

# People and Agrarian Landscapes

## An Archaeology of Postclassical Local Societies in the Western Mediterranean

edited by

Juan Antonio Quirós Castillo  
and Josu Narbarte Hernández



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## **People and Agrarian Landscapes. An Archaeology of Postclassical Local Societies in the Western Mediterranean**

This volume aims to offer the reader a series of keys to understand why Agrarian Archaeology has become one of the most dynamic, experimental, and innovative sectors of the discipline in southern Europe, providing an overview of the driving theories, methodologies and the main topics that have been addressed to date. In this way, the text is presented as an introduction for students, a critical reading guide for other scholars, and an informative instrument aimed at a wide audience, taking into account that most of the results of Agrarian Archaeology have a place mainly in highly specialized journals and venues, which are not always easily accessible. For this reason, the volume presents the works, tools, and conceptual frameworks that have been developed by some of the main research groups active in the South of Western Europe to study rural societies throughout history, considering the materiality of agricultural activities.

## Credits

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# GIPYPAC

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and Cultural Landscapes

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# Sunflowers, Agrarian Capitalism and Traditional Landscapes. Agrarian Archaeology in the postclassical age

Juan Antonio Quirós Castillo<sup>1</sup>

## Abstract

This introductory chapter explains the reasons to edit the present volume. It is argued that the studies on agro-silvo-pastoral landscapes carried out by different research groups in southern Europe are very relevant to study the history of post-classical societies from the point of view of both historical-archaeological research, and heritage and identity matters. The seven papers included in this volume discuss the conceptual and theoretical bases on which they are founded, as well as their methodological tools and operational strategies. Additionally, several specific case studies are presented to illustrate the main topics. Although each group has its own particularities, this chapter evidences some common traits that characterise the wake of an Agrarian Archaeology in the Mediterranean West over the last 20-30 years. Finally, the relevance of this archaeological practice is highlighted in relation to the present-day agrarian policies.

## Keywords

Sustainability, Heritage, Memory, Rural Landscapes, Peasantry, Common Agricultural Policy, Political agroecology.

## Why this book? Sunflowers, Agrarian Capitalism and Traditional Landscapes

Is it possible to receive public subsidies to plant sunflowers that will not be harvested? When the policies are related to the space sown instead of production, it is perfectly possible to obtain public funds to plant sunflowers that will not be harvested.<sup>2</sup>

The Common Agricultural Policy (CAP) is one of the fundamentals of the European Union. It was created with the purpose of granting European food sovereignty after the Second World War, in an economic and geopolitical context very different from the present one. In some moments, the CAP represented up to 70% of the total common budget and amounts to one third at present (386,000 million € for the period 2021-2027). But, still, it remains a barely known and understood policy for most Europeans.

The CAP has been a fundamental vector in the implantation of a capitalist agriculture, replacing peasants with farmers and establishing new productive logics for the long historical evolution of European rural landscapes. The process has met some paradoxes, like granting subventions for cultivation but not for harvesting; permitting to produce below the actual production costs; promoting forms of environmental sustainability while financing at the same time companies practising an intensive monocultural agriculture; etc. The same stands for husbandry exploitations. Summarising, these aids have ended up by determining what, when, how, by whom and with which purposes European fields

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<sup>2</sup> [https://www.eldiario.es/navarra/fiebre-girasol-agricultores-navarros-recuperan-cultivo-efectos-invasion-rusa-ucrania\\_1\\_8883960.html](https://www.eldiario.es/navarra/fiebre-girasol-agricultores-navarros-recuperan-cultivo-efectos-invasion-rusa-ucrania_1_8883960.html). Consultado 11.8.2022.

are cultivated. At present, producers generally agree that, without the aids granted by the CAP, nothing could be cultivated with a minimum benefit.

Derived from this policy, the traditional agro-pastoral societies have been first eroded and then completely dismantled. This assertion implies not only the abandonment of an old-fashioned way of cultivating, but the disappearance of whole systems of biocultural diversity, sustainable resource management models, and the immaterial heritage of traditional ecological knowledge constructed over the centuries. But the consequences of such a decapitalisation, derived from the implantation of agrarian capitalism, are not only economic but especially of social and cultural nature. The rural environments have been increasingly marginalised by the dissolution of the peasant communities, forms of shared management of goods, values and practices, and the deep modification of the agrarian landscapes. Instead, a single urban-centric model has been imposed, based on the 'free market'. The resulting tertiarization and touristization of the rural world has contributed to objectivising and devaluating the ways of life that we now consider 'traditional', typical of our ancestors and nowadays overcome by 'progress' (Alonso González 2017). Paradoxically, all this happens in a moment where the sewing of the capitalist system suffers increasing tensions in the framework of the climatic crisis, the risks of globalisation made visible by the COVID-19 pandemic and the war of Ukraine, the relevance of food sovereignty or the increasing territorial and inter-generational inequalities.

This brief introduction is structured in three main sections. First, Agrarian Archaeology is contextualised in the framework of the Landscape Archaeologies and the objectives of the volume are outlined. Second, each chapter is presented emphasising their principal thematic, conceptual, and methodological aspects. Finally, some of the main common topics are identified and future lines of research are proposed in relation to the management and valorisation of agricultural heritage.

### **An Archaeology of Postclassical Local Societies in the Western Mediterranean**

Since concept of Landscape Archaeologies was adopted in the 1970s, a very large volume of studies has been generated, from different points of view, on the notions of landscape, archaeology, and Landscape Archaeologies. Consequently, many manuals and reference texts have been published with an accent on methodological, theoretical, conceptual, or applied topics (Cambi, Terrenato 1994; García Sanjuán 2005; Chavarría Arnau, Reynolds 2015; Feinman 2015; David, Thomas 2016; Gilchrist 2020). One of the main reasons why Landscape Archaeologies have been adopted with enthusiasm by many specialists is their synthetic and inclusive nature in terms of conceptualisation, methodology, operativeness, and heritagisation. For instance, Landscape Archaeologies have been the backbone of the integral reform of the Cultural Heritage normative framework in Italy (Volpe 2016; Volpe 2020).

Many lines of work have found their place within this hub, including the Agrarian Archaeology developed within the last twenty years in southern Europe (Guilaine 1991; Orejas Saco Del Valle 2006; Kirchner 2010; Mayoral Herrera, Sevillano Perea 2013; Mayoral Herrera *et al.* 2021).

Why editing a book aimed at 'traditional' agrarian landscapes? Agrarian Archaeology has been declined in various manners across the continent, depending on the different methodological, thematic, and academic drives that determine the course of any scientific knowledge. Hence, relevant scientific contributions have been made over the years, but these have often remained limited to a restricted circle of specialists. One of the objectives of this book is, therefore, to present some of these advances with the scope of proposing innovative lectures on the Western rural world and lifestyles.

Still, the main purpose of this collective work is not to vindicate, from a nostalgic or defeatist perspective, a past that does not exist anymore, or persists in a mutilated and subaltern manner in

some ‘peripheral’ spaces. Conversely, the idea is to provide critical tools to re-think the territorial, economic, and cultural policies that are generally accepted on the rural world. Equally, the book aims at denouncing the anachronic and false aspects of the classical vision of the rural society and landscapes, often conceptualised as static realities fixed in an immutable time and space.

For obvious reasons of space, only a limited number of research groups and projects are represented in this volume, namely: Laboratoire Tempora, Université de Rennes 2<sup>3</sup>; Laboratory of Archaeology and Ambient History LASA, University of Genoa<sup>4</sup>; Grupo de Investigación Arqueología Histórica y Patrimonio del Mediterráneo occidental, University of Murcia<sup>5</sup>; Research Group of Landscapes and Cultural Heritage, University of the Basque Country<sup>6</sup>; Grup d’Arqueologia de l’Alta Muntanya, Universitat Autònoma de Barcelona<sup>7</sup>; Gabinete de Arqueología Patrimonio y Territorio<sup>8</sup>; and the European projects Resistance and Resilience of Ancient Agricultural Soils tRRACES<sup>9</sup> and AAREA Archaeology of Agricultural Resilience in East Africa<sup>10</sup>.

But there are many other groups involved in the collective project of studying Postclassic agricultural archaeology in southern Western Europe. Although it is inevitable to forget some initiatives, it can be mentioned the following: Instituto INCIPIT (CSIC, Santiago de Compostela)<sup>11</sup>; Grupo de Investigación Llabor (University of Oviedo)<sup>12</sup>; Arqueologia Agrària de l’Edat Mitjana (Universitat Autònoma de Barcelona)<sup>13</sup>; Laboratorio de Arqueología Biocultural MEMOLA (Universidad de Granada)<sup>14</sup>; Instituto Universitario de Investigación en Arqueología y Patrimonio Histórico (Universidad de Alicante)<sup>15</sup>; Grup de Recerca Arqueologia del Paisatge del Institut Català d’Arqueologia Clàssica<sup>16</sup>; Centro de Investigaciones de Desertificación (CSIC, Valencia)<sup>17</sup>; Grupo Estructura Social y Territorio, Arqueología del Paisaje (CSIC, Madrid)<sup>18</sup>; Instituto de Arqueología de Mérida (CSIC, Mérida)<sup>19</sup>; FRAMESPA (Université de Toulouse 2)<sup>20</sup>; Unité GEODE-Géographie de l’Environnement (Université de Toulouse 2)<sup>21</sup>; Laboratoire ITEM - Identités, Territoires, Expressions, Mobilités (Université de Pau et des Pays de l’Adour)<sup>22</sup>; University of Newcastle<sup>23</sup>; University of Padua<sup>24</sup>; etc.

### The contents in this book

The papers included in this volume can be overall classified in two groups: those presenting specific research projects or syntheses on specific topics, and those proposing a general overview on a long-

<sup>3</sup> <https://sites-recherche.univ-rennes2.fr/tempora/>

<sup>4</sup> <http://www.lasa.unige.it/>

<sup>5</sup> <https://www.um.es/arhis/>

<sup>6</sup> <https://www.ehu.eus/en/web/culturalheritage>

<sup>7</sup> <https://arqueologiademuntanya.wordpress.com/>

<sup>8</sup> <http://www.gaptalava.com/index.php>

<sup>9</sup> [https://mobile.twitter.com/trraces\\_project](https://mobile.twitter.com/trraces_project)

<sup>10</sup> <https://sites.google.com/york.ac.uk/aarea/home>

<sup>11</sup> <https://www.incipit.csic.es/>

<sup>12</sup> <https://arqueologiaagraria.wordpress.com/>

<sup>13</sup> <https://grupsderecerca.uab.cat/araem/>

<sup>14</sup> <https://blogs.ugr.es/memolab/>

<sup>15</sup> <https://inaph.ua.es/es/>

<sup>16</sup> <https://icac.cat/recerca/equips-de-recerca/arqueologia-del-paisatge-giap/>

<sup>17</sup> <https://www.csic.es/es/investigaci%C3%B3n/investigadoressabina-fatima-asins-velis>

<sup>18</sup> <http://cchs.csic.es/es/research-group/estructura-social-territorio-arqueologia-paisaje-est-ap>

<sup>19</sup> <http://www.iam.csic.es/>

<sup>20</sup> <https://framespa.univ-tlse2.fr/>

<sup>21</sup> <https://geode.univ-tlse2.fr>

<sup>22</sup> <https://item.univ-pau.fr/fr/accueil.html>

<sup>23</sup> <https://www.ncl.ac.uk/hca/>

<sup>24</sup> <https://www.beniculturali.unipd.it/www/homepage/>

term experience, formulated in theoretical and methodological terms, and sustained with specific case studies.

The three contributions included in the first group refer to al-Andalus, the Forest Archaeology project of Zigoitia and the study of two agrarian landscapes of East Africa.

In the first work, Jorge A. Eiroa takes into consideration the Agrarian Archaeologies developed on the societies of al-Andalus over the last fifty years. Al-Andalus was a Western Islamic society, which generates a number of tensions when it comes to incardinate this ‘awkward memory’ in the narrative on the ‘origins’ of the Nation state (Díaz-Andreu García 2016) or the academic lecture of the Spanish and Portuguese past. The emergence of a powerful archaeology of al-Andalus after the end of the Spanish dictatorship has marked a profound intellectual and conceptual renovation, overcoming the sense of otherness that it had had in the past (García Porras 2014). The so-called Hydraulic Archaeology, centred on the study of the materiality of irrigated agrarian spaces, has permitted a theorisation of the state, the peasantries and the structures of social articulation of al-Andalus, along with the process of islamisation (Cressier, Gutiérrez Lloret 2020; Kirchner 2020). In this paper, Jorge A. Eiroa proposes a critical survey of those experiences, evidencing their successes and failures, as well as the most recent trends like the progressive incorporation of husbandry or the non-irrigated agriculture into the analysis of the Andalusian agrarian practices. The utter debates raised around these topics in the last years have determined the projection of this line of research. Still, Jorge A. Eiroa outlines four main lines of renovation that are being consolidated at present. First, the increasing number of bioarchaeological (archaeobotanical, archaeofaunal) studies focusing on al-Andalus in the context of the explosion of the Archaeological Sciences. Second, the debate on the origins and evolution of large urban *huertas*. Third, the characteristics of hydraulic systems in the most peripheral rural areas. Fourth, the connection between agrarian storage and social structures. Summing up, this paper offers a balance and critical analysis of one of the major areas of research in this field.

The second work included in this section corresponds to the research project carried out in Zigoitia (Alava, Basque Country) from the perspective of the so-called ‘Forestry Archaeology’ by a geographer and a historian with a broad archaeological experience. This is a particularly interesting experience, since it reflects a number of trends that characterise the recent developments of the Archaeologies of agro-pastoral landscapes in Southern Europe (Rendu 2003; Rendu *et al* 2016; Costello, Svensson 2018; Fernández Mier 2018; Costello 2021). On the one hand, the archaeological study of the Modern and Contemporary periods is experiencing a notable development in the last years, becoming one of the most dynamic fields of experimentation and renovation in the discipline. The convergence of interests between specialists interested in the thematic and theoretical dimensions of research—rather than in the traditional period-based academic divisions—and those working in postmedieval archaeologies and related disciplines, has created a powerful field of work, destined to change the fate of the archaeological disciplines in the following years. On the other hand, although the Historical Ecology has a long tradition of studies based on a European scale (Rackham 1976), its implantation in Southern Europe has been moderate and sporadic (Moreno 1990). As a result of these and other tendencies, a new Historical Archaeology is being progressively affirmed, with notable differences with respect to the American one (Orser 2014).

The project carried out in Zigoitia is a model example of these perspectives. A. Martínez Montecelo and J. Rodríguez resort to the category of Forest Archaeology to define a practice founded on three main pillars: 1) a historical and archaeological ‘appropriation’ of a series of very diversified evidences, which have been traditionally confined in the ahistorical framework of Ethnography; 2) the realisation of a research project in and with the local community, which is not only the passive object of the investigations, but an active participant in the construction of memories, heritages, meanings and identities; 3) the setting

up of a multiproxy work program that valorises oral and written sources, highly refined field survey, biomarkers, paleoenvironmental data and other ‘non-traditional’ records. The volume of records is impressive, as well as their diversity and informative potential —opening unexpected paths into the microhistory of the local communities.

The third and last paper in this section presents the results of two research projects financed with European funds. Although the book is mainly focused on Western Europe, the initiatives of European research in East Africa (Ethiopia and Tanzania) have also been considered for several reasons. First, it permits to relativise the hegemonic Western thought on modernity in postcolonial terms, by historicizing agrarian practices from another type of rationality. Second, it permits to illustrate in a solid manner the notions of sustainability and rupture of the social, economic, and political balance, by analysing traditional agrarian systems. Third, it provides an alternative interpretation to terraced field systems, which have traditionally been interpreted as a mere resort related to agrarian intensification. Fourth, it proposes a fresh perspective on the application of a set of updated methodologies and approaches to the understanding of social landscapes.

The work considers two different case studies: the Konso World Heritage mountain landscape (Ethiopia) and the agricultural landscape of Engaruka (Tanzania). The combined analysis of both landscapes permits to address the complex problem of sustainability. But what is sustainable agriculture? Is it possible to take advantages of agrarian archaeologies to plan a more sustainable agriculture?

The Konso terraced field system has existed for more than one millennium. It has been considered as a model of sustainable high-mountain agriculture. Conversely, the abandoned agrarian landscape of Engaruka has been considered as a pragmatic example of rupture of a sustainable agrarian model.

The studies realised by C. Ferro and D. Stump through a massive use of geoarchaeological techniques reveals the logics that lay beneath the creation of both terraced field systems. Both can be framed in the so-called runoff farming, challenging the traditional understanding of terraced agrarian landscapes. The domestication of soil erosion has allowed the creation of new and fertile agricultural soils, using a strategy based on capturing rich sediment. Terraces have played a multifunctional role, including the control of hydrology, the construction of sediment traps improves the productivity of the soils in absence of fertilizers and risk mitigation strategies. Following this experience, the authors define the nature of sustainable agriculture and the role of indigenous knowledge as a powerful heritage.

The second group of chapters includes four studies carried out by four different research groups.

France has been a privileged laboratory of social history in general, and spatialised social history in particular, throughout the 20th century. The echoes of the different *Annales* generations, the historical geography and other intellectual backgrounds in this country have notably influenced the Humanities in Southern Europe. So, even if the Anglo-Saxon tradition has nowadays replaced much of this centrality, France remains an area of dynamic experimentation of new approaches in the study of agrarian landscapes and practices (Galop 1998; Rendu 2003; Poirier 2010; Rendu *et al* 2016).

In this volume, M. Watteaux presents one of the most solid and influential proposals developed in the last years in the field of agrarian landscape studies. The concept of Archaeogeography, adopted twenty years ago (Chouquer, Watteaux 2013), expanded and relocated some previous experiences identified under the label of Archaeomorphology. This line of research is the result of an original synergy between historical geography and the archaeology of agrarian landscapes, based on the study of the transformations in the morphology of cultural forms legible in the landscape. M. Watteaux realises an exhaustive intellectual biography of this approach as it has been configured in France, which has

later been successfully applied in other contexts of the Western Mediterranean. This long experience has derived in a significant corpus of data, textbooks, consolidated research groups, but also a clear epistemological definition. Based on G. Chouquer's reflections, the epistemology of Archaeogeography is defined as symmetrical and reflexive, heir of B. Latour's assumption that human and non-human agents are connected, and their interactions produce the social dimension of landscapes. Beside this, the paper introduces some major methodological features, such as the multidisciplinary dimension, the multi-scale approach, the long-term analysis and the role of morphology analysis. In order to illustrate these methods, some case studies are presented considering a wide range of periods and territories. In synthesis, this chapter provides a brilliant and powerful introduction to one of the most influential approaches developed in the last few years.

The mainstream Italian approach to the archaeological study of landscapes has been principally oriented to the study of inhabited areas, especially those of the prehistoric and classical periods. Since the end of the Second World War, many research groups have carried out intensive survey programs that have contributed to defining the methodologies, the topics and the notion of landscape in line with the Mediterranean tradition (Cambi, Terrenato 1994; Attema *et al.* 2020). However, the proposal included in this volume refers to the experience of the Laboratory of Environmental Archaeology and History of the University of Genoa. For almost thirty years, this group has build an original conceptual, methodological, and operational framework, resulting from the synergy of different specialists with certain specific traits. This experience focuses on the so-called Environmental Resources Archaeology, rooted in the tradition of T. Mannoni's Total Archaeology (Iscum 2021), the Italian micro-history (Levi, Burke 2003), the British historical ecology (Rackham 1976), the palaeoecological studies and the postmedieval archaeologies (Milanese 2014). This theoretical approach, which the authors define as slope archaeology, deploys through a methodology based on four axes: 1) a redefinition of the notion of archaeological site; 2) the extensive use of regressive approaches; 3) a multi-scalar analysis; and 4) a dialogue between different sources considered equipollent. In order to illustrate this innovative approach, R. Cevasco *et al.* explain two examples. The long-term study of the agro-forestry landscapes of the Upper Trebbia valley, located in Eastern Liguria, provides valuable information to understand the cultural biography of the hillslope landscapes. Hence, wooded pastures have been identified as a manner of integrating a diversity of productive dedications: temporary agriculture occupations in mountain areas; the relevance of wetland areas to inform husbandry practices; the meaning of terraces; etc. The second example refers to the Cinque Terre landscapes, where a direct connection has been established between the research tasks, the protection of a natural park and the valorisation of the local heritage. In this case, the research has focused on how transhumance between the coast and the mountains has modified and transformed the agrarian landscapes. Some of the most outstanding aspects of this project has been the identification of herbaceous corridors related to the transhumant paths, as well as the multidimensional uses of agrarian features, such as terraces. The chapter concludes with the identification of eleven principles that rule the Environmental Resources Archaeology proposal, grouped as general assumption, methodological issues, and field techniques.

This attention paid to the mountain areas is the central argument of the next chapter included in this group. E. Gassiot illustrates one of the main trends in the archaeology of agro-pastoral landscapes in the last decades: the social analysis of mountain areas. For a long time, the extensive, spatial and landscape archaeologies have focused on the areas that, according to our pattern of Western rationality, a major social life has been developed. Hence the study of plains, valleys and settled areas has shaped the main narratives on settlement dynamics, rural economies, viability, production, and consumption, etc. However, in the last decades a more holistic and inclusive conception has strongly emerged as a result of the synergy of different factors. In terms of methodology, the increasing refinement of the analysis of less monumentalised areas or the visualisation of forested areas through LiDAR sensor, has allowed

for a new approach on the ‘peripheral’ or ‘marginal’ areas. Conceptually, the postcolonial approaches have contributed to revising the ideas of social and physical landscapes of past societies, showing that notions of high mountain areas, periphery and marginality are contingent cultural constructions that must be considered in their own contest (Costello 2021). In terms of heritage, mountains have been acknowledged not only as containers of a number of entities of cultural interest, but also as a repository of practices, memories and social life that has barely transcended the ethnographic dimension.

E. Gassiot’s chapter develops this topic under the light of twenty years of works carried out in the central Pyrenees by the High Mountain Archaeological Group, highlighting that the archaeological evidence in high mountain areas does not always follow the same patterns as the that of lowland areas. To address this conceptual and operational challenge, the author proposes the GTL systems approach (Geosystem, Territory, Landscape), following the scheme proposed by C. and G. Bertrand. Methodologically, the proposal is founded on the relevance of fieldworks surveys; the replacement of the site with the territory as the main unit of analysis; the relevance of the Archaeological Sciences; the centrality of GIS frameworks to model relational approaches; and the long-term approach. Indeed, a case study shows how these perspectives have been implemented in the Central Pyrenees. The archaeological study of the Virós forest, located in the Catalan district of Pallars Sobirà, has shown the relevance of iron-activity in the past. In particular, 1037 charcoal kilns, 237 iron mines and 19 mounds of slags dated between the roman and the early medieval ages have been detected in 900 ha. But the study has recovered extensive traces of prehistoric, modern, and contemporary remains as well. Using an inclusive multiproxy approach, the study shows not only the local history of the mountain spaces, but also the connections with larger socio-political structures and the relationships with other distance territories. Summarising, this paper demonstrates how a flexible and adaptative use of methodologies developed in other projects can be used to historicise apparently ‘wide’ territories, which are otherwise difficult to conceptualise in archaeological terms.

The last work included in this section presents the proposal of the Agrarian Archaeology developed over the last twenty years by the Research Group of Heritage and Cultural Landscapes of the University of the Basque Country. In this period of time, the Basque Country and many other regions of northern Iberia have witnessed an explosion of postclassical archaeologies. The historical underdevelopment of the medieval and postmedieval archaeologies in the northern regions, especially if compared to the long trajectory of the archaeology of al-Andalus, has been overcome by the consolidation of new work groups, the generalisation of rescue archaeology and a reconsideration of the materiality of more recent periods. Hence, the investigation of rural landscapes has been one of the topics privileged by the local specialists.

The Basque Country has a solid trajectory of prehistoric archaeology, which has enhanced the formation of a good number of specialists in archaeozoology, archaeobotany and geoarchaeology. Equally, the realisation of large-scale rescue interventions, the analysis of deserted and inhabited settlements, and the study of agrarian practices considering a wide range of topics (e.g., field systems, manure and improvements, storage, output products, husbandry practices, outlands, etc.), have allowed the definition of an specific Agrarian Archaeology (Quirós Castillo 2014). In this paper, Agrarian Archaeology is defined as a path to deal with historical and cultural landscapes in relational terms. Multiple agencies, postcolonial perspectives, micro-historical approaches, *longue durée* analysis, multiproxy studies and the deep integration of different sources are some of the main bases of this experience. In order to develop this perspective, two cases studies are presented. On the one hand, terraced fields are considered, showing the implications of their construction, maintenance, and transformation in a social, political, and economic sense. The second case study presented the results of a project carried out in Gipuzkoa, approaching in a holistic perspective a single village. In the Aizarna project have been studied the current village, the surroundings agrarian fields, the peripheral pasture areas, forest areas



*Figure 1.1. Sunflowers scorched by the heat of summer 2022 in Piemonte (Italy).*

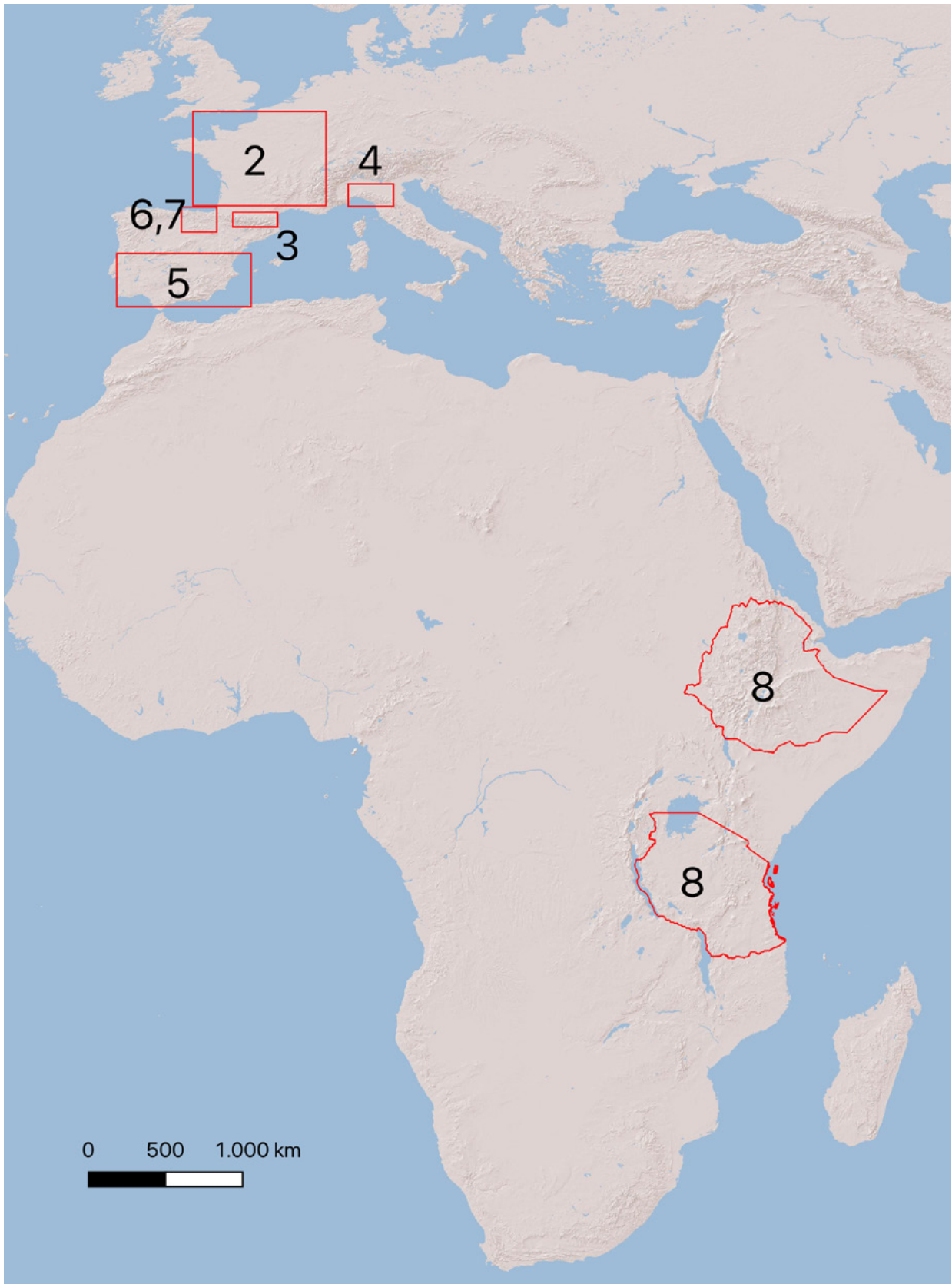


Figure 1.2. Regions considered in this volume. Numbers are related to the chapter of the book.



Figure 1.3. Word cloud of the keywords of the papers included in this volume.

as well as mountains spaces exploited by the community. Combining a number of different sources, a comprehensive landscape history has been obtained paying attention to agrarian, husbandry and other productive activities from the Roman period to the contemporary period. Probably the most relevant conclusion of this experience is the fact that Agrarian Archaeology is in continuous construction, adding new topics, concepts, approaches, and methods.

### Trends, discussion and conclusions

Although the purpose of this volume was not to gather all the experiences and proposals formulated over the last decades from the perspective of the Agrarian Archaeologies in Southern Europe, there are some general trends that define these and other analogous projects.

First, all the works are based on the definition of landscapes, rather than sites, as their object of study. Different nuances are stressed by different authors, but the landscape is not conceived as a simple extensive scale or a sum of sites and their relations. In some cases, the accent is set on the continuous nature of the records; in other cases, on the integrated nature of the different spaces; occasionally, on landscapes as the spatialised materialisation of social action; etc. Some authors resort to the concept of palimpsest, whereas others question it. Depending on the research trajectories and addressed topics, some components of the landscape are privileged. But, in any case, this diversity is the reflection of the conceptual, theoretical, and methodological richness of the Archaeologies of agrarian landscapes.

Second, a long-term approach is adopted in these studies, instead of the classical chronological compartmentalisation of the academic archaeologies or the Mediterranean tradition of landscape archaeology. This choice is not based on a supposed 'conservative', 'traditional' or static nature of rural societies. However, the history of landscapes and their complexity requires a perspective that valorises diachronic depth.

Third, many papers adopt a multi-scalar perspective, which is one of the major challenges faced by a relational archaeology. Specialists have paid much attention to theorising concepts such as Time, Space, Materiality, Memory, Heritage, Identity, etc. However, the problems related to scale have not yet been

systematically addressed. Experiences like the Italian micro-history provides relevant conceptual tools for a successful understanding of relational landscapes.

Forth, the study of agrarian practices implicitly or explicitly assumes the notion of mixed farming (Harris, Fuller 2014) to take into consideration, from an inclusive and integrated perspective, the primary activities related to husbandry, forestry or the exploitation of mountain and high mountain areas. This ontological reorientation has been made possible by the availability of new instrument and research methods, as well as their higher resolution. But especially, it is the result of a conceptual renovation based on an integral comprehension of the cycles of agrarian production and the reappropriation of spaces and topics hitherto reserved to ahistorical ethnographic perspectives.

Fifth, the proposals made by both the research groups and the presented projects overcome the classical inter-, multi- or trans-disciplinary labels, by defending a multi-proxy analysis. From this perspective, the main debate consists on how to establish a fruitful dialogue between the raw data and the theoretically-informed conceptual frameworks, rather than discussing how to interrelate disciplines with different trajectories.

Sixth, the intellectual biographies and theoretical backgrounds of the different schools and experiences included in this book reveal a notable diversity of approaches, which has contributed to the archaeology of agrarian landscapes in the medieval West to become an ecumenic church. Even if this line of research has for long developed in the margin of the academia and the dominant historiographic debates, it has produced such a large volume of data and interesting works, that it has reached an increasing visibility in the European scene. Indeed, several European projects have already been articulated around these topics (e.g., MEMOLA, ARCHIMEDE, ANTIGONE, INPACT).

Seventh, although the focus is still set on the economic dimension and the logics of political economics, there is an increasing interest to consider the multidimensional and multifunctional nature of agrarian practices and landscapes. The diversity of the forms of articulating, modelling, and managing these landscapes generates a wide range of forms of collective governance, dissents and consents, social cohesion, ‘antieconomic’ social practices, ideological and symbolic meanings, etc. The different contributions in this book cover a number of problems and topics, including agrarian colonisation, sustainability, resilience, the integration of different agrarian dedications, the multifunctionality of spaces and landscapes, forms of social domination, intensification, iron production, indigenous knowledge, etcetera.

Eighth, the ‘alternative’ nature of the archaeology of agrarian landscapes and practices with respect to the traditional ideas, the necessity of legitimating in the social media in which it operates —by valorising, among other things, orality, and memory— explains the close relationship between scholars and local communities. These kind of ‘new heritage’ stresses the participated and communitarian dimension of the archaeological practice.

Ninth, the studies included in this book also pose the problem of the heritage dimension of the archaeology of agrarian landscapes and practices. This biocultural heritage is fragile, diffuse, distribute, and defined upon criteria that are not generally familiar to the managers of cultural heritage. In other words, it is difficult to delimit with a polygon in the map or to regulate by the usual rules of access and use. It may be paradoxical, but the greatest threaten to the definition of such a heritage dimension is probably derived from the commonly accepted conception of Natural Heritage, which is concurrent and dominant in other legal arrangements. For instance, the successful advertising campaign entitled ‘Asturias Paraíso Natural’ (Asturias, a Natural Paradise) has succeeded to transform this region of northern Iberia in the favourite target of all those interested in a naturalistic and conservationist vision.

Without denying the potentiality of this strategy, it must be noted that, eventually, it has subdued or even annulled the cultural and historical dimension of heritage. The Muniellos Forest, considered as the best example of Natural Heritage in Asturias, is in fact the result of an intense anthropic activity that has changed over the centuries. Owned by the counts of Toreno since the 16th century, it has been exploited for shipbuilding and, since the 19th century, for the production of timber by English, Catalan, Belgian, Basque and Asturian companies (López Álvarez 2014). And, still, it continues to be represented, visited, presented, and enjoyed as the most evident manifestation of a virgin nature as contrasted to human action.

Tenth, the focus of this book on the agrarian landscapes of the historical periods in the Western Mediterranean is a purely operative delimitation, not a conceptual one. Many of the authors who participate in this volume also work in other territories, chronologies, topics, and projects. The most evident example of this is the work focusing on two examples from East Africa.

Finally, despite the intellectual primacy of the Anglo-Saxon traditions in the study, conceptualisation and analysis of historical landscapes in general, and agrarian landscapes in particular —an example of this being the fact that the text has been written in English—, this book aims to highlight how other experiences are being developed in Southern Europe, by valorising other intellectual backgrounds.

### **To conclude: Agrarian Archaeologies and the Common Agricultural Policy**

Another aspect that has been highlighted is the fact that Agrarian Archaeology is a space of experimentation and renovation of the different dimensions of archaeological practice: research, memory, heritage, and critical construction of knowledge.

In the heading of this Introduction, it has been stressed that the European agrarian policy has had a profound transforming effect on the ‘traditional’ landscapes in just a few generations. To conclude, we claim that an archaeology of agrarian landscapes and practices permits to empower local communities by providing them with useful tools to participate in a conscious and informed manner in the process of decision-making that affect them. It offers a decisive contribution of critical tools to the civil society, increasingly disconnected from a rural world that is conceptualised in terms of distant otherness. Equally, it provides critical knowledges for the development of sustainability policies, as C. Ferro and D. Stump support in their contribution.

In summary, Agrarian Archaeologies are more than an intellectual exercise, providing the basis for an applied archaeology, following the C. Erickson path (Erickson, Candler 1989; Erickson 1992; Erickson 2006).

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# Medieval Agrarian Landscapes seen by French School of Archaeogeography

Magali Watteaux<sup>1</sup>

## Summary

This paper aims to present the discipline of ‘archaeogeography’ developed in France since the 1990s and its main results concerning the medieval landscapes. Drawing on her own work and that of her fellow archaeogeographers, the author intends to show what is the originality of this recent approach compared to other geohistorical disciplines and what are its theoretical and methodological foundations. To do this, the paper first exposes the intellectual and theoretical background of the discipline. Secondly, it presents its main methodological principles that guide analysis. Thirdly, it presents several case studies which illustrate the scientific renewal allowed, among others, by the archaeogeographical study of medieval landscapes. Finally, a discussion is initiated on the issue of the articulation of data and discourses between different disciplines and on the issue of the social interpretation of the forms of landscapes.

## Keywords

Archaeogeography; Morphology; Forms of landscapes; Agrarian landscapes; Middle Ages.

## Introduction

This paper aims to present the French school of archaeogeography.<sup>2</sup> This discipline was first developed in France by Gérard Chouquer during the 1990s, initially under the name ‘archaeomorphology’, then, from 2003, ‘archaeogeography’. More detail on the history of this disciplinary title and its historiographical background will be given, but let’s say right away that this discipline is born in a particular institutional context, in the late 1990s and early 2000s, when the ‘Human and Social Sciences’ department of the CNRS (*Centre National de la Recherche Scientifique*) was directed by a geographer (Marie-Claude Maurel) and an archaeologist (Georges Tate). This configuration created a scientific opportunity for the development of this new research orientation on history of landscapes.

Archaeogeography needs to be understood at two levels (Chouquer 2007a): as an archaeology of geohistorical knowledge that acknowledges the major ongoing challenges in determining and reconfiguring the objects of study of historical geography as apprehended by various disciplines (*Études Rurales* 2003 and 2005, Chouquer 2008A, Watteaux 2011A, Chouquer And Watteaux 2013); and second, as a discipline focusing on the history and dynamics of ‘landscape forms’<sup>3</sup>, including road networks, that is to say the ‘planimetric’ dimension of the ‘Ecumene’.<sup>4</sup> This latter level basically consists of studying

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<sup>2</sup> I will discuss here the developments in France but it should be stressed that archaeogeography has also been developed in Spain, Portugal (inside the school of Coimbra) and Italy (in particular at the University of Siena, which has ratified a double degree master’s agreement with the French University of Rennes 2 to train Italian students in archaeogeography).

<sup>3</sup> Here I will only deal with this morphological dimension of landscapes and not with their physical or ecological dimension.

<sup>4</sup> ‘Ecumene’ is a term used by geographers to mean inhabited, exploited, developed, transmitted, inherited land (BERQUE 2000). The term ‘planimetry’ (*planimétrie* in French) and its adjective ‘planimetric’ mean the features produced by all the

all aspects of a society's rural<sup>5</sup> and urban<sup>6</sup> spaces at several temporal and spatial scales, with the dual aim of helping to reconstitute the historical periodisation of the forms of these spaces, and improving understanding of the long-term dynamics determining how they have come down to us (Chouquer 2007A, Watteaux 2014). Thus, the specificity of the French school of archaeogeography is to work on the *morphology* of agrarian landscapes. This is a very particular dimension of landscapes which, as we shall say, was studied a great deal by French researchers at first (following the Germans) but which has been abandoned by geographers since the 1970s. Now, whereas archaeological surveys and excavations - obviously valuable - provide us with information on the materiality, function and/or chronology of landscape structures at a given time and in a specific place, the specificity of archaeogeography is to enter into the study of agrarian landscapes through their morphology and cartography. Indeed, the 'point' (an agricultural element) cannot speak for the 'surface' (the space in which the agricultural structure is inserted) because one cannot see everything that happens horizontally, in plan, from the agricultural structures alone. This is why Gérard Chouquer summarised in an epistemological paper in 2011: 'Archaeogeography is a discipline of analysis of physical, social and hybrid *forms*, whose referent disciplines are geography, agrarian *morphology* and urban *morphology*' (Chouquer 2011:182).

For this, archaeogeography is a school that seeks to build scientific coherence by exploring all aspects of a science: it develops theories, describes its epistemology, defines research objects and invents or perfects scientific methods and techniques.<sup>7</sup> It is this disciplinary set that I will present here, by first exposing the historiographical background in which archaeogeography has been developed (2.), then the method which characterises it (3.) and the main results concerning medieval landscapes, in particular in Western Mediterranean (4.). I will finish by addressing two points of methodological and epistemological discussion which are, in my opinion, at the heart of the research on these landscapes (5.).

## Intellectual and theoretical background

### *The History of Agrarian Landscapes: An Old and Rich Field of Research, at the Crossroads of Disciplines*

#### *A Constellation of Disciplines Organised According to National Genealogies*

Archaeogeography clearly does not stand alone in the constellation of geohistorical studies and takes root in other and older disciplines. In a recent book (Chouquer and Watteaux 2013), I listed with Gérard Chouquer on publications in France, Great Britain, Spain, Portugal, Italy, and even Germany thanks to summaries in French, no less than 152 discipline titles or simple approaches describing a research area at the intersection of geography, history, and archaeology ('historical geography', 'geohistory', 'landscape archaeology', 'spatial archaeology', 'chrono-ecology', 'historic landscape characterisation', etc.).<sup>8</sup> Even the term 'archaeogeography' is not new and has known a variety of meanings from the beginning of the

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actions of societies on the land surface: roads, land parcels, habitat networks, artificial limits composed of vegetation (forest hedges, for example), coastlines, hydraulic works, human actions on the hydrographic network, and so on. It is used as a synonym of 'forms of landscape'.

<sup>5</sup> Since February 2022, a research blog lists most of the studies on agrarian morphology carried out in the world by archaeogeographers over the last thirty years, or by other researchers who have contributed to renewing the terms of analysis of rural plots. Cf. <https://manoma.hypotheses.org/>

<sup>6</sup> Several archaeogeographical studies have been performed on current cities. The concepts and methods used are the same as in rural archaeogeography. I will, however, speak very little about it in this paper, preferring to borrow the examples from rural areas because of the aim of the book and because this is where the methodological and epistemological renewals came from.

<sup>7</sup> To complete this paper, one can suggest to readers wishing to know more about French archaeogeography to refer to Brigand 2015 and Watteaux 2017, both general papers in English on this topic.

<sup>8</sup> See also WATTEAUX 2009a for a short presentation of the British historiography, and Chouquer and Watteaux 2014 about palaeoenvironmental studies.

20th century. This diversity is not neutral and must be accounted for. The question is: why and how have we moved from a few plain and solid titles in the early 20th century to dozens of names, most of which are synonymous, or more or less overlapped? How can this profusion and the proceeding confusion be accounted for? Is it the consequence of the passage of Modernity to post-Modernity in which one title equals another finally bringing it down to relativism? Or is it just the symptom of methodological individualism, that is to say one of the features of Modernity? Without being able to go here within the details of the different epistemological analysis of this phenomenon that have been drawn in the second part of our book, let's sum up our main thesis beyond the variety of the academic traditions and strategies: the abundance of the names, sometimes proceeding in confusion, is an obvious piece of evidence of the richness characterising the emergence of a vast field of research, that of the rediscovery of the Ecumene and the complexity of the legacies that compose it. We think that this field of research will be major, because it seems necessary the existence of a discipline which deals with the transmission of the memory of planimetric and spatial realities, which is neither a simple illustration of history through forms of landscapes nor a simple spatialisation of archaeological data nor a succession of geological or ecological sequences.

The existence of four main national genealogies can also be distinguished (in the limits of our investigation):

- a German tradition based on ethnicity, law, state control and planning;
- a Mediterranean tradition based on topography, rather a-morphologic and roman;
- an English tradition which is rather archaeological and gravitational, which found close links with the utilitarian thinking and the conservative economic thinking of the 18th and 19th centuries;
- a French tradition based on a fundamental relationship between form and function, constituting the functionalist and determinist heritage of the 19th and 20th centuries. Moreover, French geohistorical works are structured by a strong idea that France is a country where the association of history and geography is stronger than in other countries (Ozouf-Marignier 1995). Thus, from the Paul Vidal de la Blache's famous *Tableau de la géographie de la France* (1979 [1903]) forming an introduction to the *Histoire de France* of Ernest Lavisse, French historians have traditionally set the scene for their stories by describing the landscape where the 'action' will take place. But this 'geographical picture' ultimately turned out to be, as the geographer Georges Bertrand says, 'the consequence and the cause of a blocked conception of the relationships between Man and the environment' (Bertrand 1975:39-40). Indeed, it can retain only general and permanent features, to the detriment of the varied dynamisms that characterise rural history.

Marc Bloch, influenced by late 19th century research in Germany and England, introduced the notion of the 'forms of landscapes' as a privileged area of study which, through various types of documents (maps, cadastres, aerial photographs), could reveal the long-lasting imprint of the ways in which the land was laid out in a distant past. Several historical, geographical and architectural studies dating to the end of the 19th century focused on the continuity and durability of certain patterns of landscapes (Robert 2011a). Landscapes were long viewed from a morpho-functional perspective in which given layouts were associated with given societies (Robert 2012) and from a morpho-historical perspective that presupposes planning and gives institutional and political facts a predominance over social and spatial facts (Chouquer 2000a). At times, this led to the suggestion of typo-chronologies or even to propose ethno-typological interpretations, as the one by August Meitzen in the end of the nineteenth century, who equated types of settlement and agrarian morphologies with specific ethnic groups. While

such a view was rapidly rejected in France (Lebeau 1969), the idea that old land layouts could be found as they once were persisted.

*The Choice of the Term 'Archaeogeography': Epistemological and Semantic Issues*

It falls outside the scope of this paper to go into all the differences between archaeogeography and other geohistorical disciplines<sup>9</sup>, but schematically speaking, one can summarise by saying that archaeogeography stands out for its voluntarily reflexive stance towards its research objects ('archaeology of geohistorical knowledge') and for the attention paid to the complex processes by which landscape forms are transmitted and hybridised in the long-term, unlike studies that view landscapes as 'palimpsests', i.e. with a linear and stratigraphic conception of over time. The metaphor of 'landscape-palimpsest' is very common in Archaeology and is, to our knowledge, a proposition of the famous British field archaeologist O.G.S. Crawford in his book *Archaeology in the field*:

'The surface of England is a palimpsest, a document that has been written on and erased over and over again; and it is the business of the field archaeologist to decipher it. The features concerned are of course the roads and field boundaries, the woods, the farms and other habitations, and all the other products of human labour; these are the letters and words inscribed on the land. But it is not easy to read them because, whereas the vellum document was seldom wiped clean more than once or twice, the land has been subjected to continual change throughout the ages. [...] To revert to the analogy of the palimpsest – the writing was completely erased twice, by the Saxons and by the authors of the enclosures.' (Crawford 1953:51-52)

The spectacular results of aerial archaeology as well as the well-known phenomenon of Modern enclosures have favoured such a stratigraphic reading underlying breaks in the history of landscapes. However, research in archaeogeography on the dynamics of planimetric forms over time has shown that this image does not take into account the complexity of the processes of memorization and transmission of these forms in space and time. Their history cannot be reduced to a pile of strictly periodized strata because of the transmissions, transformations and filters that the *longue durée* puts between the production of a planimetric fact and its current observation. As if a centuriation was only Roman, a coaxial planning only medieval, etc., whereas these morphological objects are much more intertwined than we thought. In the end, rather than the freeze-frames produced by generations of historians and geographers on the basis of historicist and typo-chronological assumptions, archaeogeographers more often recognise dynamic processes of transmission and transformation, both in terms of space and time, that determine the way sites are configured, and which are notable for the potential for reactivation and periods of latency (see below, 2.2.b. and 2.3.) Socio-economic conditions continue to play a role in this history, but according to another evolutionary scheme: not (or not only) according to supposed major historical thresholds (for instance, end of Antiquity, around year 1000), but according to a multitude of local conditions, hybridized with geographical realities and ancient legacies.

