## 4.2. Dry stone walls and heritage

The previous video discussed the importance of dry stone walls in Mediterranean historical landscapes.

Share your experience and thoughts about this topic, after thinking about the following questions:

Are there any dry stone wall constructions in the place where you live? If so, what are they like? Are they well preserved?

If not, what materials were traditionally most used for agricultural construction in your region?

Do you think dry stone walls should be preserved, and why - or why not?

Do you think that the UNESCO nomination of dry stone walling as universal heritage will help people to understand their value and therefore facilitate their preservation?

Post your thoughts to share with other learners.

# Activity 2: Fire

*Fire has been used since the earliest millennia of human existence and, for thousands of years, for multiple purposes including the working of metals and in warfare. Traces of these and associated activities can be found all around the Mediterranean and have left their marks on its landscapes.*

## 4.3. Mining Landscapes

The use of fire for metallurgy has been an extremely important element in the technological development of humanity. The observation of natural elements such as volcanoes and their relationship with the smelting of rocks led to the emergence of the first attempts at metallurgy. As a consequence, mining in search of metals has been pursued by human communities from recent prehistory to the present. Metals are extracted from ore deposits in the earth’s crust, so the location of mining is conditioned by the lithology of a region. The earliest currently known examples of copper extraction from ore date to approximately 7,000 years ago.

Non-metallic mining or quarrying focuses on the extraction of non-metallic minerals, for example salt, those used in materials for construction, or raw materials for the manufacture of artifacts, such as silica (sand) used for the production of glass. For example, among the first World Heritage sites to be listed in 1978 were the Wieliczka and Bochnia Royal Salt Mines (Poland). Used for mining for 700 years from the 13th to the 20th centuries, they comprise 240 kilometers of galleries and more than 2,000 chambers, which contain underground chapels and statues sculpted by the miners in the salt.

However, even beyond mines themselves, mining considerably marks the landscapes in which it is practiced, giving rise to the concept of mining landscapes. This began to be used after the creation of the term cultural landscape in 1992 by UNESCO. As with cultural landscape, the term mining landscape refers to an interaction between nature and man, creating a place characteristic of the evolution of society and settlement, which is at the same time influenced and conditioned by the natural environment.

Thus, this term does not refer to mining alone. Mining, miners and the landscapes that have been generated by this activity cannot be understood in isolation from associated activities such as agriculture, keeping livestock, or mineral processing.

All these complementary activities have modified the land, leaving traces fossilized in the landscape that we see on the ground and in its toponymy. Sometimes, the remains of mining activities are easily recognizable. However, sometimes, continuous mining activity erases the old mining works, which are superseded by more modern ones.

The main sites of extraction (such as trenches, galleries and quarries) are not the only vestiges that tell us about mining. We can find a wide variety of traces that indicate the presence of mining activities. Canals, dams and reservoirs are part of the numerous hydraulic works that underline the importance of studying mining landscapes not only from the point of view of direct exploitation.

In the same way, the human population in these landscapes is planned and distributed around the metal deposits, generating a series of relationships that are not only related to the exploitation of the mineral. Social and power relations are created around the extraction and transformation of the minerals. Infrastructure such as towns or transport networks are built. Places are dedicated to the storage and processing of the ore, such as ovens, ore washes or chimneys. There is also a series of places where the remains are discarded, the dumps. All these sites are characteristic of mining landscapes.

## 4.4. War landscapes

World War I altered the landscape on every continent where it took place, as conflict never had before. This unprecedented destructive capacity was due to the development of more sophisticated artillery and explosives and of the industries which made it possible to produce millions of armaments in a limited period. The industrial scale of weaponry reduced the battlefields to veritable lunar landscapes, changing their appearance forever. The armies of the opposing countries, to protect themselves from these new weapons, adopted "positional warfare", structuring lines of defense on the fronts. These were made up of trenches, shelters, tunnels, and associated structures to make these places livable: camp kitchens, ammunition depots, latrines, barracks, and field hospitals. To support this logistical effort, they also built roads, cableways, mule tracks, railways, aqueducts, telephone and telegraph lines.

These landscapes and their evolution were accurately documented by two technologies, also new to the end of the 19th beginning of the 20th century: photography and the airplane. These were combined for the first time in a military context by the Italian air force during the Italo-Turkish war (1911-1912), in order to gather information on the Ottoman army in Libya - its defensive structures, the position of its artillery and the movement of troops. This information was then developed into military topographical maps, to be distributed to the commands of the armies, in order to be able to carry out military plans. Today, these documents are important sources of historical information, which allow us to understand the landscapes of the past and the temporal evolution of military works.

In the more than 100 years since the end of the conflict, some elements of the war landscapes such as trenches have been filled in and covered over by pastures and cultivated fields, although some rivers and land areas still contain unexploded shells. Rubble from constructions has been removed and used as landfill, and the armor from bunkers, casemates and concrete forts was dismantled for the sale of the metal. However, in some places the war landscapes are preserved as monuments.

*A case study of a preserved war landscape*

One of the best-preserved World War I battlefields, named a World Heritage Site in 1998, is the Gallipoli Peninsula Historical National Park. The 33,000 hectare site was the location of an 8 month battle in 1915. It contains 70 cemeteries and memorials to the more than 100,000 who were killed there, some of whom were never buried. In 2010 – 2014, a Joint Historical and Archaeological Survey of this war landscape was carried out by scholars from Turkey, Australia and New Zealand. The project surveyed the earthworks, including trenches, tunnels, and dugouts, collected artifacts such as water and medicine bottles, food containers, barbed wire and expended ammunition, and examined military maps and aerial photographs. Due to the sensitive nature of the site and the dense vegetation with which it is now covered, field survey and ground-penetrating radar were used rather than excavation, and all data was combined within a geographic information system (GIS).

## 4.5. Think like an archaeologist

Look at these images of the Alpine landscape and try to identify the elements within them which have been generated by past war and territorial conflict.

# Activity 3: Water

## 4.6. Hydraulic Landscapes: Irrigation in Sierra Nevada (Video)

Since antiquity, different human groups have developed and articulated themselves around natural resources. Water is certainly the most important element for human existence. The relationship between humans and the natural environment has developed into what we understand as hydraulic landscapes. These landscapes are scattered with numerous anthropic elements that control the water, from the sources to the outlets. These ways of guiding water are the result of the observation that, from time immemorial, human beings have been carrying out in the natural surroundings. Hydraulic landscape leaves indelible traces in the territory, in the form of irrigation systems. In this way, the settlement, the form of cultivation, livestock farming and even the ecosystems themselves depend largely on the water supply.

Sierra Nevada is one of the most important mountain ranges on the Iberian Peninsula. It has important local flora and fauna. It also has one of the most important water management systems in the area.

These systems are fed by meltwater and have ensured the cultivation and irrigation of crops for at least 700 years. The arrival of the Islamic communities in the Iberian Peninsula in 711 brought with them a series of knowledge that would change the landscape. These systems have proved to be efficient, ensuring a constant flow of water for agriculture in the summer periods. The imprint of these irrigation systems has left an enormous mark on these mountains. It is calculated that there are more than 800 km of irrigation ditches carved into the slopes of the Sierra Nevada, including the main and secondary ditches.

The origin of these systems can be traced back to the peaks of the Sierra Nevada. The inhabitants of these mountains realized how the water from the melting snow could be channeled through what we know as the Careo irrigation ditches. These channels, excavated in the ground and in the rocks, were designed to release the water on the slopes of the Sierra Nevada. In this way, the water hydrates the soil, generating very beneficial pastures for the livestock. But the water does not stop there. Thanks to the geology of Sierra Nevada, the infiltrated water flows under the mountain ground, flowing down at a slower rate than on its way along the surface. This makes it possible to maintain a constant flow of water even in the warmest months. Along the way, the water filters through the bottom of the channels. These water losses help to a large extent to keep the soil fertile and the vegetation growing along the route of the irrigation channel.

The water that flows underground appears at a lower level, in springs and fountains. From these springs, irrigation ditches are created to irrigate the fields located in the fertile lowlands. Gradually and in this way, the system becomes increasingly complex, becoming denser and more dense, and a larger number of secondary ditches appear that enable the water to reach all the places.

These landscapes are highly efficient, making use of water in a seasonal way and ensuring that settlements maintain a constant source of water supply in their territories. This type of irrigation, unlike the new systems, is an ancestral solution based on the most primal relationship between humans and their natural environment. It is therefore a sustainable and resilient system that brings numerous benefits to the soil in the areas where it is practiced.

## 4.7. Hydraulic Landscapes: Videos from the from the MEMOLA (MEditerranean MOuntainous LAndscapes) Project (Video)

## 4.8. Quiz

## 4.9. Water as energy (Reading)

Canals have existed for millennia. The Gunditjmara people of southeastern Australia built rock water channels and dams for harvesting eels, radiocarbon dated to around 6,600 years ago, and this Budj Bim Cultural Landscape is listed as a UNESCO World Heritage Site.

Canals appeared widely in the early Bronze Age in association with the development of the earliest civilisations, which required irrigation for agriculture, in Egypt, Mesopotamia, Central Asia, and China, for example.