Let's take the example of 'Landscape Archaeology', a very common disciplinary title as it has been developed in France ('*archéologie du paysage*'). As in many other geohistorical disciplines, the choice of

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<sup>9</sup> The question of the relationship between archaeogeography and these other disciplines has already been partly discussed in the above-mentioned book, but also in an issue of the journal *Études rurales* entitled 'Archaeogeography and neighbouring disciplines' (no. 188, 2011), where Gérard Chouquer deals with the subject in a general way ('A discipline without a mandate') and Sam Turner from the British point of view ('Landscapes and relationships: archaeology, geography, archaeogeography'). In the case of Spanish works, the publications of Ricardo Gonzalez Villaescusa also reflect this. Finally, the present collective publication under the direction of J. A. Quirós will be a useful opportunity to go further in the confrontation of the different research schools studying agrarian landscapes.

this title has never been subject to theoretical justification. During the founding symposium of 1977 (Chevallier 1978), the term ‘landscape’ was used in its broad sense and associated with archaeology because this discipline made an undeniable progress in knowledge of history of landscapes. This lack of content and, therefore, the difficulty of identifying a real discipline rather than a simple new object, probably explain why the title has not been as successful as in the Anglo-Saxon world (‘Landscape History’ then ‘Landscape Archaeology’). Already in 1977, Georges Bertrand, however convinced by the interest of the approach, wondered about the relevance of this term: ‘The landscape is therefore not a concept, at most a teeming notion that everyone believed they could use in their own way and under various acceptances. For the past few years it has served as a ‘Spanish hostel’ [expression meaning that we gather under one ‘roof’ very varied things even contradictory]. It became confused, then insignificant and finally transparent! Will archaeologists, after other researchers, further increase this inconsistency and ambiguity?’ (Bertrand 1978:133). At the end of the symposium, G. Bertrand therefore proposed to abandon this term on the scientific level (he did not rule out its use in its banal sense) to seek more clear and operational concepts, such as ‘ecosystem’ and ‘geosystem’. More than forty years after the kick-off given in France by this symposium, it is clear that few researchers really wanted to place themselves under this banner, most preferring more limited titles linked to various fundamentals: geological (‘geoarchaeology’), ecological (‘archaeobotany’, ‘chrono-ecology’, ‘historical ecology’, ‘archaeo-ecology’...), geographic (‘archaeogeography’), geohistoric and political (‘historical chorematic’, ‘archaeohistory’...), among others. In 2000, R. Chevallier himself, however the instigator of this landscape archaeology in France, preferred to highlight the title ‘archaeological geotopography’ (Chevallier 2000)... Today, the definition still seems ill-defined and unclear, because of a connection with environmental archaeology which becomes the ‘hat’ encompassing landscape archaeology. As Ricardo González Villaescusa (2019) explains: ‘for twenty years, neo-naturalism has gradually imposed in archaeology, interest in environmental dynamics and interactions between environment and Man taking precedence over the interest for variations and dynamics of the construction of landscapes by societies’. If this question is not a problem for some researchers (for example Leveau 2005), it seems to us on the contrary that it presents an irreducible difficulty: the plurality of meanings of the term ‘landscape’ and their fragmentation in a tense epistemological situation.

This is why the French school of archaeogeography, in 2003, did not use this term to define itself (Chouquer 2003a). The choice of the term ‘archaeogeography’<sup>10</sup> allowed to differentiate ourselves from problematic titles on the epistemological level, but also to enhance the geographic anchoring of the discipline (and to distinguish itself from geoarchaeology where the prefix –geo refers to geology). At last, it focusses on the necessary disciplinary hybridisation (archaeology + geography) and not just one disciplinary banner. This term was also preferred to those developed by Gérard Chouquer since the end of the 1970s: ‘morpho-history’, ‘archaeomorphology’, then ‘dynamic morphology’. The evolution of the research on ancient centuriations, showing the complexity of the legacies composing these landscape forms, has indeed led to identify the limits of these expressions: they presented the risk of giving the impression of a return to the outdated agrarian and morphological typologies of old historians and geographers. To conclude, the choice of the title ‘archaeogeography’ therefore owes nothing to chance and wishes to designate a new way of making history, with a geographical methodology (including morphological analysis) and on the basis of largely archaeological materials.

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<sup>10</sup> The word had already been used punctually in the 1980s in France in various contexts and particularly under the pen of medievalists, but never with theoretical analysis or methodological developments.

### ***Crisis and Renewal of the Morphological Analysis: From Morpho-Historical Towards Morpho-Dynamical Perspective***

#### *Weaknesses and Criticisms of the Morphological Analysis of Landscapes*

Geographers have largely laid the foundations for morphological analysis (see for example the reference manuals: Meynier 1958, Lebeau 1969, Pinchemel and Pinchemel 1988), but have failed to overcome the weaknesses and dead ends of their methodology. From the 1970s and 1980s, modern geography therefore purely and simply turned away from morphology (in particular agrarian), criticising its narrow and sterile descriptive approach, in favour of new and rich geographic adventures (spatialism, environment, cultural geography, network analysis, social analysis of space, etc.). A few rare geographers continued well to defend the interest of this field (like Yves Poinot, Pierre Clergeot or Pierre Gentelle) but in a marginal way, revealing even more the rejection of the geographic discipline for these works... Under these conditions, it would have been miraculous for a renovation of the morphological analysis to emerge from the geography itself!

To be fair, French historians have also neglected morphological analysis, despite Marc Bloch's interest in the subject. The attention paid as of the final years of the 19th century and of the beginning of the 20th century to maps, cadastral maps, and aerial photographs yielded little in the way of convincing morphological analysis of the information provided in such documents, a failing which does much to explain the highly critical attitude or pronounced misgivings that most historians and archaeologists have towards morphology, that is when they did not dismiss it out of hand (Chouquer 2009) (see below, 5.2.). Thus, the blockages of geographers, on the one hand, and of historians or archaeologists, on the other hand, explain that today the current documentary explosion – the numerous photographs from vertical air missions carried out by IGN since the 1940s-50s which can be consulted and downloaded from its geoportal, the Napoleonic land maps digitised and put online by departmental archives, or the increasing satellite images available on the internet – no longer meets the workers that should be able to be found to enhance these incredible documentary resources.

Why was there a problem? Because the objects that geographers and historians had installed since the 19th century were, indeed, widely criticisable. First of all, they suffered from three major epistemological biases: methodological nationalism (i.e. the effects of the construction of the Nation-State on historical narrative), methodological naturalism (i.e. the effects of the separation, stemming from Modernity, between Nature and Culture) and methodological historicism (i.e. the effects of the periodisation of historians on the understanding of the various dynamics) (Chouquer 2007a and 2008a). In short, these biases embarked on the geographic realities in dogmatic narratives, that is to say that the forms had to be folded into necessarily glorious genesis, into necessary evolutionism, historical stages, the Nation building process, etc. Thus, the least regularities became abusive initial planning projects, the forms always having to reveal high social functions. Here we find the idea expressed above according to which material or spatial productions reveal automatically social organisations. An additional difficulty is also due to the fact that historians and archaeologists for too long attributed to the Roman era ambitious planimetric forms (the centuriated grids), while they refused any planned grid of a certain size for the Middle Ages, considering only very local organisations for this period (Chouquer 2000a and 2003b). Symmetrically, the simple fact that Romans had been present in a particular area was often considered sufficient to claim centuriation, even if no morphological evidence supported it. Convinced that these land divisions signalled the presence of some unique, clearly identifiable ancient society, it was deemed justified to probe present-day planimetrics and those immediately preceding to search for the more or less vanished traces of these necessarily datable and well-dated patterns (Favory 1996).

Despite this heavy scientific heritage, French school of archaeogeography thinks and affirms that form remains a relevant object of study that be renewed. One of the major projects of archaeogeography has therefore been to deeply renew the methodological principles of the analysis of agrarian and urban morphology.

*Renovation of Morphological Analysis: The Contribution of Studies on Ancient Centuriations and of Preventive Archaeology*

The first stages of this renewal date back to the 1970s, within the framework of historical research programs on ancient centuriations and of the development of what were then called 'new techniques in Human Sciences'. In particular, the 'Besançon group' played a leading role in developing a method for identifying centuriations, first by optical analysis and then by computer (Chouquer and Favory 1981, Chouquer 1985). Then, since the 1990s, advances in 'preventive archaeology' (formerly called 'rescue archaeology') have made it possible to go further in understanding the dynamics of planimetry over the long-term (Chouquer 1996a). Rescue excavations carried out in the 1990s on the route of the 'Mediterranean TGV' (between Lyon and Marseille) played in particular a major role in this French historiography. A high number of geoarchaeological dig surveys revealed ditches that had been dug in identical places, following similar patterns, in spite of the deep layers of sediment which separated them (Berger and Jung 1996). This first-hand archaeological observation was instructive for its relevance for environmental history and regional climate. For agrarian landscapes, it stimulated the revisiting of processes of non-linear transmission over long periods of time while studying field divisions (Chouquer 2000b). A similar epistemological reappraisal followed the construction of the A85 highway during the same time. A comparison of land division documentary records and archaeological finds showed that it was rarely possible to date remains and traces to one specific period, even when ditches were found to have been set out along identical lines and with a similar organisation (Chouquer *et al.* 1997). Even when excavation have been organised, it was impossible to date the two major networks of agrarian forms that, each on a small scale, helped to structure the principal layout of the landscape in this sector. Although this was considered as a failure by some archaeologists, it helped to generate the concept of 'formation network' ('réseau de formation') (Marchand 2000). These, as opposed to 'foundation network' ('réseau de fondation') such as ancient centuriations, refer to an amalgam of orthogonal but not orthonormal organised configurations, resulting not from some overall design, but generated over long periods of time and often dating back to Protohistory. In addition, the notion of 'legacy' ('héritage' in French) began to take on great importance in the 1990s to demonstrate and explain the historicity of environments. These legacies must be studied over the long term ('longue durée') because the lag time between an action and its environmental consequences (its resilience) can be very long.<sup>11</sup> So the notion of 'degradation' (of the environment, the landscapes) has been replaced by that of 'dynamics'<sup>12</sup>, at the crossroads of historical intentionality and inherited socio-environmental constraints.

Both Gérard Chouquer (1994, 1996b) and François Favory (1996) were the first to take into account these new archaeological data to study planimetric landscapes, which led them to criticise the traditional methodologies. They challenged the way in which ancient centuriations had been reconstituted (including which they themselves had presented in their early research). But as time went by, initial critique gave way to a more 'existential' and epistemological review which G. Chouquer formulated in a major essay published in 2000: *L'étude des paysages. Essais sur leurs formes et leur histoire*. Archaeogeographic awareness began at this critical tipping point: the renovation of scientific geohistorical objects could

<sup>11</sup> See GUILAINE 2000 for a review and forecast of research in France on the 'longue durée'.

<sup>12</sup> Here are two symptomatic references of this evolution : S. Van Der Leeuw (ed.), *L'homme et la dégradation de l'environnement*, Actes des XV<sup>e</sup> Rencontres internationales d'Archéologie et d'Histoire d'Antibes, Sophia Antipolis, 1995 ; J. Burnouf, J.-P. Bravard Et G. Chouquer (eds.), *La dynamique des paysages protohistoriques, antiques, médiévaux et modernes*, Actes des XVII<sup>e</sup> Rencontres internationales d'Archéologie et d'Histoire d'Antibes, Sophia-Antipolis, 1997.

only be a re-examination of the dynamic processes that lead to current forms of the landscapes. In other words, understand what shape memory is and how it works. After years of research on well-known centuriations and on what landscapes could tell us about what had come down to us, G. Chouquer confirmed that an accurate reconstitution of ancient land divisions was impossible without taking into account the transformations that occurred over a far greater period of time (Chouquer 2007b and 2008b). G. Chouquer in fact took the argument significantly further by showing that, whether they were working with Roman land surveyors' reports or a corpus of centuriational designs, historians were essentially dealing with how documents were composed, whereas landscape design cannot solely be considered as the result of some given society's planning and land development. It is also a product of the subsequent transformations through which centuriations have come down to us. Attempts to unravel these entangled features – the presumed original grid pattern and its subsequent transformations – prove somewhat illusory for two reasons: not only does the documentary evidence we possess not allow us to do so, but also because a number of features of these centuriations do not date to Antiquity but to medieval times, and occasionally even the modern era, despite possessing a morphology that is typical for Antiquity (see below, 4.1.). In truth, some centuriations that come across as remarkably well-preserved are in fact 'too good to be true' (Marchand 2003). They bear witness to two thousand years of history, and not simply to Roman design.

Lastly, since the 2000s, the influx of geoportals and the increasingly favoured access to documentary resources (especially geographical resources) have changed the work of morphological analysis and multiplied the opportunities. The plunge into the large scale (that of the details of photo- or carto-interpretation) brings out very general and hollow insights from the old historical geography or the old geohistory.

Ultimately, this renovation of the morphological analysis and interpretation, undertaken for almost 25 years, from objects such as Roman centuriation, medieval openfield and *bocage*, road networks, etc., has led archaeogeographers to suggest what should be a geography of old forms which is not based on functional *a priori*. Indeed, a form is never entirely a reflection of a society, because 'in studying the soil, one never works on simplified and principal lines of patterns ['épures'], but on legacies' (Chouquer 2009:224). The form is, of course, the result of the action of a society, but it is also and above all the result of a hybridisation between this action a time *t* and inherited realities; it is therefore a profoundly transformed result, because it is transmitted to us over the long term. This explains why, although it is always necessarily 'in' society (if this form is 'active', that is to say non-fossil<sup>13</sup>), it can cover several functions over time.

### ***Archaeogeography, a Discipline with a 'Cosmopolitical' Epistemology Dealing with the 'Memory' of the Landscape Forms***

These scientific renewals have led us to realise that the forms of landscapes are not simply an indication of *what these places once were*, which has become an increasingly problematic proposition, but also and above all *what these places have become*. This represents a major intellectual shift. We have moved from the study of landscape forms waiting to be mapped or unearthed, to the study of what has come down to us as contained in today's landscapes, in spite of—or in fact because of—the numerous changes altering them through the ages (Marchand 2003 and 2014). This is what the concept of 'transmission' is intended to express, the term having been coined to describe the dual processes of transmission and transformation over time, emphasising that spatial forms only exist because they are appropriated by subsequent societies (Chouquer 2007a). The meaning and materiality of these forms clearly change, but

<sup>13</sup> A fossil form – or archaeological trace – is a form buried in the ground but visible on aerial photographs, satellite images or thanks to excavations.

always to a limited extent, and without effacing their general outline. These transformations are the precondition for transmission as H  l  ne Noizet summarises: ‘what gives the appearance of continuity in fact results from permanent discontinuity: it is only because there are many modifications to details that the overall structure is transmitted’ (Noizet 2014:186). Thus as she succinctly puts it: ‘it is the overall process of the transmission of a form which is taken into account, from a period of varying remoteness through to contemporary documents, and not an individual moment’ (*ibidem*:185). The discipline of archaeogeography hence deals with the ‘memory of places’, and is akin to Laurent Olivier’s (2008) innovative definition of archaeology (Watteaux 2017, Lavigne 2017). The true focus of archaeology, he argues, is not past events as they actually occurred, but rather the memory contained within things, what we find in them and understand from them here in the present. This perspective does not preclude the study of earlier landscapes and land systems specific to a particular society and period; but it does considerably alter the ways we understand and speak about them. In this, French archaeogeography has a certain number of points in common with Historic Landscape Characterisation (HLC) as developed in Great Britain (Herring 1998).

The epistemology of archaeogeography is said by G  rard Chouquer ‘cosmopolitical’, ‘reflexive’ or ‘symmetrical’ (different words to express the same idea) because it is largely based on the intellectual and scientific propositions of the sociologist of science Bruno Latour<sup>14</sup> (1991, 1999, 2006). It aims to go ‘[...] beyond the modernity of our uprooting, deals with risky attachments, hybrids, the composition of collectives with soft edges and which makes evaluation a constitutive and permanent approach to the scientific process’ (Chouquer 2003a:20). In Latour’s methodological approach scholars create a ‘collective’ (after deliberation inside the ‘parliament of objects’) because the problem to be explained is unclear, and they know neither who or what will explain it nor how that will come about (Latour 2006). The collective allows them to bring together human and non-human actors who are connected by bonds that can be human or non-human, and whose interaction produces that which is ‘social’ (see below, 5.2.). Creating such ‘collectives’ forces us to reconsider the relation between disciplines (see below, 5.1.). Archaeogeography straddles borders. It moves between archaeology, geography, history, anthropology, geoarchaeology, the history of law, land surveying, etc. on the basis of its needs and the scientific problem at hand. And each given problem determines the disciplines and the documentary sources that need to be drawn upon. The way one scholar navigates between disciplines need not be duplicated by another; some other researcher might deem another approach preferable. In this sense, archaeogeography is a ‘discipline without a mandate’ (Chouquer 2011) or, as Bruno Latour (1999) put it, a discipline with ‘unclear boundaries’. None of this precludes archaeogeographers from having a homeport, that is, a specific kind of professional training and a specific area of expertise, but their research cannot be reduced to this.

There are other similar epistemological bases – the criticism from the anthropologist Philippe Descola (2005) of the partition between Nature and Culture and the study of analogical way-of-thinking in premodern societies, the ‘methodological cosmopolitanism’ advocated by the sociologist Ulrich Beck (2001), the ‘cosmopolitical compass of epistemologies’ defined by the political scientist Dominique Boullier (2003)... – but it would fall outside the scope of this paper to present them. So let’s mention a last and important epistemology, different from these previous ones but perfectly complementary: the reflexion of the geographer Augustin Berque (2000) on what he calls the ‘Ecumene’. This researcher has developed the principle of ‘*m  diance*’ that allows to organise our relationship with Ecumene. The idea is that we give to space a value of ‘subject’ which establishes oneself on project’s societies and balances them, even figure out them, and, in return, societies transform this space through a range of patterns (or ‘predicates’). This mediance allows to link spatial and local analyses and to link also the study of the

<sup>14</sup> Bruno Latour prefaced G  rard Chouquer’s reference synthesis published in 2007, *Quels sc  narios pour l’histoire du paysage? Orientations de recherche pour l’arch  og  graphie*.

old elite's representations of their space to eco-bio-social materialities and to hybridisation processes unfolding for millennia. Archaeogeography adds the consideration of the dynamic and historicity of these processes thanks to the morphological analysis because the 'subject logics' defended by A. Berque are at the same time geographical and historical (Chouquer 2008c). This logic of places presupposes an adapted methodological procedure.

### Methodological Principles

#### ***'Sources': Working with a Heterogeneous and Heterochronic Set of Documents and Data to Draw up a 'Compiled Map'***

The archaeogeographical method, while differing from that of archaeology, history, and geography, draws on the documents and data drawn up and used by these disciplines. It is thus a 'sister' methodology, and complements its siblings (Robert 2011c, Brigand 2015). An archaeogeographer works with an extremely heterogeneous and heterochronic set of documents or data, ranging from the extremely typical (written sources, old maps) to the most contemporary (geographical databases, Lidar), through archaeological data. He uses mainly what are known as 'planimetric documents' (maps, aerial photographs, satellite images, and geographical databases).

These documents and data give access to information of different dates, scales and natures. In order to associate them more easily during the analysis, they have to be gathered in a common 'document' drawn up by the archaeogeographer, called 'archaeogeographical map' or 'compiled map' (under GIS) (Figure 2.1). This map is so called because it compiles all the historical, archaeological, and geographical information deemed relevant for a given georeferenced space (Watteaux 2021; see Robert 2011c for details). It therefore makes it possible to promote the practice of associations which guides analysis and interpretation. Indeed, the archaeogeographer seeks on it for planimetric configurations to see how they are organised, how they combine, how they conflict, and so on and so forth. What guides the analysis of these configurations is their 'planar forms' or 'forms in two dimensions' (*formes en plan* in French). Indeed, as I said, morphological analysis is central in the archaeogeographical methodology, favouring the reading of planar forms than 'relief patterns' or 'shaped forms' (*modélés* in French), land use and archaeological traces. For instance, 'eco-morphological corridors' associate morphological 'corridor' (idea borrowed from Landscape Ecology) that is expressed by a linear and relatively narrow organisation in the landscape, nearly always associated with the river system (either still existent or paleo-channels), and by the ecological composition of landscapes which tend to be dominated by juxtaposed pastures and meadows. So, 'eco-morphological corridors' as they are defined by archaeogeography are the association between planar forms composing a coherent planimetric configuration, relief patterns and types of land use. It is the mix between these three levels that produces the whole morphological unit revealed by the analysis of the compiled map. Other example, a road layout (*tracé* in French) may consist of a series of different shaped forms: motor road, simple service road, dirt track, etc. This form (a line) can be an old main path whose layout has been transmitted over time, but whose relief patterns have evolved locally, depending on the evolution of uses over time. Relief patterns are indeed more fluctuating in time because they are more subject to historical uses than the planar forms. It is because of this greater resilience of these latter that archaeogeography preferentially studies this level of landscapes.

Moreover, the temporality of the relief pattern and of the archaeological trace is linear (it is that of its physical decomposition until its disappearance), whereas the one of the planar form is deeply complex and dynamic because it can be reactivated at different times depending on nonlinear terms. Indeed, recent advances in archaeogeography have demonstrated that the relationship between archaeological traces and planar forms visible on planimetric documents is not linear. If there are undeniably cases of

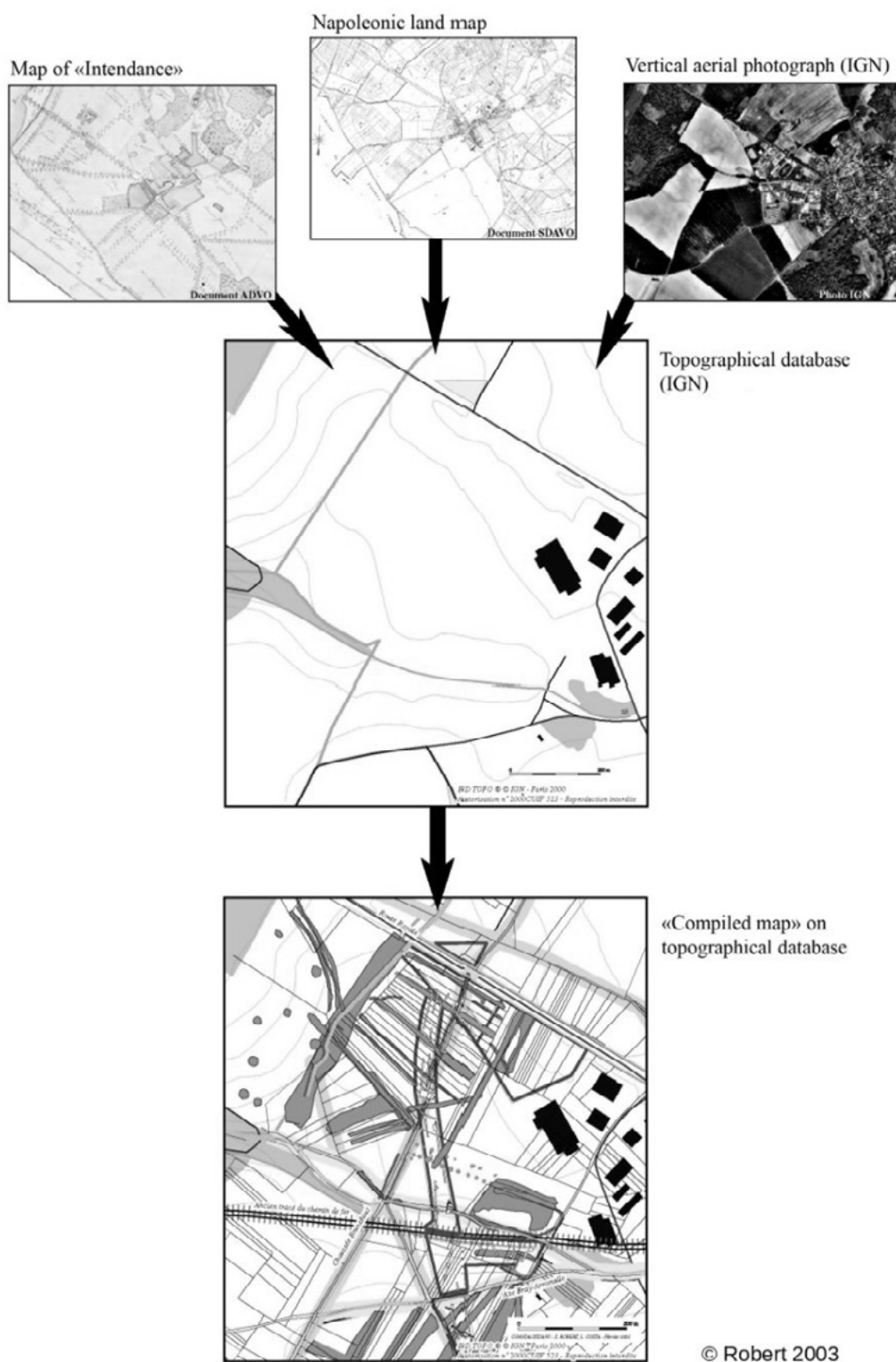


Figure 2.1. Principles of the 'compiled map'. Source: Robert 2003b.

strict persistence of traces and forms ('diachrony') as well as disappearance of forms ('taphochrony'), there are often cases of dissociation of these two levels ('uchrony'<sup>15</sup> and 'hysterechrony'<sup>16</sup>): transmission of planar forms with transformation of their relief patterns over time, persistence of forms without material traces, chronological hiatus between a form and its material manifestation, displacement of a trace but maintenance of an orientation, etc. (Robert 2003a). For this reason, it is better to talk about 'spatiotemporalities' than about temporalities because the conditions for the transmission of the forms happen according to various chronological and geographical scales and involve frequent changes in their nature:

'To transmit is to transport a space-time information, and in addition to pass it from one nature to another. Therefore, transmitting leads us to accept the idea that changes and sustainability are consubstantial (notion of resilience), but also that such a nature of changes can produce a transmission affecting other types of facts. This is how social *functions* often taking the form of *projects*, objects of history, produce forms which are objects of morpho-historical geography, and *relief patterns* which are objects of agrarian archaeology and which, then, become *traces*, whose spatiotemporal vicissitudes are the object of archaeology and geoarchaeology, and which transmit and produce new *forms*, object of a morpho-dynamic geography, which also support *relief patterns*, objects of archaeology, geography, history, and ethnology. But this presentation says badly the feedbacks, the more complex trajectories in reality and it should not introduce the idea that this would necessarily take place in this way and only in this order and in this direction'. (Chouquer 2008c:235)

This is why relief patterns and archaeological traces have to be linked with morphological analysis; they are just not the starting point.

The 'compiled map' therefore represents a method of transforming documents into sources on planimetric landscapes, according to the questions formulated by the researcher. Indeed, a document is not a 'source' in itself but can be a 'source' for a given problem depending on its nature, scale, objectives, date, etc. (Kuchenbuch 2004:306). Gérard Chouquer uses a metaphor to capture the purpose of such a document for historical research: 'the compiled map of archaeogeographers is no more of an objective 'source' than a [medieval] cartulary is. It is a pure construct. But this construct gives access to information about the past, and above all enables associations depending on what has been included in the document' (Chouquer 2007a:223). Thus, unlike archaeological maps or morpho-historical attempts to reconstruct the landscape dividing space by periods, the compiled map allows to capture a continuous space through space and time.

### **'Cursor': Using a Multi-Scale Approach**

A central aspect of the archaeogeographical methodology is to continually vary the scales of analysis. With regard to spatial scales, the work has to be performed at the scale of a plot of land as well as an entire region. This is particularly true for the study of the road networks which requires to work from a micro-local level (old paths identified by archaeologists or visible on large scale maps or aerial photographs), to a supra-regional level, and on all the levels in between (Vion 1989, Robert 2003b, Watteaux 2013, Robert and Verdier 2014). Of course, the number and the definition of the analysed

<sup>15</sup> 'Uchrony' means a spatiotemporal modality which is observed when a structure or an element of a form imprints in the ground a potentiality which a subsequent social fact replays at an unexpected moment in the history of the place. The modality is then expressed by 'isotopy' (transmission to the same location), 'isocline' (transmission of orientation) or 'isoaxiality' (transmission in the extension of an earlier line or form). See Chouquer 2000a and 2007a.

<sup>16</sup> 'Hysterechrony' means a spatiotemporal modality that translates the lags, delays and response times that one observes between a 'cause' and the manifestation of its 'effects' (for instance when a limit of a *centuria* can be reified several centuries later). See Chouquer 2000a and 2007a.

objects differs according to these scales. For agrarian landscapes it is often less wide but different scales between the parcel and an area wider than the parish or the contemporary administrative district are necessary to understand the logic of the observed planimetry.

The archaeogeographical interpretation of forms also implies leaving behind any periodised framework (forcing the researcher to no longer focus on its preferred period). Firstly, we analyse current landscapes because we use documents that are contemporary and not historical ones (satellite images, orthophotomaps, geographic maps and databases). And it is not at all a problem because if we understand landscapes to be a digest of memories, then today's landscapes can speak to us of the past with the same legitimacy as those of the previous centuries. Secondly, we must bring down the partitions created by academics between the various periods because no landscape is understandable without this diachronic perspective (see just below the example of medieval landscapes). Indeed, the forms relate to multiple timescales, and they therefore link up the various epochs with which these forms are associated from Protohistory through to the present day. Without rejecting synchronic dating, they supplement it by examining how epochs are related, in a process of complex temporality (non-linear resilience) involving transmissions and transformations (see above, 2.3.). Let's give one heuristic example between archaeological traces and current planimetry, near Genlis in Côte-d'Or (Eastern France). Here, an aerial photograph shows an archaeological ditch (probably dating from the Iron Age and the early Roman period on the basis of excavations of similar lineaments a few hundred metres to the north) that runs north-westwards beneath a contemporary geographical feature, a path, as if there were no temporal gap between the two (Chouquer 2009). The association of the two levels (by isoaxiality) creates therefore a coherent whole in which memory and oblivion are interwoven.

The absence of a multi-scale approach has sometimes relegated some morphological phenomena to the side-lines. This is the case, for instance, for configurations referred to as 'radial grid pattern' (Watteaux 2003a and 2009b). Spatial organisations in the Middle Ages have long been viewed through the prism of concentric models, with space conceived in terms of parishes and seigneurial domains and time considered within the framework of the Middle Ages period (in particular, with a break at the year 1000). This 'freeze-frame' approach prevented the detection of diachronic phenomena in land division and road networks, which are not commensurable to parish, lordly and medieval scales. But unplanned areas of land are often laid out in a radial pattern of squares, in which, on a large scale (in the cartographic sense), a radial road network focused on a habitat is accompanied, on a smaller scale, by plots of land laid out in a predominantly non-orthonormal grid pattern that does not belong to a specific period but is rather the product of a long, resilient, dynamic process (a 'formation network'). The intermeshing of the two generates a completely unplanned form in the overall layout, not relating to any precise period (see below, 4.2.a). As a strong spatial object, the 'radial grid pattern' escapes any chronotypological classification, meaning spatiotemporal dynamics need to be fully taken into account to analyse it.

### **Cases Studies: Medieval Parcels of Land between Creation and Legacies**

The introduction into archaeology of the long-term paradigm and the development of palaeoenvironmental studies have made it possible to show that medieval societies inherit environments already exploited, since at least the Bronze Ages, and have adapted these environmental and landscape legacies to their own needs. This is also and even particularly true in the case of agrarian plots.<sup>17</sup> However,

<sup>17</sup> One could add here a development on the criticism of the paradigm of the 'birth of the village' which would have occurred according to certain historians around the 11th century (see Watteaux 2003b for a summary), but that would distance us from the landscapes *stricto sensu* (it is rather the topic of settlement) and the renewals come more from the contributions of preventive archaeology and spatial archaeology than from archaeogeographical studies proper (but it is true that it is a research topic of archaeogeographical nature). However, to summarize in a few words, let's say that thanks to a pioneering

these taken up, transformed and prolonged legacies do not imply the perfect continuity of the landscapes in their ecological and physical dimension nor the identical perpetuation of the agrarian practices and systems that take place there. The mobility of these landscape components (ecological, physical and social) is greater than that of the planimetric forms which have their own temporality, characterized by a complex articulation between phenomena of continuity (transmissions) and discontinuity (hiatus and/or transformations). The example of the bocage, developed further on, shows this very well: the hedges and embankments are more recent than the forms of the parcels on which they are installed. This shift in analysis forces to study the landscape in its inherited state, and not from the period of specialization of such or such researcher. However, it does not mean to prevent the historical discourse on landscapes in the Middle Ages because it is not all a legacy; it does simply, but considerably, alter the ways we understand and speak about them (see above). Moreover, it is not all a legacy; there are also creations of plots of land during this medieval period that is often underestimated in this domain (Lavigne And Watteaux 2018).

### ***Agrarian Planning and Colonisation during the Middle Ages: A European Phenomenon***

#### *Agrarian Colonisation During the First Middle Ages<sup>18</sup>: An Emerging Topic Full of Promise*

Agrarian colonisation (i.e. the conquest then the occupation of lands), even the division and allocation of land did not only concern Antiquity or the Second Middle Ages (see below, b.). The Carolingian sovereigns in particular practiced a policy of concessions to their faithful (powerful laymen or religious establishments), aiming to annex new lands or to increase and enhance existing exploitations. The texts speak of *apprisio*, *proprisio*, *occupatio* or even *bivang* in present-day Germany. Gérard Chouquer (2019, 2020a and 2020b) analysed and synthesised the legal and fiscal methods of this land appropriation. These faithful obtained fairly extensive rights (to transmit, to sell, to exchange..., the land), with the responsibility for them to conclude with their 'men' (settlers, *massarii*, tenants, hosts ...) sub-concession or sublease contracts for the effective development of farms by peasants, fixing the taxes, the services due, the distribution of land and their transmission. This scheme was, for instance, used from the end of the 8th century to establish the conquest of Septimania and the March of Spain. The kings then assigned tax lands left fallow or vacant to local aristocrats or military leaders (called *Hispani maiores*), as well as to monastic establishments, often founded by the Carolingians themselves, on condition that they worked for the extension of the *cultum*, in exchange for military service and tax contributions.<sup>19</sup>

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work conducted by geographers and archaeologists inside the 'Archaeomedes' research group on habitat networks in the valley of Rhône since the Bronze Age (Durand-Dastès *et al.* 1998), the debate in France on the 'birth of village' (expression proposed by Robert Fossier) around the year 1000 (when the 'medieval village', thought of as an ideal-type, was said to have emerged) move forward. Indeed, the implementation of the concept of 'settlement systems' (Raynaud 2003) and the multiplication of archaeological discoveries of sites dating from the First Middle Ages (Peytreman 2003) helped to shift the focus to studying the long-term dynamics of habitat networks as a process. Hence the threshold of the 10th to the 12th century, viewed by some as the foundational moment in the history of villages—and by extension of the 'true' Middle Ages—instead came to be seen as a period when there was a bifurcation in the evolution of the habitat network, part of a far longer process reaching back to the second half of the 7th and early 8th century, which over time acquired the aspect of a network of 'classic' villages forming the current distribution of villages across the landscape. Additionally, this gave new scope to the study of protohistoric, ancient, and early medieval villages—now free to use the label of 'village'—as distinct stages in the evolution of settlement systems.

<sup>18</sup> Since the early 2000s, French medieval archaeologists (and recently also historians) have abandoned the academic periodisation between 'High Middle Ages', 'central Middle Ages' and 'Low Middle Ages', to distinguish two major periods: a 'First Middle Ages' which goes from the 5th to the 11th included, and a 'Second Middle Ages' which goes from the 12th century to the 16th century included. The 12th century indeed appears to be a real tipping point, an irremediable threshold for several reasons (see Burnouf 2008 and Mazel 2014).

<sup>19</sup> However, all fallow land to be cleared does not fall under this scenario. Pierre Bonmassie (1990) has shown that in Catalonia, peasant families are also attacking wasteland and it should be remembered that the counts or bishops also conceded land in order to attract settler peasants.

It seems that these operations of agrarian colonisation did not, most often, lead to the creation of regular set of geometrical plots, named ‘agrarian surveyed planning’ (*‘planifications agraires arpentées’*), that is to say planimetric layouts whose very regular morphology and metrology proceed from an initial survey. However, the investigation has only just begun and the first studies show that more attention is likely to be needed. Two studies conducted by Gérard Chouquer on the planimetric forms fitted out by ecclesiastical establishments, sometimes breaking with previous morphological organisations, sometimes being part of an ancient legacy, show the potential of these recent researches.

The first concerns the *villa* of Tillenay (Côte-d’Or, Eastern France), known by a tax-census (*‘censier’*) dating from 937 (Chouquer 2020b). It is a set of lands of fiscal origin (public lands which have been granted) structured in seven *villae* over which the cathedral of Autun (its *‘chapitre’*) exercises a very strong *dominium*, since there is no intermediate lordship between the *‘chapitre’* and its tenants. This situation created favourable conditions for a restructuring of the plots of land. It so happens that almost all the current villages corresponding to these *villae*—located in an alluvial terrace sector—have a regular face (village-street or beginning of grid pattern) and are established in an agrarian space (open fields) organised according to an equally regular frame (Figure 2.2). Archaeological data could certainly provide valuable information on the period in which these sites were created, but in France archaeology in village context is still in its ‘infancy’... However, we note that the Gallic and Gallo-Roman sites known in this sector were organised with a different orientation. As none of these villages knew a foundation as a *‘villeneuve’* during the Second Middle Ages, which could have explained such regularities (see below), one can reasonably think that these regular village and agrarian forms are linked to a reorganisation of the *villa* of Tillenay by the cathedral of Autun, on an unknown date but before 937, characterised by the foundation of small habitats grouped and the drawing of units of plots by ‘quarters’ dedicated to cereal crop (*‘quartiers de culture’*), or even by the definition of new tax units on the basis of the system of *‘mansus’*.

The other study, in Italy, shows the case of a regular planimetric morphology linked to an agrarian colonisation taking over an ancient legacy. In Romagna, during the 8th century, the abbey of Nonantola received, from Lombard then Frankish kings, a vast set of land which it then conceded either to farmers or to seigneurs who themselves signed contracts with tenants in order to enhance these forested or cultivated areas (Chouquer 2020c). For this, the monastery reused and extended the planimetric framework of an ancient centuriation (Figure 2.3). Archaeological probes have shown that these ancient limits (agrarian or paths) did not exactly match those we know today, since the former lay several metres deeper, and systematically to one specific side, likewise by several metres. What present-day planimetric documents reveal are, in fact, the ‘medieval centuriation’ lines. Furthermore, textual sources from the 8th-12th centuries indicate that medieval people used this grid as a location system differently than Roman people, no more according to their position within the whole centuriate grid with respect to the *cardo maximus* and the *decumanus maximus*. They simply now mention the longitudinal direction and the transverse direction of the *limites* (sing. *limes*) of a *centuria*, with which are associated a toponym or a specific feature (eg. *limes Malmeniacus*, *limes altus*). This evolution signals the passage to a ‘toponymic’ phase of apprehension of space, a phenomenon which does not concern only Italy: one observes it also in France since the 9th century. The archaeogeographical analysis also makes it possible to show that the reinvention of the centuriation is here linked to the management of flows in the plain: the channels which following the limits of the centuriation play a structuring role, which therefore favoured their recovery and transformation by men of the First Middle Ages, thereby promoting the remarkable transmission of this ancient legacy to the present day.

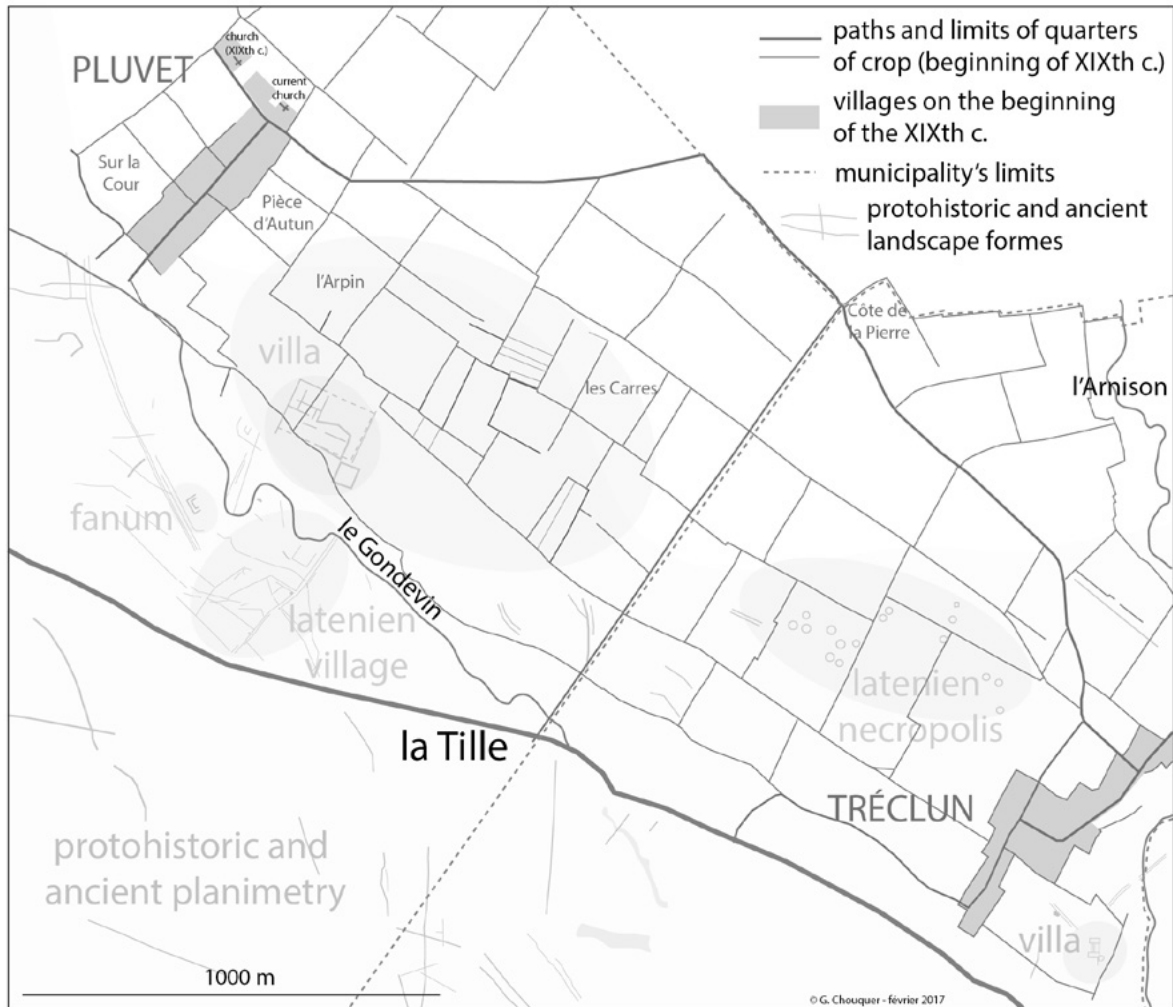


Figure 2.2. Protohistoric and ancient occupation (in light gray) and occupation from the Modern period supposedly dating back to first Middle Ages (in dark gray) between Pluvet and Tréclun on the old villa of Tillenay (Côte d'Or, France). Source: Chouquer 2019.

### *The Agrarian Surveyed Planning During the Second Middle Ages: A Long Debated Historical Fact*

The recognition of regular morphologies in areas that have known agrarian colonisation mainly concerned the Second Middle Ages.<sup>20</sup> It is a major land and agrarian phenomenon that affected all of Europe from the 12th century onwards. This major topic, relating more to medieval history than to archaeology, has been eagerly taken up since the late 1990s with Cédric Lavigne, an early leading

<sup>20</sup> To draw attention to these surveyed planning is not to deny the existence of collective practices among peasantry for the supervision of agrarian practices (such as the collective constraints of openfield), a subject which I will not discuss here.

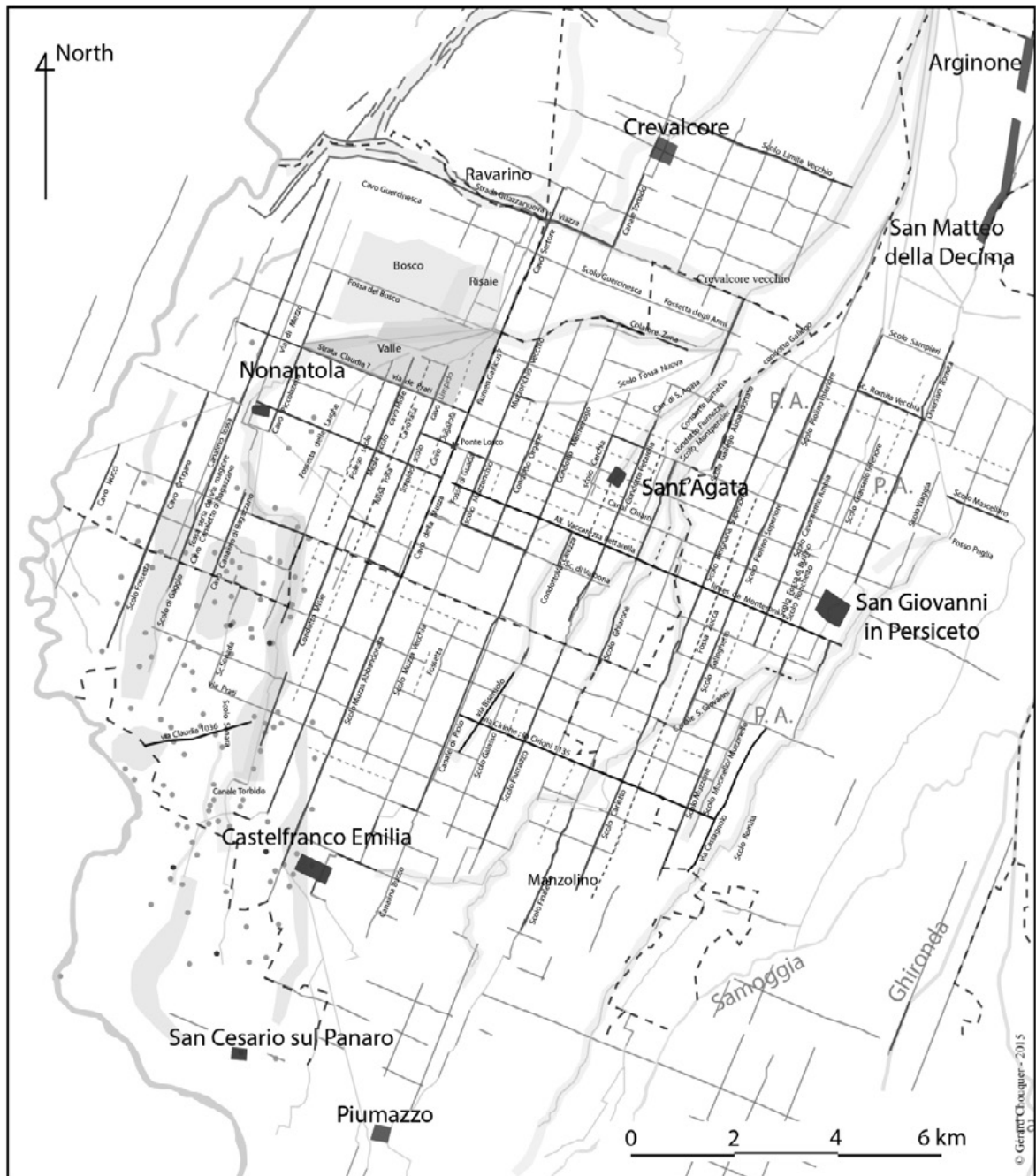


Figure 2.3. Updating in the contemporary planimetry of the so-called Destra Panaro centuriation in the Sant'Agata sector (Emilia-Romagna, Italy) and indication of the names which are given to the limites in the texts of the first Middle Ages produced by the Abbey of Nonantola. Source: Chouquer 2020c.