Sophisticated water management techniques, developed in drylands of the Near East, were brought to Portugal and Spain after the expansion of the Islamic Empire in the 7th to 8th centuries AD.

After the Ist century BC, canals started to be used to create water energy for watermills in the Roman and Chinese Empires. Over the past decades, classical archaeologists and historians have shown that Roman use of waterpower, in particular the vertical-wheeled water mill, was widespread and that it was a preferred technology for some industrial applications, including sawmills used for cutting marble. A famous example is that of the huge complex of 16 watermills at Barbegal in southern France, used for grinding grain.

A relief of a water-powered stone saw mill on a sarcophagus at Hierapolis dating to the second half of the 3rd century AD, is considered the earliest known machine to combine a crank with a connecting rod to form a crank slider mechanism.

*Hydraulic landscapes in the Early Middle Ages*

Fresh archaeological discoveries continue to augment our knowledge of the structural aspects of early medieval dams, weirs, mill-ponds and mill races, and it is now clear that the methods and materials employed to build them changed little from those of the Roman period.

The Germanic peoples who settled within former Roman territories all appear to have been familiar with their use. The Frankish law code of the late 6th century AD (Pactis Legis Salicae) punished with 15 solidi “he who breaks the dam of somebody else’s flour mill”. By the end of the 6th century AD, Gregory of Tours described the construction of a diversion dam for the monastery of Loches: “When he had driven down poles across the river and brought together heaps of huge stones, he built a weir and collected water into the channel, by the force of which he made the wheel of the mill rotate at great speed” (Vitae Patrum, xviii, 2).

The Rule of St Benedict, composed in c. AD 540, prescribed that if circumstances allowed, the layout of the monastery should be arranged ut omnia necessaria id est aqua, molendinum, hortum, vel artes diverses intra monasterium excerceantur: “in order that everything necessary, that is, water, the mill, the vegetable garden and the various crafts practiced – should be within the monastery”. From the 6th century, therefore, it seems clear that a source of hydraulic power had already become an important locational consideration for the siting of monasteries.

Monks (especially Benedictines and Cistercians) were among the most active communities in the development of watermills, possessing both skill and manpower. We know, for example, that by the 9th century 84 waterwheels were owned by the abbey of Saint Germain des Prés in France, one of the major abbeys with lands between the Loire and the Rhine rivers.

But the use of water power in early and later medieval Europe was by no means restricted to monasteries. Throughout the medieval period, watermills and their artificial water storage systems were constructed and had significant impacts on their immediate environment. Mills allowed the development of many industrial activities in rural and also in urban contexts. Within and outside cities, watermills developed on small rivers or on canals derived from rivers. In 1086, the Domesday book identified no less than 5624 water mills. Many cities in northern Italy, such as Padova, possessed hundreds of mills inside and in the immediate surroundings of the city, which was crossed by numerous channels.

*The use of water power*

Medieval mills were used for many purposes including grinding grain, fulling cloth, hulling rice, sawing timber, crushing mineral ores and - later in the Middle Ages - for sugarcane and preparing pulp for paper-making. The competition between water mills, or between water power and agriculture or navigation, was frequently the cause of disputes and trials. Centuries later, water-power was to become one of the driving forces of the industrial revolution of the 18th century, powering the first industrial cotton machines of Britain.

*Further readings:*

Follow this link for: Budj Bim Cultural Landscape, UNESCO https://whc.unesco.org/en/list/1577/

Follow this link for: Grewe K and Kessener P. A stone relief of a water-powered stone saw at Hierapolis, Phrygia : A first consideration and reconstruction attempt In : Énergie hydraulique et machines élévatrices d’eau dans l’Antiquité. In BRUN, Jean-Pierre and FICHES, Jean-Luc (eds). Énergie hydraulique et machines élévatrices d’eau dans l’Antiquité. Naples, Publications du Centre Jean Bérard, 2007 (généré le 10 mars 2023). http://books.openedition.org/pcjb/397

Rynne C (2015) ‘Landscapes of hydraulic energy in medieval Europe’ In: Alexandra Chavarria Arnau , A. Reynolds (eds). Detecting and understanding historic landscapes. Mantua: SAP Societa Archaeologica.