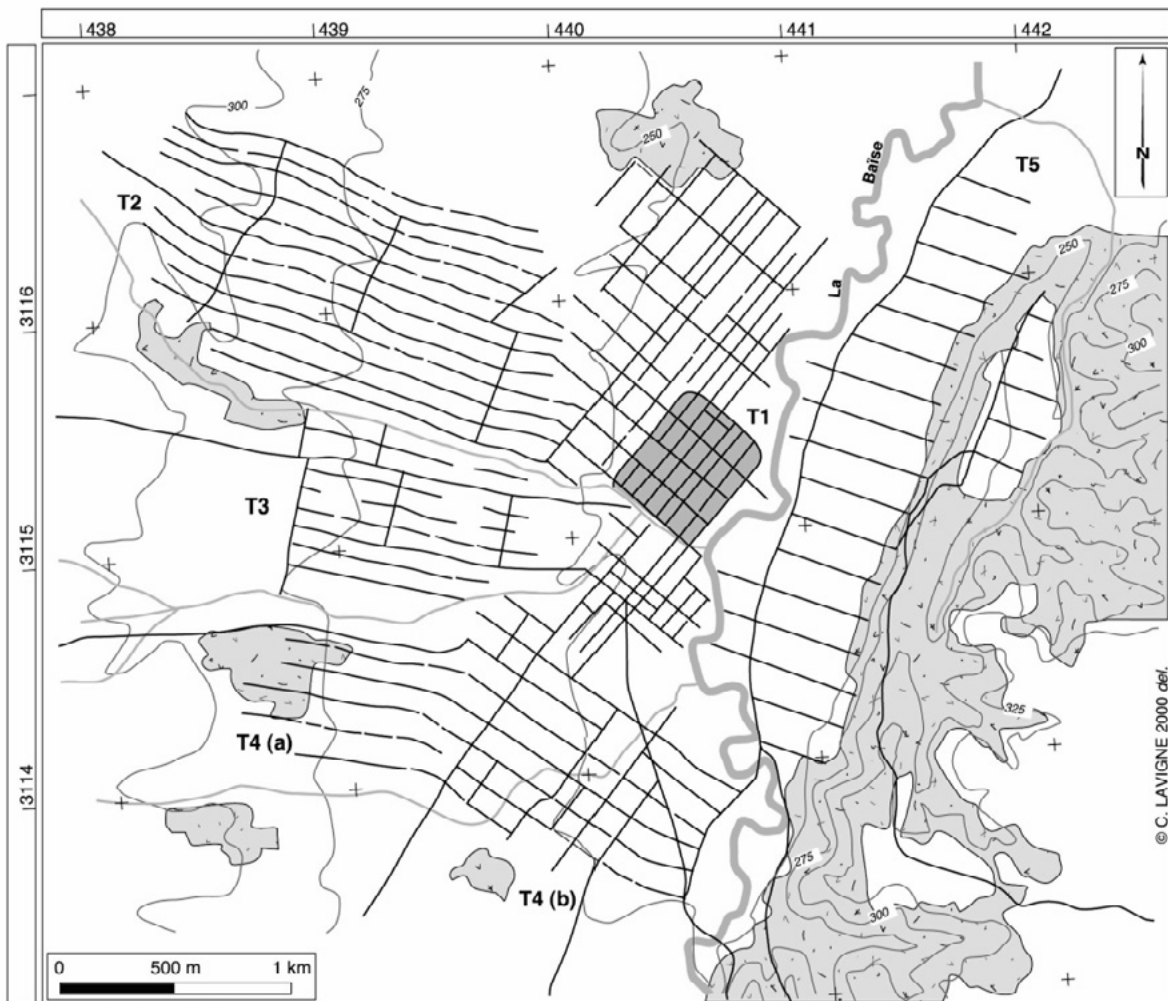


Figure 2.4. Morphological analysis of planned farmland around the bastide of Trie-sur-Baïse (Hautes-Pyrénées, France) Source: Lavigne 2002.

figure.<sup>21</sup> In his thesis on medieval ‘*bastides*’<sup>22</sup> in Gascony, rather than looking at the forms of this type of village, as was traditionally the case, he studied the forms of agrarian colonisation accompanying these foundations (Lavigne 2002). His analysis revealed hundreds of coaxial patterns, running in strips and smoothly adapted to topography, hydrography and pre-existing pathways, that can extend from several

<sup>21</sup> It should be noted that his work encountered very firm oppositions at first. This explains why the two editors Benoît Cursente and Mireille Mousnier of an important synthesis on medieval territories (*Les territoires du médiéviste*, 2005) chose not to offer a place for Cédric Lavigne’s work. Since then, progress has been noted, even if it remains relatively timid. Thus, whereas in 2003 the medievalist Élisabeth Zadora-Rio denied the modelling of medieval agrarian planning proposed by C. Lavigne in three severe reviews of his PhD, in 2009 she finally seemed to have accepted it about the *villanova* of Villafranca in Italy (Zadora-Rio 2010), yet studied by another archaeogeographer, Robin Brigand (2010), who had used the same methodology—claiming his debt to C. Lavigne and G. Chouquer—and had come to similar conclusions. We can see all the controversial charge of this first decade of the 21st century over the agrarian surveyed planning of the Second Middle Ages...!

<sup>22</sup> ‘*Bastides*’ are fortified ‘*villeneuves*’ founded by the king or great seigneurs in South-Western France in the 13th and 14th century, often with a regular layout. They had an economic purpose (accompanying the agrarian colonisation of the surrounding lands) as well as a political and a military function. Their modest size means they are closer to an agricultural village than to a genuine conurbation.

hundred hectares to several thousand. These planned systems stretched out around *bastides*, either extending the layout of the rectangular urban grid, or adding coaxial strips that could be either rigid or supple (Figure 2.4). Their juxtaposition created a very dense pattern covering most of the farmed space. At last, the fields within these sections are divided into precise modular units based on a coherent system of measurement in use throughout the region.

Attempts to date these regular patterns have given rise to a debate<sup>23</sup>, but it seems today sure that they are medieval creation since they are located around medieval villages and within parish boundaries, and since no early modern document refers to them. Moreover, those who consider medieval origins to be too early and thus too uncertain do not question the presence of Roman centuriations on planimetric maps. But why is transmission over approximately six centuries (13th to 19th centuries) an implicit error, while transmission spanning twenty to twenty-two centuries is evidence? In addition, despite tenuous textual evidence, the Roman centuriations are accepted unanimously. At last, the centuriations too change over time to a greater or lesser extent as they are handed down, yet no one would suggest that the regular shapes observed are not Roman or of Roman origin. Dating some instances of agrarian land planning to the Middle Ages can thus only proceed on the basis of the accumulation of evidence, not as a mechanical demonstration supported by texts and archaeological data, which will never be sufficient. Furthermore, the discovery of an increasing number of such phenomena across Europe adds to our knowledge on this topic annually (Chouquer 2019). They are often, for this reason, the earliest indications of planned land design, even though at the time there existed other kinds of land development involving irrigation (González Villaescusa 2002) or the draining of marshlands (Abbé 2006).

On the Iberian Peninsula, such patterns have also been identified<sup>24</sup>, both in Portugal (Watteaux 2011b) and in Spain to the north of Valencia (Chouquer 2019) and in the area of Murcia (Lavigne 2005 and 2007) where they have studied sets of very precise texts about how land was divided in the 13th century and compared this information with forms observable on planimetric documents (figure 2.5). The same line of reasoning has led Ricardo González Villaescusa (1996) to propose that the strip fields observed in Moixen, in Pla des Alcuses, date from the Middle Ages. In Italy many studies have once again shown the existence of coaxial strips associated with foundation villages (Lavigne 2005, Brigand 2006 and 2010, Chouquer 2020c). These Italian examples are especially interesting for they show how medieval people accommodated ancient legacies, which are very evident in northern Italy. On occasions the coaxial strips are quite simply inserted into the Roman grid as around Cittadella in Venetia (Figure 2.6); on others, the foundations of *villanova* were located where *centuria* boundaries intersected, such as at Lugo in Emilia-Romagna (figure 2.7). In this area, historians have clearly shown the intensity of medieval agrarian colonisation in the 12th-14th centuries, characterised by an impressive series of foundations of habitats (with regular plans). However, with the exception of Massa Lombarda for which a different pattern is identifiable, this whole area is that of the best affirmation of centuriation... even as archaeologists observe that the Roman levels are deeply buried! Surface centuriation—the one visible on current planimetric documents—is therefore strong where medieval agrarian colonisation is intense, which underlines its medieval construction. Here, medieval colonisation does not correspond to a specific morphology with coaxial strips (which is the most frequent case), but leads to the reuse and reinforcement of the ancient centuriation. Italy thus brings out the great variety in planned farmland forms, together with the equally varied and diverse type of foundation villages during the First and Second Middle Ages (Chouquer 2020c).

<sup>23</sup> For an overview of the controversy and a methodological discussion, see Watteaux 2011b and Chouquer 2020c:98-111.

<sup>24</sup> To know what works were borrowed from local researchers, see the publications mentioned (as for other archaeogeographical research in other countries). However, it is the original cross-analysis between morphology, history and archaeology that is highlighted and commented on here.

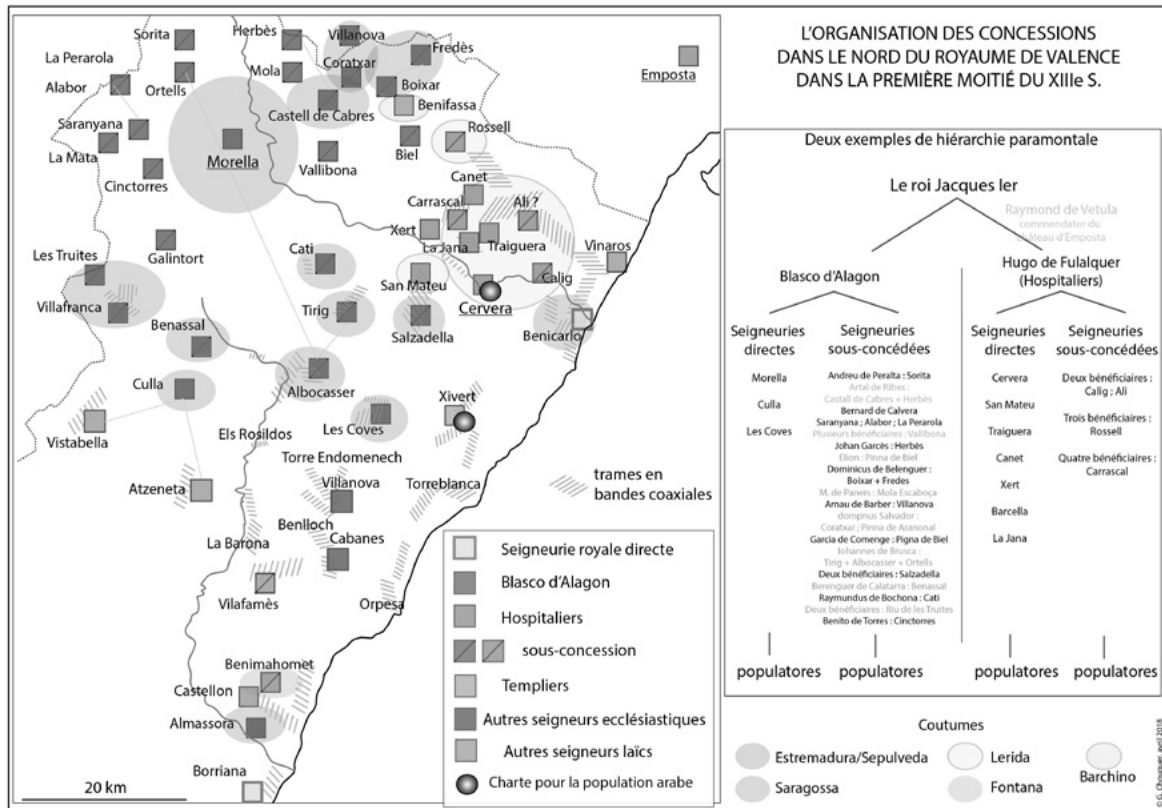


Figure 2.5. Geographic and legal organisation of concessions in the north of the Kingdom of Valencia (Spain) in the first half of the 13th century. Source: Chouquer 2019.

Outside Mediterranean countries, same phenomena have been observed. Recently, in England, Gérard Chouquer (2020d) has turned his attention to many novel objects of enquiry in Yorkshire, Norfolk, Nottinghamshire, and Derbyshire, showing that many foundations of new villages (irrespective of their form) between the 12th and 14th century were often associated with divisions of farmland into coaxial strips, thus forming numerous patterns (figure 2.8). There is nothing new about this identification of coaxial forms, for it was already known to British researchers (see Silvester, Williamson, Rippon, Harvey, Fleming, Mart and Pears, Hall, Oosthuizen etc.). Gérard Chouquer's point is that medievalists only see the open field part of this farmland morphology, and thus fail to pick up on an object of agrarian history, namely the *agrarian planning* of the 12th to 14th centuries that becomes visible in these planimetries. He argues that though these fields organised into coaxial strips played a part in the rotation of an open-field system, this is not the reason why they exist, which he instead attributes to the process of agrarian colonisation of land on royal or aristocratic estates, as so extensively illustrated in Great Britain. Therefore, the problem is most studies enclose research on agrarian forms and their dynamics in a global process of setting up commons fields which allows us to see neither old legacies nor the medieval creations. So G. Chouquer suggests to 'see' these planned phenomena—i.e., that we name and map them—as an important step. At last, also in Germany the historical study of colonisation in Eastern Europe during the Second Middle Ages would be greatly enriched, twenty-five years after the synthesis of Charles Higounet (1989), by integrating the true morphological analysis of the agrarian plots.



Figure 2.6. Planned farmland around Cittadella (Venetia, Italy). The long medieval strips are inserted into square forms inherited from Antiquity (Brigand 2010). Source: Brigand 2006.

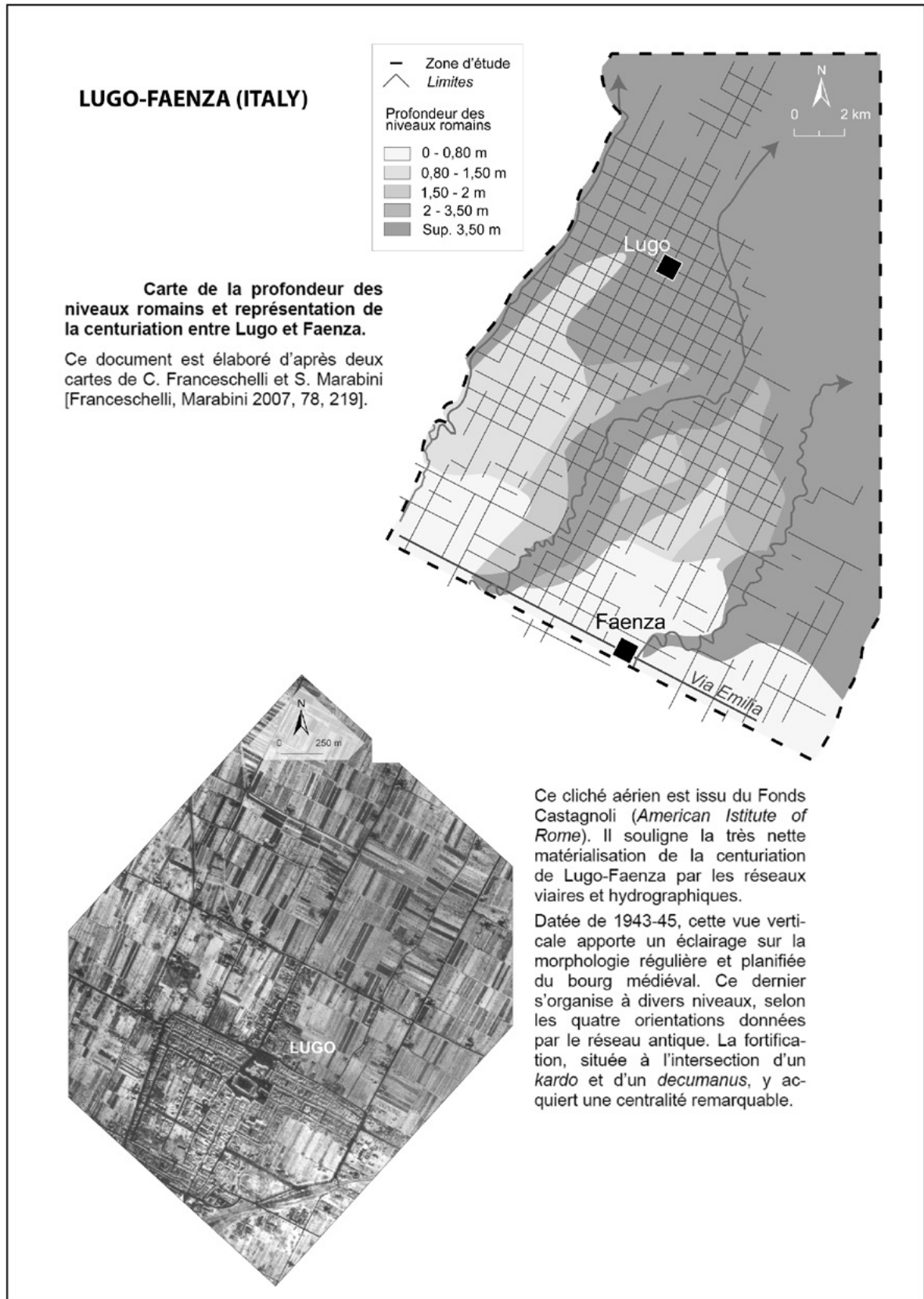


Figure 2.7. Figures from the PhD of Robin BRIGAND (2010, vol.2: 41) showing the location of the market town and castle of Lugo (Emilia-Romagna, Italy) at the intersection of a *cardo* and a *decumanus*.

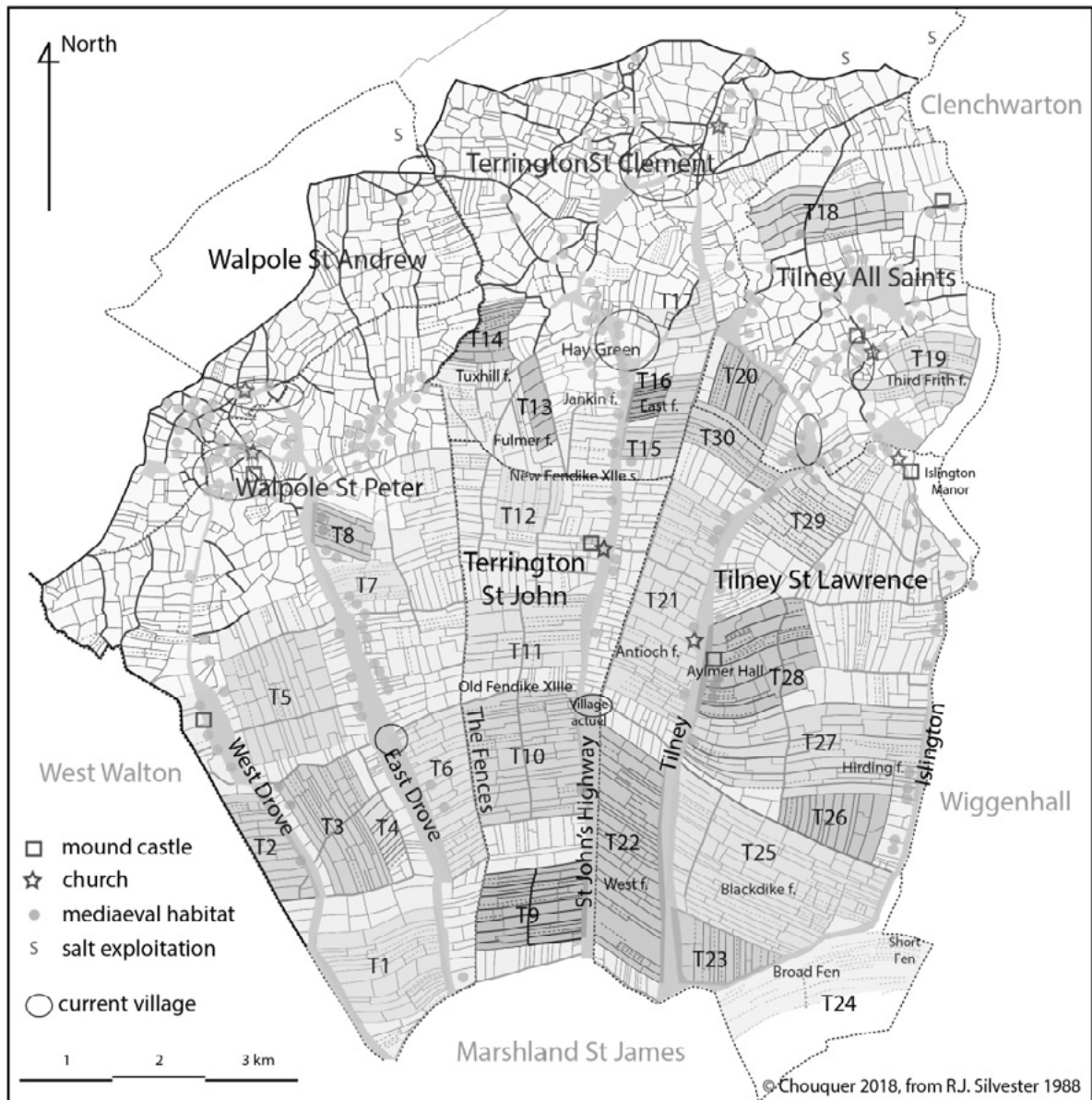


Figure 2.8. Divisions of farmland into coaxial strips ("T-n") in the land around Terrington, Tilney, and Walpole (West Norfolk, England). Source: Chouquer 2020d.

From several of these studies, C. Lavigne and G. Chouquer proposed a definition and a modelling of agrarian planning in the Middle Ages, which is similar to that proposed by historians of Antiquity and modern period: it assumes a prior conception of forms (often coaxial strips), metrological and fiscal normativity on the scale of large regions (the region of Toulouse under Capetian influence, the kingdom of Valencia conquered by Jacques I of Aragon, the kingdom of Murcia conquered by Alphonse X of Castile...), a great technical mastery on the part of surveyors, and an administrative management to locate and register the land (Lavigne 2002 and 2005, Chouquer 2019).

## *Agrarian Landscapes of the Middle Ages Between Legacies and ‘Transformission’*

### *Forms of Medieval Landscapes in the Light of the ‘longue durée’*

Whether from the First or the Second Middle Ages, morphological configurations originated from agrarian colonisation enterprises have undergone an evolution, and therefore transformations, until today. The simple fact of studying them through modern and contemporary planimetric documents means that we must not forget that they are what ‘time’ made of the medieval initiatives and not the original layouts

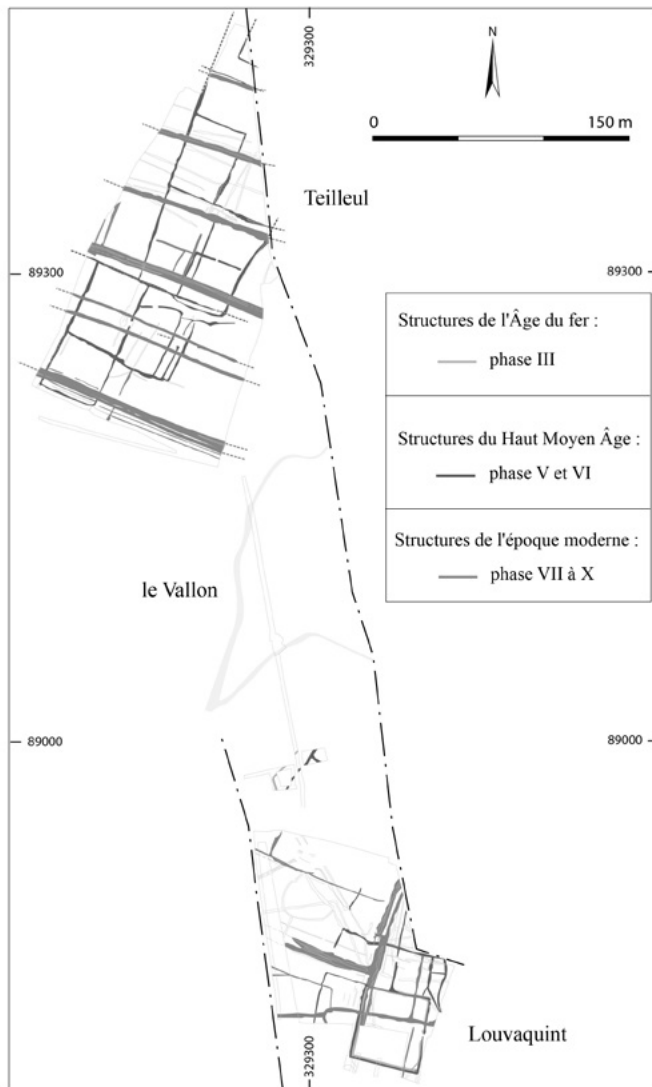


Figure 2.9. Archaeological ditches found on the sites of Louvaquint and Teilleul (Montours, Ille-et-Vilaine, France). Source: Lavigne 2003 (based on Catteddu 2001).

that would have gone through the centuries without modifications. It is what the concept of ‘transformission’ is intended to express (see above, 2.2. and 2.3.). However, it is not necessarily a process of ‘degradation’<sup>25</sup>. The example of Nonantola mentioned above masterfully shows that a very old morphological frame (Roman in this case) can, on the contrary, be strengthened over time, through the subsequent reappropriations. However, these reused, transformed and prolonged legacies do not imply a continuity of the landscapes in their ecological and geographical (physical) dimension, nor of the agrarian practices and systems that take place in these landscapes. The mobility of these components (ecological, physical and social) is more important than the planar forms of the plots (in two dimensions), which have their own temporality dominated by discontinuity and resilience.

It is the same evolutionary process which is at work for the plots which do not result from a preliminary survey. In view of the numerous ditches of plots from the Gallic and Gallo-Roman periods revealed by preventive archaeology, it seems that—with the exception of the planning plots mentioned just above—medieval settlement is part of pre-existing frames of plots and very rarely

<sup>25</sup> The common idea of an initial Roman centuriation that evolving by disintegrating itself whereas constructing itself can be understood and explained by two things:

<sup>1)</sup> the perception of a period, the Roman one, that is more ‘brilliant’ to organize agrarian spaces (above all in comparison to Middle Ages), so it is hardly conceivable that post-Roman people have do the same ;

<sup>2)</sup> a perception (not explicit) of the evolution of planimetric forms in an ‘organic’ or ‘biological’ perspective, i.e. life-growing-death.

proposes a new structuring of the agrarian space, most often reproducing and extending older legacies by transmitting their orientations (Watteaux 2003a and 2009b). For example, in the municipality of Montours (Ille-et-Vilaine, Brittany), the overall pattern of the agrarian plots, in which the two habitats of the 7th to 10th centuries in Teilleul and Louvaquint are inserted, takes up and extends the orientation of a Gallic squared enclosure located on the south-east of the site (figure 2.9) (Catteddu 2001). Then, this medieval planimetric set conditioned the subsequent plots still visible on Napoleonic land maps or aerial photographs of the 20th century, by ‘transformission’. The medieval period therefore constitutes an important ‘link’ in the transmission of very old planimetric legacies until the 19th and 20th centuries.

This explains why one of the common layouts of unplanned medieval agrarian spaces is radio-grid, as shown by the example of Pouillé in Vendée (Western France) (Figure 2.10) (Watteaux 2012). A road network runs out in a star shape from the village, intermingled with a series of routes forming a supple and long-ranging grid pattern. The association of these two figures means that the pattern of this planimetric object may be described as one of radiating squares (‘radial grid pattern’), in which features from two different and complementary scales may be observed:

- a supple grid framework, observable on a large scale, not specific to any period but resulting from a dynamic construct lasting over time and often initiated during Gallic period;
- a small-scale road network focused on the habitat (here, Pouillé).

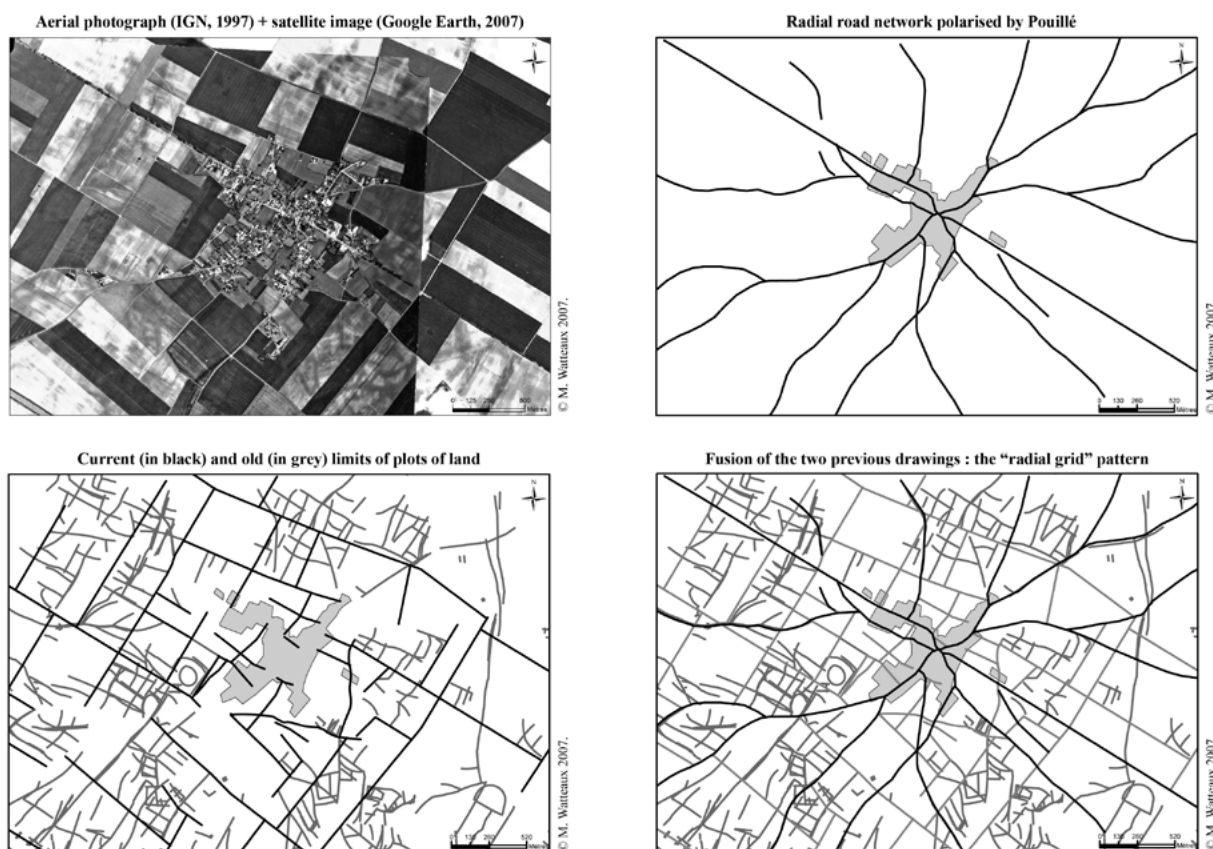


Figure 2.10. Example of a radial grid pattern at Pouillé (Vendée, France). © M. Watteaux 2007.

*About Bocage and Openfield: What Remains of the 'Traditional' Agrarian Landscapes?*

These scientific results, enabled by the development of archaeogeography, have made it possible to review the issue of France's 'traditional agrarian landscapes' (but which also concern many European countries). This was really launched by Marc Bloch (1931) in his famous book *Les caractères originaux de l'histoire rurale française*, where he extended and discussed the first English and German works on openfield (especially) and *bocage* (Watteaux forthcoming). Despite the debates on their dating—oscillating between medieval creations and proto- or even prehistoric origins—these landscapes were traditionally presented as taking root during the medieval period. Marc Bloch thus installed the classic agrarian landscape trilogy of France (openfield, *bocage*, and a 'southern type' less 'clear' and studied), which for a long time guided research in medieval and modern rural history. Since the early 2000s, a strong charge has been brought against these geohistoric objects, at least in their propensity to dominate the historical discourse on medieval landscapes (Lavigne 2003).

Let's start with the '*bocage*' (Watteaux 2005 and 2019). Medieval historians themselves have finally shown that it appeared rather at the end of the Middle Ages and that it actually took place throughout the modern period; rather, they speak of a 'embocagement process'. In addition, they seriously qualified the corollary idea of the inexistence of a grouped habitat in country of hedgerow enclosures. Finally, they deepened Marc Bloch's first advances on collective agrarian practices, thereby nuancing the idea of a so-called 'individualist' agrarian regime for these spaces. For their part, archaeologists (after trying in vain to date the *bocage* by counting plant species in the hedges, thus confusing hedge and *bocage*) have unearthed ditches of plots whose dates range between the Iron age and the 19th century, not allowing to date 'the' *bocage*. In fact, it was a fixist reading of modern maps that created the impression of unity (and immutability) of what is actually the product of the long-term formation of the agrarian planimetry. The *bocage* is not a medieval landscape that would have been fossilized in the plots of land mapped on the Napoleonic cadastre of the 19th century; it is an essentially modern relief pattern (hedges) on an older and complex planimetry.

The same is true for openfield: the general morphology most often refers, in the orientation of its main lines, to a frame built over the long-term, whose premises date back to the Iron Age (Lavigne 2003, Leturcq 2007). Thus, the medieval agrarian planimetry results from new plot divisions (drawing by 'quarters' and strips) or from ancient and Gallic potentialities. The chronology of the phenomenon is therefore impossible to describe because the share of transmission is large. Contrary to what has long been thought, the morphology of openfields does not correspond to medieval agrarian planning but is simply, as for *bocage*, only the result (modern and contemporary) of the evolution of complex agrarian planimetries over the '*longue durée*'.

Ultimately, instead of the frozen states observed by historians and geographers of yesteryear based on historicist and typoschronological *a priori* ('characters'), archaeogeographers and archaeologists observe dynamic processes of transmission, transformation and hybridisation of landscapes in space and long-term. Socio-economic conditions obviously continue to play a role in this history, but according to another schema: not (or not only) according to historical thresholds, marked or even brutal (end of Antiquity, around year 1000), but according to numerous local conditions hybridised with geographic realities and old legacies. For this reason, *bocage* and openfield, *in their morphological dimension*, can no longer be presented as the emblematic forms of medieval landscapes. However, the question that arises acutely is that of the nature of the relief patterns associated with these planar patterns. What seems to dominate during the Middle Ages is a great local diversity in the articulation of open, closed, wooded, mixed spaces, according to maps difficult to establish. Hedges and woods form with the open fields original and evolving hybridisations which do not allow to definitively classify such or such a landscape

in the category of *bocage* or openfield because this typology is precisely too narrow, rigid and unsuitable for the medieval period.

### **Discussion: About Agrarian Morphology, Disciplines and Study of the ‘Social’ and ‘Agents’**

#### ***An Interdisciplinary Research, Yes... but without Hierarchy and with some Difficulties!***

Despite all the contributions of the morphological analysis of agrarian landscapes, the fact remains that the study of these landscapes can only be conceived in an interdisciplinary way. In the absence of collective interdisciplinary programs, it is, *a minima*, a ‘posture’ that all researchers must adopt and which is, in essence, that of archaeogeography since it is a cross-border discipline (see above, 2.3.). But we strongly assert that the forms of landscapes are just as worthy and legitimate as any other documentary level. It is therefore advisable not to prioritise the levels of ‘sources’ because it is precisely by not refusing the status of ‘source’ to planimetry and by upsetting the usual hierarchy of documentation that the most interesting results have emerged.

#### *History, History of Law and Agrarian Morphology: An Articulation to Defend and Strengthen*

While historians have largely studied the agrarian colonisations of the Second Middle Ages thanks to many historical texts, they have never studied, or very little, the maps and aerial photographs showing the forms that could be associated to these historical processes.<sup>26</sup> The work of Charles Higounet is emblematic because, if he had well recognised and studied some planned landscapes in Eastern Germany, he never recognised the very regular plots that surround the medieval *bastides* of South-Western France while he was a specialist of them (Higounet 1975). The resumption of these textual files in the light of the morphological studies of the landscapes made it possible to (really) discover surveyed planning in context of agrarian conquest (see above, 4.1.b.). Other historical issues known essentially by texts and/or archaeological data would benefit from being re-examined in the light of planimetric forms. H  l  ne Noizet (2014) recently drew up a non-exhaustive inventory: issue of the *incastellamento* which, although supposing a reorganisation of agrarian space associated with the social polarisation of the dependents around the *castra*, has never been studied under the angle of morphological analysis<sup>27</sup>; issue of Germanic colonisation in Eastern Europe; issue of the relationships between urban space and the functioning of domestic groups (for instance cardinal livery in Avignon or *alberghi* in Genoa); etc.

The legal dimension of this textual documentation (treated essentially in ‘history of law’, a discipline completely autonomous of history in France) has just been deepened by G  rard Chouquer from the point of view of the agrarian issue. Like morphology, law constitutes a disciplinary and scientific path<sup>28</sup> that has been much less explored by historians.<sup>29</sup> Rural historians reduce this legal dimension to ‘agrarian contracts’ concluded between a possessor and a farmer, instead of renovating this field of historical knowledge. However, the recent works of G. Chouquer—accompanying the ‘legal turning point’ which

<sup>26</sup> The research of Jean-Loup Abb   (2006) on the drying up of ponds in Languedoc (Southern France) illustrates cases of agrarian surveyed planning, but on a very local scale: the dried up pond is a punctual morphological unit within the agrarian space.

<sup>27</sup> Except in Romagna, Italy (CHOUQUER 2020c).

<sup>28</sup> G  rard Chouquer has also exploited the results of the ‘anthropology of law’, while warning against its possible drifts: under the guise of promoting legal pluralism (‘bundles of law’), we come to say that only the anthropology of law is interesting and can, inexpensively, replace law. However, the anthropology of law operates on a ‘modern versus non-modern’ basis which reproduces all the clich  s of this kind of opposition. On this topic see his contribution on the theme of common property (Chouquer 2019).

<sup>29</sup> This has also been the case in all the social sciences for around sixty years. See the recent publications of G  rard Chouquer on the history of land for the analysis of this rejection as one of the consequences of the rejection of Modernity (post-modern epistemology): because law—which shares this particularity with the cadastre and the tax system—is one of the witnesses of the modernisation of the State, all the opportunities are good to minimise its importance.

has begun in recent years in the historical study of the First Middle Ages<sup>30</sup>—demonstrate that the society of the First Middle Ages is not society without rights to manage land appropriations (Chouquer 2019 and 2020a). As a specialist, also, of the ancient ‘agrarian law’<sup>31</sup>, he observes transformations but also continuities, in particular the existence of a plurality of the rights devoted to the land appropriation as well during the First Middle Ages that during Antiquity which, contrary to what is commonly thought, rightly invented legal pluralism (Chouquer 2022). During these two periods, the fundamental and axial question is that of the private possession of public land (something that is neither public nor private and does not easily enter into this reduction), a constitutive question of heterogeneous and legally pluralist societies. This fundamental work on the legal dimension of land appropriation therefore allows him to demonstrate that (i) the First Middle Ages did not constitute a break or a reproduction of ancient agrarian law and, (ii) that the famous agrarian contracts were not only the result of notarial practices but also, and above all, applications of complex legal elaborations at the service of the powerful to ensure them a land appropriation of newly conquered spaces (see above, 4.1.a.). The few cases studied which show how can be articulated legal and morphological analyses reveal all the potential of taking into account law in the study of the historical forms of the agrarian landscapes.

*Archaeology and Morphology: How to Respectfully Articulate Scales and Reciprocal Specificities*

Since the development of preventive archaeology in France in the 1990s, the articulation between archaeological data and morphological facts has been tested many times, which has allowed a critical perspective (Chouquer 1997, Vialet And Watteaux 2021). Two symmetrical drifts are often observed, which both lead to possible overinterpretations. The first, quite generalised, is that of wanting to give importance and meaning to a historically ‘humble’ archaeological fact (most often a ditch, which reduces the domain of planimetric realities<sup>32</sup>), by relating it, even by forcing, to a rewarding morphological network, such as for example an ancient centuriation. The second possible drift consists in trying to prove a morphological layout by archaeological facts, beyond the plausible. Let’s add that this presupposes the materiality of the networks studied whereas a morphological network can exist partly without archaeologists finding it in the ground (see the administrative boundaries which are not systematically reified). In both cases, this amounts to establishing a hierarchical relationship between archaeological data and morphological facts. However, if the validation and the scientific control of morphological analysis has to be done, it is advisable to discuss their conditions and to withdraw them from a hierarchical deference with regard to archaeology.

First and foremost, there is a problem of scale: the extent on which the archaeogeographer works is much wider and continuous than the punctual sites uncovered by the archaeologist. And even when an archaeologist uses planimetric documentation, he adopts more a process of carto- and photo-interpretation, that is to say, prospecting for the discovery of new sites. It would therefore be necessary, for a true ‘validation’ of the morphological analyses, to excavate the entire study window of the archaeogeographer, which is of course impossible (not to mention the problems of differential conservation...). As for aerial archaeology, if it covers large areas, it remains dependent on the conditions for revealing the archaeological traces (weather, nature of cultures, sedimentary processes, etc.) and therefore reveals truncated networks. That’s why archaeologist Joëlle Burnouf invites to assume this existing situation: ‘The landscape of the archaeologist is also a fragmented landscape. It is a

<sup>30</sup> See the work of Paolo Grossi (1995) on the medieval legal order.

<sup>31</sup> ‘Agrarian law’ is a new legal category that Gérard Chouquer (2010) proposed to organise some of the rights existing in pre-modern societies.

<sup>32</sup> Indeed, we only know the limits of old plots well when societies have had to fight water by drainage, to protect themselves by dikes, when they have dug ditches and sunken paths, or when they have created a specific landscape like farming terraces or irrigation systems. Therefore, excavations draw attention to particular times and societies compared to others where the clues are more tenuous and more difficult to perceive.

heterogeneous and discontinuous landscape: the cause is that, fortunately, we will never be able to dig everything' (Burnouf 2003:220).

Ultimately, archaeology does not appear 'competent' to validate a morphological network. The integration of archaeological data is obviously fundamental but the two approaches cannot be confused. Gérard Chouquer even suggests reversing the control relationship between archaeology and morphology: 'Without going from one excess to another, we can say that the interpretation of a fact in relation to the network (therefore the form) is less hypothetical than the interpretation of the network by the archaeological fact itself' (Chouquer 1997:24).

*Palaeoenvironmental Sciences and Morphology: Limits and Potentials of an Interdisciplinary Research Horizon*

Any research on landscapes or environment in the Middle Ages must, of course, also integrate the results of palaeoenvironmental sciences which have become essential. However, here again, this is not without posing methodological difficulties and the dialogue should be favoured rather than manipulation. Regarding archaeobotany, disciplinary crosses with morphology, in France, are neither yet numerous nor very obvious because the spatialisation of archaeobotanical data is not easy, leading more to 'vegetal ambiances' than to 'landscapes' (Delhon *et al.* 2003). In fact, the transition from the palynological diagram to the landscape is achieved by visual modelling which, as evocative as they are, do not account for the planimetric landscape as a whole, that is to say all the plots, roads, paths, and settlement. Furthermore, once again there is a problem of scale of analysis. For instance, dating a hedge does not mean dating, by extension, a *bocage*. Beyond these fundamental questions, it should also be stressed that in a preventive archaeological context the results are often disappointing: most often they only confirm the opening of landscapes already deduced from archaeological data. The palynologist Hervé Richard (1999:21) criticises what he calls this 'juxta-disciplinarity', which according to him leads to a certain 'failure' of palynology: he denounces 'uncertain results and of minimal or even zero interest [because] no clear issue concerning the place of the site studied in its environment was defined at the start'. To remain optimistic, let's say that the dialogue still deserves to be continued. In Brittany, for example, the advances of palynologists and anthracologists on the question of paleoecological signals of 'embocagement' suggest an interesting continuation to the chapter of history of landscapes in Western France (Marguerie and Ouilic 2007).

The articulation between morphological facts and results of geoarchaeologists seems much more promising, but has so far been little experimented for the simple reason that the common case studies are not so numerous. The formulation of the concept of 'transformission' and the innovative rereading of 'ancient' centuriations owe much to the contributions of these geoarchaeological works. However, it is the morphological analysis which had made it possible to explain the evolution of planimetric forms over the long-term. The example of the centuriation in Romagna (Italy) mentioned above is enlightening: because of important sedimentary deposits archaeologists and geoarchaeologists have concluded that the centuriation still perfectly observable in current planimetry could not be Roman (Franceschelli and Marabini 2007). However, no morphological analysis was carried out... In other words, there is a tendency to think that analysis of sediments can replace analysis of forms and can decide on the dating of these latter. Works of Gérard Chouquer (2020c) and Robin Brigand (2010, 2011), starting from the same observation but also using planimetric documents, proposed another interpretation: centuriation of ancient origin is built over time, thanks to medieval and modern reuses and reinventions, allowing to perpetuate its structure despite the 2,000 years of active sedimentation. This conclusion is therefore the fruit of true interdisciplinarity, understood as the ability of one discipline to redefine its problems and its objects according to the results of another discipline. As for archaeology, the idea of verifying the morphology by geoarchaeology then disappears in favour of a thought on the link between different documentation and results (Chouquer 2007a). It is, for example, in this 'spirit' that

research on planimetric forms and palaeoenvironment in the Rhône valley was carried out thanks to a archaeogeographical thesis (Jung 1999) crossed with preventive archaeological and geoarchaeological works conducted on the route of the ‘Mediterranean TGV’ (Favory 2013).

***What Type of Links Can Be Made Between Forms of Agrarian Landscapes and ‘Social’ Interpretation or ‘Social Agents’?***

I would like to finish by addressing the question of the relationship between the landscape forms and the social forces because it is fundamental but not obvious. Let’s recall the example of planned morphologies from the Second Middle Ages to illustrate this topic (see above, 4.1.b.). Certain historians and archaeologists react to these morphological discoveries with disconcerting ambiguity. On the one hand, they give us to understand that these land patterns are not necessarily medieval and tell us that they are tempted to pass the problem over to the modernists (or the Arabs in Spain). On the other hand, and in sheer contrast, they want us to tell them ‘about crops and how they were distributed, farming methods and practices, seigneurs and tenant farmers, the way the land was worked and developed’. They are actually saying something as: ‘Talk to us about the social and economic dimensions of these morphological layouts’. This is how communication between historians and archaeologists on the one side and archaeogeographers on the other has been doubly inhibited: by a historicist assumption (i.e. ‘there was no agrarian surveyed planning in the Middle Ages’) and by naive, unreasonable expectations (i.e. ‘if the agrarian planimetry can’t tell us everything, it can’t tell us anything’). Yet, adding a morphological approach raises new questions about medieval societies such as: were there real teams of surveyors at least from the beginning of the 13th century working in the service of the great dynasties (Capetian, Aragonese and Castilian, to mention just the attested ones)? How a particular model of farming settlement and agrarian planning spread across Europe? Have there been coherent and compatible systems of measurement? When land was allocated by creating standard geometric plots or by transferring pre-existing plots without engaging in new land divisions (with all that this implies with regard to the location of the land, the registry of property, and the way they dealt with changes in ownership)? Have land units been standardised for tax purposes?

Clearly, it is important to clarify what morphological studies can contribute to social and economic history, and what they cannot. The problem is that the term ‘social’ can be understood in different ways. For most historians, it refers to an existent state, a definition much criticised by the sociologist of science Bruno Latour (2006). He labels those who subscribe to this definition ‘sociologists of the social’. Their ‘social’ is a kind of essence, or substance, or even a matter that researchers are supposed to grasp (*ibidem*:231), and which represents that fraction of ‘the social’ that is measurable and stable. Planimetric configurations do not fit especially well in this view because they take numerous legacies and physical features (geographical and environmental) into consideration. This explains why the French school of archaeogeography has chosen to align itself with Latourian epistemology (see above, 2.3.) and adopted his alternative definition of ‘social’, which is the basis for the ‘sociology of associations’ he advocates: a movement that connects elements that are not (or at least not yet) social in character. As he says: ‘Understood in this way, the epithet ‘social’ no longer designates some specific thing [...], but rather a kind of connection between things that are not themselves social’ (*ibidem*:13). It belongs to the human and non-human actors involved to show us what ‘social’ means, and to show us how it functions over time and in space. The most difficult kind of connection that we have to deal with is precisely the one between elements that are linked spatially but separated over great periods of time. The example of Nonantola during the First Middle Ages and the others elsewhere in Romagna during the Second Middle Ages presented above show that the reaffirmed medieval presence of an ancient centuriation is part of a medieval social dynamic and, insofar as it is, it alters the terms of history. Where once we saw only a community or urban phenomenon we now see an agrarian one; where once we saw failed *incastellamento* (since the centuriation of ancient times has endured) we now have come to see that medieval societies

were far more planned—with rigorously regular designs—than we had thought, or rather, had preferred to think.

This question of the social interpretation of forms also poses that of the relationship between forms and social and historical agents (or ‘actors’). Some researchers have criticised the concept of ‘self-organisation’ by saying that it excludes these agents in the historical evolution of planimetries and therefore social intentionality (see Cursente and Mousnier 2005’s introduction and the critical answer of Chouquer 2006). A self-organised process is the diachronic process by which initially dissociated parts evolve into a construct without this evolution having been planned and without the need for some overall plan to account for it (even though the overall process may include a planned phase). It is the interaction between the various component parts that determines the overall structure and its durability (Durand-Dastès *et al.* 1998:17). But this process does not exclude social agents, on the contrary. Research carried out by Hélène Noizet (2007, 2011 and 2012) on the ‘urban fabric’ of Tours and Paris, and by Sandrine Robert (2011b) on that of Pontoise, has illustrated how the process of self-organisation combines actions, strategies, and planning of agents involved in urban development. Self-organisation is therefore not some *deus ex machina* disconnected from mankind and societies, and thus from historical considerations. Ditches, hedges and roads are, of course, all the work of men. But in doing this work, men occasionally reactivate some old patterns, and they do so unconsciously, and above all unintentionally. In this way, the work done by men is, on a large scale, effectively a vector of transmission, but that does not prevent there being, on a smaller scale, phenomena of transmission that are not exclusively their doing: ‘a multitude of human actions carried out on a local level can lead to the creation and transmission of an organised form on a supra-local level, in this case, a city’ (Robert 2011a:16). The concept of self-organisation thus allows us to conceive planimetric forms generated over time as the product of dynamic processes that include planned designs, inherited morphological configurations, and transformations on several spatiotemporal levels. This is why H. Noizet and Henri Galinié (2000) consider cities to be ‘unimagined’ (*‘impensé’*) that is to say the result of the unending interaction between human intervention and the materiality of the city-space, which is in large part inherited from the past. The complexity of all that is inscribed in configurations cannot hope to be grasped through a historicist, that is, a period-based, approach. Ultimately, the ‘project’ (in the sense used by architects and urbanists) remains pertinent for historical analysis, but equally, all subsequent stages (in the case where there was indeed a development project) are held to be just as interesting, and hence form an integral part of the scientific study and account. Conversely, not all foundational moments necessarily start over from scratch, for planned developments tend to take their place within a space that is already organized, in the light of oro-hydrographic factors and/or prior social functioning.

### **Conclusion: From the Middle Ages to Nowadays**

The agrarian landscapes of today include morphological configurations that refer to diverse and intertwined legacies from different periods and that the French school of archaeogeography has particularly studied since about 30 years. Obviously, it is necessary to develop more and more integrated studies, i.e. combining as many methods as possible to gain a better understanding of the different elements that make up agrarian landscapes. This methodological path also depends on the object studied – for example, surveyed agrarian planning cannot be studied without the support of written sources. Morphological analysis, as renewed by archaeogeography, therefore finds its full place in this concert of specialities, and even a place of choice for understanding agrarian landscapes as composite and complex geographical ensembles. This work of linking morphological data to other data (archaeological, historical, geographical, legal, etc.) can and must also be carried out by other schools of research, because, as Gérard Chouquer wrote in 2011: ‘We must resist the temptation to confuse a legitimate aspiration to synthesis with recourse to a discipline that would be responsible for this synthesis’ (Chouquer 2011:182).

The men of the Middle Ages contributed to this tangle of forms by creating new planimetries and by transmitting to us protohistoric and ancient legacies while modifying them. It is through this process of 'transformission' that these inherited landscape forms are still inscribed in our present. In this way, the configuration of a landscape is not simply a matter of its history. It becomes truly contemporary, a part of the present that influences the present, that is to say us. The assimilated past to which land configurations bear witness to is hence memory that morphological research as refashioned by archaeogeography can bring back from oblivion.

Sometimes the medieval legacy can constitute a landscape 'heritage' (also called 'matrimony') when it is tangible. It can then become a resource for the cultural, touristic and therefore economic development of the territories, even if one should not be fooled by the part of transformation inherent in this transmission. More generally, even in the context of territories that do not clearly present a medieval legacy likely to be turned into heritage, knowledge of landscapes, with its share of medieval contributions to their history, offers an expertise able to help the current actors to become aware of the impact of legacies on the landscapes and territories for which they are responsible (including sometimes in terms of environmental risks) (Lavigne 2011, 2014 and 2015).<sup>33</sup> Thus, the '*longue durée*' is not only a methodological framework for understanding the complexity of medieval landscapes; it is also a gateway to current affairs and the concerns of our societies.

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<sup>33</sup> This is the professional direction that some French archaeogeographers have taken since several years when they have proposed their services at the local level to developers, regional governments, and heritage managers.

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# Defying limits. Archaeology of social landscapes in high mountain areas of the Central Pyrenees

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## Summary

In recent years, numerous research projects have broken the glass ceiling of archaeology by turning their attention towards high mountain areas. In many cases these were initiatives that originated on the margins of academia. Their area of study was located in places thought to be irrelevant for history, inhospitable and unlikely to be used for any kind of human activity in the past. Archaeological research has gradually disproved that myth. With the accumulation of empirical evidence in this regard, high mountain archaeology is beginning to come of age. And with it, numerous theoretical questions to reflect upon are emerging. One of them, especially relevant both for the characteristics of the geographical environment of the research and the documented evidence, is the conceptualization of space. How are the prehistoric spaces or landscapes documented by this archaeology? Are they also part of our object of study or only a context where it occurs? How do we deal with their representation and, within them, of a widely dispersed archaeological evidence? In this article I try to address such issues that, although already established in landscape archaeology, perhaps we have discussed little in the archaeology of the high mountains.

## Introduction

A few days ago, a colleague from another university remarked that archaeology on the fringes often provides much wider perspectives on the discipline itself than forms of archaeology located in places with a more robust and consolidated tradition. He was referring to research in the high mountains of Europe, a field of study that has undergone a remarkable expansion in the last two decades.

By describing high mountain archaeology as a field on the fringes of archaeology, my colleague summed up several points. In one way, he was alluding to the fact that today many archaeologists and historians still consider mountain areas marginal to the main economic, social and cultural developments that have taken place over time. It is still usual to hear explanations that regard mountains as shelter for social forms resistant to change coming from stimuli that are always exogenous. The contemporary reality in Europe, in which political and economic systems are created from cities, is turned into a quasi-universal rule. Identifying high mountains as places of archaeological interest defies the modern limits of archaeology.

Another point refers to chronology. Academic archaeology is largely structured chronologically, both in its relation to particular historical processes and in the study of a specific empirical materiality. Thus, the acknowledgement of archaeology as a historical discipline implies its organisation into delimited periods of time which are in turn linked to a particular range of material remains that a specialist in that period can identify and situate easily. Recent developments in high mountain archaeology tend to break that pattern as attention is increasingly paid to diachronicity (for the Pyrenees, among others, Aguirre-García *et al.* 2018, Clemente *et al.* 2020, Gassiot 2016, Le Couédic 2012; Montes *et al.* 2019, Palet *et al.* 2019; Rendu 2003; Rendu *et al.* 2016). In that way, it defies the chronocultural structure of the

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discipline. This is due to two factors. First, research is oriented to determine how the population and exploitation patterns were established in those areas and how they were maintained and underwent changes over time. To a certain extent, preference is given to the *longue durée* in the analysis of social processes. Second, archaeological evidence in mountain areas does not always follow the same general pattern as in adjacent lowland areas. This conditions the capacity of rapidly attributing the phenomena observed to one or other chronocultural entity.

A third point is the management of space in archaeological research itself. As will be explained below, space is a key category in social sciences and therefore also in archaeology. Implicitly, and generally without an extensive prior theoretical reflection, highland archaeology tends to acknowledge that reality in different facets. One of them is the nuancing of the notion of 'archaeological site'. Generally speaking, archaeology has developed through the study of settlements, in caves, small villages, larger towns and cities. Even in its mortuary aspect, necropolises and burials, the delimitation of the widest area in which a particular society existed is conceived as a network of sites. In some way, high mountain archaeology defies the limits of this conception and attempts to view space as a continuum. This is partly because of the difficulty in delimiting the concept of 'site' empirically in mountains, as some authors have noted (Gassiot *et al.* 2016, Le Coéudic 2010, Le Couédic *et al.* 2016a).

In a complementary way, archaeological research in highland areas has tended to combine interest in palaeoenvironmental changes and archaeological sequences. Paradoxically, this interest partly derives from the assumption that these montane environments impose constraints for human presence and activity. However, it also corresponds to the aim of some studies to document how this human life affected and shaped high mountain ecosystems. It is frequent to observe joint research projects with archaeologists, geographers, palaeoecologists and other environmental scientists.

According to my colleague's remark, these aspects place highland archaeology on the fringes of the discipline. From this position it is perhaps easier to challenge the limits of archaeology. Finds of a considerable amount of archaeological evidence above 1,500, 2,000 and even 2,500m altitude are exceeding limits by demonstrating that these places, generally regarded exclusively as natural sites, are also archaeological areas. However, high mountain archaeological research is also breaking through theoretical and methodological limits of the archaeology consolidated in the academic sphere.

## **Intellectual and theoretical background**

### ***Archaeology, time and space***

Archaeology is one of the scientific disciplines that study human beings over time and is one of the social sciences. In different European traditions, archaeology is also seen as a historical science (Daniel 1975; Trigger 2006). To the extent in which it focuses its interest basically on the study of the past, time and its passing become a central axis in archaeological research. This is the reason not only for the academic ascription of our discipline but also the familiarity of all archaeologists with the systems of measuring and determining time: relative chronology, stratigraphic superimpositions and absolute dates. There is a total consensus in establishing a relationship between archaeology and time.

However, it is equally obvious that all societies exist in space; a space that it occupies and which facilitates parameters that mark its very existence but which in turn is modified (or even produced) by the practices of that society. It can therefore be concluded that social sciences are necessarily historical sciences and, at the same time, they are also spatial or 'geographic' sciences. However, it is possible that none of them include in the image it builds of itself the acknowledgement that both dimensions are equally pivotal in its constitution as a tool of knowledge. Disciplines that give priority to synchronic

approaches to social reality tend to pay most attention to the spatial dimension of social phenomena. In contrast, those that are defined by diachronic approaches attach greater weight to temporal aspects.

Despite forming part of the second group, at least in European Schools, archaeology is possibly the social science where both views of reality interact most closely (Santos 2000). This may be because its main sources of information, material remains, are located dispersed in different places. Both among those sites and internally inside them, it is possible to define topological relations between the evidence; i.e. to determine the distances between them and characterise spatial associations and dissociations. Additionally, each piece of archaeological evidence corresponds to one or a series of human activities carried out in a particular context, in a specific time and with particular participants, following a specific technical sequence and with a series of purposes, functionalities, uses and discard. The combination of topological determinations and the precise characteristics of an assemblage of remains is able to define patterns in the distribution of human activities. In this way, a space can begin to be characterised archaeological, even if only intuitively. At this point, it is now necessary to attempt to define what space is.

### ***Brief notes on space***

Since the late 1970s, landscape archaeology has gained importance in the discipline, partly coinciding with the 1978 issue of *World Archaeology* with the same title. From its emergence until the present time, the conception of landscape, and even space in archaeology, has not followed a linear trajectory. At its start, the first studies that used that term employed a perspective taken from processual archaeology and cultural ecology. They assumed certain environmental determinism that foregrounded interest in palaeo-ecological information to understand the processes of adaptation of past societies (e.g., Aston and Rowley, 1974; Marshall, 1978). This was one of the developments of processual and functionalist archaeology which, from different points of view, added a growing concern for addressing spatial analysis (Vita-Finzi and Higgs, 1970; Jarman *et al.*, 1972; Binford, 1982; Hodder and Orton, 1990; etc.).

However, in the 1990s spatial studies in archaeology shifted and the terms 'space' and 'spatial archaeology' became scarcer in specialised publications to be replaced by the consolidation of the terminology 'landscape' and 'landscape archaeology'. At the same time, the consideration of landscape as an ecosystem was pushed into the background as phenomenological approaches were proposed instead (Criado, 1999; David and Thomas, 2008; Johnson, 2012; Parcero 2012, Tilley 1994; Ucko & Layton 1999). The conception of landscape as a physical entity was replaced by the view of landscape as a social element. The profusion of post-processual and post-modern perspectives in archaeology, especially in the Anglo-Saxon world, took those approaches towards concepts focusing on the social and individual apprehensions of landscapes.

The debate on space and landscape in archaeology reproduces an analogous discussion in physical geography that oscillates between the conception of landscape as a product of natural history and that of a tool to understand the representations that society makes of the territory (Pélachs 2006). One way to overcome this debate, which is quite meaningless, is to acknowledge that space is in itself a multifaceted reality, following the scheme proposed by the geographers Claude and Georges Bertrand (2000, 2002). They suggest that space should be studied in a hybrid way to overcome the duality established between nature and its opposite, which is the 'artificialisation' of space, as it is not possible to separate the social environment from the biophysical one. To achieve this, they propose the GTL system (Geosystem, Territory, Landscape), which can be used to explain three different but complementary space/time categories that define social space (Bertrand 2001).

- Geosystem represents the basic natural element of the system; that which is used, perceived and develops the function of source. It is formed by different physical entities that are connected with one another by a series of physical and chemical processes, etc.
- Territory represents the economic and social element. It defines resources and places as components of space integrated in the social dynamic.
- Landscape is the ideological component of the system. It is the result of the social-ideological practices of appropriation of the environment, in both its perception and its direct use. They establish it as a set of symbolic values in the framework of an 'artialisation' process (Roger 1997).

According to this proposal, every space comprises these three realities. As a starting point, it is a geosystem. A given geomorphology has created relief and a substrate, it hosts a series of biotic communities, past human activity has added a series of elements (terraces, artificial banks, new animal and plant species ...), insolation, precipitation and other factors favour certain physicochemical processes, etc. As such, it is the basis on which various physical entities are related in terms of natural processes, even though the origin of some of those entities may be anthropic. Territory is formed by the social use of a geographic area in a certain time. Thus, for example, the creation of common land, a road and communications network, the division of land or differentiation into habitat versus funerary spaces and other kinds of activity are central components in all territories. Finally, landscape recognises a universal reality: the fact that every community projects itself ideologically in a space and this process is historically variable, arbitrary (to the extent that the assignation of meaning is) and changeable both in time and between segments of a community. As a GTL system, social space exists diachronically. The geosystem changes over time, both due to natural dynamics and human impact. The territory, insofar as it is the materialization of historically changing economic and social practices in space, varies from one period to another and from one place to another, as does the landscape.

Highland archaeology acknowledges this scheme more or less implicitly. As its object of study, it establishes the territory, or rather a succession of territories in constant transformation, which it understands as the spatial existence of a given society. As a source of information, it resorts to the geosystem in that this is also shaped by the material alterations to the environment resulting from human activity. These alterations form the archaeological databases, although they sometimes fall outside the format that archaeology normally considers for archaeological empiricism. This aspect will be studied further below. Finally, it acknowledges the existence of the ideological appropriation of the space, as the terrain for social reproduction and conflict, but in turn it accepts the difficulty in tackling its study, since the arbitrariness of this symbolism greatly hampers its present phenomenological comprehension.

The identification of space by archaeology comes up against another problem, whose solution is often not achieved totally consciously although how it is done is very important for all studies. Again, this problem is related to how, from social sciences, we understand that space is shaped. In fact, in Western thought the notion of space has swung between two poles. One has led to it being presented as an *absolute element* in itself. The other, as a *relational sphere*. In the former, space is viewed as a container of processes and things; in the latter it is seen as a mesh of relations between the processes and the entities that shape it (Harvey 1969; Conolly & Lake 2009).

The absolute or Euclidian characterisation of space explains it as a container of entities and understands that its existence is independent of the elements it contains. This approach can be traced in the Greek atomist philosophers and later in the Renaissance. Newton's development of physics stimulated this point of view as he formulated a series of laws that govern the objects and processes in that space. In turn, the English physicist resorted to God to justify the pre-existence of space over the phenomena it contains. Similarly, Kant considered space as an '*a priori*' condition, as the place or setting where a range

of events occur, a series of objects coincide and different processes take place (Sus 2016). From this perspective, space allows an element to be introduced to classify those events, objects and phenomena according to their position. In the late nineteenth and early twentieth centuries, geography and other social sciences objectified that perspective and gave space a character of externality to social practices as it was considered the base, container or place where these take place and largely determines or conditions them (Ratzel 1889; Sauer 1925). In the twentieth century, this perspective was also hegemonic and has led to physical space often being assigned a determinant role in social reality.

In sum, space is envisioned as a setting for social practices and the objects shaped, altered or produced by those practices. Following this thread, every society occupies a space with a particular relief, hydrographic network, climate, vegetation, etc. In theory it can be delimited precisely and to a certain extent an explanation for the geographic reach of that society can be sought in the nature of those limits. This does not exclude the possibility that the said society might alter its physical environment, depending on its technological capacity and social 'needs'. This sequence of arguments, which is common in archaeology (Bender 1993, Heilen 2005, McGlade 1997, Tilley 1994), reproduces the approach to space as external to society and faithfully follows the 'nature-culture' dichotomy that has been at the heart of some of the concerns of geography and anthropology since the late nineteenth century.

At this point, the analysis of social space has always come up against two issues that are hard to solve. First, if space pre-exists, what is its influence on human societies over time? Does it determine them and how much? Does it affect all societies in a similar way? Archaeology has responded to this problem in several ways, oscillating from a Ratzelian determinism to possibilism supported by the proposals of such geographers as Sauer and anthropologists as Kroeber (Gassiot, 2001). However, the answer has generally been implicit and it has usually been assumed that pre-industrial societies, especially in prehistory, adapted to a pre-existing environment. Following this logic, the only way to deny determination of the environment over a society requires their activities to be explained outside the context of the setting in which they take place. In prehistoric archaeology, these situations have normally been linked to colonisation processes in a territory; although after the initial settlement, the environment is again assumed to influence later social and cultural developments.

The second issue refers to the limits of the space: how far does a given social space reach? This issue often arises in monographic studies and research programmes that need to delimit their spatial frame. The limit can be situated at the edge of an archaeological site, or in a physiographic, biogeographic, administrative or cultural entity. Considering high mountain archaeology as an independent field of study, focused on supposedly isolated and self-sufficient populations in those areas, also comes up against this problem. In general terms, research in those areas shows that the human presence in mountain areas during different periods cannot be studied out of its context in the economic and social dynamics of a wider geographic area, of which it formed part.

However, space can be conceptualised in a radically different way. It can be understood as a positional quality of the world of objects and events (Harvey, 1969; Lefevre 1991; Olsson 1974; Soja 1980). That is to say, space exists to the extent that there are objects and events occur. Some objects and some events appear and occur in a place, for which a relationship of proximity or distance can be defined. In contrast, it does not exist without objects or events. During the nineteenth century, for example from the positivism of Comte, some philosophers of science began to advocate that view partly as a reaction to Newton's metaphysical identification of absolute space with God (the *Sensorium Dei*). The development of the theory of relativity contributed to spread this relational perspective of space in physics, as science had been reluctant to abandon the Newtonian approach until the early twentieth century. Thus, a topological, or rather a topometric, conception of space has gradually become accepted; at a physical

level it is assimilated to a network of relations between different entities. These relations are expressed as distances and directions that can therefore be quantified and also represented mathematically.

By the mid-twentieth century, this view of space began to be introduced in geography (Watson, 1955), initially from a quantitative logic but later it was also included in radical and Marxist geography (Harvey, 1969; Santos, 2000). It was steadily accepted that, in social space, the distance between the entities that form it can be expressed in terms of cost, effort, time, labour or other variables derived from social interaction. In some ways, this categorization of space involved a framework of analysis that was compatible with the usual procedures in archaeology when spatial associations are defined. At the same time, by focusing the notion of space on the entities that form it and their relations, it established a framework that the developments of geodatabases and GIS applications were able to represent with increasing precision.

Within this line of thought, and following Santos (2000), social space is a material reality that can be defined as a topological relation between 'technical' objects. In simple words, space is formed by 'things', each one of which, through a series of processes, is located in a place. This means that between one 'thing' and another there is a certain distance in a particular direction. Thus, a topological relation can be defined, measured and, in physical terms, it can be described objectively as a vector. The limits and the character of this space can be established by the distribution of the elements that form it, by their density, the aggregations they form or the absence of them, and the characteristics of their relations. As archaeologists, we are interested in the social facet of this space and not only the physical aspect. This implies that two relevant issues arise. The first is that we focus on the 'technical' aspects of the things that constitute it. That is, on the objects that participate in some way in social life, whether as raw materials, as domestic places, as means of production, as symbolic referents, as excluded places, and so on. The second is that the measurements of proximity and distance can be transferred to other units, such as the duration of movements, the effort, and other types of accessibility. It is also understood that, in the absence of entities, the consideration of this space is meaningless.

This forces us to go beyond the simple topology of the objects that form a given space. In other words, it also implies observing the characteristics of the entities that, with specific locations, define a given space. In fact, in many cases, these qualities explain the exact position of the entity and consequently the relations of proximity or distance (of association or dissociation) with other entities in the space. Santos's notion of 'technical' object (2000) is the outcome of the acknowledgement that, in a human and therefore social space, every object can be characterised in connection with the activities that are performed. Through its labour, every human society transforms matter to ensure the necessary means for its existence (Marx and Engels, 1974). The application of human labour in the process of the production of social life involves a series of actions on a pre-existing matter that, in general terms, comes from previous situations of social life. These actions acquire a certain morphology and take place in a particular sequence depending on the product being created, and the knowledge, technical resources and capacity of investment in labour of those who carry out the actions. This is therefore the reason for the 'technical' nature of the different objects forming a social space. In other words, they are products of the work of men and women who live in a specific time, who seek to solve specific needs and relate to each other and to their environment in a certain way. In this process they recreate an existing reality and, at the same time, modify it. This means that space, from a social point of view, is historical and changing.

However, it is also necessary to take into account those entities that exist in a geosystem but do not receive a direct action and therefore their morphology is not directly and clearly altered by human activity. Two points must be considered. First, both the inclusion and exclusion of a given productive process are defined in the frame of a social practice. This practice defines the utility or otherwise of an

object for human life and, in that case, the place it occupies in it. The abandonment of many highland pastures with the changes in livestock production in the late twentieth century, as well as the disinterest in Pyrenean iron seams of the populations prior to 900 or 800 cal BC, to cite two cases, are examples of this. In the eyes of the researcher, both cases contribute to characterise the productive systems and consequently, the social practices in the different historical periods and geographic settings. To complement this aspect, the spatial arrangement of the entities that form a space and do not receive direct human labour also indicate continuities and discontinuities in terms of distances (and therefore of time costs, social relationships, etc.) in the human practices and thus also define the social spaces where they exist. While they are part of the geosystem, they do not participate in shaping the territory or, consequently, the landscape.

The second question refers directly to the identification of human action on matter. When the impact of labour on a material is direct, the identification of human activity is clear. In the context of a living society, it derives from the very awareness of the actions that are performed. In the case of a fossil record, archaeology has gradually developed procedures to identify such labour (Daniel, 1975; Trigger, 2006). In contrast, this identification is not so direct or evident in those alterations that the same human actions cause to elements in the space but which do not receive the action directly. One example is the introduction of domestic cereals in south-west Europe in the Neolithic, which involved the spread of a series of adventitious plants, modification of the speciation of ecosystems, changes in edaphological processes, etc. These materials also receive an anthropic impact that modifies their morphology, distribution, frequency, etc. In fact, in recent decades, archaeology has increasingly identified this reality more clearly, for example by employing techniques from palaeoenvironmental sciences to assess the degree of anthropisation of a given space (Berger, 2005, Butzer 1982; Catalan *et al.* 2013, Ejarque 2009, French 2005, Ninot *et al.* 2017).

The relational categorisation of space is able to overcome some of the issues associated with absolute space and is especially useful in archaeology. In the first place, it places matter in the centre of its own space, so that the space would not exist without it. Therefore, it fixes the source of information *par excellence* in our discipline as the basis for the identification of the space. Similarly, social space is structured by a materiality that, as well as being characterised by specific physical properties, is formed in connection with human labour and activity. In this way, the elements articulating the social space are the social practices that are realised materially. In fact, the space is that materialisation. Therefore, society itself cannot pre-exist in abstract as a social space. It is not external to it but is it in itself. Apparently contradicting this, the pre-existence of a social space derives from the fact that in turn, every space is a social product. In the same way as every intentional action corresponds to the existence of an 'idea' of that action, and that this previous notion comes from the experience of the person who has it, human existence is carried out in a space that it previously produced or socialised; that is, on a previous historical experience that is also spatial by definition.

In second place, it is the social action that defines the size of its own space. This solves the problem of its delimitation. Indeed, in a space that is continuous, it allows gradual boundaries to be established resulting, for example, from a decrease in the intensity in which a society is active as the distances increase (fewer activities, less frequent presence, etc.). Finally, this theoretical proposal requires the focus of archaeological study to be concentrated on space as a territory. A centrality that is also compatible with the recognition of the two other dimensions of social space; as a geosystem and as a landscape.

This theoretical reflection has accompanied 20 years' research in upland areas carried out by the High Mountain Archaeology Group (GAAM) at the Autonomous University of Barcelona (UAB) and the Spanish National Research Council (CSIC). It has grown with the need to constantly rethink an archaeological

practice that did not always fit in previously learnt schemes. At the same time, it has also pointed to horizons that the research should head towards. I shall now try to point out some of the implications of these proposals in the fieldwork. In my opinion, these implications are not at all peripheral to the development of archaeology as a science even though they have partly taken shape in a 'marginal' area for research.

## **Methodological approaches**

### ***Surveying as a source of information***

One of the foundations of highland archaeology is the premise that the past territories become fossilised and that it can in part be recognised archaeologically. This assumption has increased the value of surface surveying as an archaeological method enormously. It is nothing new for archaeological surveys to be regarded as a vital archaeological method, not with the aim of discovering a 'good site' but a source of archaeological information in themselves. They began to be introduced in Anglo-Saxon archaeological research programmes in the 1970s as a way to strengthen a view of the territory of study over and above the site. In Spain, this development has clearly not been so complete and surface surveys have mainly been carried out to complete administrative archaeological catalogues and in the context of preventive studies connected with building work and territorial planning (Clemente *et al.* 2019, Gassiot 2016, Montes *et al.* 2019, Palet *et al.* 2019, Rendu 2003, Rendu *et al.* 2016, etc).

The scarcity of previous archaeological records has meant that research in high mountain areas has generally attached great importance to surveying, at least in initial phases of their programmes. At first, the purpose of this surveying was surely not too different from its role in traditional archaeology: to locate archaeological remains where more intensive research could be carried out later. However, with time, surface surveying has acquired a more central position. First, it has emerged as a possible, accessible and useful method to reduce the deficit of archaeological records in certain areas (Gassiot *et al.*, 2016, Le Couédic 2016a). Secondly, and more importantly, it has enabled a wide and varied array of archaeological remains dispersed across a physical space to be located, positioned and described. The situation of those remains has sketched out a first archaeological map which, rather than being a more or less dense point cloud, has introduced a first perception of the archaeological space. Each point refers to a morphology of the remains and an initial hypothesis about their functionality and chronology. Thus, point by point, a first zonification of the space has been achieved, with their different uses and intensities.

In physical terms, each archaeological site is still a discrete unit, delimited on the surface by the presence of walls, the distribution of portable objects, etc. However, this first assignation of significance transfers it to a continuous space. To give an example, a pen suggests the stabling of livestock, which in turn leads to the pastures around the places where these archaeological remains are visible. Similarly, a habitat in a small rock-shelter leads to a consideration of the firewood burnt in the hearth, among many other aspects. Archaeological surveying does not therefore only contribute a list of points or archaeological remains. It also provides an initial basis to begin to draw the main lines that shaped a territory in a given period. As surveying reveals evidence of different periods, it also sketches out the sequence of changes in territories over time.

The consideration of surveying as a way to obtain archaeological data also involves risks as well as its strengths. It is able to cover large areas with a limited cost in economic, human and time resources. The correct use of the information it generates creates attractive and plausible pictures of the possible past territories. However, in many cases an archaeological site ends up characterised by its location; by variables related to its place. Making the inference of the function of a site depend solely on these

variables can lead to a kind of micro-geographic determinism: a particular location implies a specific function of the site and even the occupation pattern. Plentiful empirical evidence reminds us of the need to increase the information with archaeological data from different places as a way to reinforce the inferences about their meaning. A fixed equation between type of place and type of function or use of its occupation cannot be assumed beforehand.

### ***From the site and the settlement to the territory***

The new importance of archaeological surveying in high mountain areas has resulted in a change of perspective that has involved numerous methodological challenges in addition to a theoretical reflection. First, it has reduced the importance of the category 'site' in archaeological records for several reasons. At an empirical level, without excavating, it has proved difficult to establish the relations of coetaneity between the different elements visible on the surface enabling their association with a synchronic settlement (Carrer *et al.* 2015, Le Couédic 2010). Similarly, the frequent dispersion of the remains also makes it difficult to establish the spatial limits, especially when the ability to define settlements only by surface finds is debated. The solution of this issue is not easy and has led to cooperation between different research teams (Le Couédic *et al.* 2016b, Laurent *et al.* 2019).

In addition, high mountain areas in southern Europe were generally not the location of large political power centres as, for different reasons, they have not been suitable terrain for state systems. In the same way, in many cases winter weather conditions have limited the possibility of all-year settlements and imposed very mobile population dynamics. These two realities mean that few archaeological remains are usually found at the sites, which limits the capacity to assign them significance. One way of partially overcoming this limitation is to turn attention away from the site itself and seek a complementary source of information in its location and proximity or distance relationship with other entities (Gassiot *et al.* 2019).

The central importance of the site has also decreased on the analytical level. In the first place, the recreation of space as a continuous realm of relationships also affects the boundaries of the site. We should recall that this is a concept that comes from entities that are easily delimited archaeologically, such as a cave, a fortified settlement or a dolmen. From a 'macro' point of view, territory acquires the role of the mirror of a society and illustrates the organisation of its activities, the shaping of its places and its structuring, the socialisation and transformation, ultimately, of the geosystem in a social instance. As this reality becomes fossilised, the material record dispersed across the space is the basis of the archaeological identification of the territory (Bradley 2000). This record is formed by traditional archaeological evidence (artefacts, ruins of buildings, graves, etc.) but also by numerous physical remains distributed across the geosystem, which necessarily correspond to human action on it. In this way, the archaeological attention to territory widens the scope and acquires new depth. It explores palaeo-ecological records, changes to the relief that cannot be explained solely by natural processes, alterations to biological speciation, traces of atmospheric pollution... but without ignoring the value of traditional archaeological remains as a robust source of information about the past (Wash 2008).

This new array of empirical interests requires new inter-disciplinary alliances and indeed, many studies in mountain areas have been a good example of this in recent years. At the same time, interest must be enlarged to cover everything that occurs outside the archaeological site. External evidence is no longer a simple contextual element and becomes the manifestation of a past territory. This is also emerging as a characteristic of highland archaeology.

***Relational space, GIS, geodatabases and territorial analysis***

Understanding space as a mesh of distances between objects, events and processes removes it from appearing as static representation, for example like a picture in a frame. It involves a complete change of perspective which, in some ways, is fully coherent with the usual apprehension of space in archaeology. In an excavation we record the coordinates of objects to determine their position; we represent the extension of the strata and draw structures. Even when photogrammetric techniques are introduced, we also aim to georeference the images. In this way, as in a jigsaw, we construct the representation of space piece by piece. When associations between objects are used to identify and characterise areas and contexts, we are operating within a relational perspective of space. When we move outside the excavation square grid and carry out the operation at a smaller scale, locating cabins, isolated walls, terracing, galleries, charcoal kiln sites, isolated objects, paths, etc. we are doing the same. By establishing the relations between these elements, each of which is in a specific position, we are characterising an archaeological territory. If other records are available, such as the geology or inferences about the palaeovegetation, we superimpose them as layers in order to increase the robustness of our representation of the past space.

Archaeology may have come late to the use of Geographical Information Systems (GIS) and also unequally. Although in Spain their use has developed most rapidly in preventive archaeology linked to territorial planning, in recent years it is also becoming more widespread in basic research (Quirós & Vigil-Escalera 2019). It is now a common tool in many archaeological research projects in different fields of knowledge. In high mountain archaeology, the use of different GIS programmes is practically universal, not only to project archaeological data spatially and represent them but also to perform analyses and make inferences (Carrer *et al.* 2015, Gassiot *et al.* 2020, Le Couédic 2010). While the use of this software follows the standards of its use in other fields of archaeology, the extension of its application to practically all the research teams is noteworthy. This means that the systems of collecting information and codifying it are gradually being modified, both in response to the spatial nature of the data and to facilitate their representation.

Thus, for example in architectonic contexts in the open air, in the GAAM we try to avoid the complicated term of site to record, at different levels, archaeological zone, settlement, enclosure, wall, activity area and object. Each category corresponds to a segment of the archaeological record, which is largely assumed to be continuous when observed at different scales. In turn, each one of them is formed by different zones, settlements, enclosures, etc. situated in a particular place, with a specific geometry and with a specific set of spatial relations with other entities, either archaeological or belonging to other components of the geosystem.

The consolidation of the use of geodatabases in highland archaeology, together with the growing application of geographic analysis software, is allowing increased modelling of archaeological territories as continuous spaces. It is necessary to resolve several issues to complete this representation. One of them is to represent the past geosystem and its successive alterations as precisely as possible. In mountain archaeology, the integration of both fields of research has been intense for several years, with numerous joint research programmes (Catalan *et al.* 2013 y 2019, Ejarque 2009 y 2010, Gassiot *et al.* 2014, González-Sampériz 2019). Another is the inference of the social practices that determine the link between the entities that shape a particular territory. This last aspect is at the heart of all archaeological explanations and, as in other fields of the discipline, different initiatives of methodological development are being explored in high mountain research.

### Discussion of an example: archaeology and mining territories in Bosc de Virós

Numerous high mountain archaeological case studies have promoted the previous analyses, none of which had been determined barely 15 years ago. This has taken place within the GAAM, as the advancement of empirical research has demanded parallel theoretical development to solve several issues which had not been foreseen initially. Thus, the realization of archaeological surveys with their subsequent excavations in various areas of the Pyrenees in the last 20 years (figure 3.1) has forced us to face unforeseen challenges. I would imagine that other teams working in similar environments will be undergoing analogous processes. Archaeological investigation in the area of Bosc de Virós is a good example, a sample that can be transferred to other fields of research.

Located on the northern slope of Pic de Mániga, the Bosc de Virós is a forested area that extends over 1,800 ha. at altitudes of between 900 and 2,540m (figure 3.1). Now belonging to the High Pyrenees Natural Park (PNAP), it is located in Vallferrera, a Catalan place name that means ‘iron-producing valley’, one of the places in the Pyrenees that saw intensive iron production during the modern age.

Three different projects focused on Bosc de Virós, the forested part of the mountain slopes, in the years from 2002 to 2004. One was the archaeological surveying by the GAAM. The second was an environmental geohistory study by the High Mountain and Landscape Research Group (GRAMP) at the UAB and the last one was carried out by the Mining School in the Polytechnic University of Catalonia (UPC) (Castellarnau & Mata 2002, Gassiot *et al.* 2007, Pélachs 2005). From the archaeological point of view, a total of 1,037 charcoal kiln sites, 237 beginnings of iron mines (shafts, ditches and galleries) (figure 3.2) and 19 mounds of slag from direct iron reduction (figure 3.3) were located and documented (Augé *et al.* 2012, Gassiot 2016). The charcoal kiln sites were dated between the 11th century and the present, except those associated with the slag heaps. Like the slag heaps, these were dated between the late 2nd and mid-6th centuries cal AD (with some rare later sites, in the 7th century). The chronology of



Figure 3.1. The Bosc de Virós is a north-facing slope in the western Pyrenees of Catalonia. In the map, its location.

Figure 3.2. Example of two iron mines in the Bosc de Virós. Up: open-air trench mine, possibly with a Late Antiquity chronology. Bottom: slag heap of an active mine in the 19th century.



Figure 3.3. Image of a slag heap cut by a forest track. The cleaning of a section of the profile allowed the recovery of coals, direct iron reduction slag and fragments of furnace walls.



the mines was more variable. Some of them were active in the 19th century, whereas others displayed no contemporary evidence and were only associated with the slag heaps, generally less than 100m away. Stone tumuli and circles, possibly corresponding to the 1st millennium cal BC; some small much more recent pastoral constructions, and remains of the Spanish Civil war were also documented in the area. The research continued from 2006 to 2009 in a joint project by the GAAM and the GRAMP, in which the palaeoenvironmental study, based on a sedimentary core taken in Coma de Burg, was combined with the archaeological information.

The fieldwork has defined Bosc de Virós as an old iron-working territory at different periods and in a changing manner over time. A huge number of materials directly related to past iron production are distributed across an area of a little over 900 ha. They include evidence of mining for ore, the transformation of the ore into metal, and the production of fuel for the furnaces and forge. Ruins of buildings connected with the mines and furnaces and some tracks have also been conserved. In this regards, Bosc de Virós is therefore a continuous archaeological space. From the start, numerous doubts were raised by the recording system, which was based on the category of archaeological site, inspired by the usual procedures in both academic archaeology and administrative archaeological catalogues. What level should the 'site' be limited at? Was the whole area a 'site' or should it be delimited at the level of each particular entity? And in this case, if it was clear that a 4th century slag heap could be a 'site', what was the correct procedure for a charcoal kiln site or a mine that additionally formed part of a series of mines following a seam? Questions like these were salient for both research and heritage management.

The solution to these issues proved to be even more complex when the modern vegetation and data about its development over the last 3,000 years was added to the equation. Pollen and micro-charcoal evidence indicated that after the 2nd century cal AD, the number of fir trees and deciduous species declined and pine began to predominate as it occupied the spaces left by the former taxa (Augé *et al.* 2012, Pélachs *et al.* 2009). Numerous <sup>14</sup>C dates confirmed that this process began at the same time as the direct reduction furnaces were functioning in the late Roman Empire. The woodland recovered after the 6th to 7th centuries although this did not involve the regeneration of mixed forests. This was followed by a new decline in the forests during the 10th/11th century AD, which was mainly of pine, and it only began to recover again in the second half of the 20th century. Historical sources place in the 15th / 16th century AD a new iron and steel production in the region, this time centered on workshops with hydraulic furnaces in the valley bottoms. Unlike the previous one, this second decline in the forest mass does not correlate with evidence of in the Bosc de Virós area. In fact, its origin cannot be associated with evidence of metallurgical activity given the absence of slag heaps. Rather, it seems to be linked to a marked increase in cereal production and the opening of pastures. In sum, Bosc de Virós, as it exists today, is largely the consequence of different processes, including their intensive forestry use linked to iron production both in the late Roman period and later, from the end of the Middle Ages to the 19th century. The evidence of this is not only the size of the forest but above all the decrease in its diversity. The modern forest is therefore also a material product of the past.

In this way, the archaeological focus expanded, not only from the 'site' to the territory but also to the modern form of the geosystem which displays, like a palimpsest, the impact of human activity in the area at least during the last centuries. The result is a series of layers of information, one on top of another, to complete the representation of an archaeological space. However, that does not complete the definition of the territory. As explained above, territory is constantly redefined by the social practices in a space in each period. It therefore requires a synchronic study. While the palimpsest that is deposited in the geosystem records the diachronicity, the definition of the territory should discriminate the synchrony for each period. This also requires chronological information to be assigned to each entity documented and situated in the space. Thus, the establishment of age, mainly by absolute dates, becomes a necessity and implies discriminating the components in the space to find synchronies between them and

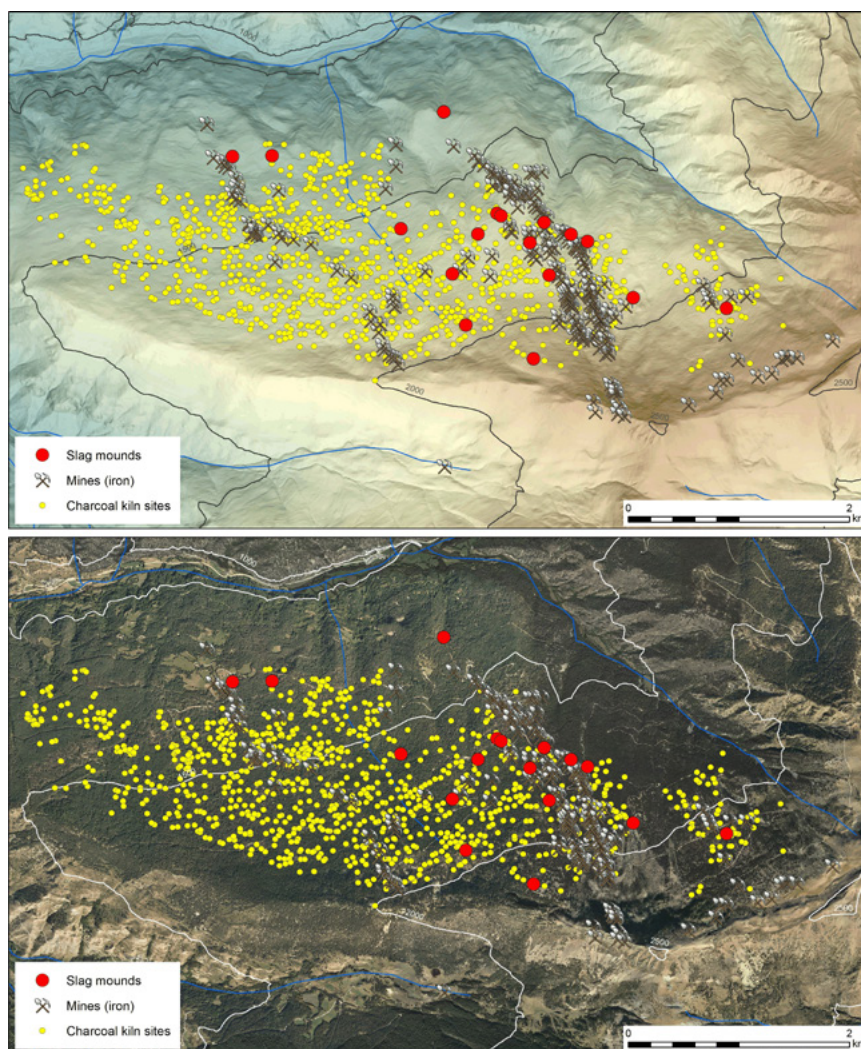


Figure 3.4. Dispersion of the archaeological vestiges of mining and iron and steel production in the Bosc de Virós. Up: topographic map. Bottom: aerial photography.

represent each territory. Their temporal succession is also able to sketch out the social changes in the territory over time.

Territory is represented by the sum of different kinds of entities with specific associated metadata. To complete the representation, it is also necessary to determine the geographic reach of the territory. As mentioned above, in archaeology we are accustomed to defining delimited geographic frameworks in which we focus the study, and we tend to allot them certain historical and social significance. In a very nuanced way, Figure 1 may also play that role: the mining-metallurgical territory of Bosc de Virós is given those boundaries, it covers this area with these characteristics. However, it is obvious that the activities that defined this geographic area as a mining-metallurgical territory went beyond those boundaries. In the modern age, reduction was carried out in furnaces in the valleys, where hydraulic energy was used. Furthermore, part of the mining work may have been performed by labourers from the Ariège, on the northern side of the Pyrenees, while the local population were mainly farmers. Finally, the iron produced was transported downriver to the port of Tarragona, where it was traded.

From this point of view, the spatial aspect of iron production in Vallferrera in the 18th century displays numerous facets. The supply of iron to the forges in Àreu and Ainet came from mines a few kilometres away, like the charcoal. The labour force, particularly specialised workers, came from the north of the mountain range. Then the product was sold in a Mediterranean port. The topological relations between these activities characterise a mining-metallurgical territory in the modern age very clearly, but in a very different way from the territory that existed before the 6th century cal AD. At that time, the iron reduction workshops were a few metres away from the mines and these, unlike in the 18th century, exploited the four iron-ore seams in the area. Even the charcoal hearths where the fuel for reduction was made were nearer at hand. At least some of the metallurgical workers may have lived near the workshops, in the light of the architectonic evidence documented at some of them. These workshops may not have functioned in winter as in many cases they are at above 1,700m altitude and up to 2,100m. Although we do not know the use that the iron was put to, its distribution was possibly much less extensive geographically. The Late Antiquity production in Vallferrera came into being when other much larger Roman iron-producing centres, as at Montagne Noire in France, lost importance and much more local workshops emerged. Thus the set of relationships that shaped the mining-metallurgical territory before the 4th century cal AD was very different in appearance (Decombeix *et al.* 2001).

## Conclusions

By challenging its altitudinal limits, high mountain archaeology may have moved outside our discipline's comfort zone; and not only because of the difficult access to the places it studies. The lack of prior information about many of the issues it addresses, together with the nature of its sources of information, has obliged it to solve problems that emerge in it with particular relevance. The need to consider space, understood as a territory or social landscape, as the focus on which it concentrates to represent the past, is not unique to this field of archaeology. However, this need is seen clearly and openly in highland archaeology and has led the different research groups to seek solutions to shared problems as they appeared. Answers have largely been reached through practice, by addressing aspects such as how to define the units of observation, establish the links between the different scales of that observation, combine different types of data and manage it as a set of information that possesses both a geographic and a temporal nature. This has also involved the need to consider how this space is understood and recognise its duality as the place where societies exist and at the same time the place produced and recreated by the same societies.

Little by little, the need for practical solutions to the different situations is also opening a window to other considerations. This paper has tried to describe part of the GAAM's 20 years of experience and explain some of the reflections that this has encouraged. They are really issues that emerge in many other fields of archaeology but which perhaps occur with a special intensity in mountain archaeology. The collective effort to solve them, to which this paper aims to contribute, must undoubtedly also assist progress in archaeology as a whole.

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# A historical context for rural landscapes: the contribution of Environmental Resources Archaeology (ERA) (NW Italy)

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## Summary

Since 1995 the Laboratory of Environmental Archaeology and History (LASA) has carried out several projects aimed at characterizing environmental management systems and their effects on ecosystems developing the Environmental Resource Archaeology (ERA) approach. ERA adopts the perspective opened by the historical ecology and the geographic-historical micro analysis, employing in a multidisciplinary framework a wide range of analytical tools. Sources coming from Environmental Archaeology, Archaeobotany, Rural Archaeology, Botany, Historical Ecology, History and Historical Geography make it possible to re-interpret rural landscapes in a more precise and complex historical, social and cultural dimension. Adopting ERA and related historical and geographical contributions it becomes possible to replace generic but diffused concepts concerning the relationship between people and their environment such as ‘anthropic disturbance’ or ‘anthropic exploitation’ with more precise and useful historical contents, chronologically and topographically identified. In addition, ERA supports research projects applied to the historical characterization for the management of individual rural landscapes (inside Natural Parks, Sites of Community Importance, etc.) and connected local agricultural products. Aiming at illustrating ERA methods and strategies, some case studies in Liguria (NW Italy) will be presented.