Sürmelihindi et al.: Sürmelihindi G, Leveau P, Spötl C, Bernard V, Passchier CW. The second century CE Roman watermills of Barbegal: Unraveling the enigma of one of the oldest industrial complexes. Sci Adv. 2018 Sep 5;4(9):eaar3620. doi: 10.1126/sciadv.aar3620. PMID: 30191173; PMCID: PMC6124920. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6124920/

# Activity 4: Beneficiaries: Landscapes and people - what is all this for?

*Landscape archaeology can engage communities in co-production of research (into what is called participatory research or citizen science) in order to contribute to social sustainability by supporting new educational strategies, inclusion and community cohesion.*

**4.10 Historic landscapes and local communities (Reading)**

*Participatory approaches to cultural landscape knowledge and management*

The Universal Declaration of Human Rights, proclaimed by the United Nations General Assembly on 10 December 1948, established every person’s right to freely participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits (Article 27). This concept has been reiterated in subsequent conventions and recommendations regarding cultural heritage.

A further concept that understanding of historical landscapes comes not only from science but also from the people who inhabit and use them was put forward by the European Landscape Convention (Council of Europe), adopted by the Committee of Ministers of Culture and the Environment in 2000. This stated that the landscape is "a certain part of the territory, as perceived by the populations, whose character derives from the action of natural and/or human factors and their interrelations" (chapter I, article 1.a).

The phrase "as perceived by the population" implies that the views of all groups should be included, not just those of an academic or political elite. Landscape protection, management and planning must therefore deal with the characteristics of the landscape that the populations involved wish to recognize in their environment.

The Convention imposes on signatory States the obligation to:

* legally recognize the landscape as an essential component of the life context of populations, an expression of the diversity of their common cultural and natural heritage and the foundation of their identity;
* establish and implement landscape policies aimed at the protection, management and planning of landscapes through the adoption of specific measures; and
* initiate procedures for the participation of the public, local and regional authorities and other interested parties in landscape issues.

Among specific measures (Article 6), three highlighted areas are awareness raising, training/education, and identification/evaluation.

Although the social value of cultural heritage was implicit in the 1948 Declaration of Human Rights, in practice the actual involvement of local individuals and groups has been rare. The 2005 Faro Convention (Convention on the Value of Cultural Heritage for Society) calls for the involvement of local associations and communities in safeguarding historical and cultural heritage. The Convention underlines the importance of educational initiatives related to heritage, highlighting the need to go beyond simply teaching people how to preserve or protect their heritage. It emphasizes the need for heritage communities formed not only by experts and professionals, but also other interested individuals and groups in an open and inclusive way which fosters identity, ownership, communication and research.

*Further reading:*

Maguelonne Déjeant-Pons Head of the Spatial Planning and Landscape

Division (2006) The European Landscape Convention, Landscape Research, 31:4, 363-384, DOI: 10.1080/01426390601004343

## 4.11. Community Archaeology Projects

## Look at the CITiZAN project and tell us what you think of it

## CITiZAN: Lara Band 2019 ‘CITiZAN 2015-2018 and 2019-2021, a community archaeology project past and future: successes, challenges, potential solutions’ - download the PDF below

See more there <https://citizan.org.uk/>

See more about the MEMOLA project here <https://memolaproject.eu/>

*Over to you*

Would you like to be involved in a community archaeology project? Have you ever taken part in an archaeology project or any activity linked to the study of cultural heritage in your territory?

## 4.12. Synthesis and feedback

*The past and the future: new roles for archaeology*

Landscape archaeologists are able to identify and evaluate the resources of a territory and the different ways in which these resources have been exploited historically, thus creating knowledge about the strategies which were and were not sustainable in the past. The objective is not just the discovery and conservation of things which are lost or disappearing, but potentially also to use archaeological knowledge to inform more sustainable living in the future.

Over the last decade archaeologists have begun to understand and develop the discipline’s potential to contribute to future sustainability. Examples like the UK’s programme of historic landscape characterization or the MEMOLA project on Mediterranean Mountainous Landscapes have shown how archaeological knowledge can be used to inform landscape management and planning. Landscape archaeology projects which engage communities in co-production of research (also called participatory research or citizen science) can also contribute to social sustainability by supporting new educational strategies, inclusion and community cohesion.

The re-orientation and re-purposing of archaeological knowledge is one of the changes archaeologists can make to contribute more fully to creating better futures. Landscape archaeology can identify effective and ecologically beneficial land use strategies, and present historical approaches which enable stakeholders to envisage future landscape scenarios which are better and more sustainable than those we have today.

*Further reading:*

Guttman-Bond, E. 2019. *Reinventing Sustainability. How Archaeology Can Save the Planet*. Oxford: Oxbow

Sam Turner, Tim Kinnaird, Elif Koparal, Stelios Lekakis & Christopher Sevara (2020) Landscape archaeology, sustainability and the necessity of change, *World Archaeology*, 52:4, 589-606, DOI: [10.1080/00438243.2021.1932565](https://doi.org/10.1080/00438243.2021.1932565)