## Keywords

Historical geography, slope archaeology, historical ecology, rural archaeology, multiple land use systems

## Introduction

As a starting point, we explore the potential of Environmental Resource Archaeology (ERA)<sup>4</sup> to identify historical processes (i.e. the context of implementation of local production and activation practices with a regressive approach) and the drivers that have led to the current environmental and economic condition of rural landscapes and communities. We also focus on the main causes that have generated their current marginalization and abandonment.

At first, the main approaches and methods used in the study of past landscape and environment will be summarized highlighting the foremost critical issues. Secondly, the theoretical background offered by ERA will be presented using a series of case studies developed by the Laboratory of Environmental Archaeology and History (LASA)<sup>5</sup>.

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<sup>4</sup> During the development of the decennial LASA research the formula of *Archaeology of environmental resources* has been also adopted, which we consider equivalent.

<sup>5</sup> The Laboratory of Environmental Archaeology and History (LASA) - which recently became an Interdepartmental Research Center (LASA) - is active since 1995 at the University of Genova (Liguria - Italy) acting as a bridge between the Department

In recent decades, the theme of rural landscape has been addressed in different ways, with tools and methodologies that have often crossed and influenced each other (eg Landscape Archaeology, Environmental Archaeology, Rural Archaeology, Agrarian Archaeology, Ancient Topography etc.). In Italy, between the late 1950s and 1970s, major projects related to the study of the rural landscape were carried out in the framework of Ancient Topography and devoted to the identification of the features of the 'ancient' (mostly classical or pre-medieval age) landscapes: eg buried settlements, necropolis, Roman routes and centuriation (Celuzza & Regoli 1981). In this framework fragmented attempts of extensive survey projects for cadastral and rescue purposes were carried on (Azzena 2001). Instead, between the 1980s and the 1990s, a deep impulse to the construction of archaeological maps, following the examples of British Landscape Archaeology, was given (Barker 1995; Carandini & Cambi, 2002; Francovich & Valenti 1999). However, as clearly emerges by the first handbook on Italian Landscape Archaeology (Cambi & Terrenato 1994), these investigations, on the one hand, excluded post-medieval periods (Milanese 1999; 2001; 2004, Moreno 1997) and, on the other hand, they were exclusively devoted to the settlement sites (Francovich & Valenti 2001). As happened in Ancient Topography studies, the research appeared to be mainly focused on conventional archaeological artefacts (Cambi & Terrenato 1994), and did not include the identification and cataloging of evidence of past environmental resources management. Even if a geographical model is explicitly mentioned in this approach (Cambi 2011, refers to the definition of 'agrarian landscape' by Emilio Sereni), in Italy the Landscape Archaeology has not taken into account the agro-sylvo-pastoral features or, more generally, the historical ecology of resources that support the local agricultural systems and landscapes (for a discussion cf. Stagno 2009a; 2018; Moreno 1997).

After the 2000s, and following French and Spanish models, a more complex approach to the study of rural areas was also developed in various parts of Italy (Brogiolo *et al.* 2012; Volpe & Goffredo 2014). Those recent developments, especially in their first statements, often refer to Tiziano Mannoni's lesson on 'global archaeology', which in previous decades had very little consideration. Surely this kind of researches share a multiperiod and multisource approach<sup>6</sup>.

At the same time and mainly in European mountain environmental contexts, research in Environmental Archaeology (with a theoretical base on Human Palaeoecology and devoted to extra-site, off-site and intra-site analysis) has, incrementally, been building up (Albarella 2001; Reitz & Shackley 2012; Branch *et al.* 2005; Galop & Catto 2014). This trend, however, has not characterized the growth of the Italian Environmental Archaeology research rather focusing on biological evidences dug out from conventional archaeological sites (on-site) (Mercuri *et al.* 2014)<sup>7</sup>.

The Italian delay in the development of a more complex archaeological approach to the study of rural and mountain environment could be explained with some general difficulties:

1. prevailing focus on settlements (and rarely on mountain ones) rather than on 'used spaces' as defined by Riccardo Francovich (Francovich & Valenti 2001);
2. lack of consideration, until recent times, of the post-medieval period (and consequently of post-medieval archaeology and the regressive approach of the historical ecology of the sites) rich, more than any other period, of visible traces related to the agricultural and pastoral organization;
3. palaeoecology instead of historical ecology as the prevailing approach in the study of environmental evidences;
4. scarcity of theoretical discussion in archaeology, which includes historical and social context reference. Usually, the Emilio Sereni agrarian landscape history – a classical outset of the 1950s

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of Antiquity, Philosophy and History (DAFIST) and the Department of Earth, Environment and Life Sciences (DISTAV). For a summary of the LASA projects and research cf. Stagno (2013) and see also Cevasco *et al.* (2019).

<sup>6</sup> For a critical review about the archaeological approaches to rural areas cf. Corsi 2016 and Stagno & Montanari 2015.

<sup>7</sup> Actually, that was more the development of archaeobotany or archaeometry, rather than of environmental archaeology.

– is assumed as the main reference; however, Sereni took for granted, in developing its historical generalization, the opposition between the natural landscape and the agrarian/cultural landscape as conceived by the 1950's Italian geographers. Consequently he did not develop a rural social history that includes the spaces practiced by localized peasant communities and their landscapes (Moreno & Raggio 1999).

As we will see in the next paragraphs, the formulation of the ERA approach is independent from the development of the post-classical Italian archaeological research on rural areas, mentioned above; nevertheless, they both share the same origin in the early 1970s methodological discussions nurturing the foundation of an Italian Medieval Archaeology and in the 1990s a Post-Medieval Archaeology.

### Historical and theoretical background

ERA's path is apparently isolated from both the Landscape and Environmental Archaeology research currently adopted in Italy.

As previously mentioned, it has a long history of dialectic relationships with Medieval Archaeology and is closely connected with the development of Post-Medieval Archaeology (Milanese 1997), also growing up thanks to the contribution of palaeoecological researches developed in prehistoric studies (Maggi 2016).

In Liguria, thanks to the pioneering research of Tiziano Mannoni, and to the convergence with the area of Historical Geography interested in the history of the rural settlement (Quaini 1971; Mannoni 1994), the development of Medieval Archaeology (enshrined in 1974 by the birth of the journal *Archeologia Medievale. Cultura Materiale, Insediamenti, Territorio*) has been permeated by geographical and historical issues and by a multidisciplinary approach (Moreno & Stagno 2021). The dialogue was strict at the very beginning of the 1970's around geography and archaeology of population, history of agrarian landscape, the study of deserted medieval villages, the archaeology of preindustrial production, woodland history and archaeology, etc. The multidisciplinary approach was further developed through the debates on history of material culture (Stagno 2018 for a critical review of those years).

This path has developed again in LASA projects (focused on the North-Western Italy) and it has maintained uninterrupted links with the practice of the 'global' archaeological research (Global Archaeology) as developed by Tiziano Mannoni with the *Istituto per la Storia della Cultura Materiale* (ISCUM) based in Genova. During the 1980s, the geographical-historical approach (which opened the first phases of Medieval Archaeology in Italy) has been further improved thanks to different research experiences: 1) the Italian micro-historical analysis impact on geography (Cevasco & Moreno 2007; Quaini 2018) and the British local history tradition (Raggio 2004; Grendi 1993b; 1996; 2000; Hoskins 1955); 2) the British historical ecology approach, that developed the lesson of local or topographical history through the use of fieldwork and multiple sources including archaeological one (Peterken 1975; Rackham 1971; 1976; 1980; 1986; 1994).

In Italy during the 1980s Medieval Archaeology was consolidated around the studies on settlements (especially urban ones), while Historical Geography developed the study of environmental resources thus following the British historical ecology of Oliver Rackham and focusing on Woodland History and Archaeology (Moreno, Piussi & Rackham 1982; Moreno 1986)<sup>8</sup>.

<sup>8</sup> On further developments see, for example, Maggi, Montanari & Moreno 2002; Moreno *et al.* 2010; Cevasco, Moreno & Watkins 2022, Moreno, 2020; Panetta & Pescini 2021.

Further developments arose from the dialogue with botanists, archaeobotanists and continuously with environmental archaeologists, as developed by prehistory studies (Maggi 2016). Dialogues were fed by more or less formalized collaborations with other European research groups, implementing common research projects. As a result of this collaboration, LASA has experienced a peculiar archaeological approach particularly used to define a method of contrasting evidences in the mountain environmental archaeology survey: the 'slope archaeology'. Formulated by the French Environmental Geography (in particular at the GEODE laboratory of the University of Toulouse-Jean Jaurès) it has been employed in several projects in Southern Europe mountains (eg in the Pyrenees and in the NW Apennines) with an active collaboration between geographic and archaeological research (Cevasco 2012). This type of investigation considers the mountain slope, its soils and vegetation cover relationships as an environmental system driven by human history and presenting a stratification similar to that of conventional archaeological sites and monuments.

Historical ecology approach generally contributed to revise the concept of 'archaeological object' when referred to the landscape issue and its ecology: the most common example is the woodland archaeology and the variety of agro-sylvo-pastoral landscapes that have been reconstructed in NW Italian mountains<sup>9</sup>.

In Southern Europe, the biological component of present rural landscapes as well as the settlement features appear to be the output of past environmental resources management and multiple land use systems historical transformations. Thus, according to the British Historical Ecology, the biological component of the rural landscape (namely the 'site present ecology') is considered as a living 'archaeological' artefact. Environmental resources are explicitly considered as 'social products', and, accordingly, their ecology is historically defined by production and activation practices (Moreno 1990; 2018; Cevasco 2007). The local social context of rural practices appears conditioned by conflicts in control and access into and among the rural communities as well as by the local naturalistic knowledge (Moreno 1990; Raggio 2004; Stagno 2018). The reconstruction of historical transformations that have affected these special artefacts represents the key for a better understanding of the processes' drivers that have produced the current forms and ecological contents of the landscape itself or - more precisely - of each individual landscape. These actions/drivers/practices (i.e. the sets of local /localized production, distribution and consumption practices) and their environmental effects (biodiversification processes, ecosystem activation issues, etc.) leave bio-stratigraphic traces, archaeologically identifiable in soils, sediments as well as in the present ecology of plant and animal populations that can be identified and interpreted through multiple investigation tools and disciplinary skills (Pescini 2018). In the same way, evidences of such local practices can also be identified in rural archaeological buildings and their remains (eg rural housing, terraces, hydraulic channels, etc.) (Moreno *et al.* 2010; Stagno 2018; 2019).

Considering the present ecology of a site as a particular archaeological artifact allows to overcome the long-established dichotomy Nature vs. Culture and its late derivations, especially, in Landscape Archaeology. Among the consequence of such a dichotomy there is, for example the concept of 'site' usually understood in the archaeological common sense as an 'anthropic island', measurable as a peak of density of artefacts compared to a surrounding 'natural' landscape. The concept of 'site' has a quite long history in the archaeological field, even if it is still a problematic issue ('defective, even deleterious' as stated by Dunnell 1992), especially in relation to the topographical definition of the ancient settlements (on-site) and of the areas external to them (off-site) on the basis of the surface remains<sup>10</sup>. Since at the scale of the excavation the site tends to be self-defining, the greatest effort of definition is at the operational scale of the survey, at the interpretative scale of settlement archaeology and at the conservation scale of Cultural Resource Management (CRM). On the contrary, with regard to common

<sup>9</sup> A general view of LASA research on NW Italy mountain wooded meadows systems is recently published (Moreno *et al.* 2019).

<sup>10</sup> Foley 1981; Gallant 1986; Fowler 1990; Bintliff 2000; for a more complete bibliographic review cf. Panetta 2018.

Landscape Archaeology practice, environment seems to be an ‘off-site’ area external to human activities and more or less ‘influenced’ by human action or clearly unimpeded as living in ‘natural’ condition (Reitz & Shackley 2012). On this assumption, which reflects and pursues a dichotomy between Man and Nature, disciplinary sectors and specializations have developed (eg Environmental Archaeology, Archaeobotany, Bioarchaeology etc.) linking the study of past human activities to archaeological and archaeobotanical remains from within the settlements<sup>11</sup>.

### Methodological Approaches

LASA environmental archaeology and history research makes use of many different and complementary sources, thus involving geographers, historical ecologists, archaeologists, historians, geologists, botanists, archaeobotanists, etc. The environmental and historical characterization of individual rural landscapes is based on a series of main tools and methods.

1. Recognition of the ‘status’ of archaeological site (or site of historical-archaeological-environmental interest) to any traces of human action or to any evidence that records such traces;
2. Regressive analysis not only in the collection of data in the field, but also in their interpretation, starting therefore from the analytical evaluation of the effects of the practices (and of their abandonment) on the current vegetation and on the landscape formation. The transformation over time of the reciprocal relationships between the environmental factors of a specific geographic area are more easily identified and controlled if a regressive method for the analysis of the site is used: starting from the most recent and documented periods, we can better characterize these relationships and, moreover, we can control variations and discontinuities in the local environmental effects of the different shifting from one phase to the previous;
3. The choice of a detailed analysis scale for the ground reconstruction of historical management and activation practices allows to identify the processes that produced the rural landscapes of the past and the related-settlement distribution;
4. Close dialogue between the different expertises and production of a ‘network of sources’ constantly monitored and verified starting from the different disciplinary experiences and methods. In this perspective, the sources are potentially of equal relevance (= equipollence) (Grendi 2000; Raggio 2004).

This historical characterization of individual landscapes - on the basis of the multidisciplinary study of sites, areas and complexes of environmental archaeological interest - is proposed as an alternative approach with respect to the reconstruction of the types and forms of the agrarian landscapes based on the agricultural history which is the classic method inspired by the works of Emilio Sereni<sup>12</sup>. The historiographical problem arises due to the limited development of rural history in the context of economic and social history in Italy. The particular contribution due to the development of the LASA method towards the micro-historical approach can be appreciated through some seminar works on post-medieval rural communities - in different places of NW Italy - due to Edoardo Grendi, Giovanni Levi, Angelo Torre e Osvaldo Raggio (Grendi 1993a; Levi 1985; Raggio 1990 (2018); Torre 2019). The objective, therefore, is not to offer general frameworks or to reconstruct economic models, but to analytically reconstruct contexts and changes mainly from a social and environmental point of view. The topographical approach of the micro-history - based on the experiences of the British social and economic anthropology, sometimes formulated as a historical ethnography - helps to focus the internal

<sup>11</sup> On the limits of this approach in deciphering the historical processes that have affected the environmental system see Panetta *et al.* 2018; Pescini 2018. On the difficult dialogue between archaeology and some of the archaeological specializations within the study of environmental systems (and on off-site/extra-site analysis), see Albarella 2001.

<sup>12</sup> A contribution dedicated to the history of agricultural landscapes of Liguria - which brings Sereni’s method back to the regional scale - is due to Massimo Quaini (1972).

social relationships of the local rural community. Through the study of the social context, it allows to situate the practices of production and activation of environmental resources and center the attention on their interaction within the rural communities. In this way, intra- and inter-community conflicts emerge in the foreground, otherwise invisible to purely documentary research or the ethnographic generalizations (Tigrino *et al.* 2013; Beltrametti *et al.* 2021).

### Cases Studies

The investigations summarised here were developed during a series of research campaigns and projects (Stagno 2013; Beltrametti *et al.* 2021; Gabellieri & Pescini 2015; Gabellieri, Panetta & Pescini 2020) in the Eastern Ligurian Apennines and in the corresponding coastal area (Figure 4.1).

For many centuries these areas have been strongly subjected to transhumant grazing practices that moved from the Apennine summer pastures to the winter coastal ones<sup>13</sup>. Indeed, one of the most

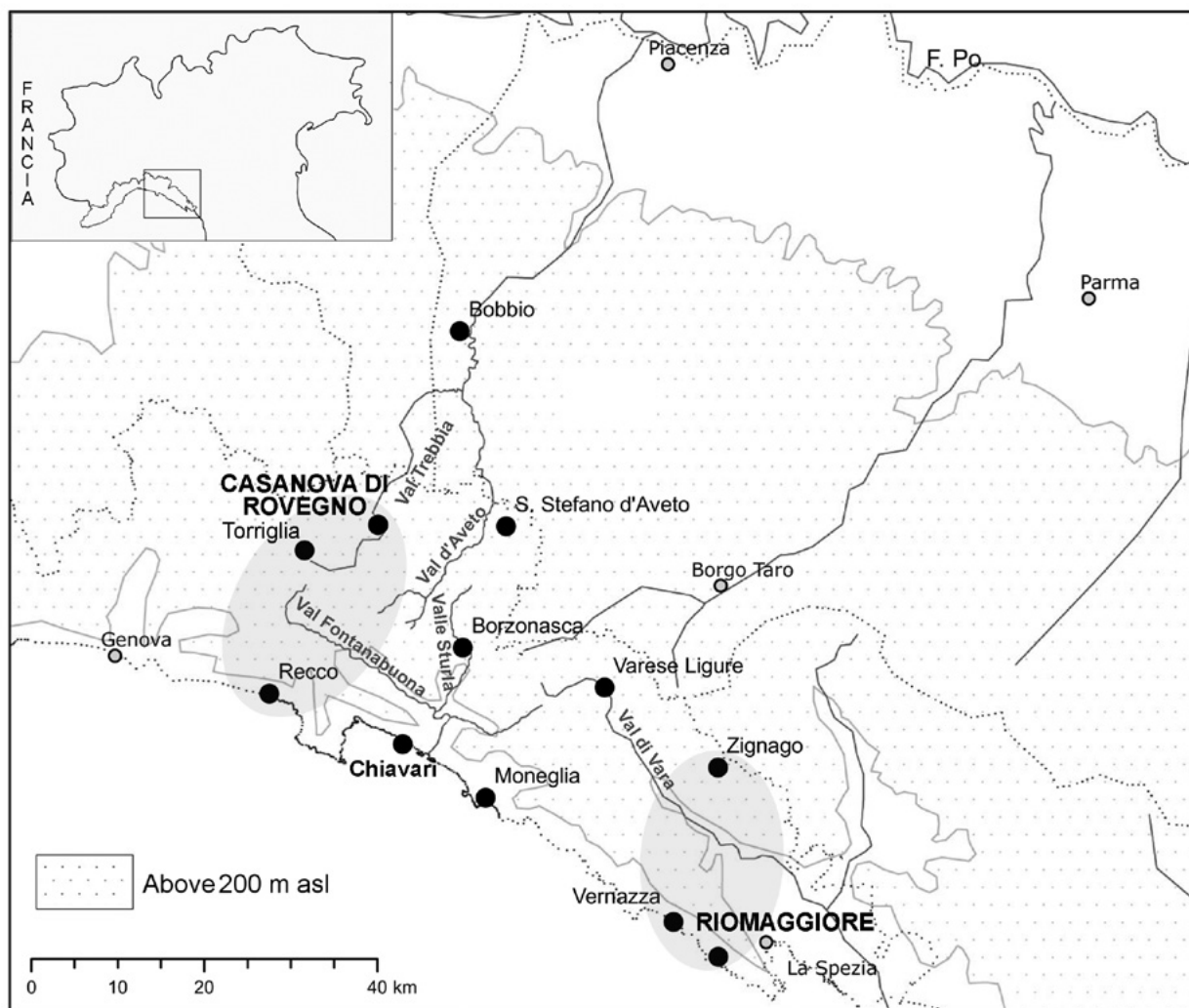


Figure 4.1. Case studies location map, in the framework of LASA researches devoted to the reconstruction of transhumance systems in Eastern Ligurian Apennines.

<sup>13</sup> An exhibition collecting different type of textual, archaeological and field sources have been recently devoted to the transhumance heritage in Liguria (Gabellieri, Pescini & Tinterri 2020).

important goal of the LASA studies has been the historical characterization - through the methods of the Environmental Resource Archaeology and Rural Archaeology - of the local pastoral practices and systems (agro-sylvo-pastoral multiple systems) that have given shape (landscapes) and environmental content (site ecology) to the investigated spaces (slope or individual landscapes) within its specific chronological phases (ie the reconstruction of an individual landscape biography).

The archaeological and archival sources available for these areas<sup>14</sup> show a settlement network characterized in post-medieval period by an alternation of phases and episodes of individual colonization of the common lands and by nucleated settlements with a poor demographic consistency. Documentary sources define these settlements as 'ville' (today 'frazioni'), often coincident to parishes and oratories locations and show how, in the *ancien régime*, they were poorly linked to central administrative districts, but above all to the social structure of the 'kinship' (Raggio 1990;2018). In the Apennine area, a high density of common lands has been preserved, enjoyed undivided by the inhabitants of a 'villa', or together with other 'ville', or by a single kinship. Even in the coastal area - eg in the Cinque Terre - important collective rights on pastures remained until the mid-eighteenth century and then eroded throughout the nineteenth century by the expansion of specialized viticulture.

As exemplified by the study cases, the peculiarity of these areas - after a long phase of abandonment of pastoral production and breeding economy - is the recognition of their 'high environmental value' (eg Regional and National Natural Parks and several SCI have been established). LASA research has shown how the contents or values of such naturalistic-environmental interest are linked to specific historical practices of environmental resources management, whose traces still remain in present landscapes. Traces are recognizable thanks to a micro-analytical perspective, which allows dialogue and the production of the 'new sources of historical ecology, archaeobotany and archaeology': 'new' compared to the prevalent use of textual sources in the history of agriculture and the Ligurian agrarian landscape. A complex system of multiple use of environmental resources was thus identified which brings to light eg ancient wooded pastures, terraced chestnut groves, meadows and pastures subjected to temporary cultivation practices, managed wetlands and numerous forms of scattered temporary cultivation that in this mountain area are present in almost all the common land use types.

### ***Slope archaeology in Upper Trebbia Valley***

The concerned slope is located in the Trebbia-Aveto valleys watershed occupying the western side of the reliefs of Montarlone (1500 m asl), Roccabruna (1418 m asl), Cifalco (1381 m asl) and Ripa (1389 m asl) (cf. location map, Fig 4.2). These upper lands have played an important role as a link between the Ligurian Sea coast and the Po Valley (Tigrino 2007; Cevasco 2018) already relevant in the early Middle Ages (Destefanis 2002) and since prehistoric times (Maggi 2016)<sup>15</sup>.

The first multidisciplinary study of slope archaeology in the area began about twenty years ago with a series of international field campaigns (Maggi, Montanari & Moreno 2002) which pointed out some shared

<sup>14</sup> The two investigated areas are today located in the provinces of Genova and La Spezia even if some related sites border the Parma and Piacenza provinces. At the end of the *Ancien Régime* (1798) the mountain area of Casanova di Rovegno (Upper Trebbia Valley) was part of the imperial fiefdoms of the Malaspina and then Doria-Pamphilj families; the coastal area of Cinque Terre was already a fiefdom of medieval Malaspinian consortia (Da Passano) then became part of the Republic of Genoa (Riomaggiore, Podesteria di Vernazza). After the brief period of the Ligurian Republic (1797-1805) and the annexation to the French Empire, these areas passed into the Kingdom of Sardinia (1814) and finally into the Kingdom of Italy, when they have been inserted in the modern municipal network. Hardly this changes in general jurisdictional framework have an immediate effect on local practices but surely affected - as our research can suggest - the environmental resource access system (Tigrino *et al.* 2013 Gabellieri & Pescini 2015).

<sup>15</sup> In fact, the area was already known to archaeologists for the chipped lithic industry from surface collections attributable to the Paleolithic and Mesolithic (Campana & Maggi 2002).

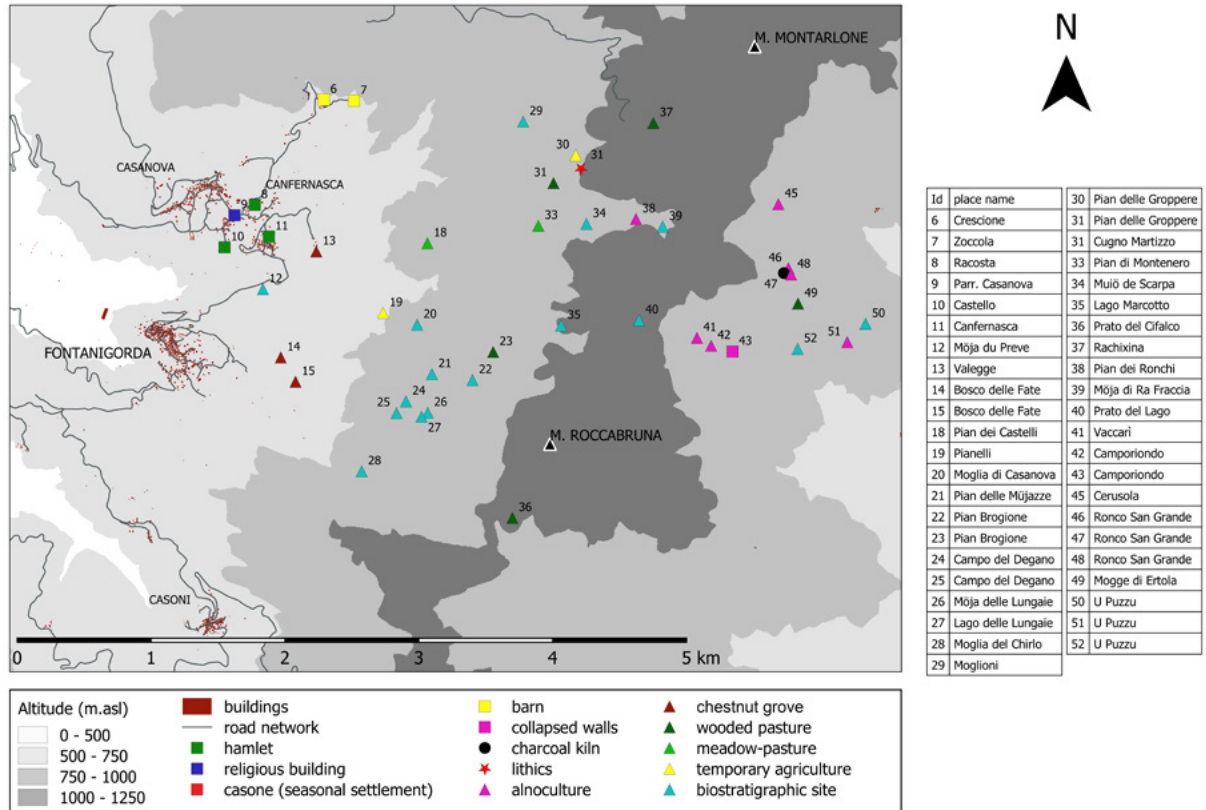


Figure 4.2. Location map of the sites of historical - environmental interest as studied by LASA in the Upper Trebbia Valley (elaboration by A. Panetta).

research lines of a European project - LEARCO (Local Ecosystem Assessment Research Coordination<sup>169</sup>) which suggested the use of archaeology and historical ecology in the assessment of ecosystems and evaluation of the environmental sustainability of the local landscape. The local scale was adopted against the global scale assessment - a main stream feature in those years - and the lines included environmental archaeology and historical ecology studies that in the following years fed other LASA projects. The historical environmental study of the wetlands - conceived as biostratigraphic archives of surrounding 'cultural' landscapes - has been fundamental in the development of ERA research in this valley.

A first relationship was established between the wetland sites and the 'related sites' (sites with evidence of ancient trees, charcoal kilns, stone walls, channels, indicator species, etc.) through their historical-environmental and archaeological-environmental contents (Lasa 2006).

The dense network of sites of historical - environmental interest indicated in Figure 4.2 - including *Pian delle Gròppere*, *Rachixina*, *Mogliani*, *Pian dei Ronchi*, *Pian Brogione*, *Moglia di Casanova* - was qualified thanks to the critical and comparative analysis of historical topographic cartography contrasted with historical

<sup>16</sup> The project - although selected by the European Commission in that year - was not completed for purely administrative reasons. Learco has remained an extensive work program, a scientific proposal that is being realized in many different research projects (Cevasco 2007, 58-60).

ecology ground observations<sup>17</sup>. The integration with archaeobotanical and archaeological sources allowed to reconstruct precise processes of variation in the local biodiversity that have historically affected these slopes (Menozzi *et al.* 2007). Traces of agro-sylvo-pastoral systems have emerged in the form of fir, beech, alder, chestnut groves managed as wooded-pastures and temporary fields, as well as heathlands and wetlands managed for pasture and agriculture<sup>18</sup>. Through multiple crossings of sources, archaeological and floristic-vegetational indicators (*indicator species*) of temporary and permanent cultivation practices, haymaking, extensive grazing, irrigation, controlled fire, etc. have been identified (Beltrametti *et al.* 2014; Cevasco 2013).

The research also had several application developments, including, lastly, participation in a project financed by the Liguria Region on European funds aimed at testing historical practices for innovative management of the local biodiversity. It suggested the direction for a new management phase after decades of abandonment through an experimental regeneration of historical practices by local stakeholders (mowing of ancient grasslands, heathlands and bogs, use of controlled fire to restrain shrubby vegetation and promote the herbaceous layer, restoration of wetlands and their perimeters, etc.)<sup>19</sup>. The area in question is, in fact, included in a Site of Community Importance of the Natura 2000 Network - for the varied system of wetlands that have been preserved (locally called *Möje*, it. *Moglie*) - and in the ZRC Roccabruna, a Provincial Protected Zone for the local production of small wild game<sup>20</sup>. LASA research has shown how biodiversity recognized on a conservation level is closely linked to the history of the management of previous habitats, today mainly colonized and infilled by newly formed woods with uncontrolled development of wild ungulates and the wolf return/reintroduction<sup>21</sup>.

The slopes in question are still mainly common lands, organized into 'beni frazionali' belonging to the hamlet of Casanova, a fraction of the municipality of Rovegno (province of Genova, upper Trebbia Valley) divided in turn into different settlements (or 'ville')<sup>22</sup>. Until at least the beginning of the twentieth century, they constituted one of the summer pasture points of a network of transhumance routes - between the coast, the mountain and the Po valley - documented at least since the seventeenth century<sup>23</sup>. The work with local informants has allowed to document how access to the common lands of this slope took place, until the years 1970, for vertical sectors referable to the different *ville* of Casanova.

<sup>17</sup> This research has been applied to the small wild game management (Bertolotto 2013). From a methodological point of view, the contextualized analysis of cartography integrated with fieldwork allowed to decode the different historical cartographic documents (Cevasco 2002, Marullo 2002; Molinari & Montanari 2018).

<sup>18</sup> For a summary of the environmental archeology and historical ecology research carried out by LASA in this area, starting from the preparatory studies for the Wild Game Management Plan of the 'Roccabruna' ZRC cf. Cevasco 2007; 2009; 2013.

<sup>19</sup> The interventions allowed to experimental restoring (or more simply bringing to light) management practices considered residual and otherwise not legitimate (and therefore only detected during sanctions), such as the use of controlled fire (Cevasco & Moreno 2015; Cevasco *et al.* 2015c).

<sup>20</sup> Bertolotto 2013. The wetlands in question are habitats of great interest for the woodcock, the surrounding pastures for hares and red leg partridges.

<sup>21</sup> Given the impossibility of summarizing the numerous researches, see Cevasco (2013; 2014) and the cited bibliography. A research on jurisdictional conflicts around common lands, which is part of a larger project on the history of collective property between Liguria and Piedmont, in Tigrino *et al.* (2013) and Beltrametti *et al.* 2021. On the wolf in Liguria, whose historical populations were closely connected with the transhumance circuits until the first half of the nineteenth century, rather than a 'return' after almost 100 years of absence, this is an uncontrolled re-introduction from refuges in the pastoral areas of Central Italy (Hearn, Watkins & Balzaretto 2014).

<sup>22</sup> The 'beni frazionali' are still managed for pasture and wood by the inhabitants of the *ville* of the Parish of Casanova through a 'Commissione dei monti' - the body that is usually indicated in other realities as 'Comitato di gestione dei beni frazionali' - made up of a president and two advisors, now being renewed in the form of a 'Fondazione Comunità dei Monti' (Beltrametti *et al.* 2021). On the historical organization of the management of this area, see Cevasco (2007; 2012) and Tigrino *et al.* (2013).

<sup>23</sup> At 1820 the livestock in seasonal movement from the coastal areas of Nervi and Recco ('Montagna di Fascia') to the Apennine districts ('mandamenti') of Torriglia and Ottone, to which Casanova belonged, was at least 4000 sheep (Moreno 1990, 111). On the topic of transhumance in Liguria, see Moreno 1990; Moreno & Raggio 1990; Raggio 1995 and the exhibition on transhumance in Liguria hosted at the State Archive of Genova between 2020 and 2021 (Gabellieri, Pescini & Tinterri 2020).

The wetlands present in these common lands (dial. 'monte') (§ 4.1.3.) have represented pastoral resources of fundamental importance and have been affected by continuous historical variations. Through the environmental archaeology research, they turned out to be real 'biostratigraphic archives' for the reconstruction of the history of 'cultural landscapes' (Lasa 2006). Some of them were filled at different times and transformed into chestnut woodlands or meadows/pastures (for example the site *Mogge di Ertola* which became grassland in the eleventh century) or were recently dried up due to the abandonment of pastoral management (*Lago Marcotto*, *Lago della Nava*), many have been preserved and are now in the form of ponds or peat bogs (*Moglia di Casanova*, *Mogliani*, *Moglia del Chirlo*, *Lago delle Lungaie*, etc.). The topographical, archival and archaeological documentation made it possible to specify directions and chronologies of the known environmental dynamics conventionally attributed to the evolution of these ecosystems: the passage, for example, from a pond to a swamp to a meadow, and vice versa, is an effect of precise strategies that have determined specific sequences of cultural landscapes according to pasture (local and transhumant), forage economy, irrigation of permanent crops pushed up to the higher slopes, or their abandonment. The pulsations in the management of this dense network of wetlands are also recognizable in the history of the rural settlement (§ 4.1.3). Their persistence still in the nineteenth and twentieth centuries seems to refer, in most cases, to the persistence of collective uses.

The investigations of rural archaeology on the Casanova slope have identified/characterized artefacts associated with past agro-sylvo-pastoral activities and activation/occupation of common lands: rocks smoothed by the passage of sheep and goat livestock<sup>24</sup>, temporary shelters ('casonetti' dial.) as well as playground created by young shepherds as bowling alleys ('campetti da bocce' dial.) used till 1960, barrier walls to avoid the digression of livestock, filtering walls and bridles to manage wetlands as pasture (watering ponds) and temporary (indicated by presence of piles of stone/stone cairns) and permanent (as shown by the traces of irrigation canals derived from wetlands) cultivation<sup>25</sup>. Also due to the lack of in-depth excavation, the chronology of these traces has not yet been completely reconstructed stressing the need to identify local chronotypologies for these pastoral artefacts as well. Of particular interest in the study of wetlands is the history of water regulation<sup>26</sup>.

The expansion of previous investigations with observations of architectural archaeology made it possible to reconstruct the transformations of the spaces functional to livestock farming in the different *ville* forming the hamlet of Casanova (§ 4.1.3). Transformations which, as will be seen, are attributable to changes in the practices of multiple management of environmental resources.

Evidences of controlled fire practices characterize these slopes and can be identified by analyzing cartography, micro-toponymy and sedimentary sources. Historical fire practices have left traces on the

<sup>24</sup> Traces of smoothing of the rocks attributable to repeated passage of sheep and goat cattle (and therefore interpretable as possible indicators of the paths followed) have been documented in the investigations on the Neolithic occupation of the lower Rhone valley (Beeching & Brochier 1994).

<sup>25</sup> For a first discussion on rural archeology investigations carried out in the area, see Cevasco *et al.* (2009), Stagno (2009b, 213-267) and Montanari & Stagno (2015). While the sub-current use of some of these artefacts has been widely documented, the traces of previous phases, although evident, have not yet been completely reconstructed. On the possibility of defining the chronotypologies for the construction of stone fences and temporary mountain pasture structures in the diachrony, see the works by Rendu (2003) for the Enveig mountain, and Le Codeuic (2010) for the Aspe and Ossau valleys, in the Pyrenees. For a chronotypological study of the pre-protohistoric pastoral precincts of Corsica, see Mazet (2008).

<sup>26</sup> On the opposite side, east of the watershed, in the Aveto Valley, connected to the collective rights of the villa of Ertola, the natural hydrographic network that drains the slope is completely remodeled in several phases. Traces of reclamation for 'colmata' in the late and post-medieval ages have been identified in the archaeological stratigraphy found in the sites of *Mogge di Ertola* and *Pozzo* (Guido *et al.* 2013). Downstream too, all the accommodation around the village of Ertola is served by a complex network of natural/artificial channels for irrigation of the terraces that overlapped the water circulation routes and roads (Moreno 2013).

Roccabruna area (site of Pian Brogione - site n. 23, Figure 4.2), for the medieval and post-medieval age<sup>27</sup>. Moreover, on the Montarlone slope, the dialectal microtoponym *Rachixina* (site n. 37, Figure 4.2) and that of *Costa delle Chiscine* recorded by the topographic cartography of the early nineteenth century, refer to the use of ‘fornelli’ (stoves) in the practice of ‘ronco’ (‘Pian di Cucina’, ‘Pian di Cosina’, cfr. Cevasco 2002; Raggio 2001; Moreno 1990). The term ‘ronco’ is frequent in post-medieval documents and indicates a particular multiple production system that involves a cyclical soil hoeing for the sowing of cereals (i.e., rye and/or oats) through different practices of controlled fire (Beltrametti *et al.* 2014; Bertolotto & Cevasco 2000; Cevasco 2007; Pescini 2019; Moreno *et al.* 1998). The reintegration of fertility of the parcel subjected to the ‘ronco’ is assured by the long cycle of fallow land when left as rangeland and by ashes produced during the controlled fire. This practice of temporary agriculture was very common in the eastern Ligurian Apennines until the end of the nineteenth century (Moreno 1985) and its effects were certainly important both on plant and animal populations, including birdlife (Cevasco 2007, 187; Moreno 2018). The practice of ‘ronco’ is proved to be, at least at the beginning of nineteenth century, at the basis of the fire regime – together with the effects of pastoral fire – determining the ecology of many different types of ‘landscapes of trees out of forest’. The legal dismissing of the fire practices during the nineteenth and twentieth century – with the adoption of the forestry laws regime – caused the disappearance of many of the historical landscapes of the Ligurian Apennines.

In particular, the sites of *Rachixina* and *Pian delle Groppere* show traces of such controlled fire practices and will be presented in the next paragraphs.

#### *Rachixina site: a beech wooded pasture*

The *Rachixina* site (1334 m asl) consists of a parcel of about 700 m<sup>2</sup> of private property inside the fractional common-land of Casanova<sup>28</sup>. Today it consists of an aged beech coppice-wood, characterized by a very poor underlying herbaceous layer due to the heavy leaf litter deposit. The site represents a real historical-archaeological document: it is, in fact, one of the rare examples still present in Liguria of a ‘population’ of pollarded beech trees (Figure 4.3), relict of the ‘landscape’ of the beech wooded pasture as it appeared in the first decades of the 1900s (Moreno & Poggi 1996). Previous observations of historical ecology had focused on the peculiar circle features of the radical suckers and the very few herbaceous traces of the last ‘open’ phase, in the context of the whole Montarlone slope (Cevasco 2007, 202-206).

The wooded-meadow-pasture system consists of a particular type of multiple uses of plant resources, spread throughout Europe starting from the Neolithic period (Maggi & Nisbet 2000; Rasmussen 1990; Sigaut 1975). With regard to the Ligurian-Tuscan-Emilian Apennines, this peculiar type of agro-sylvo-pastoral management of the ‘terre alberate’ (land bearing trees), particularly common from the medieval and post-medieval ages until the first half of the nineteenth century, was aimed at the production of hay from mowing and fodder from herbs and leaves, the latter derived from the regular treatment of pollarding or suckering (Moreno 1990; Moreno *et al.* 2019). In the post-medieval age, the practice of pollarding was also used for the production of charcoal (Moreno & Raggio 1992; Baraldi *et al.* 1992; Di Stefano 1983). Archival investigations have made it possible to document that ‘terre alberate’ were considered, at least until the first decades of the nineteenth century, ‘terre salvatiche’ (wild lands), lands

<sup>27</sup> The place name is *Pian Brusone* in the handwritten map of the military topographer Gustavo Scati (1827), which recalls the use of fire (Cevasco 2002). The site was cored in 2000 (Branch *et al.* 2002) and samples were re-analysed in 2009 (Menozzi, Montanari 2010) looking for NPP and charcoals. A first interpretation of the diagram linked to the experiment on local fire practices in the SIC Roccabruna (April 2010) and to the effects on present site ecology in Cevasco 2018:356.

<sup>28</sup> A first interdisciplinary discussion on this research has been proposed in Cevasco & Molinari 2009; for further details on the palynological analysis, see Molinari (2010). Other recent contributions in Molinari & Montanari 2018 and Moreno *et al.* 2019.



Figure 4.3. *Rachixina* site. The largest pollarded beech inside the coppice. The aerial and radical suckers are visible (photo: R. Cevasco, from Cevasco 2009, Figure 1).

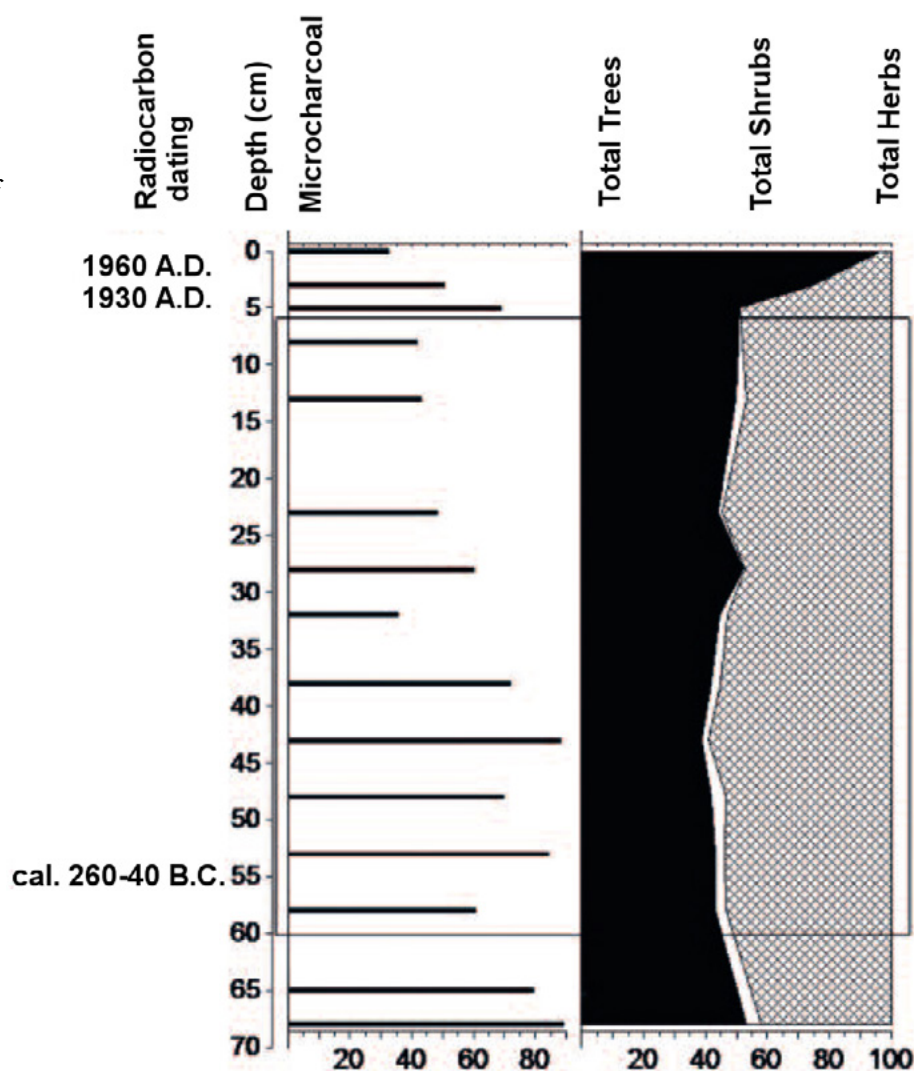
that could be both common and privately owned, and that were distinguished from ‘terre domestiche’ (domestic lands) intended for permanent crops<sup>29</sup>.

Archaeobotanical analyses (Molinari 2010; Cevasco & Molinari 2009; Molinari & Montanari 2018; Stagno & Molinari 2014) allowed to document management practices at site scale for at least the last 2200 years (§ 4.1.2)<sup>30</sup>. A soil profile was sampled for palynological and anthracological analysis resulting chronologically stratified and thus providing useful archaeo-environmental data. During the most ancient period recorded by the pollen diagram (of which a simplified version is shown in Figure 4) the tree cover is almost exclusively represented by beech. The presence of *Ericaceae* suggests the use of the

<sup>29</sup> The historical ecology investigations have made it possible to identify traces of this system, with different characteristics and specificities, in all the valleys of the Eastern Ligurian Apennines (Beltrametti *et al.* 2014; Cevasco & Poggi 2000 for further bibliographical details). In particular, on the problem of ‘terre salvatiche’ and ‘terre alberate’ and the way in which they are documented in archival sources (in particular nineteenth-century statistical surveys) see Bertolotto & Cevasco (2000), Moreno (1990) and Stagno (2018).

<sup>30</sup> For a discussion on the *Rachixina* case as an example of biodiversification processes at the microtopography scale, see Cevasco & Moreno (2013).

Figure 4.4. *Rachixina* site. Summary pollen diagram showing the trees, shrubs and herbs trends and the results of the quantitative analysis of microcharcoal particles. The phase recording palynological traces of the use of the site as a wooded-meadow pasture is underlined (Molinari, from Stagno & Molinari 2014, Figure 3).



area for pasture, in a form of wooded pasture. This thesis is supported by the high concentrations of microcharcoal that could be referred to the pastoral use of fires (or confined fires?)<sup>31</sup>.

In the next phase of the pollen diagram (the beginning of which is dated around 200 BC thanks to radiocarbon analysis), the presence of the beech is constant. The increase in the percentage of herbaceous species attests the affirmation of the wooded-pasture system. In this phase, the identification of some pollen grains of cereals (albeit in low percentages) suggests the use of some form of temporary cultivation in the immediate vicinity which can be associated with the practices of the *ronco* system attested by the fluctuating presence of microcharcoal concentrations<sup>32</sup>.

The most recent phase of the diagram is instead characterized by a definitely denser forest cover. The disappearance or reduction of shrubs and herbs marks the progressive closure of the wood which is

<sup>31</sup> Previous studies carried out in the nearby site of *Moglia di Casanova* had already revealed, during the Bronze Age, an important phase of stable grazing within the silver fir woodland (Cruise 1990; Moreno *et al.* 2019).

<sup>32</sup> Also for this phase, comparisons are found in the results of the investigations carried out at the *Moglia di Casanova*, where, during the medieval and post-medieval phases, the constant presence of cereals and the decrease in alder pollen indicate the coexistence of grazing activities and temporary agriculture cycles (Cevasco 2007, 155-156).



Figure 4.5. *Rachixina* site. Terraced charcoal kiln sites (from Stagno, Beltrametti & Parola 2018, Figure 10).

associated with the decrease in herbaceous species and the cessation of grazing activities on the site and in its immediate vicinity. Furthermore, this phase also marks the end of the ‘agricultural use’ between the beech trees and the beginning of a monocultural use of the area, aimed at the coppicing of the beech woodland and conifer plantations. The simultaneous increase of microcharcoal in the uppermost levels could be a trace left by charcoal kilns inside the wood, documented by the presence of some charcoal burning platforms (Figure 4.5) datable between 1930 (first licences for the burning of beech charcoal piles) and 1950 (when the last licences for charcoal piles were documented) thanks to some archival documents relating to authorizations for the ignition of charcoal kilns (Cevasco & Molinari 2009; Molinari & Montanari 2018; Stagno & Molinari 2014; Stagno, Beltrametti & Parola 2018). In the second half of the twentieth century, we assist to the almost complete disappearance, after more than 2,000 years of documented continuity, of the herbaceous cover, replaced today by a thick bed of beech leaves (Cevasco & Moreno 2013).

#### *Gròppere site: evidence of temporary early-medieval agriculture*

The ‘Pian delle Gròppere’ site (1225m asl) is located in the municipality of Casanova di Rovegno (Upper Trebbia valley): here traces of temporary cultivation characterized by trees cutting cycles, fire, use and abandonment have been identified and radiocarbon dated to the seventh–eighth century (Campana & Cevasco 2001; Guido, Scipioni & Montanari 2002; Paltineri 2002; Moreno *et al.* 2005; Cevasco 2007; Moreno & Montanari 2008; Pescini 2019). The site is part of an ancient common land (*comunaglie*) belonging to the inhabitants of the parish of Casanova di Rovegno. In 2000, when the study was carried out, the area was characterized by a series of dry-stones cairns (a few decimetres height) half-buried by soil and low-shrubs vegetation in a clearing with partially eroded soil (Figure 4.6). This land feature probably generated the vernacular name of the place, ‘Pian delle Gròppere’ that is ‘the plane of the cairns’. Linguistic studies have established that the etymology of the vernacular word ‘groppe/groppe’ (that in the Ligurian local geographical terminology refers to a rounded form) derives from Germ. \*kruppa meaning ‘a sub-spherical accumulation’ (Petracco Sicardi & Caprini 1981). This is a further linguistic trace that would confirm the chronology (Lombard period) already suggested by radiocarbon analysis.

The stratigraphic excavation of some cairns and the observation of exposed sections of soil led to the reconstruction of a temporary cultivation phase, from the cutting of the fir and beech forest (charcoal remains and radiocarbon dating is provided by the dominant forest species), up to the abandonment of cultivation (post-cultivation vegetation dynamics and regrowth of spontaneous heath vegetation whose pollen was found in recent soil (Figure 4.7).

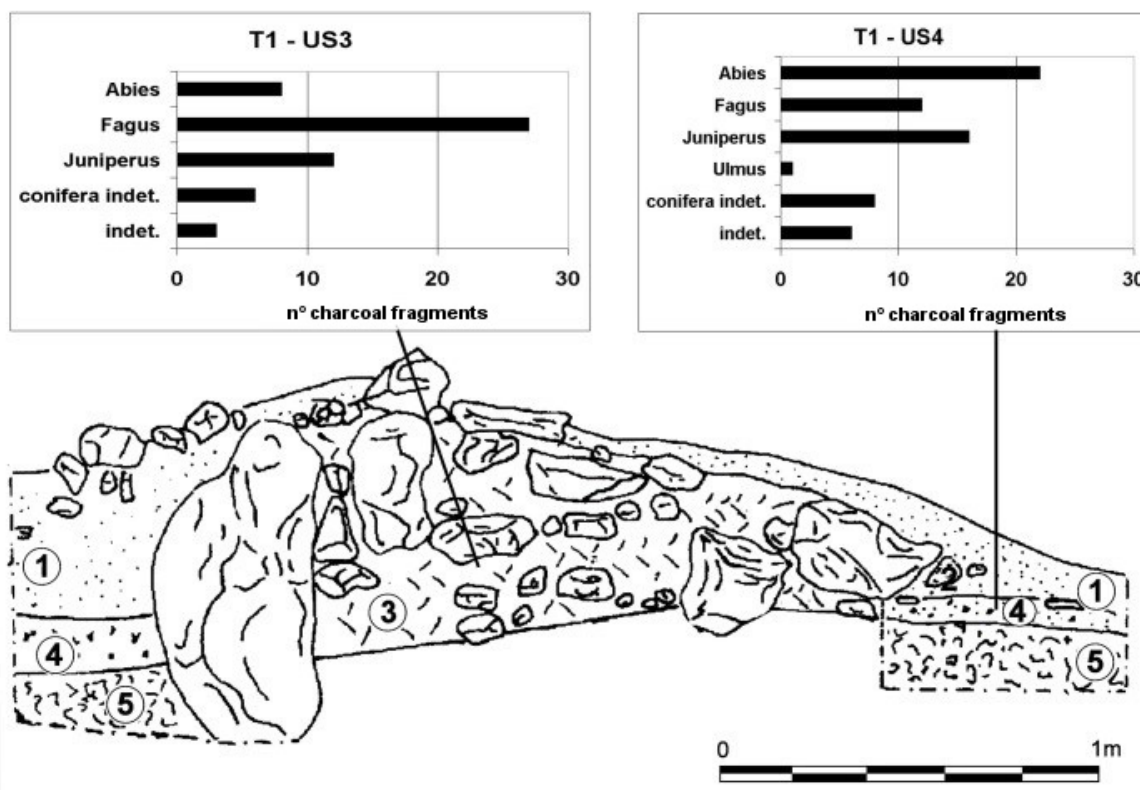


Figure 4.6. Pian delle Gròppere site. Archaeological section of a cairn. Anthracological diagrams concerning two different stratigraphic units (US 4, before the medieval temporary farming, and US 3, more recent) reveal the environmental changes produced by a particular practice of slash and burn. The silver fir (*Abies alba*), which had dominated the regional landscape until the Roman Age, almost disappears just in the Middle Ages (from Guido *et al.* 2003).

The analysis of the soil profiles near to the cairns has highlighted a truncated palaeo-soil (remains of a soil generated by a previous mixed fir-beech woodland) topped by a newer one produced by the current heathland; these newer soils, which are only contiguous to the artifacts (stone piles), contain small charcoal fragments and pollen that show the disappearance of the former fir-dominated forest and its replacement with beech wood, which is accompanied by cultivated species (chestnut) (Figure 4.8). A few hundred meters from the site, another soil profile has recorded beech charcoal dated around AD 1200.

Silver fir is absent in the top soil, in agreement with its disappearance from most of the Ligurian Apennines during the Middle Ages (Guido *et al.* 2013); on these slopes, however, silver fir is documented in post-medieval time by a pollen diagram from the nearby site of Pian Brogione up to the seventeenth century (Branch *et al.* 2002.; Cevasco, Moreno, Balzaretto & Watkins 2015; Cevasco, Moreno & Hearn 2015) (cf Figure 4.11). In the site of the 'Tana di Monte Nero,' between the Ceno and Nure valleys, the current living populations of centuries-old silver fir (at an altitude of about 1650 m asl) are considered relics and not due to twentieth century forestry plantation policy (De Marchi 1984): a rare Apennine fragment of ancient pasture with silver fir still lives in continuity with the historical populations as well as with the few nearby populations of mountain pine (*Pinus mugo* Turra) (Gentile 1995; Petriccione 1988; see also Moreno *et al.* 2019).

This information which derives from sedimentary sources, from plant remains embedded in the soil and also from oral sources, confirm, localizes and contextualizes in space and time practices of which

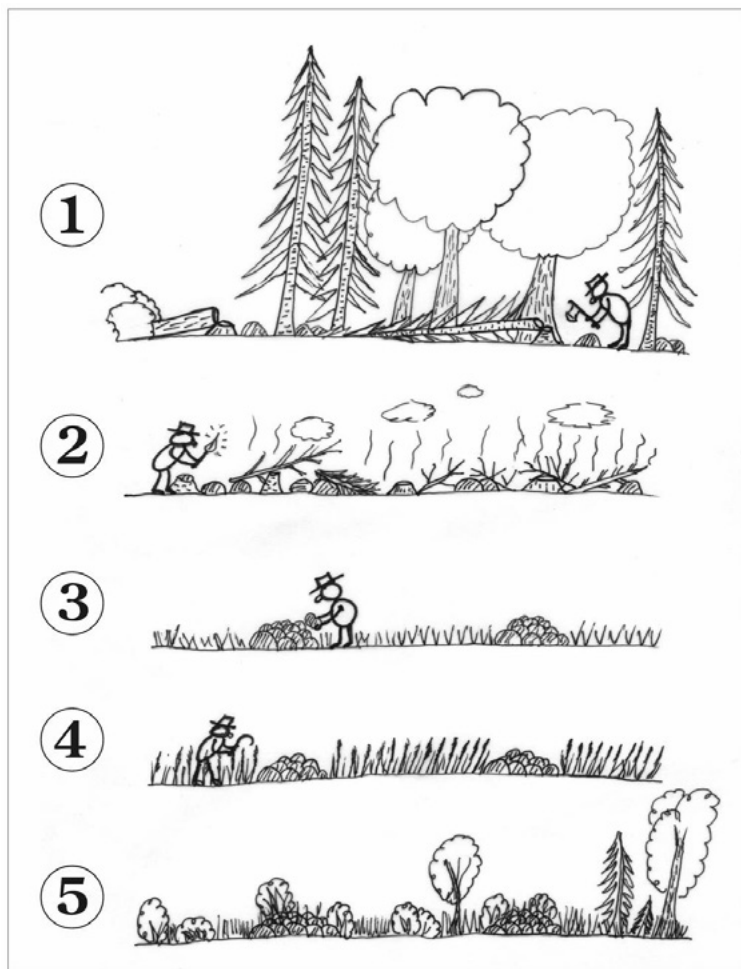


Figure 4.7. Pian delle Groppere site. Reconstruction of temporary agricultural activity at Pian delle Groppere (c. 700 AD): 1) cutting the mountain fir and beech forest; 2) fire of cut residues; 3) clearing stones; 4) cultivation; 5) abandonment of cultivation (from Moreno et al. 2005 (sketch by J.-P. Métaillé)).

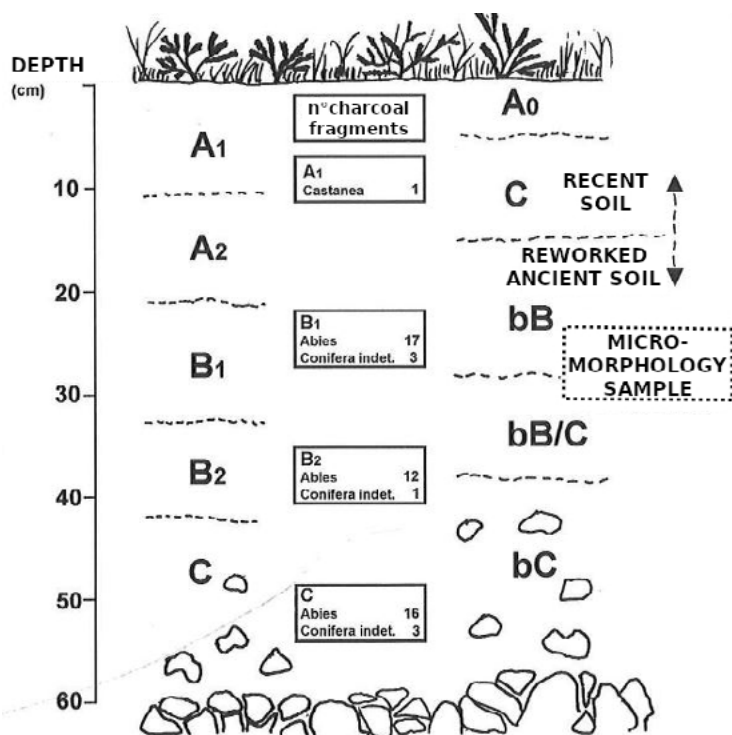


Figure 4.8. Pian delle Groppere site. Soil profile, outside the stone cairns: on the left, the 'traditional' pedological interpretation; in the center and on the right, the pedo-anthracology and the micromorphology allowed to identify the truncated forest soil, on which the recent heathland soil has developed (from Guido et al., 2002, modif.).

previously only documentary evidence existed. It is interesting to recall today the reluctance of the older generation of users of these common lands ('comunaglie') to admit and describe the use of fire to maintain the pasture: none of the living commoners remembers the temporary cultivation at Pian delle Gròppere but the memory of *ronchi* remains in the local microtoponymy - another local name of the site is *Pian de Furnàsci* (Campana & Cevasco 2001) which recalls the use of confined fire) and also in sites of the adjacent slopes of the Aveto Valley (Cevasco 2007). The study of this site of historical environmental relevance, a true 'field archive', opens a window on the medieval landscape of this Apennine valley, by recording the changes brought about by the use of local environmental resources. Their evidence, as in this case, came up to us in the form of visible traces (clearance stones cairns) - therefore truly archaeological - which need to be interpreted. This can be done especially comparing the results of field research with the traces in archival documentation.

#### *Wetlands and buildings as indicators of changes in practices and in access rights*

As a further example of the potential of the crossing of sources, the case study of permanent meadows and fields in mountain slopes is discussed here, linking the archaeology of historic buildings in the hamlet of Casanova with data on land use changes at the scale of surrounding slopes. Field surveys focused on the study of historic pasture and/or watering sites used by the residents of specific settlements ('nuclei') of the Casanova di Rovigno hamlet (*Canfermasca* and *Racosta*) until the end of the 1970s, documenting the traces of the past management: regulated wetlands, temporary and permanent agriculture sites, ancient wooded pastures and grasslands (Cevasco 2007). The archival investigations mainly concerned the study of a centuries-old controversy that saw some families of Fontanigorda and the *villa* of Casanova opposed around the rights of use of portions of the so-called Roccabruna forest (Beltrametti *et al.* 2021; Tigrino *et al.* 2013).

The interviews with current users allowed to record the memory of peculiar practices centered on the management of wet meadows located above 1000 m asl, where even in the 1960s a thin hay was cut, the 'fèn fin' dial, largely consisting of sedges. This production seems to take place through the maintenance of a film of water, as in the 'marcite' system, and obtaining, as witnesses point out, 'more meadow' (hay) and less swampy soils ('ballerìn-ne'). These are hay meadows for which use the palynological analysis crossed with the cartographic one suggest a nineteenth century phase (Cevasco 2012).

Archaeological surveys carried out in the wetlands between Casanova and Fontanigorda have made it possible to document the presence of bridges and filter walls to regulate the outflow and inflow of water, some of which may perhaps be linked to this phase of colonization (Montanari & Stagno 2015; Stagno 2009b, 213-268). Depending on the wetlands, these structures have different characteristics (dimensions, processing of the blocks) which could be traces of different phases of use (Figure 4.9). Furthermore, some wetlands are bordered by low dry stone walls, which often also divide the internal space (*Lasa* 2006), with the function of preventing the digression of cattle and therefore the access to the portion of the wetland perhaps used for the hay production<sup>33</sup>. The analysis of the current cadastre indicates that the presence/absence of fence walls corresponds to a difference in the ownership status of these areas: the fenced wetlands (*Lungaie* and *Moglia del Chirlo*) appear as private property enclaves within 'beni frazionali' areas and the documented walls precisely follow the perimeter of the cadastral parcel whose division dates back at least to the beginning of the twentieth century. The same cadastral situation is in fact documented by a survey of 1926 (on the basis of a previous cadastre), drawn up on the occasion of the rekindling of a centuries-old controversy over the common enjoyment of the resources of these mountain slopes following the intervention of the *Commissariato per la liquidazione degli usi Civici* (Tigrino

<sup>33</sup> The walls constituted the stone base which had the function of housing wooden poles that formed real fences, with manholes to allow access to the inside of the wetlands (Stagno 2009b; Montanari & Stagno 2015).



Figure 4.9. Filtering walls of the Lungaie (a) and Moglia del Chirlo (b) wetlands (from Montanari & Stagno 2015, Figure 3).

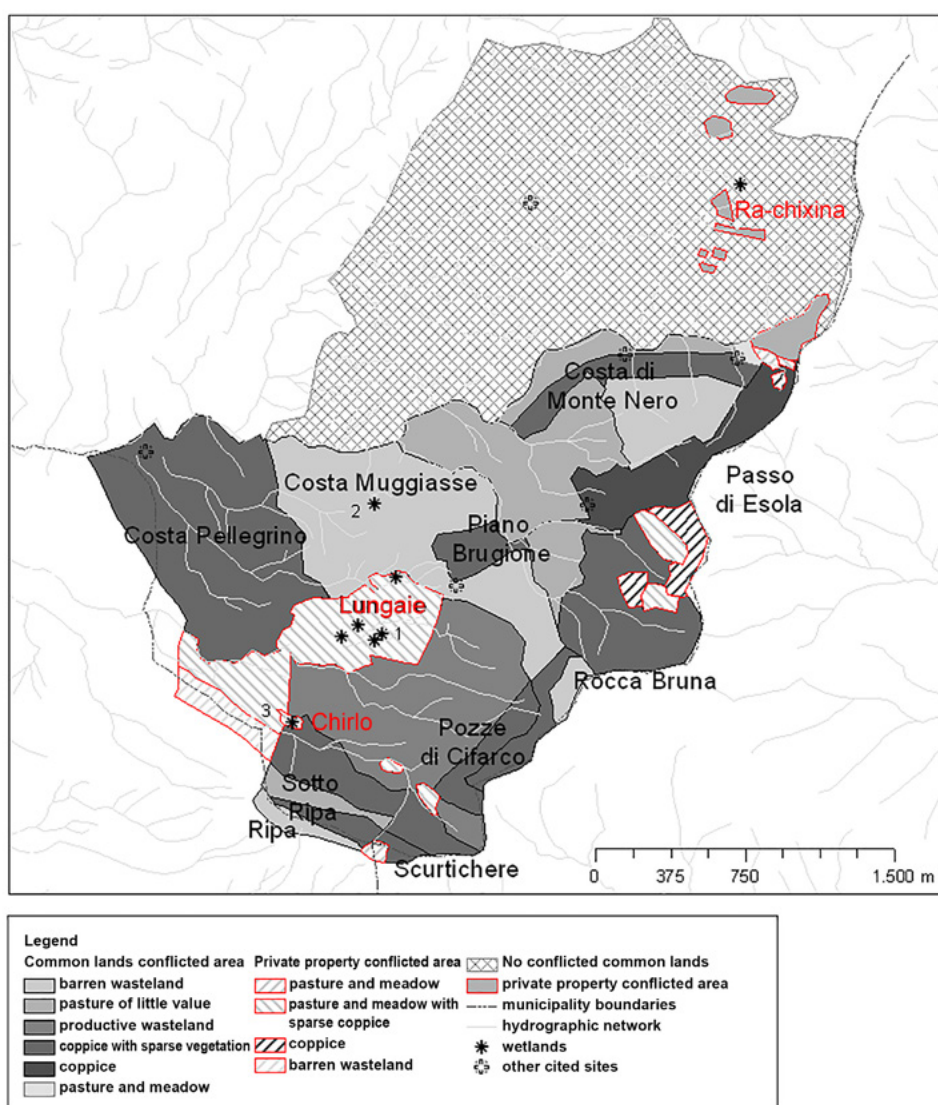


Figure 4.10. Casanova-Fontanigorda. Elaboration from the topographical sketch of the geom. Pietro Billi map on the contested area (May 1926), where the analysed sites are located (from Montanari & Stagno 2015, Figure 4, modified).

*et al.* 2013, 130-137) (Figure 4.10). These enclaves could be traces of usurpation actions carried out within the common lands, perhaps precisely coinciding with a phase of intensification of the agricultural and pastoral exploitation of the slopes (in this case hay production)<sup>34</sup>.

For the *Moglia di Casanova* area, no plots of private property have been recorded and no fence walls have been found (except one very badly-conserved filter wall in correspondence with the outflux stream, cfr. Beltrametti *et al.* 2021), however the surveys revealed other traces of appropriation aimed at cultivation. In the clearing surrounding the swamp, heaps of stone have been documented (which can refer to both permanent and temporary crops) and in the area below the wetland, locally called *Pianelli*, there are numerous heaps of stone associated with a series of small terraces and traces of canalizations: these evidences appear as a clear trace of a permanent agriculture activity. The case is particularly interesting because, in this area, the pre-1800 oat and rye palynological traces in the diagrams allowed to document the exercise of temporary crops in the context of *ecobuages* cycles practiced in a wood pasture with presence of fir trees until medieval times (Moreno *et al.* 2019; Cevasco 2010) analogously to what documented in the neighboring wet-land sites, like Pian Brogione since the fifteenth-sixteenth century, Figure 4.11). The cartography of the mid-nineteenth century (based on surveys of 1827) indicates the presence of fields in this area (notation 'C'), indicating the permanent cultivation on the higher slopes, perhaps to be related to the adoption of maize in the local production system (Cevasco 2002, 209), a phase clearly evident in the palynological diagram from the 'Moglia di Casanova' site (Cruise 1991), Figure 4.12<sup>35</sup>. This area, however, in the 1926 survey is classified as 'sterile uncultivated' (Beltrametti *et al.* 2014, 243-244). The archaeological traces could therefore refer to an episode of colonization or usurpation of common lands for the planting of permanent crops located in the mid-nineteenth century or before, already interrupted at the time of the cadastral survey, which consequently did not record it either from the point of crop view, nor that of the property. A case, therefore, of previous usurpations and 'privatizations', then released to collective uses, while elsewhere the stable meadows were used and therefore claimed as private still in 1926 (Beltrametti *et al.* 2014, 246-251). The analysis suggests a complexity of the agricultural phases of the nineteenth and twentieth centuries, often underestimated, but whose deciphering appears central in the reconstruction of the current landscape<sup>36</sup>.

The different characteristics of the documented filter walls could therefore be linked to the different periods of their construction, and their different state of conservation suggest different phases of use. The results already achieved by the archeological investigations of the pastoral enclosures encourage the possibility of defining chronotypologies also for these structures (Gassiot & García Casas 2014; Le Couédic 2010; Rendu 2003) and the terraces as well (Harfouche 2007) which suggest that the difficulty in recognizing the historical (and chronological) dimension of these traces exists because their study has not yet started systematically.

As already mentioned, the architectural archaeology investigations in the different *ville* of Casanova were carried out through the study of the walls (and in some cases of the interiors) of the preserved buildings that did not show restoration interventions of such a magnitude as to prevent recognizing previous building phases (Figure 4.13).

<sup>34</sup> Throughout the ancient regime, episodes of usurpation by private individuals or family groups are frequent and well documented throughout the European mountains, which have often resulted in the formation of new private properties. (Bille, Conesa & Viader 2007; Raggio 1992).

<sup>35</sup> The diagram records the presence of large size *Gramineae* pollen grains and allows to document traces of temporary oat fields at least since the Bronze Age in the fir clearings (Cevasco 2007, 94, 155; Beltrametti *et al.* 2014).

<sup>36</sup> On the general theme of the nineteenth century intensification see Moreno 1990; further reflection developed in Stagno 2021. On the specific case, for comparisons with the documentable transformations in the historical building of the hamlet of Casanova, see Stagno & Molinari (2014) and Tigrino *et al.* (2013).

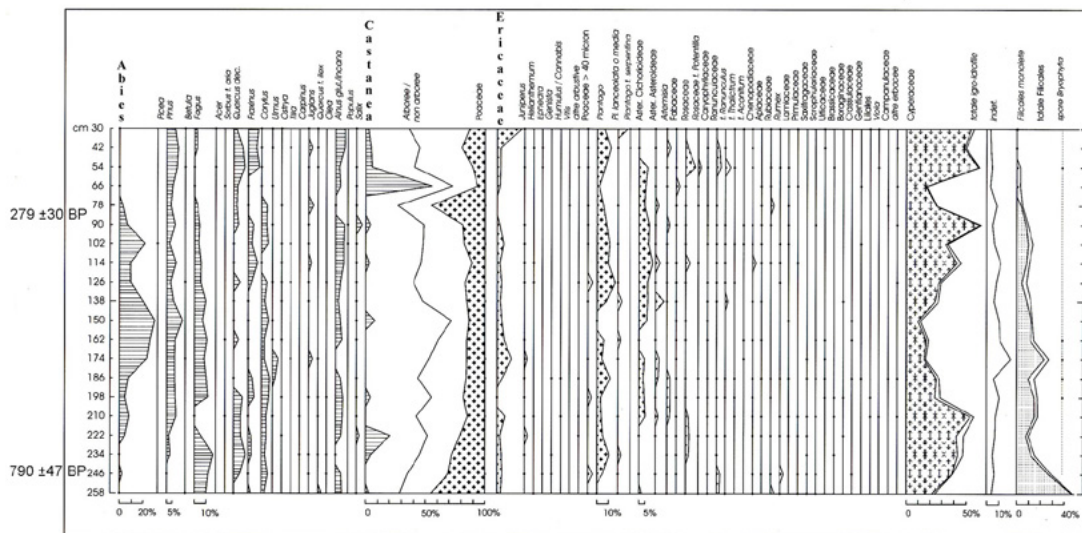


Figure 4.11. Pollen diagram from Pian Brogione (Casanova) (Branch et al. 2002). A wooded pasture with beech and silver fir alternating with chestnut groves is recorded throughout Medieval and post-Medieval times near the wetland of Pian Brogione (Müiore site - dial. Casanova, 1150 m a.s.l.) (from Cevasco 2010, Figure 1, pp. 111-113).

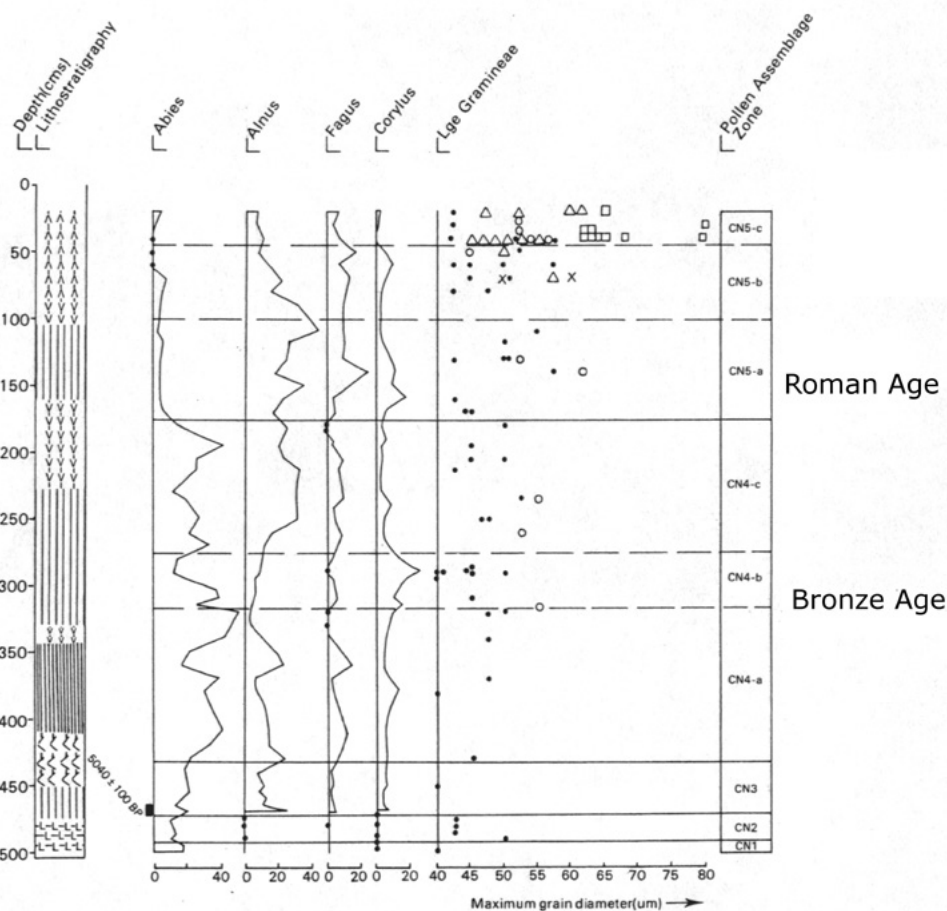


Figure 4.12. The appearance of Zea mays in the local production system at the Moglia di Casanova site (1100 m a.s.l.) as documented in the palynological sequence from Cruise 1991 (Cevasco 2007, p. 94). Circle = oats (type Avena), triangle = rye (type Secale), square = corn (type Zea), cross = wheat (type Triticum).

The investigations allowed to reconstruct traces of the development of the settlements since the sixteenth century (Figure 4.14). At least two major transformations have been identified through the analysis of buildings linked to breeding practices (stables and barns, Figure 4.15), which can be connected to profound changes in these practices. The first change occurred during the eighteenth century with the construction of new cattle stables equipped with a sewage discharge system, not attested in previous periods (in which the differentiation between dwelling houses and livestock spaces was not clearly identifiable) and new large barns of higher architectural quality (Figure 4.16). These constructions could be a trace of the spread of a local cattle breeding, alongside (and in competition with) more consistent transhumant flows that did not require significant housing spaces in the settlements (Beltrametti *et al.* 2021). Given the contextual increase in housing structures, it is possible that this change is linked to the intense demographic increase that occurred during the eighteenth century (Tigrino *et al.* 2013, 144, Figure 7).

During the nineteenth century the growth of stables and barns is documented, both in size and number, as evidence of an intensified process of cattle breeding. It coincides with the consistent increase in isolated buildings - perhaps 'casoni', structures supporting agricultural activities and grazing - in terraced areas along the slopes, attested by historical cartography from the second half of the nineteenth century. The creation of permanent meadows in the higher slopes (which gradually replaced the previous system of

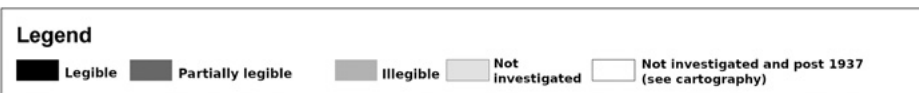
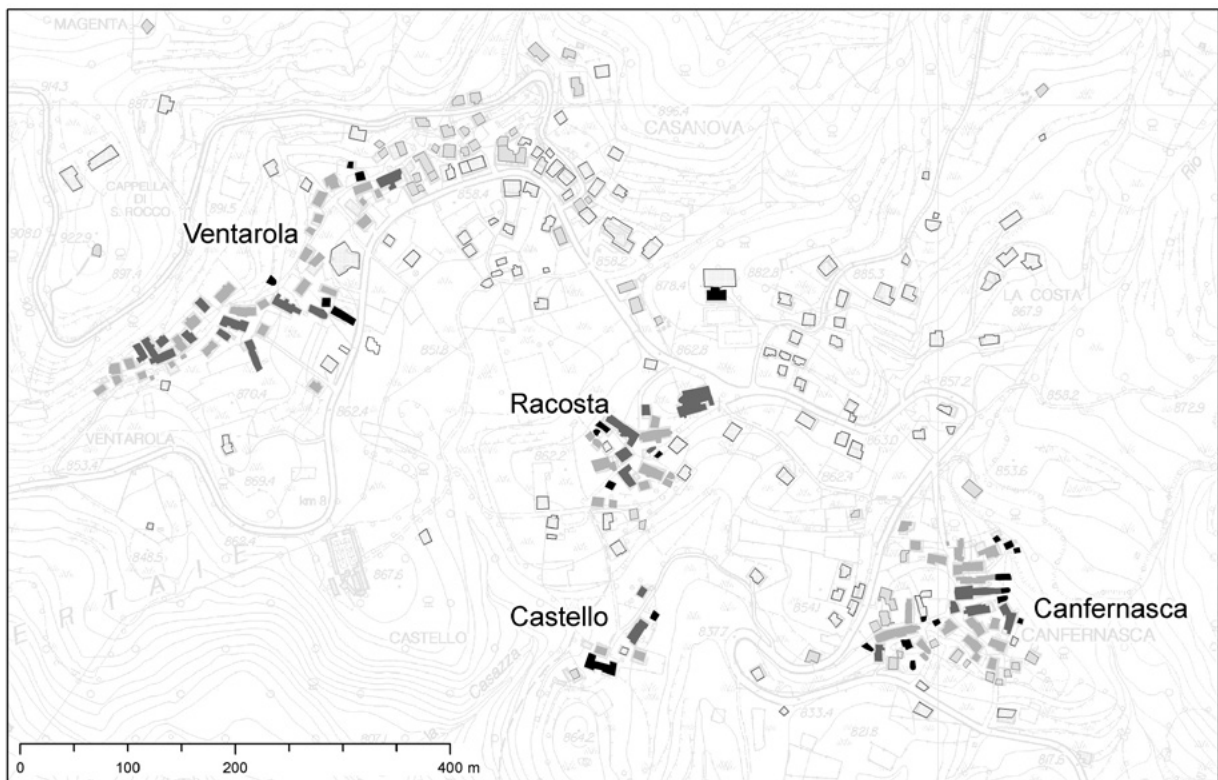


Figure 4.13. Casanova hamlet. Summary table of the investigated buildings (with the indication of the structures that can be dated, with an undefined and unreadable chronology due to recent restoration particularly invasive interventions, such as the complete concrete lining) and not investigated ones (from Stagno & Molinari 2014, Figure 4).

Frazioni	XVI-XVII	XVII-XVIII	1700-1775	1775-1830	XIX	1890-1930	after XX
Canfernasca			9	2	6	3	
Castello			5	2	3	2	
Racosta		1	4	4	1	4	3
Ventarola	1	6		5	3	6	4
<b>Total</b>	<b>1</b>	<b>7</b>	<b>18</b>	<b>12</b>	<b>14</b>	<b>15</b>	<b>7</b>

Figure 4.14. Casanova hamlet. Summary table of the chronology of the buildings that have been dated (from Tigrino et al. 2013, p. 138 tab. 1 modified).

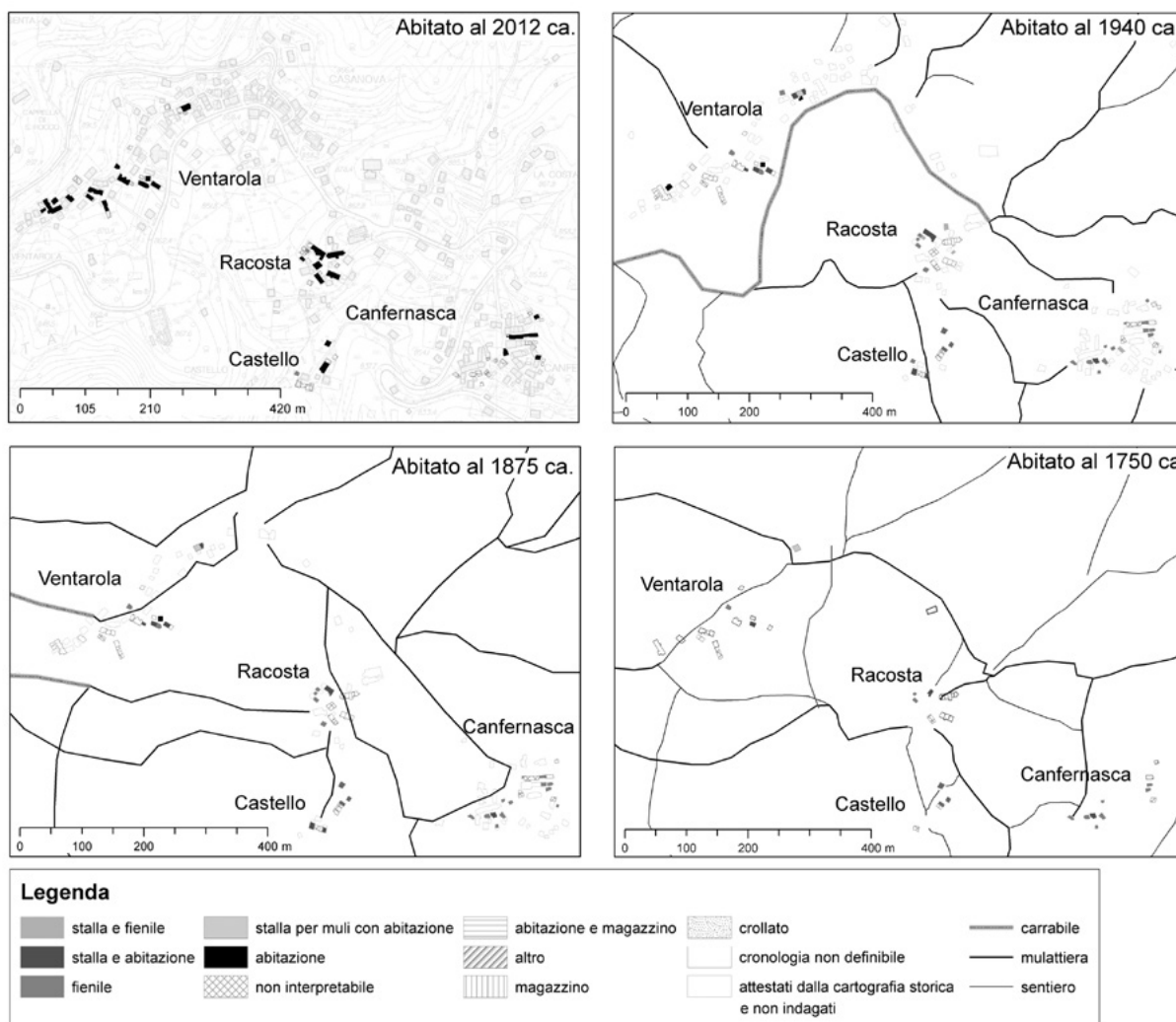
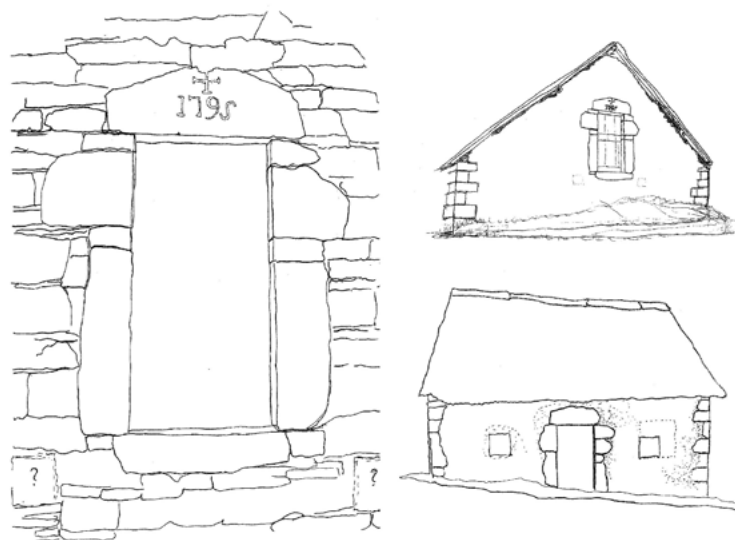


Figure 4.15. Casanova hamlet. Buildings transformations based on different surveys of architecture archaeology and on historical cartography between 1750 and 2012. Changes of the buildings function in different phases have been reconstructed starting from the characteristics of the last identifiable function, thanks to the presence of specific markers (for example, feeders, exhaust systems sewage, paving, etc.), to the shape and size of the openings, and from information gathered from oral sources in June 2011 (from Stagno & Molinari 2014, Figure 5).

Figure 4.16. Casanova hamlet, villa of Racosta: barn (*cascìn-na dial.*) dated 1795 with cantonals and openings worked in local limestone (*pria crumbìn-na dial.*) synchronous with the expansion phase of the mountain hay meadows in the common lands (Cevasco 2012, Figure 4). a. Nord side; b. West side; c. dated portal (D. Moreno, sketches from photography, Racosta 11 February 2011).



'boscaglie pascolate' and wood-pastures after the 1820s) is further proof of the increasing hay demand (Cevasco 2002).

Between 1890 and 1930 the construction of new stables with an overlying dwelling, and of stables with above barn is documented. These structures can be connected to the definitive passage from a transhumant herd to a permanent bovine herd (managed with the 'monticazione' system), and to the consequent need for space both for hay and for the winter housing of cattle inside the inhabited areas. This period sees the transition from a multiple system of use of agro-sylvo-pastoral resources (in which, among others, also the wooded pastures) to a partially monocultural one, with spaces permanently and exclusively intended for cultivation, meadows, pastures and woods. The first results of the investigations on the historical demography of Casanova show that this second transformation cannot be connected to an increase in the population: if in fact the population grows throughout the eighteenth and up to the mid-nineteenth century, it has remained stable since the second half of the century and it begins to decrease at the beginning of the twentieth century (Tigrino *et al.* 2013, 143-144). Certainly, and not only in these slopes, the applications of forestry laws (from 1822 to 1878) and the 'improvement' policies supported by the nascent agronomic disciplines in favor of intensive livestock production are responsible (Moreno 1990; 2018; see also Bertolotto & Cevasco 2000; Cevasco 2004; Stagno 2018).

### ***The Cinque Terre landscapes: research and application experiences***

Since 2002, the LASA, in partnership with the Cinque Terre National Park and the Superintendence of Archeology, Fine Arts and Landscape for the City of Genova and provinces of Imperia, La Spezia e Savona, have been carrying on research of environmental archaeology and historical ecology starting from the analysis of some specific sites (Case Lemmen, Caginagora, Case Lovara). The initial aim was to trace the history and functions of small rural buildings in the framework of historical agro-sylvo-pastoral practices and the dynamics of the post-cultural vegetation cover. These studies included applications: they helped both in the definition of UNESCO heritage within the Park area and the restoration of rural buildings and small farmhouses. Then, a second phase of research with ERA methods was opened in 2014 (Figure 4.17).

These previous researches have made it possible to reconstruct generalizable local historical dynamics for the environmental resources of the Cinque Terre (mainly vegetation cover and soil). The aim was to

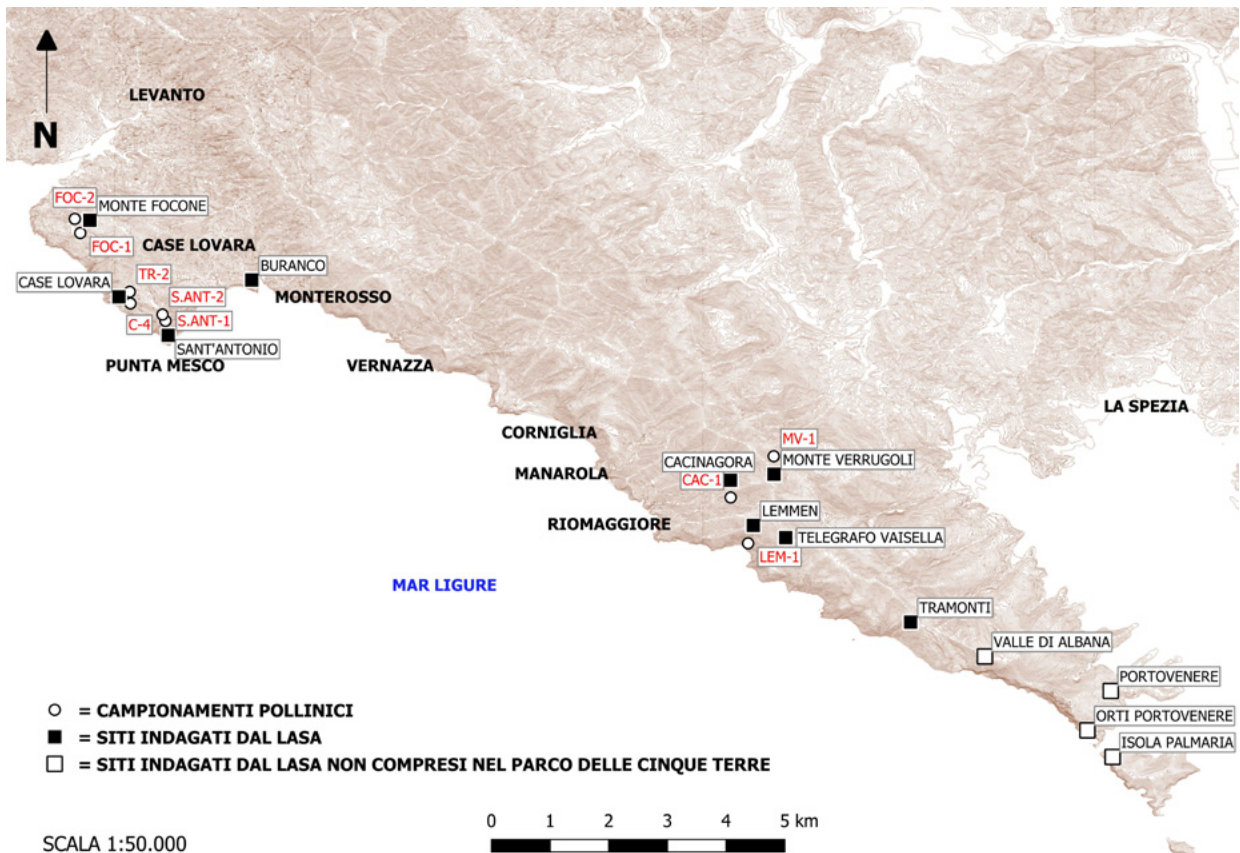


Figure 4.17. Location map of the Cinque Terre sites studied by LASA: white circle = pollen corings; black square = investigated sites inside National Park; white square = investigated sites outside National Park (elaboration by A. Panetta).

help the planners to overcome on the one hand the ‘aesthetic’ value that the local terraced landscape - protected by UNESCO and the National Park policy - currently has and, on the other hand, the widespread idea that the present vineyard monoculture is the historical type of land use in the whole area.

Such interdisciplinary researches allowed to highlight a more complex rural landscape history than the current one which is solely dominated by vine monoculture and olive tree cultivation.

At least since the Roman period (but with discontinuities that still need to be investigated) traces have been identified testifying the presence of a transhumance system that connected summer pastures (located in the Apennines) to the winter ones situated along the coast. Such system, still productive until the first half of the nineteenth century was possible thanks to a multiple use of the land which provided the mutual integration of pasture (especially for sheep and goat) with olive, chestnut and vine cultivation including also charcoal and timber production (Figure 4.18). At the end of the century this system collapsed but important traces are still living in the present ecology of sites. In the post-medieval system, the access rights to these resources were expressly regulated in time and manner (i.e. collective use/common land, reserve, emphyteusis etc.). This multiple land use means that, for example, terraced vineyard could be subjected, in different periods of the year, to different practices by different users. In particular, after grape harvesting, grazing was allowed in autumn and winter, making

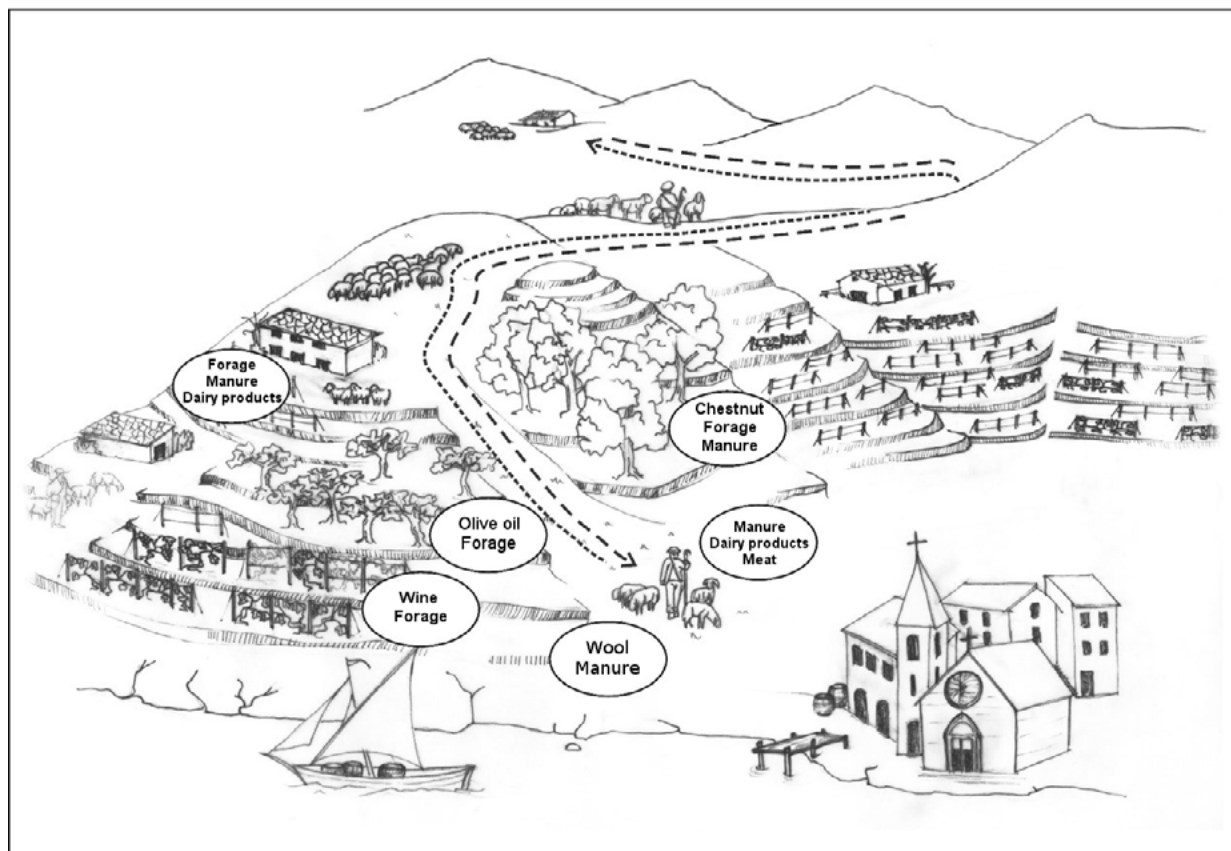


Figure 4.18. Ideal and schematic reconstruction of the Cinque Terre (Riomaggiore) rural landscape in the first half of the 19th century, based on archive and biostratigraphic sources. It shows an articulated environmental resources activation system, different from the contemporary monocultural one. Fodder resources have played a primary role, through the 'herbaceous corridors' between the coast (winter pastures) and the hinterland (summer pastures) (from Moreno et al. 2005).

it possible to reintegrate fertility<sup>37</sup> into the terraces. The use of this practice for almost four centuries has had a stabilizing effect on the ground ecology thanks to the continuous trampling and compaction of the terrace surface and composition and structure of the herbaceous layer.

The movement of herds between mountain (summer pasture) and coastal pasturelands (winter pasture) was allowed without difficulty thanks to the activation of 'herbaceous corridors' that played a fundamental role in terms of economy, transfer and activation of fertility (dung and vegetal manure), pastoral products (milk, dairy products, meat, wool), etc. The presence of such corridors has been highlighted (see below the example of Riomaggiore) comparing series of different cartographic sources then cross-checked with palynological results (Lasa 2003; Lasa 2009). Cross-checking a series of historical topographical maps (see Figure 4.19, a method called in geography 'filtraggio cartografico' / 'cartographic filtering' cf. Cevasco 2007; Moreno 1995; Poggi 2004) and iconographical documents showing the Riomaggiore area between 1818 and 1999, it has been possible to reconstruct the topographic structure of the system that connected the winter pasture areas of the coast with the Apennine summer pastures, analysing in the

<sup>37</sup> Until the first half of the century, in Riomaggiore, the sale/exchange of 'manure nights' was a customary practice. The 'nuit de fumure', (dialectal: *leà* or *levà*), until the mid-nineteenth century was the unit used in the measurement of animal manure transferred to the terraces overnight. The same practice, sharing surprisingly the same name, has been documented since the fifteenth century in the Maritime Alps and in the mountain part of Apennines to define the fertilization of small temporary fields in summer pastures.

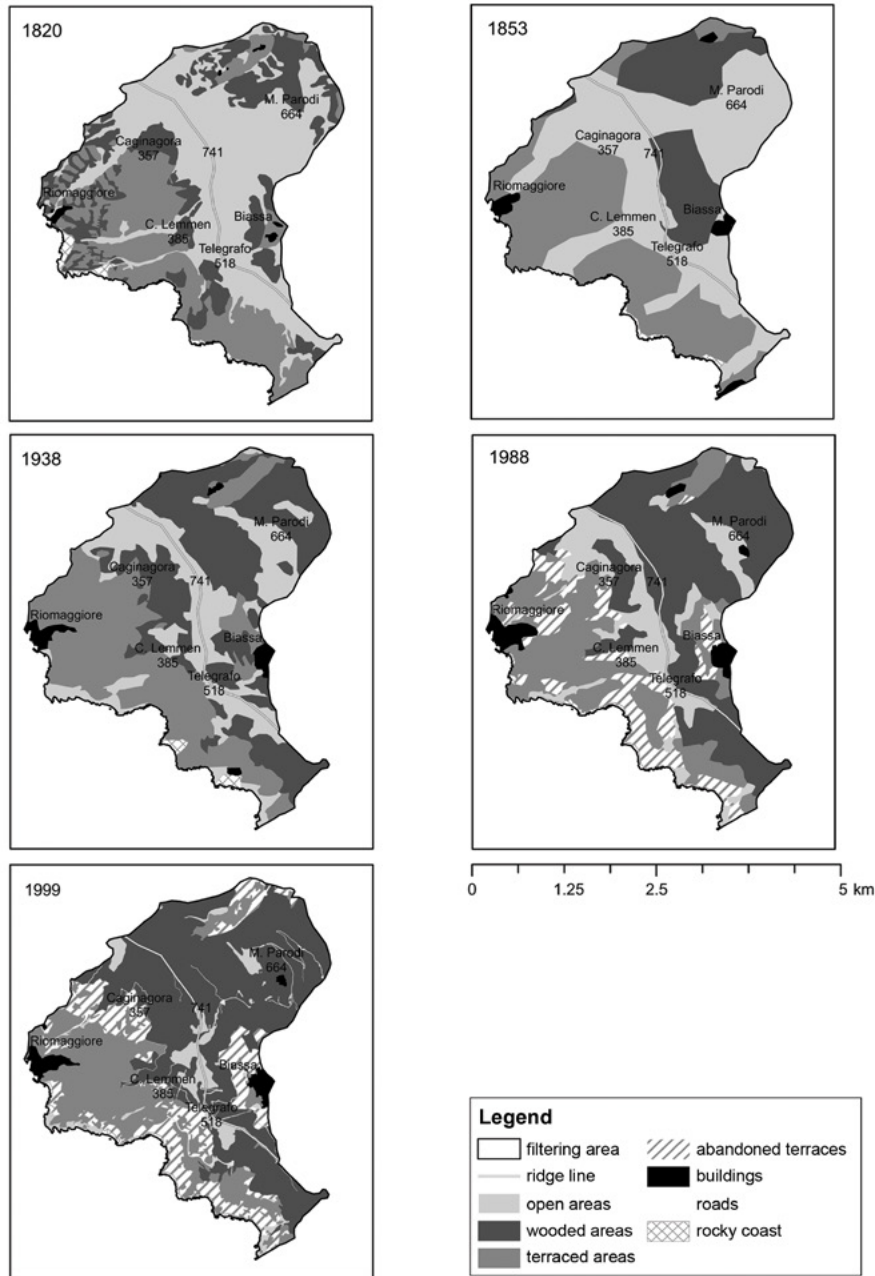


Figure 4.19. Riomaggiore, analysed area. Land use and vegetation cover dynamics (1820-1999) summary table (from Stagno 2011: 204, Figure 5 mod.). In order to compare the different maps, the categories used in the study of maps produced between 1818 and 1820 (open areas, wooded areas, areas with scattered trees, terraced areas and buildings) were used for the interpretation. The analysis of 1988 and 1999 maps allowed to point out post-cultural dynamics: abandoned terraces and newly formed woods (from Stagno & Molinari 2014).

cartographic representation the changes over two centuries of surfaces occupied by woods, meadows and pastures (Stagno 2010; Stagno & Molinari 2014).

While in 1818 we can see large open areas with limited scattered trees<sup>38</sup>, in the following maps the spaces devoted to woods, meadows and permanent pastures gradually decreased (as a possible trace of a change in the management of environmental resources from multiple practices to monoculture). The open corridors (especially on the ridges) functional to livestock accessing to coastal terraces, which are evident at the beginning of the nineteenth century, progressively narrowed, as a consequence of the abandonment of the coastal pastures. At the beginning of the twentieth century, the area specialized in

<sup>38</sup> In particular, in 1820 the transhumance system involved the flow of 4000 sheep limited to the upper land of Riomaggiore.

crop activities shows the increase in vineyards and terraced olive groves to the detriment of chestnut groves. However, such trend ended during the second half of the twentieth century when the process of abandoning the countryside in favour of overseas migration and in urban areas led to the formation of secondary woodlands on the previous terraced crops<sup>39</sup> or infilling the abandoned pastureland. Thus, the decline and definitive end of historical transhumance systems led to the contraction of 'herbaceous corridors', triggering different dynamics depending on the topographical conditions and previous historical land uses. The traces of these routes can still be identified today in the flora and vegetation of the Cinque Terre, and observable through the recognition of peculiar 'indicator species': a distribution that reflects the local history of resources activation, grazing systems and their dissimilar spatial and temporal dynamics. An example of these traces are the relict populations of good forage species characteristic of meadows-pastures, which today are incorporated in the Mediterranean scrub formations isolated in clearings or around rock outcrops (Cevasco, Montanari, Moreno 2015). Another example are the species of arid meadows, especially 'domesticated' spaces that coexist in historical crossroads areas (e.g. at the 'Telegrafo' site) thanks to the intermittent/occasional maintenance of open habitat conditions. More explicit traces, perhaps related to the history of goat grazing, are of course the garrigues and rocky environments, which, being subjected to much slower dynamics than the plant populations that occupy soils of a certain thickness, maintain ecological conditions suitable for the persistence of 'wreck' herbaceous populations (Maggi *et al.* 2006).

The management system centred on transhumance was a functional structure based on the use of pastures in collective lands as well as in individually occupied lands. In the last decades of the nineteenth century, the sheep transhumance system declined and so did the transfer of fertility through grazing. Land parcels are now fully managed in a private/communal regime. The insufficiency of vegetable fertilizer is underlined by several technical documents at the end of the century (Montanari, Guido & Moreno 2010).

The analysis of palynological, fiscal and cartographic sources and the historical ecology surveys conducted at Case Lemmen, in an area with terraced chestnut grove, have allowed identifying a rural landscape characterized at least between the mid-seventeenth century and the end of the eighteenth century by the presence of chestnut wood-pastures (then replaced by the fruit chestnut grove) next to the terraces with vineyards and other cultivations (Lasa 2003; Moreno *et al.* 2005; Moreno & Montanari 2008; Molinari 2010; Stagno & Molinari 2014; Molinari & Montanari 2018). The study of the tax sources available for the area had shown the rising importance of chestnut growing between the first half of the seventeenth and the end of the eighteenth century, when the area began to specialize in the mass production of wine. This last production will become increasingly relevant from the second half of the nineteenth century. Xylological analyses carried out in a rural building at Caginagora have confirmed the use of chestnut wood for beams, doors and boards for the floor such as silver fir.

The most ancient phase of the palynological diagram at Case Lemmen site (before the mid-twentieth century, see Molinari 2010; Molinari & Montanari 2018) is characterized by the clear prevalence of herbaceous species, accompanied by high percentages of chestnut pollen, thus indicating a rather open and grassy environment, interpretable as a winter grazed fruit chestnut grove. The discovery of some cereal pollen also indicates the probable presence of arable land around the sampled site. The subsequent phase of the pollen diagram, which dates back to the mid-twentieth century, is instead characterized by a marked increase in the pollen percentages of pine (*Pinus cf. pinaster*, maritime pine)

<sup>39</sup> Such 'renaturalization' of the slopes is characterized by the propagation of a plant cover promoted by wild fires and dominated by maritime pine and heather (*Erica arborea*) and the disappearing of the herbaceous and fodder resources. The post-cultural nature of this cover is intertwined with the conservation policies in the contemporary capitalization process of the entire Cinque Terre area, first through the establishment of the natural (regional and then national) Park and therefore of the UNESCO site designation. On the limits of this policy see Cevasco & Moreno 2015.



which, no longer contrasted by grazing in the woods, partially replaced the chestnut, and by an increase in the pollen of shrub species (especially *Erica*). Due to an impoverishment of the herbaceous plants, it is conceivable the presence of a different environment, characterized by a strong shrub component (especially *Ericaceae*), as the first sign of grazing abandonment. These shrubs formations, however, in the Cinque Terre and Punta Mesco area have been managed in continuity during the nineteenth century in the local viticultural and pastoral systems (Lasa 2003; Cevasco, Gabellieri, Pescini 2019). The last phase of the pollen diagram corresponds to the now complete abandonment of the site management, with the progressive decrease of the herbaceous species (due to the scarcity of light that can reach the undergrowth) which is accompanied by a further increase in coverage both arboreal (now dominated by maritime pine), and shrubby (always dominated by heather, *Erica arborea*, and no more by *Calluna*), together with low percentages of juniper and ivy, and characterized by the appearance of vine). This reconstruction is consistent with the results of the historical ecology studies relating to the farming spaces, as the (transhumant sheep) grazing was part of a system that operated on these slopes in the post-medieval age and up to the second half of the nineteenth century (Stagno & Molinari 2014).

During a recent research project<sup>40</sup> in the Cinque Terre National Park devoted to the restoration of an abandoned terraced farmland (Case Lovara) which today is owned by FAI (*Fondo Ambiente Italiano*, a national trust involved in the enhancement of historical monuments and sites), new environmental resource archaeology research has been performed.

A pollen diagram from a small coring near Case Lovara shows a similar decrease in herbaceous species, due to the abandonment of grazing practices (Figure 4.20). In fact, comparing 1) pollen results (dated between fifteenth and nineteenth century), 2) historical floristic surveys made by field botanists in the early twentieth century and 3) present vegetation stands, it has been possible to register the progressive disappearing of indicator species of the previous pastures (Cevasco, Montanari & Moreno 2015).

Moreover, comparing pollen and charcoal analysis (these last derived from charcoal hearth soil dated between fifteenth and twentieth century) with local oral sources, a peculiar multiple use of the woody resources (specifically pinewood) has been detected. Grazing activities were indeed integrated not only with vine, olive and chestnut cultivation but also with tree and shrub species selection for charcoal production. Actually, pine, which is abundant in pollen record increasing since almost fifteenth century, is not present in the anthracological record (mostly consisting of holm oak, heather and strawberry tree). The failure to use pine to produce charcoal was due, apart from its low value as charcoal, also to its use in vine cultivation and in breeding activities as revealed by interviews collected from the last tenant of Case Lovara. According to such oral sources, young pine trunks (6-8 years old) were used as poles for the vineyard while branches and needles collected from shredded pines were used as vegetal manure for vines and bedding. Several other local practices have taken place and have had effects on the ecology of plant cover; for example, the collection of needles on the pastureland ground allowed herbs growing under the pine tree, increasing the grazing value: an environmental resource completely disappeared from the present site ecology (Pescini, Montanari & Moreno 2018).

In the previous study of the sites of 'Case Lemmen' and 'Caginagora' it was shown how the isolated buildings on the terraces were used in modern times as pastoral buildings for the overnight stay of the flocks, before becoming (during the twentieth century) structures simply connected with the specialized cultivation of terraced vineyards, when the sheep and goat fertilization practices and the whole transhumance system had disappeared. Case Lovara site shows a similar history: while until the late twentieth century it was the tenant living house, in a tax documentation (*caratata* a descriptive cadastre) dated to 1662 there is mention of a single stable in this area. The change in land use is also revealed by different

<sup>40</sup> 5T.ERA Project, see <https://5tera.jimdo.free.com>

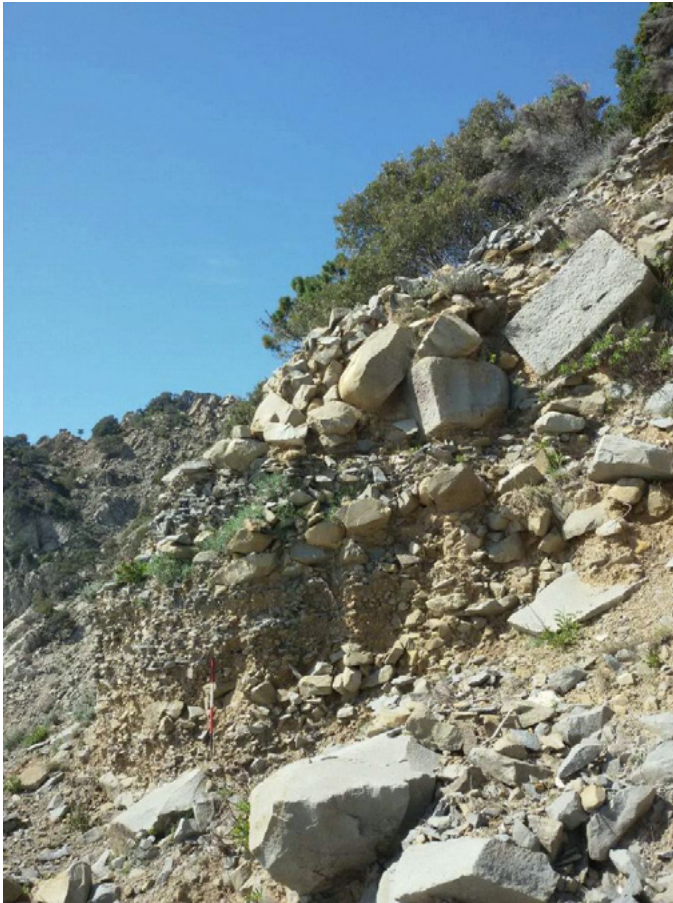


Figure 4.21. Exposed section of the sandstone landfill at Case Lovara site: stratified dump of stones with machining marks and scattered stone chippings interpreted as traces of sandstone extraction.

construction phases identified during the investigations of rural archaeology on the building during its refurbishment (in particular the wall stratigraphy and pottery found in the walls made it possible to establish a relative chronology, see Panetta & Pescini 2015).

At the beginning of the LASA research in the area of Case Lovara no archaeological site had been reported, however the archaeological survey has made it possible to identify and detail topographically many other structures and evidences of past environmental management (Panetta & Pescini 2015). In particular, traces of sandstone quarries have been documented (Figure 4.21): they consisted in both processing areas (e.g. areas with a dense concentration of stones, thick layers of stone chips and quarry fronts on the slope) and structures related to this activity (e.g. sandstone dry-wall buildings and truncated pyramid bases probably used as material loading platforms for the ropeways). Quarry activities were surely present from the second half of the nineteenth century until the 1960s as documented by archival official papers. However, such activities could have been operative in the previous period, when

the area was frequented as shown by stratigraphic features and late medieval – early modern pottery fragments (Gabellieri, Panetta & Pescini 2020).

With specific regard to the history of the terraces, the combined use of different methods of archaeological investigation (shovel test, sampling, survey, transects) allowed to define a detailed topography of terracing sequence, dating between the fifteenth and twentieth centuries. In particular, terraces located closest to the sea level seem to be prior to those near the Case Lovara building, as emerges by a comparative study of terracing typologies cross-compared with historical cartography and radiocarbon dating of charcoal kilns and archaeological stratigraphy (Gabellieri & Ruzzin 2015; Pescini, Montanari & Moreno 2018).

## Discussion

In the course of 25 years of research and teaching activities at LASA it has been possible not only to deepen the approaches to the different general contexts of analysis (mountain wetlands as biostratigraphic archives, woodland and ancient grassland archaeology, pastoral practices, etc.), but also to identify and reconstruct particular environmental resources management practices (charcoal production, grazing on terraces, use of controlled fire, temporary crops, wooded pasture, etc.) and to suggest some ecological, archaeological and archaeobotanical indicators.

As we tried to show through the implements offered by the *slope archaeology*, the historical ecology, the rural archaeology and therefore the ERA approach, it is possible to overcome the infertile dichotomy between man and nature that, in Italy, still dominates the history and archaeology of rural landscape (and approaches of rural planning and landscape design), by considering the specificities of the interactions between all the biotic and abiotic components of the environment (included humans) and their historical effects.

Thanks to this perspective, the research approaches presented in these pages allowed to reconstruct an original/unknown history of rural spaces and to re-contextualize in their historical dimension many evidences erroneously considered as the result of unimpeded environmental process: as the case of wetlands clearly showed. These small mountain peat-bogs that characterize the Ligurian Apennines have been for centuries (and in some cases millennia) used as watering pit for animal and, in some case, as wet meadows for hay production and hydraulic basin for irrigation systems<sup>41</sup>. In the last 30-40 years they are slowly and inexorably disappearing due to their infillment, as a consequence of the dismissal of all those management practices of their springs and emissaries (as well as the cleaning of the vegetation) that allowed their existence. An analogous thinking could be applied to the disappearing of many important herbaceous plant species, whose habitat – now invaded by shrubs and trees – was maintained thanks to specific practices of grazing, mowing, controlled fire, etc.

These few examples show as LASA researches have made clearly visible a historical object in many cases ignored: the historical processes linked to abandonment, not only related to the ecology of the mountain slopes, but also to the settlements, whose built heritage risks disappearing day-by-day, not only due to abandonment, but also due to the absence of protection procedures that take into account its historical dimension (Stagno 2018).

This observation is relevant in several respects. On the one hand, it is linked to the need to look at the process of marginalisation of European rural societies with a different, more analytical gaze, beyond the economic dimension and inevitability with which we have looked up to now, in order to address the historical processes in their complexity at the local scale (Stagno 2019; Stagno & Tigrino 2020) and reversing the telescope (from urban to rural) (Cevasco & Moreno 2020). On the other hand, it is a profoundly applicative perspective: the historical gaze makes it possible to question not only the approaches linked to a presumed possibility of renaturalisation by bringing to the centre the actors who have constructed the landscapes and by asking the question of what cultural and historical-environmental heritage we want to pass on to future generations (Moneta & Parola 2014; Stagno & Tigrino 2020), but also the perspective with which rural spaces are observed from the conservation point of view and through land-use maps. The strongly typological and aesthetic approach of protection mainly aims at preserving forms, without delving into ecological contents and functions from a historical perspective (Cevasco & Moreno 2015; Gardella & Stagno 2020; Gabellieri, Panetta & Pescini 2020; Gabellieri, Pescini & Tinterri 2020). At the same time, the observation of land use maps, with apparently neutral definitions, leads to the suppression of the emic and historical dimension and with it the landscapes, artefacts and green memories that still characterize rural spaces.

In particular, thanks to these investigations, the ERA approach allows to formulate proposals to promote the ‘re-empowerment’ of local actors (knowledges and skills) in the management of historical-environmental resources (Cevasco 2013; Gabellieri, Pescini & Tinterri 2020; Moneta & Parola 2014) and carry out projects applied to the historical characterization and management of individual rural landscapes and local agro-sylvo-pastoral products inside natural parks, SCI, etc. (Agnoletti 2010; Gabellieri, Panetta & Pescini 2020; Gabellieri & Pescini 2015; Moreno, Quaini & Traldi 2016). In this sense, ERA supports active enhancement by reactivation i.e. by proposing and experimenting the restoration of practices that have historically shaped landscapes and activated local resources (as, for example,

<sup>41</sup> See Maggi (2016) on the origin as a consequence of deforestation activities.

the experiments on local fire practices in the High Trebbia Valley to promote the biodiversity of the heathland habitat in the SIC Roccabruna (SCI IT331012) (Cevasco *et al.* 2015; Cevasco & Moreno 2015; Gabellieri, Pescini & Tinterri 2020; Moneta & Parola 2014).

In recent years, with various researches we have been analytically addressing also the nineteenth-twentieth century transformations, following the reforms promoted by modern administrative states in the context of their consolidation (among which stand out the prohibition of multiple uses and the process of suppression suffered by forms of collective and shared management of resources (Cevasco 2007; Moreno 1990; Moreno & Raggio 1992). The aim is to decipher, at the local level, both the environmental dynamics that led the spaces investigated to become what they are today, and the social and economic ones that too often have been studied separately (Stagno 2018; 2019).

Summarizing, from a methodological point of view the main features of ERA approach are the result of an interdisciplinary research framework, with a series of key topics and approaches shared by different disciplines, that can be listed as follows:

Basic assumptions:

1. the importance of interdisciplinary fieldwork;
2. combining present local naturalistic knowledge and outside (academic) knowledge;
3. equivalence (equipollence) of sources

Methods:

1. adopting a regressive method in the historical approach to the different sources;
2. producing high resolution studies on sedimentary evidence (pollen, charcoal, etc.);
3. producing high resolution sources, from a chronological and topographical point of view, crossing different documentary sequences;
4. cross-checking field evidences and contextualized textual and iconographical evidences;
5. identifying local indicator species with the historical ecology approach

Field techniques:

1. combining archaeological survey with vertical stratigraphy for the study of standing rural buildings (and ruins);
2. observation of the present vegetation cover with a historical perspective (anomalies included)
3. identification of sites to be sampled for archaeobotanical and geoarchaeological analyses

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# Archaeology of the agrarian landscapes in al-Andalus: new paths towards integrated interpretation

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## Summary

Based on the historiographical evolution of the archaeological study of the agricultural landscapes of al-Andalus, the main methodologies used in their study are analysed. The success of hydraulic archaeology, the main methodological trend, is evaluated, and new approaches are presented which focus on non-irrigated productive spaces or which are based on archaeobotanical laboratory analysis. A review of recent years in the archaeology of the Andalusi landscape confirms a change in trend and reinforces the idea that only a global and integrated analysis of the different productive spaces that make up the Andalusi rural world can offer historically relevant results. Finally, three current debates are detailed, as case studies representative of the historiographical trends on the subject at present.

## Keywords

Agriculture; al-Andalus; peasant; archaeology; landscape; rural.

## Introduction

The aim of this short paper<sup>2</sup> is to offer a synthesis of the debate on the agricultural landscapes of al-Andalus and the methodologies that have been used in their archaeological analysis, essentially with an audience outside the Spanish historiographical space in mind. Throughout the following pages, some trends are detailed and new orientations are traced that allow us to define recent changes in the way of understanding rural Andalusi archaeology. It should be noted that this text focuses on agrarian landscapes, although it inevitably addresses issues related to livestock and other productive spaces such as wetlands and saltworks: as will be understood at its conclusion, it is impossible to dissociate some productive areas from others in the study of historical agro-ecosystems, as they are all interrelated and can only be understood in a joint and integrated reading. Finally, it is worth remembering that the inescapable generalisation of any brief text sometimes prevents us from bringing to light the many shades and chiaroscuros of the Andalusi agrarian landscapes, which always resist being confined to global interpretations such as this one.

## The debate on the Andalusi peasantry and the archaeological study of its agriculture

The rural environment is the setting in which the great historiographical debate on the nature of Andalusi society has been represented since the origins of medieval archaeology in Spain, that which attempts to characterise the relations between rural communities and central power. Agricultural landscapes were presented as the perfect observatory in which to try to explain the transformations of Andalusi society and the processes of rural and even urban change. In an environment in which written

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documentation seemed to have reached its limit, archaeology, from the mid-1980s onwards, found the perfect setting in which to project its first long-range historical interpretations.

Most researchers agree that the great ethnic complexity and diversity that seems to have existed during the formation of al-Andalus, well represented in a great variety of forms of social organisation of rural spaces, was diluted in the context of the conflictive process of social homogenisation that led to the definitive imposition of the Islamic state around the 10th century, with the Caliphate's plenitude. The image of an al-Andalus densely populated by cohesive peasant communities organised around agriculture and livestock farming, controlled by the state through taxation in the context of a tributary system, is well established in historiography. Although the central question of the degree of autonomy of rural communities from the central power is still being discussed (García & Fábregas 2020), it seems beyond doubt that these peasant groups organised the territory through the juxtaposition of some spaces, highly interrelated with each other, which are usually classified into three main groups -fortified spaces, residential spaces and productive spaces- (Eiroa 2012, 54-57); articulated in 'networks of *alquerías*', a series of settlements -residential zones and work areas- connected by specifically designed roads (Barceló 2004, 22) that would share fortified spaces of refuge.

In the fields, irrigated areas played an essential role from the beginning of the new agriculture that was imposed after the Islamic conquest in the 8th century. It was the preferred and determining option in the organisation of agricultural production in al-Andalus. As we will recall later, irrigation was not the only productive strategy, but it does seem to have been the most relevant, due to its capacity to determine and condition the other uses of the countryside, such as dry farming and livestock, and, in any case, it is the most useful from an archaeological perspective, due to its perceptibility in the present time.

Today, the great change that agriculture underwent with the early medieval Islamic expansion seems beyond doubt, and this is clearly visible from the combination of written testimonies and archaeological data. Although irrigation was in use in the Iberian Peninsula since prehistoric times, inextricably linked to agricultural work that could not depend exclusively on the rainfall regime, its use was limited until the Islamic expansion, since in Roman and Visigothic times it only experienced a fairly limited development and was closely linked to specific crops and small plots of orchards (Serrano 2004; Vigil-Escalera 1999, and 2010). After 711, irrigation became progressively more widespread, until it became a defining feature of Islamic and, by extension, Andalusí agriculture. With it, a complex technology was deployed to search for, obtain, conduct and store water, in which different devices and procedures were used, most of which had been known since classical antiquity, but which now began to be used in combination, forming complex hydraulic systems that were notably adapted to the characteristics of each specific territory. The systematic and joint use of waterwheels, drainage galleries, *azudes*, *cigüeñales* or *acequias*, among other elements (Argemi *et al.* 1995), as well as the cultivation of a greater variety of products, allowed irrigation to be extended and the fields to be exploited to the maximum. Changes in land ownership also contributed to the development of irrigation; on the one hand, the system of division of inheritance characteristic of Islamic society must have prevented the creation of large estates and facilitated the fragmentation of existing ones, causing the gradual disappearance of extensive agriculture; on the other hand, the existence of different contractual formulas that guaranteed a proportional participation of the direct exploiters in the profits produced in other people's properties boosted the new system. Production increased thanks to the application of sophisticated, more intensive crop rotation systems, which allowed different harvests to be obtained throughout the agricultural year, by introducing a new annual summer harvest into the agricultural cycle (Esquilache 2021, 31).

All these changes have been interpreted as an 'authentic agricultural revolution' (García Sánchez 1995, 41) that developed in parallel to the process of mass dissemination in the West of oriental cultigens

and the increase in cultivated species (i.e. the introduction of new species, especially fruit trees, and more variety in the known species). The outlines of this process were emphasized by A.W. Watson forty years ago (Watson 1983) and have recently been corroborated (Squatriti 2014). It was a process of global agricultural change, didactically described by Watson (under the misleading term ‘revolution’), which would have brought its onset forward by two centuries: In contrast to the interpretation of Lucie Bolens, who, rewriting Wittfogel’s thesis (Retamero 2009), had placed the ‘green revolution’ promoted by the ‘rationalising’ impulse of the *Taifa* states in the 11th century (Bolens 1978), al-Andalus was presented as an early way of penetration and diffusion of Eastern geponic knowledge and the development of new intensive agricultural work techniques (Eiroa 2011a).

This whole process of global agricultural change has been much debated. Not only because it cannot be isolated from the traditional economic strategy of supply and demand, in which growing urban populations were forcing a significant increase in food production (Martínez Enamorado 2003, 111). The main criticisms insist on the terms, timing and scope of the change itself, from the fierce comments of Decker, trying to demolish Watson’s argumentative (and very narrative) edifice (Decker 2009, 191), to the global denial of the possibility of introducing sudden and far-reaching changes (the so-called ‘revolutions’) in Mediterranean pre-industrial agricultural practices by Horden and Purcell (2000), who recall the late, selective and not very generalised nature of the process, as well as its strong link to the state. Not surprisingly, there are several fragments in the Arabic sources that indicate that some Andalusí rulers received exotic plants that they acclimatised in botanical gardens and subsequently spread throughout the rest of the territory: for instance, al-Maqqarī’s and Ibn Ḥayyān’s references to the space for agricultural and botanical experimentation that ‘Abd al-Raḥmān I established in the vicinity of Córdoba, in the *almunia* of al-Ruṣāfa (Eiroa 2011a, 250); and also the late mentions of the garden of Sultan al-Mu’tamid in Seville (García Sánchez 1995); or the ‘botanical garden’ of the palatial complex of *al-Ṣumādihīya* in Almería (Lirola 2005, 29); and, most importantly, the testimony of acclimatization: ‘[*al-Safar*] manipulated his seeds and managed to plant them, feed them [with water and fertiliser] and transplant them until a tree emerged that bore fruit and [this, in turn] matured’) and the spread in the *alquería* of Casarabonela of an eastern variety of pomegranate brought from Syria by the Ḥimyarī Safar ibn ‘Ubayd Allāh al-Kalā’ī in the first half of the 8th century (Samsó 1982; Martínez Enamorado 2003, 115), the best testimony to date of the Andalusí ‘plant breeders’ (Fenoll & González Candelas 2010, 36).

However, it seems clear today that, despite the courtly image conveyed by the texts, which insist on the important task of the rulers and the agricultural experimentation centres created under their auspices, the introduction, acclimatisation and spread of the new species in al-Andalus and the extension of irrigation must have been a largely anonymous and unplanned process (Retamero 1998). Within the framework of a common commercial space, the process developed essentially thanks to the migration of peasant groups, the real architects of agricultural change with their precise, often locally circumscribed, textually imperceptible practices. Despite the late chronology suggested by the so-called Andalusí ‘agricultural books’, which are clearly normative and urban in nature, the process would have developed in the 8th and 9th centuries and would have culminated in the second half of the 10th century. This seems to be suggested by some absolute dates, such as those confirmed for the construction of the hydraulic system of Ricote (Murcia) (Puy & Balbo 2013) and some written testimonies, such as those that relate the passage of the territory of Malaga towards intensive agricultural activity, based on a product (the fig of Rayya) in an almost monoculture regime, in the early period (Martínez Enamorado 2003, 113).

The importance of irrigated agriculture did not mean the abandonment of dry farming, which had developed so much in ancient times and which must have been the most abundant. Evidence of a very different nature, ranging from archaeobotanical data to the regular presence of flour mills, not forgetting the existence of granaries of different types (collective, state, cliff, silos), allows us to affirm that cereal crops must have continued to be the main source of food in al-Andalus, as in any agrarian

society. When we use the term dry land, we are actually referring to agricultural spaces, with enormous variations, in which crops depend on the rainfall regime and, if only circumstantially, on some artificial irrigation, posing an interesting dichotomy between ‘controlled irrigation’ and ‘rainfall irrigation’ which has been rightly pointed out, since, in reality, there is no dry land agriculture possible in a strict sense (Retamero 2011, 32).

Rainfed areas, apparently simple in their management, imply, on the contrary, complex humidity regulation operations and form part of the integral design of the peasant production areas. Rainfed and irrigated land would coexist and integrate into a common landscape, in which the diversity and complementarity of crops would be the dominant feature. There has even been talk of a ‘promiscuous’ agriculture in which vineyards and fruit tree crops were mixed, both in dry and irrigated fields, as well as vegetables and, above all, irrigated or dry cereals (Esquilache 2021, 36, 40).

A landscape in which livestock farms also played an essential role (whose spaces cannot be dissociated from agricultural ones), which gradually acquired importance (García & Moreno 2018), as in any Mediterranean rural economy; the flexible livestock activity contributed to increasing the degree of diversification and intensification of agricultural production. Without forgetting the decisive role played by other productive spaces that are usually relegated to the background: saltworks, essential in the movement of herds and in the organisation of agricultural spaces; wetlands, reserves for livestock, selective areas for crops such as rice, harvesting areas for some vegetables and spaces for hunting and fishing; even forests, a source of raw materials and an essential ‘semi-agricultural’ space for gathering plants and fruits. Together, all these productive spaces, associated and interrelated, endowed the Andalusí agrosystem with an enormous variety and an extraordinary capacity for adaptation, strengthening the resilience of the peasant groups, who found the best strategy for reducing risk in the exploitation of the greatest possible number of ecological niches with the greatest possible number of agricultural products (Horden & Purcell 2000, 263).

### **Towards new methodological perspectives: from hydraulic archaeology to the archaeobotanical revolution**

The complex universe of Andalusí agricultural landscapes, with their many facets, has been the subject of numerous approaches in the field of archaeology, which have tried to understand their logic and explain their role in the social organisation of the territory. The first major methodological approach was based on the so-called ‘hydraulic archaeology’, with the analysis of irrigated spaces as a basis; possibly the reason is to be found in the enormous archaeological perceptibility of irrigated spaces, which leave palpable traces in the landscapes of the present, and not so much in their hegemonic and directing condition over the rest of the peasant productive strategies: in the same way that fortifications have dominated studies on Andalusí rural settlement due to their enormous archaeological perceptibility, hydraulic systems have dominated the debate on agricultural spaces. It was only after the widespread application of hydraulic archaeology in different territories of al-Andalus and its success that it began to be accompanied by other archaeological readings more focused on different productive strategies. In recent years, there has been an extraordinary development of archaeobotanical research in Spain, especially in laboratories, which seems destined to transform our vision of the discipline in rural areas; at the same time, there is a move towards an integrated analysis, which seems to contemplate all the possible variables among the productive strategies of the peasantry, and tries to analyse them together. A brief overview of these methodological approaches from the beginning will help us to understand the importance of the pioneers and the true dimension of the change that has begun (figure 5.1).

To Miquel Barceló we owe the most interesting theoretical-methodological proposal of the beginnings of modern medieval archaeology in Spain, the so-called ‘Hydraulic Archaeology’, which marked the



Figure 5.1. Location of archaeological sites mentioned in the text. Illustration: J.A. Eiroa

evolution of recent studies on agricultural landscapes in al-Andalus and which we will try to summarise in the following lines, without neglecting to mention the criticisms and nuances that have arisen.

According to Barceló, irrigation spread rapidly in the Iberian Peninsula after the conquest of 711 by peasant communities. Constituted in tribal groups, they knew precisely the limits of the ‘carrying capacity’ of the territory in which they settled; that is, the maximum theoretical size that the human group could reach without exceeding the critical productive limits of its ecological niche, in order to maintain stability with the environment (Eiroa 2014). The human settlement would have been structured in ‘networks of *alquerías*’. When these groups increased in size and exceeded the limits of irrigated agriculture in that space, they resorted to group segmentation: it was the only guarantee of survival, as demographic control was insufficient and technological innovation had clear limits. Given the rigidity and the scarce possibilities of expanding the hydraulic space, according to Barceló, the surplus population had to emigrate: ‘the rigidity of the hydraulic space once built (...) is perhaps one of the main factors that lead to the segmentation of the peasant group, that is, to the emigration of part of this group when the initially estimated subsistence horizon is unattainable given the rigidity of the space and population growth’<sup>3</sup> (Barceló 1995, 28). In this way, irrigation was progressively expanding with the segmented groups, who created irrigated spaces in the new territory, reproducing the models of the places of departure that they knew so well.

The first research carried out by Miquel Barceló in the 1980s on Andalusian irrigated spaces based on the theoretical assumptions summarised above led him to formulate and systematise a series of general

<sup>3</sup> In Spanish in the original text, this translation is my own.

principles of Andalusí hydraulics (Barceló 1989 and 1995). Hydraulic systems would be the result of a unitary conception and an initial closed and rigid design. Starting from gravity, the ‘foundational fact of all hydraulics’<sup>4</sup>, a process would be developed which would involve: the selection of the place in which to build the agricultural space, through criteria based on the observation of the relief and the hydrographical conditions; the collection of water; the determination of the volume of water to be displaced; the planning of the layout, the slope, the gradient and the volume of water to be displaced; the calculation of the precise extension and shape of the cultivation plots; the location of the mills and regulating reservoirs; the distribution of the water in the fields; and, finally, the reuse of the surplus. In this way, irrigated spaces would be configured, clearly delimited by the rigid line drawn by the main irrigation channel, with little possibility of being extended, which would determine the solution adopted in the face of excessive population growth: fission or segmentation.

From the first field research carried out in Mallorca, Granada and Ibiza, the so-called ‘Hydraulic Archaeology’ (Kirchner & Navarro 1993), a set of techniques and methods aimed at identifying hydraulic systems and reconstructing the characteristics of their original design, which was subsequently perfected (Glick & Kirchner 2000), took shape. It is based on a combination of sources (preserved or documented toponymy, medieval written documentation, aerial photography, etc.) in which data obtained through archaeological surface surveys play a major role. Although it can be considered a variety of ‘Spatial Archaeology’, of ‘Extensive Archaeology’ or of ‘Landscape Archaeology’, hydraulic archaeology is clearly original in that it focuses on the planimetric and functional reconstruction of the original Andalusí irrigated spaces: their structure, their possible modifications and, especially, their dimensions (Retamero 2006). The correct identification and analysis of the fundamental structure of the initial design of a hydraulic system would make it possible to identify the stages of growth and, in this way, to evaluate its agricultural yield and its population load (Barceló 1989, 25).

The ultimate aim of Hydraulic Archaeology was, from the outset, to study the spatial concreteness of the forms of settlement resulting from Berber and Arab migratory processes. Initially, single irrigation systems were studied as isolated cases (Barceló *et al.* 1989); later, research was oriented towards specific regions and the scientific strategy was successfully applied especially in the Balearic Islands (Barceló 2001; Sitjes 2006), and made it possible to trace the Yemeni groups that migrated to al-Andalus: the study of the hydraulic spaces linked to the Banū Ru’ayn, in the high mountain plains south of San’a (Barceló, Kirchner & Torró 2000) made it possible to verify that the migration of Berber groups did not imply the mimetic repetition of the hydraulic technical solutions practised in the place of origin (Barceló 2004).

However, some authors have openly disagreed with the interpretations that Miquel Barceló and his school have made of the Andalusí irrigated spaces. In general, the principles of the so-called ‘hydraulic archaeology’ and the link between the hydraulic spaces and the Andalusí peasant communities are accepted. On the other hand, the tribal substratum that underlies most of Barceló’s interpretations is openly questioned. Eduardo Manzano, in the framework of a broad explanatory proposal of the first centuries of al-Andalus in which the conquest of the 8th century is presented as the result of the thrust of ‘the armies of a centralised empire (...) in which rigid social hierarchies prevailed’<sup>5</sup>, believes that the tribal past of the Arab populations dissolved in the maelstrom of the conquest and that the role of the tribal Berber groups was always marginal; he was convinced that the tribal structures weakened rapidly with the passage of time and that their influence in the articulation of al-Andalus was practically nil (Manzano Moreno 2006, 18-19). From this point of view, the hypotheses derived from hydraulic archaeology lack general validity and the processes of the extension of irrigation, the technological

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<sup>4</sup> See footnote 3.

<sup>5</sup> See footnote 3.

development of water use and the spread of new crops must inevitably be linked to the actions of the State.

Other authors have also raised doubts about the reliability of the chronologies assigned to the Andalusí irrigated areas based on the methods and techniques of 'hydraulic archaeology' (Gutiérrez Lloret 1996, 321). And the debate continues on the large areas linked to the cities of the east and south-east of the Iberia, which for some authors are clear examples of state intervention; for example, for Vicente Salvatierra and Alberto Canto, the discovery of large irrigated perimeters around the city of Jaén allows us to determine the intervention of the political authorities that controlled the city in the 9th and 10th centuries and 'ratifies the apparent diversity of origins and that, therefore, the spread of irrigation must be related to the structure of Islamic society, including urbanisation, rather than to that of specific groups' (Salvatierra & Canto 2008, 151-152)<sup>6</sup>.

In the last decade, the study of irrigated spaces from the perspective of hydraulic archaeology, which seemed to have been relegated to the benefit of other studies, has been boosted once again, both from its more classical approaches (Sitjes 2014; Esquilache 2019) and from new perspectives more closely linked to the recovery and survival of Andalusí irrigation systems in the present (Martín Civantos 2018; Romero, Delgado & Martín Civantos 2019).

However, it is the study of dry land farming that is beginning to acquire historiographical prominence and, in the coming years, will lead the scientific debate, driven by laboratory work (much less conducive to the documentation of irrigated crops). In different Iberian territories, such as Extremadura, the *Altiplano* of Granada and Lleida, research has begun focusing on the analysis of arid or semi-arid spaces irrigated by rain (Brufal 2011).

Although it remains to be explained why rainfed spaces should not be considered as subordinate to irrigated ones, if the layout of the latter determines the former and maintenance activities establish hierarchies according to their rigidity, their intensity and their burden on the peasantry (Retamero 2011: 47), some authors have focused their analysis on recent research. This is the case of the interesting *alquerías* documented in the *Mancha Oriental*, such as La Graja (Albacete), which are being analysed as an example of a process of 'peasant colonisation of the dry land' that would have developed within the framework of the demographic growth and commercial expansion of the 11th century (Jiménez, Simón & Moreno 2021). These lands were less favourable or conducive to agriculture, in which livestock farming also played a fundamental role.

At the beginning of the 21st century, the balance of research on Andalusí livestock farming could be described as 'disheartening' (Cara 2009, 172), with a historiographical weight in no way equivalent to its importance in the peasant economy of al-Andalus, the last decade has meant a great advance in studies in this field. The delay in the incorporation of livestock farming into studies on peasant landscapes is explained by the enormous difficulty involved in its analysis: the characteristics of livestock farming practices, derived from their flexibility, diversity, trans-territorial perspective and their enormous integration with the natural environment, make it necessary to simultaneously analyse constructive traces (*majadas* or sheepfolds, *corrales* or corrals, fountains, *abrevaderos* or drinking troughs, cisterns), which are therefore tangible, and other toponymic or landscape traces (livestock tracks, pastures, meadows, *descansaderos* or resting places), which are difficult to trace (Cara 2009, 175-176). However, in the last decade, livestock farming, which has some advantage in its study (the rigidity or immobility of the cattle routes, solidly attached to the associated elements) has acquired historiographical relevance, especially thanks to the research projects developed from the University of Granada (Malpica *et al.* 2015;

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<sup>6</sup> See footnote 3.

Villar 2013; Villar & García, 2017; García & Moreno 2018); in connection with the study of saltworks (García-Contreras 2016 and 2021) and wetlands (Arias 2018a and 2018b; Malpica & García-Contreras 2019), confirming the orientation of one of the main Spanish research groups on medieval rural archaeology towards the field of peasant productive spaces rather than agricultural ones.

An overall analysis of recent historiography allows us to affirm that the shift, in one case partially and in another case totally, of the two main Spanish research teams on Andalusi productive spaces (those of the Universitat Autònoma de Barcelona (UAB) and Universidad de Granada (UGR)) towards productive activities rather than irrigated agriculture (dry farming, livestock farming, wetlands or saltworks), but directly connected to it, allows us to draw two clear conclusions, one of a historiographical nature and the other of a purely historical nature:

- On the one hand, the maturity of a sub-discipline, the archaeology of Andalusi landscapes, which is already capable of making the leap from the study of the most archaeologically perceptible elements, the irrigation systems, to the study of the most imperceptible productive spaces, such as wetlands or livestock areas, which have barely left traces in the present.
- On the other hand, and this is the most relevant aspect, the integration of all the peasant productive activities among themselves, in a framework of balance and interdependence, which makes it necessary to analyse them all as a whole and interrelated, from an integral perspective, if we want to have accurate knowledge of the rural society of al-Andalus. Only an organic and ecological consideration of the set of motives and interests that determine the processes of peasant work will allow us to understand its agrarian system (García & Moreno 2018, 7).

Bearing in mind this last statement, the need for a comprehensive study of all productive spaces, regardless of their characteristics, in recent years a new integrative methodology has been advocated. A new interpretation of all available sources is required from the field of agrarian archaeology and in which laboratory research takes on a priority role. It seems necessary to change research strategies and increase the sources of information, on the road towards a new agrarian archaeology, as it was called a decade ago (Ballesteros *et al.* 2010). It is essential to continue defining plots and their relationship with settlements, but it also seems inevitable to begin to clearly date these agricultural spaces, defining their formation processes, and incorporating all the possibilities offered by archaeobotany. With regard to the first question, archaeogeological studies of irrigated terraces and unirrigated spaces only now seem to have begun, with no published results as yet, in different parts of the Iberian Peninsula; geoarchaeology is destined to occupy a major place in the process of gaining knowledge of the Andalusi peasantry. In relation to the second question, the last decade has seen a multiplication of studies that bring to light carpological and anthracological data on the numerous plant species documented in the excavations of Andalusi sites such as Albalat, Las Sillas, Tortosa, Lleida or Balaguer (Kirchner, Virgili & Antolín 2014; Alonso, Antolín & Kirchner, 2014; Esquilache 2021, 40-41; Ros *et al.* 2018) and others that we are aware of thanks to two excellent recent publications of analysis and updates on an Iberian scale (Peña-Chocarro *et al.* 2019; Ros *et al.* 2019). Although the picture is still quite deficient compared to other periods (Peña-Chocarro & Pérez-Jordá 2018, 23-26), everything will change in the coming years, when the true potential of carpology or anthracology, to clarify key aspects of the debate on cultivation and the different strategies for exploiting the environment, on the pressure of markets and their influence on the definition of peasant economic lines, is discovered. Even if the archaeobotanical disciplines are being renewed by new genetic and isotopic analyses, their role is destined to be transcendental, even without involving new methodologies. Agrarian archaeology, simply conceived as the compendium of techniques linked to the recovery, in the process of excavation, of plant and animal micro or macro-remains and their subsequent analysis (Kirchner 2020, 65) marks a clear line of potential evolution for the study of agricultural landscapes in al-Andalus. However, it should be remembered that aerial photo-

interpretation, morphological analysis of plots or the excavation of associated residential spaces will continue to be essential

### Open debates

In the heterogeneous panorama of the Andalusi rural space, it is possible to identify some specific areas of research which, in recent years, have been the subject of special interest. In this section we would like to highlight the dynamism of the studies on Andalusi agricultural landscapes by highlighting two recurring themes, which are the subject of new interpretations; and a new subject of study, the granaries, which in the coming years will acquire, in our opinion, a special relevance due to their capacity to open new paths for research.

#### *Large urban huertas and the debate on their origins and evolution*

The large irrigated spaces associated with the Andalusi *medinas* have been the subject of active debate since the origins of medieval archaeology in Spain, since the development of the 'suburban agricultural belts' (Manzano Moreno 1986, 618) seemed to hold the key to explaining the processes of the formation and evolution of the cities.

While a good part of the researchers who were capable of unravelling the complex structure of the irrigation systems dependent on rural settlements claimed that the large urban *huertas* were indecipherable, another group of scholars, much more traditionalist, interpreted them as classical inheritances; when dealing with the configuration and implementation of the large *huertas* in the South and East of the Iberian peninsula, the traditional historiography did not hesitate to assign them an ancient origin, within the framework of the imagined generalisation of Roman irrigation. Butzer and his team, on the basis of a series of archaeological analyses carried out in the Castellón region, did not hesitate to assign Muslim origins to the mesoscale irrigation associated with the mountain localities supplied by springs, but insisted on the evidence of Roman irrigation that could be found, in their opinion, in the case of the large irrigation systems of the great flood plains: for them there was insufficient information available to deduce either a classical continuity or an Islamic reintroduction (Butzer *et al.* 1985). Thus, a nineteenth-century discussion that is sterile when it is not articulated in terms of cultural continuity or discontinuity was artificially prolonged (Glick 2007, 103).

In recent years, the debate on the supposedly Roman nature of the complex hydraulic systems of the large periurban fertile plains has progressively closed, but there is still a very active scientific discussion on the process of formation of these large hydraulic systems, their promoters and their sustainers.

The most relevant studies have taken place around the *huerta* of Valencia. The research work carried out by Ferrán Esquilache constitutes an enormous advance in the knowledge of the large peri-urban irrigation systems (Esquilache 2018). This research combines the simultaneous use of archaeological and written sources, with great emphasis on hydraulic archaeology, and has confirmed that the great Valencian *huerta* is not the result of a planning process as a whole, emanating from the State or from commercial or urban interests. Esquilache's work has defined a large Andalusi *huerta* for the early centuries (which would be greatly modified from the 10th century onwards) with almost a hundred small hydraulic spaces (of 14 ha on average), independent and separate from each other. He considers that these small hydraulic spaces are a clear consequence of the Andalusi social structure and the basis of the work of peasant groups organised in rural communities with high levels of political and social autonomy. Perhaps the most interesting aspect of this monograph is that it equates the principles that governed the small Andalusi hydraulic spaces of a large periurban fluvial *huerta* with the principles of the small hydraulic spaces of a mountain slope or a valley floor.



Figure 5.2. Schematic map of the complex macro-system of the huerta of Murcia. Illustration: J.A. Eiroa

For other authors, however, the problem of the large *huertas* remains unresolved. In Jaén, for example, Vicente Salvatierra and Mercedes Navarro have defined a very different process, in which the reorganisation of the periurban agricultural area and the creation of its new irrigation circuits, in the second half of the 8th or early 9th century, took place not only through the self-organisation of the owners but also through the action of the State. In their analysis they insist on the enormous difficulties of analysing hydraulic spaces continuously modified up to the present day and on the difficulty of conceiving the creation of the great hydraulic systems linked to the cities simply by agreements between the peasants concerned (Salvatierra & Navarro 2016, 413).

In the case of Murcia (Figure 5.2), the large peri-urban *huerta* (Molina & Eiroa 2018, 83-93) surrounding the city founded in the ninth century is still awaiting a comprehensive archaeological analysis: despite the fact that most of the written documentation, both Arabic (Carmona & Pocklington 2008) and late medieval Castilian (Martínez 2006 and 2010; Martínez, Molina & Abellán 2019) has been carefully published, no systematic field study has been carried out that would allow us to trace a chronological evolution as has been done in the cases of Valencia or, more recently, Orihuela (Parra 2019). The excavation carried out at the site of Senda de Granada, a few kilometres from the capital (García & Cerdá 2007) discovered, above the archaeological levels corresponding to a Roman factory (an oil mill from the 4th and 5th centuries), different elements of an Andalusí hydraulic system that has been clearly dated to the 10th and 11th centuries through the chronotypology of some of the waterwheel *arcaduces* found (see, e.g., Bazzana & Montmessin 2006, 264-66); and which runs over the late-antique levels of the industrial factory, previously depreciated under a level of clayey sediments in which the irrigation channel was excavated. The pre-Arabic origin of this very central sector of the *huerta* of Murcia has been ruled out and the absurd debate about the Roman origin of its peri-urban irrigation systems can be closed. But it is still awaiting a comprehensive archaeological analysis, like the one carried out in Valencia, in order to understand its formation and evolution.

*The hydraulic systems of the most peripheral rural areas*

The archaeological study of the hydraulic systems furthest from urban areas has proved to be one of the few ways of penetrating the evolution of rural communities. This knowledge is, if possible, even more essential in the arid areas of the southeast of al-Andalus, in the provinces of Murcia and Almería.

The knowledge of the ditches, *azarbes*, *azudes*, water wheels and other structures for storage, and channelling of water for irrigation, as well as the design of irrigated medieval spaces acquire special importance in southeastern al-Andalus because in a context of permanent water deficit, with rapid development of intensive meadows and orchards, the system's survival depended on the socio-economic infrastructure equipment.

As we have seen, we understand well the big macro-systems associated with the cities, as in the case of the *huerta* of Orihuela or Valencia, which has been well defined by the archaeological and documentaries studies to make them models of the high complexity that can achieve these large hydraulic systems. But only in recent years, thanks to hydraulic archaeological studies, we have begun to know the characteristics of small irrigation systems connected to the minor settlements, the '*alquerías*' of the invisible Andalusí rural space (Glick & Kirchner 2000; Sitjes 2006).

Hydraulic systems associated with residential areas were operating from a very early date in southeastern al-Andalus. For example, in a text of the eleventh century of al-Bakri, it said that the Segura 'is a river that squeezed the mountains in a place known as Ricote so there the men can stop its flow' and it mentioned

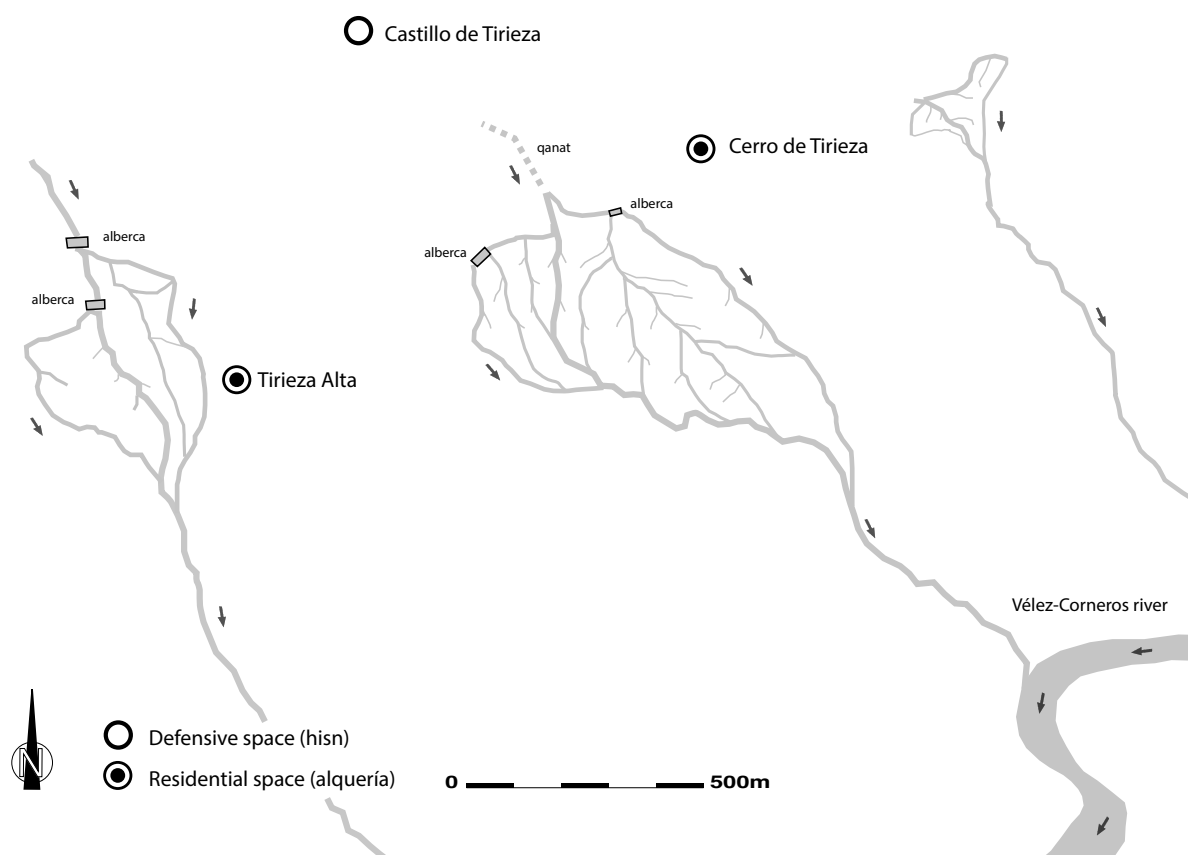


Figure 5.3. Schematic drawing of the rural hydraulic systems of Tirieza (Murcia). Illustration: J.A. Eiroa

the dam that stored water used for irrigation of the valley that is located right at the foot of the Ricote Castle (Eiroa 2015). Throughout the valley a series of hydraulic structures were deployed that caught the attention of the castilians after the conquest, who said that ‘it seems incredible and impossible for the ingenuity of man’. The structures will be merged with the fields forming a succession of middle hydraulic valley bottom systems, with the capture by diversion from the river and dam (the case of Ojos) that has not suffered too many changes in recent years (Bazzana, De Meulemeester & Montmessin 2002).

A good example of small rural irrigated systems is documented at the foot of the fortified site of Tirieza, in Murcia (Eiroa 2009). The chronology of the settlements placed its construction in the eleventh century, when we have knowledge of the building of the fortification of Tirieza by the peasant communities that lived in two sites (*El Cerro de Tirieza* and *Tirieza Alta*), located at the foot of the castle but on the growing area (Figure 5.3). The original irrigated area, which possibly remained in use until the fifteenth century, was divided into three independent hydraulic systems with the uptake of the water on the slope, of varying sizes (23, 17 and 7.5 ha approximately), located at foot of the castle and beneath the residential areas. These systems (Eiroa 2010), in which we can identify the original perimeter (roughly coinciding with the appearance that reflects the aerial photographs of 1956), had a complex technical infrastructure, highlighting the interesting building elements as regulatory reservoirs or *qanats* (draining galleries with luminaries).

Although most of the main elements of the social organisation of the rural space (fortification, residential spaces and irrigated fields) have been identified, it will not be possible to understand this specific agrarian landscape until the remaining productive spaces (livestock, dry land, wetlands, forest) are identified to allow a comprehensive reading of the whole system. This task is still pending, given the difficulty of identifying these spaces which, in the absence of written information, are almost imperceptible.

### ***Peasant granaries as a decisive element in the study of Andalusí landscapes***

In recent years, the identification of peasant granaries has opened new doors in the investigation of rural landscapes and their management by the inhabitants of the *alquerías*. Various studies, which have their origins in pioneering research in the 1980s, have identified collective storage structures built as fortified buildings or dug into the cliffs, which have many similarities with North African examples.

On the one hand, there is very solid evidence for the existence of fortified granaries in al-Andalus, with several case studies. The buildings called ‘*Agadir*’ (Adam 1985) or collective fortified granaries are numerous in the southwest of Morocco, between the western part of the High-Atlas and the limits of the Sahara. Some are in ruins, but others have survived very well, as they have been in use until very recently (Onrubia *et al.* 2006). These structures were fortified granaries where a whole group (tribe, faction or clan) kept the proceeds of their crops. This does not mean that the individual ownership was abolished. Every family had in the *agadir* its own granary where it deposited the grain of its harvest and had control of its cell. It is, therefore, juxtaposed individual small granaries that are collected and protected within a single fortification.

In al-Andalus such structures are becoming better known, especially after the discovery of the fortified granary of *El Cabezo de la Cobertera* (De Meulemeester & Matthys, 2005; De Meulemeester 1998 and 2005). This is a site excavated in its entirety between 1988 and 1990 by a Franco-Belgian team, located in the heart of the Ricote Valley (Murcia). In this building, almost a fortress (a place of difficult access protected by a defensive compound) the inhabitants of the valley store their crops and other products. It’s made up of a series of homogeneous compartments overlapping, aligned around a corridor of distribution and circulation inside and that can only be reached through the existing single access (Figure 5.4). In these

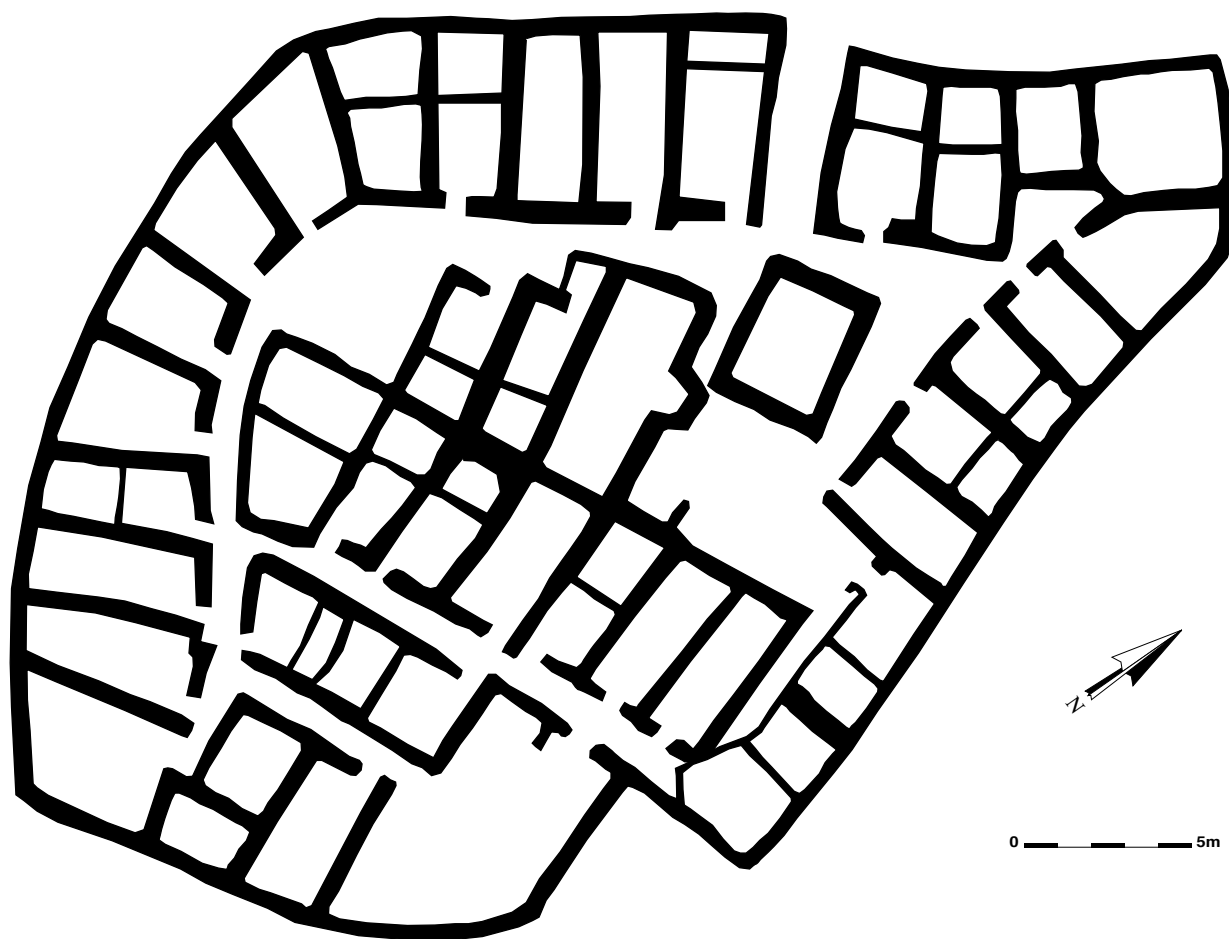


Figure 5.4. Plan of the fortified granary of El Cabezo de la Cobertera (Murcia). Illustration: J.A. Eiroa, after Meulemeester & Matthys 1995.

individual boxes, each belonging to a family, the group protects their possessions in a collective manner. About this granary, only the final period of occupation is known (XII-XIII centuries) and could be the result of the reaction of a rural community to the insecure times of the late Almohad period.

Now we know the Cabezo de la Cobertera is not a rare exception. From the decisive work of El Cabezo de la Cobertera, many researchers have begun to identify fortified granaries in other parts of the Iberian Peninsula, as in Almizra or in Castalla (Alicante) (Torró & Segura 2000). After the study of archaeological evidence in Southeastern al-Andalus we can suggest that some of the fortified sites that have a typology too compartmentalized and without apparent parallel should be interpreted as fortified granaries, such as the case of Puentes (Murcia), Bacares (Almería) or Nogalte (Murcia) (Eiroa 2011b). However, in no site is the typology as clear as in the case of Cabezo de la Cobertera, so we can interpret them as fortifications that reserve a sector of the building complex for the function of a communal granary.

The presence of such structures would be quite consistent with some Arabic medieval texts about al-Andalus, such as the known text of al-Qazwīnī that says that in the region the grain could keep in silos unaltered for fifty years (Carmona & Pocklington 2008, 26). The problem in identifying the presence of fortified granaries in al-Andalus is that there is no clear agreement on its characteristics. The few attempts to specify the characteristics that have been published focus on aspects too obvious to serve

as elements of differentiation (the construction of cells against the walls, for example). However, the presence/absence of hearths, the dimensions of the cells or the narrow doors not facing each other and high thresholds could be archaeological indicators.

Either way, the role of the fortified granaries seems to be therefore crucial to understanding the ‘dialogue’ between areas of residence and agriculture spaces in al-Andalus.

On the other hand, several cases of cliff granaries, similar to the North African *greniers de falaise*, have also been identified in Spain. The work of Maryelle Bertrand in the Granada region of Guadix and that of Agustí Ribera in the mountains of Alicante has made it possible to define several micro-regions in which cave granaries would have been common in the Andalusí period: in the NW region of Valencia, such as the *coves finestra* of the river Chelva (Ribera 2010); in the Alcoi/Bocairent area, of which the Covetes dels Moros de Bocairent are the best example (González Simancas 2008); in the Almería/Granada region, especially the caves of the lower and middle Andarax and Guadix (Cara & Rodríguez 1987; Bertrand 2000); as well as in other geographical nuclei, still poorly defined, in Huesca, Teruel, Madrid and La Rioja (an extraordinary overview on an Iberian scale can be found in Ribera 2016). The historiographical debate has focused on defining its chronology, the North African origin of the model and its link to the Berber cultural baggage, a question which is still under discussion. However, very few sites of this type have been analysed within the framework of broader studies that attempt to explain the presence of



Figure 5.5. Granary caves of Hoya Mora (Lorca, Murcia). Illustration: J.G. Gómez Carrasco- Universidad de Murcia.

cave granaries in relation to the rural settlements or areas of residence with which they are associated and the immediate territory of exploitation.

With this intention in mind, the University of Murcia has carried out a study of the granary-cave complex of the Luchena River (Figure 5.5). In the highlands of the municipality of Lorca (Murcia, Spain), on the banks of that river, lies the Andalusi *alquería* of Hoya Mora. It was identified in the 1980s and hardly any information was known about it. In 2016, a systematic surface survey of the site and its immediate surroundings was carried out, which made it possible to define the extent of the settlement and its chronology. The archaeological work identified eight granary caves and five silos associated with this rural settlement, all of which were the subject of several surveys to date them and to obtain archaeobiological samples. Both the settlement, the *alquería*, and the caves-barns were dated, based on the ceramic remains, to the 12th and 13th centuries, being abandoned at an imprecise moment in the decades after the Castilian conquest of the area, at the end of the 13th century or beginning of the 14th century. The caves preserved hardly any remains of grain inside them, but the remains found (archaeobotanical remnants of textile containers), as well as their interior structure (fittings in the main rooms) and their construction characteristics (especially their inaccessibility), confirmed that they were artificial caves excavated and adapted in the vicinity of the *alquería* and close to the exploited fields, with the intention of housing and safeguarding the grain reserves and other products of the Andalusi peasant communities. This was in line with other storage formulas, such as individual or family silos, which were used during the same period and by the same peasant groups; always in direct relation to the need to safeguard reserves for years of bad harvests and, very likely, with the conservation of the surplus necessary for the payment of taxes to the state.

## Conclusion

This brief review of research on the agricultural landscapes of al-Andalus reveals, firstly, that there are many unresolved questions about the agricultural change that took place after 711 and its implications. Secondly, it makes it clear that there has been an important methodological evolution in recent years: from the decisive study of irrigated spaces (the most archaeologically perceptible), mainly from the methodological assumptions of the so-called ‘Hydraulic Archaeology’, we have moved on to the analysis of the other productive spaces that form part of the Andalusi agrarian system: dry land, livestock, wetlands and saltworks. In this context, archaeobotanical laboratory studies have progressively acquired enormous importance and are set to play a key role in the future.

In terms of topics, there is a clear need to continue to make progress on the major pending questions such as the origin and evolution of the large irrigation systems associated with cities or the interrelationship between the different spaces that make up the complex ecological reality of rural landscapes. At the same time, new paths need to be explored, such as that represented by the archaeological analysis of agricultural storage spaces, peasant granaries, in their different varieties (fortified collective granaries, cave granaries, silo fields), and state granaries (which have yet to be correctly identified).

However, the most relevant conclusion of this general overview of the recent historiography of studies on rural al-Andalus is that peasant landscapes can only be studied in a comprehensive and integrated manner, taking into account the whole diversity of productive spaces, their relationship with each other, and their relationship between productive spaces and settlements. Otherwise, a real understanding of Andalusi rural society will not be achieved. Studying only irrigated agriculture or livestock farming, no matter how much information they provide, will not offer decisive results: it is necessary to explore all the strategies for making use of the environment as a whole; this is the only possible way to achieve a real understanding of the Andalusi agro-ecosystems.

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# Archaeology of forest and mountainous areas: The Zigoitia Research Project (Basque Country)

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## Summary

In this paper we explain an archaeological project which has been developed over several years in a woodland and mountain setting in the municipality of Zigoitia (Álava, Basque Country). Based on the theoretical foundations of Landscape Archaeology and Community Archaeology, there will be an explanation of the methodological strategies employed in this very specific environment, which are conditioned by the complex relief, the very characteristics of the material record and the scarcity of previous bibliographical references. All of this leads us to propose a definition of Forest Archaeological Heritage in order to encompass a wide heterogeneous series of elements that, nevertheless, share certain common features. Amongst them is the fact of constituting material qualities that have been little used in archaeological research and more geared towards ethnographic works. There is also the fact of their absence from patrimonial protection and conservation catalogues, which is why they are in serious risk of disappearing. The identification, characterisation and analysis of more than 1000 significant elements will help us to interpret the occupation patterns of historical rural communities outside their population nuclei, in detached spaces in which forest, livestock, hydraulic, mining uses, and so on predominated, leading to planning, appropriation, exploitation and, in general, a particular form of living in and perceiving the domesticated territory.

## Keywords

Landscape Archaeology; Community Archaeology; visual surface survey; forest heritage; patrimonialization.

## Introduction

The Forest Archaeology research project in Zigoitia is an amalgam of different activities carried out between 2014 and 2020 which have converged in one common objective: an understanding of the historical landscape of Zigoitia (Álava, Basque Country) through the identification, characterisation, interpretation and socialisation of the material evidence preserved to date. In the last six years there has been a combination of systematic surface explorations, excavations on significant elements, palaeoenvironmental samplings, the inventory of new cultural resources, an analysis of written, toponymic and topographic documentation and the compilation of the oral memory of the local population. Indeed, it is still an unfinished project, with profound implications for the patrimonialization of the knowledge acquired in particular and of the very conception of Patrimony (Common Good) in general, which advances at the pace set by the economic resources available, the support of the appropriate public administrations and the involvement of the inhabitants of the municipality.

It is an ambitious proposal whose main characteristics are: the large surface area on which the activity has been carried out (10,242 hectares), demarcated politically and administratively by the municipal

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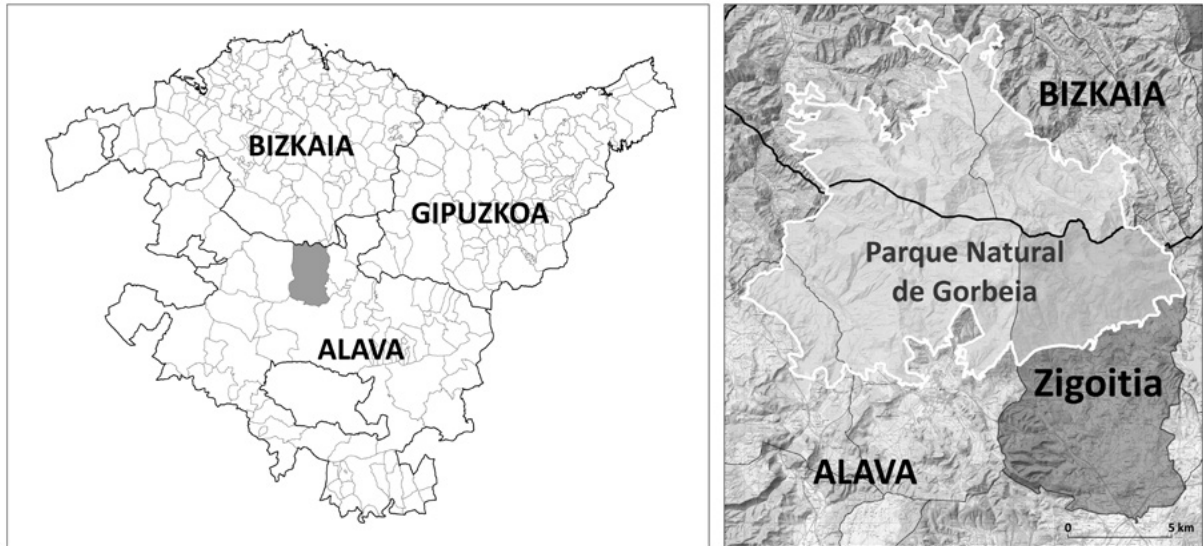


Figure 6.1. Location map of the municipality of Zigoitia in the Basque Country. Geographical relationship of Zigoitia to the Gorbeia Natural Park.

boundaries of Zigoitia; an area of complex orography and a markedly mountainous and wooded nature, especially in the Northern third of the municipality, which determines the nature of the archaeological record and also the research strategies; part of the area of study (some 3700 hectares, precisely the above-mentioned northern part) is in the Gorbeia Natural Park, a large territory protected from the natural point of view which includes five municipalities (Areatza, Orozko, Zeanuri, Zigoitia and Zuia) in two different provinces (Araba and Bizkaia); the protagonism of the local community, channelled to a large extent through the Abadelaueta Ethnographic Association, as the first element in charge of the construction, modification and conservation of the cultural landscape; the economic support of local and provincial cultural institutions, in contrast to the complete lack of involvement of those bodies which administer the natural patrimony, which shows clearly that, still, the existence of a legislation referring to the Landscape does not mean in practice an overlapping of the natural and cultural aspects at the level of political management.

### Theoretical perspectives and references of the research

Traditionally, archaeology has avoided wooded sites on winding relief. On the contrary, mountain spaces have always been much appreciated by society, and at present many of them have been incorporated into protective settings from the natural point of view, becoming reservoirs for leisure and enjoyment by a mostly urban population keen to have some contact with spaces far from the noise of cement. This has generated some idealised experiential woodland and mountain dynamics that are far removed from the historical reality, in which the biotic component has been strengthened in the face of the atrophy that until now has had its anthropic and cultural component, not because it does not exist but because of a lack of attention and study that, unfortunately in our opinion, has led to monolithic management policies almost exclusively focused on nature (Agnolletti 2013; Cevalco & Moreno 2013; Martínez & Rodríguez 2019).

And that is what we call for by means of this text, the importance of that sociocultural component and the enormous possibilities offered by its systematic integrated study in order to detect and interpret

material evidence of the past that, in many cases, appears subtly, although taken as a whole it is significant in shaping the current territory and landscape (Ingold 2000).

Fortunately, these spaces have been consolidated in recent decades as a new niche for archaeological research (e.g. Cavaciocchi 1996; Rendu 2003; Dupouey *et al.* 2007; Galop & Catto 2014; Chavarría Arnau & Reynolds 2015; Collis *et al.* 2016; Svensson & Costello 2018). In the Basque Country, barely 10 years ago, these activities were already beginning to be seen as a clear trend in archaeological production, such as for example so-called *pastoral archaeology* (Solaun *et al.* 2009; Sarasola & Moraza 2011). A longer tendency in Araba-Álava, dating from the mid-1980s in systematic fashion (Palacios 1998, 2002 & 2003; Palacios & Rodríguez 2004, 2008 & 2009) have been the numerous inventories organised by districts that have been collected within a *smaller patrimony* (mills, ironworks, bridges, springs, laundries, intersections, beehives, ice houses, tile kilns, limekilns, etc.) which in previous times was not registered in the archaeological or historical-architectural catalogues of the public administration, mainly for being considered closer to an ethnographic focus lacking historical depth rather than the archaeological vision, by diachronic definition. These *smaller elements* present, as we will see, a very clear thematic confluence with the forest archaeological patrimony that we present in this text, with the difference that the former are located in rural environments with more of an agricultural vocation, that is, at the heads of valleys that precede the forested zones of the high mountains. Little by little, these inventories are beginning to form the foundation for more ambitious studies on understanding and patrimonialization which highlight the importance of these productive centres that are characteristic of the pre- and post-capitalist societies between the sixteenth and nineteenth centuries (Rodríguez Fernández 2020).

Paradoxically, the research projects closest to Zigoitia have been carried out, during the last two decades, in places which have made up or have ended up currently forming part of Protected Natural Spaces, where good preservation of the type of evidence sought has augured well. In fact, they are scattered around the south-eastern quadrant of the Autonomous Community of the Basque Country. The motives for such projects have been varied, but one can synthesise them into some interrelated central ideas. The historical development has led to more communally managed forest areas in the southern half of the region, whilst the compartmentalisation of property in private hands, the result to a great extent of the consolidation of industrialisation, triggered from the early twentieth century on a repopulation, in an almost mono-cultivation way, of *Pinus radiata* in Gipuzkoa and Bizkaia. On the contrary, in the far South of these two provinces and in Araba (especially in its eastern half) important autochthonous (Marcescent deciduous) forested areas have been preserved in a biogeographic context of transition although predominantly Eurosiberian. Typically, extensive research linked to recent prehistory had moreover been carried out in these places, in line with the tendencies and pathologies of the archaeological discipline to date.

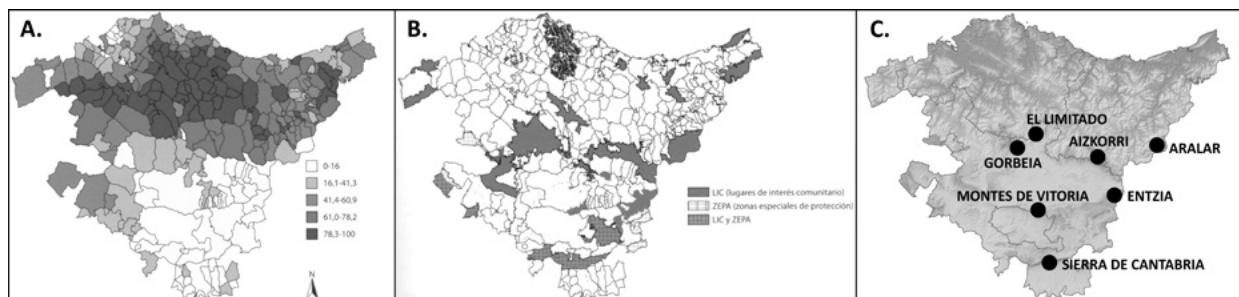


Figure 6.2. Relationship between the density of conifer reforestation (A), Protected Natural Spaces (B) and Forest Archaeology projects (C) in the Basque Country (Ruiz & Galdós 2008).

In Aizkorri, the studies undertaken by M. Urteaga from the late 1980s through the 1990s (Ugalde *et al.* 1992-1993; Urteaga & Urkiola 1996) have been continued by A. Martínez since just over ten years ago (Martínez 2009 & 2020) and by A.M. Stagno in 2015 (Stagno 2016, Stagno *et al.* 2016), now with new interpretative frames more befitting of Landscape Archaeology. There is currently a synthesis in the publication phase in which the authors of this text are taking part. It will analyse the historical trajectory of the General Parzonería of Guipúzcoa and Álava, a communally administered supra-municipal body which has overseen the intense forest and livestock exploitation of this important territory. There was an interesting cataloguing experience in Entzia-Iturrieta in the mid-1990s with a team coordinated by the Traza Taldea group, although this did not last long and produced hardly any significant bibliographical results. However, it was one of the first works aimed at addressing the entirety of the communal space, underlining the enormous variability of elements and chronologies (from megalithic structures to recent provisional sites of habitation more befitting of herding and forest activities).

In contrast, one of the spaces which reveals a greater continuity has been the mountainous massif of Aralar, with successive archaeological campaigns carried out by a team led by J.A. Mujika, from the late 1990s to the present (Agirre-García *et al.* 2017), in which prehistorical and historical archaeology have been integrated in one single discourse which reflects, again, the deep and varied human presence in these kinds of mountainous environments. A brief study in the Mountains of Vitoria (Montes de Vitoria) was carried out in 2011, with the participation (amongst others) of the authors of this article, for the Constructed Patrimony Research Group (Grupo de Investigación en Patrimonio Construido, GPAC) at the University of the Basque Country (UPV-EHU), with the aim of putting into practice the prospecting methodology described below and its potential for establishing chronotypological frameworks (García *et al.* 2011; Martínez & Rodríguez 2013). In the zone around Gorbeia, especially in the area encompassed by the municipality of Zigoitia, we discovered activities whose details we describe in this text, with the general objective of identifying, collecting, analysing and disseminating the results (Martínez 2015; Martínez & Rodríguez 2018).

In the territory known as El Limitado (The Limit), between the municipalities of Otxandio and Aramaio, a document research project was carried out from 2018 to 2019 in order to search for the roots of a secular legal conflict between Bizkaia and Araba. Moreover, there was a cataloguing of cultural elements by means of the systematic prospecting of the territory. Led by Belén Bengoetxea, it also counted on the participation of Ángel Martínez and José Rodríguez. Lastly, and collaterally, Francisco Gómez has worked on the Sierra de Cantabria-Toloño since 2017 as part of a doctoral thesis which examines the transformations in the contemporary era of road networks on both sides of the mountain range as a consequence of their adaptation to the new strategies of agricultural, livestock and forest exploitation from the nineteenth century to the appearance of the railway as the preeminent medium and long distance means of transport.

The experience accumulated in various projects and spaces of intervention (Figure 6.2) has taken shape in a progressive definition of what is the Forest Archaeological Heritage (Patrimonio Arqueológico Forestal, PAF). Logically, its localisation has been restricted to densely forested mountainous spaces<sup>3</sup>, yet typologically the concept refers to varied material evidence related to the traditional exploitation of the setting; in first place for the direct use of timber resources (in construction, as fuel...) but also those associated with other uses and productive cycles (waters, pastures, agriculture, hunting, gathering, areas of extraction and transformation...), the delimitation of exploited spaces (walls, boundary markers, enclosures, seles or meadowlands...), its symbolic appropriation (elements related to religiosity) and

<sup>3</sup> In this sense, we are aware that the concept of Forest Archaeological Heritage may be limited in certain less forested high mountain areas. However, in the geographical area of the Basque Country the term is almost perfectly suited to mountain areas, which, with a few exceptions, have a variety of woodland.

the circulation of people and goods (historical pathways, bridges, fords...). All of the above articulate a complex framework which allows us to understand what the relations between the mountains and human beings were like from an ecological, economic, social and cultural perspective. From the temporal point of view, it is a diachronic archaeology which avoids being chained to a specific period, addressing the study of long-term historical processes (Kristiansen 2009). Nevertheless, we cannot deny that most of the record is post-medieval, and is thus included in studies that, on the basis of material culture, increasingly analyse the most recent historical societies (Quirós Castillo 2020, 1-8), but always taking into account that humans have lived in different ways, according to their needs, in spaces that preceded them.

Being conscious of heterogeneous nature of the record, we want to establish some common characteristics. In first place, the volume of elements is very wide and, on many occasions, singularity is not the main motive for identification, protection and conservation. Such is the case, for example, of historical pollarded trees and of charcoal pile. This characteristic may end up having detrimental effects, since a large amount of some typologies may be a real problem, with the result that many works do not make it beyond the necessary phase or prior inventorying. Hence, precisely, the importance of a methodology of systematic field sampling. Going beyond individual admiration and reaching an overall vision is necessary in order to recognise the functioning of a whole network of elements, to determine if they coexisted and were related to one another, as well as to elaborate a historical discourse which combines the different materials and their functioning pattern as a system.

In second place, they are very fragile elements. The natural dynamic itself of the forest tends to erase what is most evident in barely a few decades, although still more aggressive is the creation of uncontrolled forest tracks or logging with machinery which destroys historical evidence. This situation is aggravated by the fact that, as a general rule, the very elements in the Forest Archaeological Patrimony lack legal protection, and it is even often difficult to establish a special precise delimitation as noted in the previous point.

In third place, its study usually brings together varied disciplines and points of view. This matter, which should be a stimulus for enriching a diversified understanding of these environments, does not end up working in practice. In general, archaeology, ethnography, botany, forestry, pedology, geology, geography and so on work separately if not in competition with one another, without optimising the synergies they may produce. All this has a negative impact, once again, on these elements. Moreover, collaboration with the local population, the closest social agents who best know the environment, is also advisable and sometimes essential.

As one can deduce, forest archaeology overlaps with landscape archaeology and, in general, with those territorial perspectives which transcend the site-settlement as the fundamental unit of reference when it comes to dealing with extensive and complex contexts in which humans have carried out their material subsistence, social and psychological needs (Cevasco *et al.* 2015, 3168; Brogiolo 2017, 11-13). In this sense, the forest, like cleared agricultural areas or pastures, must be understood as a cultivated site in permanent construction-transformation which responds to the changing needs of successive societies (Dupouey *et al.* 2007; Kirby & Watkins 2015; Paradis-Grenouillet 2017). Only in this way will we be able to overcome that ahistorical, indistinguishable and, to some extent, idyllic ethnographic vision that we alluded to previously, in order to address a polysemic multidimensional concept of landscape which must be tackled from the sociohistorical structure itself and which manages to incorporate the different ways of living in those spaces (García de Cortázar & Martínez 2003, 58; Chavarría Arnau, 2015, 7-11; González & Ayán 2018, 191).

There is a long tradition in the study of subjective experiences in the occupation of territory in disciplines like anthropology and geography (Unwin 1995; Augé 2000; Santos 2000). In the realm of archaeology, it has burst onto the scene with force thanks to a (necessarily cultural) notion of landscape which includes the environment, the human substrate and the perception of the population about such places. This definition was established already as part of the European Landscape Convention (also known as the Florence Convention) in 2000 and has been adopted subsequently in a progressive way as a normative model within the different state and regional regulations. The problem is that, almost certainly due to the difficulty in grasping that symbolic, intimate and personal dimension, we often forget about it and focus exclusively on an exploited territory in which only things that specialised researchers themselves can interpret occur, without turning to the fact that the landscape is also an active agent in shaping economic, social and mental habits which are imbued in the community that lives there (Orejas & Ruiz del Árbol 2013).

In this way, the perception of the interpretation of landscape has become on too many occasions an empty concept termed ambiguously but in reality little taken into account, in spite of the fact that it seems entirely logical to believe that our vision as researchers and the perspective of the local community is not the same. In contrast to this, certain historiographical tendencies which have laid the foundations of communitarian archaeology (Faulkner 2000; Moshenska & Dhanjal 2011) attempt to include people (we are referring to the local population rather than cultural tourists) in all aspects and moments of the research and dissemination: in the identification, comprehension and interpretation of the material remnants; in the planning and methodological praxis of the project; in knowledge transmission; and in landscape management (Martín 2015, 343-7).

In the Zigoitia research project, there has been a relationship with the local community since the beginning and at all levels of the study, without limiting itself to just the scrutiny of oral sources in order to identify and contextualise the findings. From the outset in 2014, we were conscious of the importance of the project including the needs of local people, their points of view, and of following their lead. Through the ethnographic and cultural Abadelaqueta association, a key agent in this process as an intermediary between locals and archaeologists, an immense inventory has been carried out of the cultural elements which have been highlighted by the inhabitants of the municipality themselves, of those things they considered the most significant forest patrimony to be identified, evaluated and

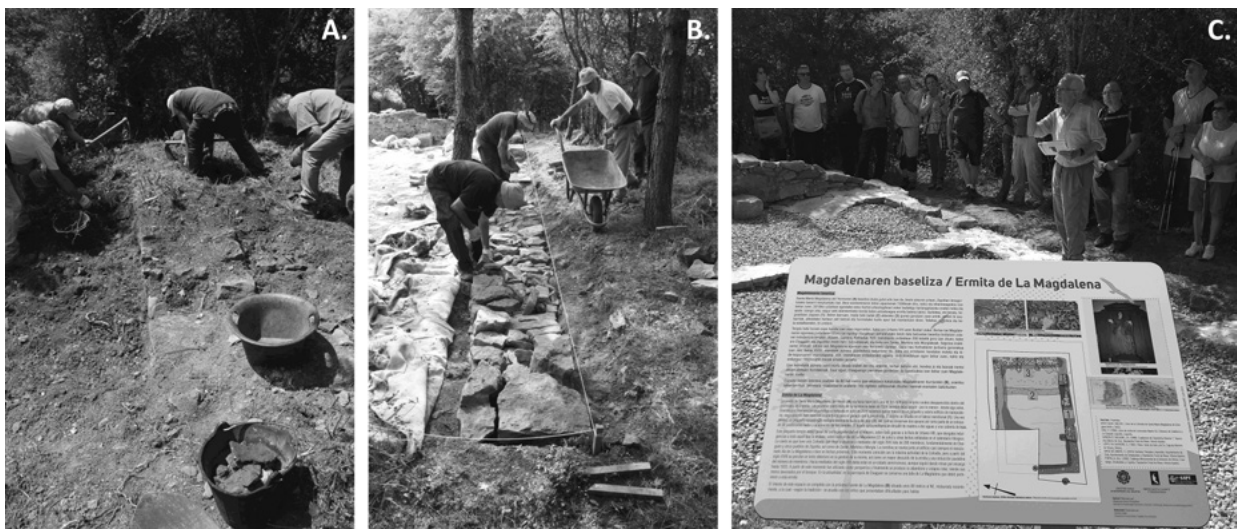


Figure 6.3. La Magdalena Chapel (2018-2019): Excavation (A), consolidation (B) and pilgrimage (C).

preserved. Simultaneously, these findings have served, and still serve, to launch cultural trails on which, once a month, many people gather in order to regain local memory around traditional activities which took place and that in many cases involved their parents and grandparents. The local community has also participated actively in archaeological excavations undertaken to date in various limekilns, a natural spring and in the La Magdalena shrine, as well as in their architectural restoration. Indeed, the objectives and planning of successive archaeological activities are discussed and agreed on between the Abadlaueta local association and the research team at the start of each campaign. The real and effective collaboration of locals and specialists has led to, for example, the recovery of a festive procession every 22 July (the day of La Magdalena), a tradition which had been lost almost one hundred years ago.

### Research methodology

As noted at the beginning of the paper, the Zigoitia project is a compendium of archaeological strategies which converge in a better understanding of the humanised forest environment. Amongst the techniques used, what clearly stands out is the visual surface survey, which is aimed at identifying and documenting on the ground the components that make up past landscapes, thus trying to achieve the most complete image possible of the cultural history of the delimited area (Fernández 1989, 50; Cambi 2001, 301-6). Prospecting has been handled in two different variants: one area has been examined more intensively and systematically (Oketa), whilst the rest of the municipality has been tackled in a more selective way, gathering materials known by the informants (the local population).

With regard to the former, the initial problem was that archaeological prospecting appeared to be almost always linked to spaces which are easy to navigate, that is, more or less flat agricultural or livestock plots which in most cases had been recently mowed or ploughed and rarely had a systematic prospecting been undertaken on large forested terrain, with rugged topography and poor visibility (Ruiz del Árbol 2005, 24). In the face of few prior references, it was necessary to design a plan of action adapted to these spaces, which was tried out in a small zone of the Mountains of Vitoria (García *et al.* 2011; Martínez & Rodríguez 2013), in certain parts of the Aizkorri-Aratz Natural Park (Martínez *et al.* 2019) and in the area of Zigoitia under study here (Martínez & Rodríguez 2018; Martínez 2020). Specifically, and in the form of a laboratory experiment, an area somewhat larger than 4 km<sup>2</sup> was demarcated in which to analyse in detail the viability of this research methodology which combines the techniques of History, Historical Ecology, Archaeology, Ethnography, Geography and Topography; and to undertake a sampling in order to estimate the quantity and typology of elements present in the area of study.

The basic idea is to plan out routes whilst trying to test the entire demarcated surface in a uniform way. Given the winding relief of the place, the most comfortable way to create trails is by following a trajectory parallel to the contour lines, with the distance between contours chosen (each 50, 100, 200 metres...) being the main factor which defines the intensity of the work in accordance with the characteristics of the terrain (gradient, visibility, degree of tree cover...) and the very objectives of the intervention. As noted, this method of systematic prospecting was conceived originally for phytogeographic inventories and analysing vegetal landscapes (Cadiñanos 1999, 44) and it has been used in various archaeological experiences, becoming consolidated as the most comfortable system to perform a uniform recognition of the terrain in this type of orography. In the specific case of this project a distance of 50 metres between the contour lines (*Sample Units*) was chosen, plus the path around the perimeter boundaries, which implied 35 per cent coverage of the total surface.

The unit of analysis and registration is the *Prospection Unit* (PU; Archaeological Survey Unit), understood as the minimum possible archaeological body that can be delimited, and made up of one or more homogenous elements (see the following section). The PU concept shares some similarities with the term *Topographical Unit* (TU), which has been suggested and used by some authors, mainly in the Italian

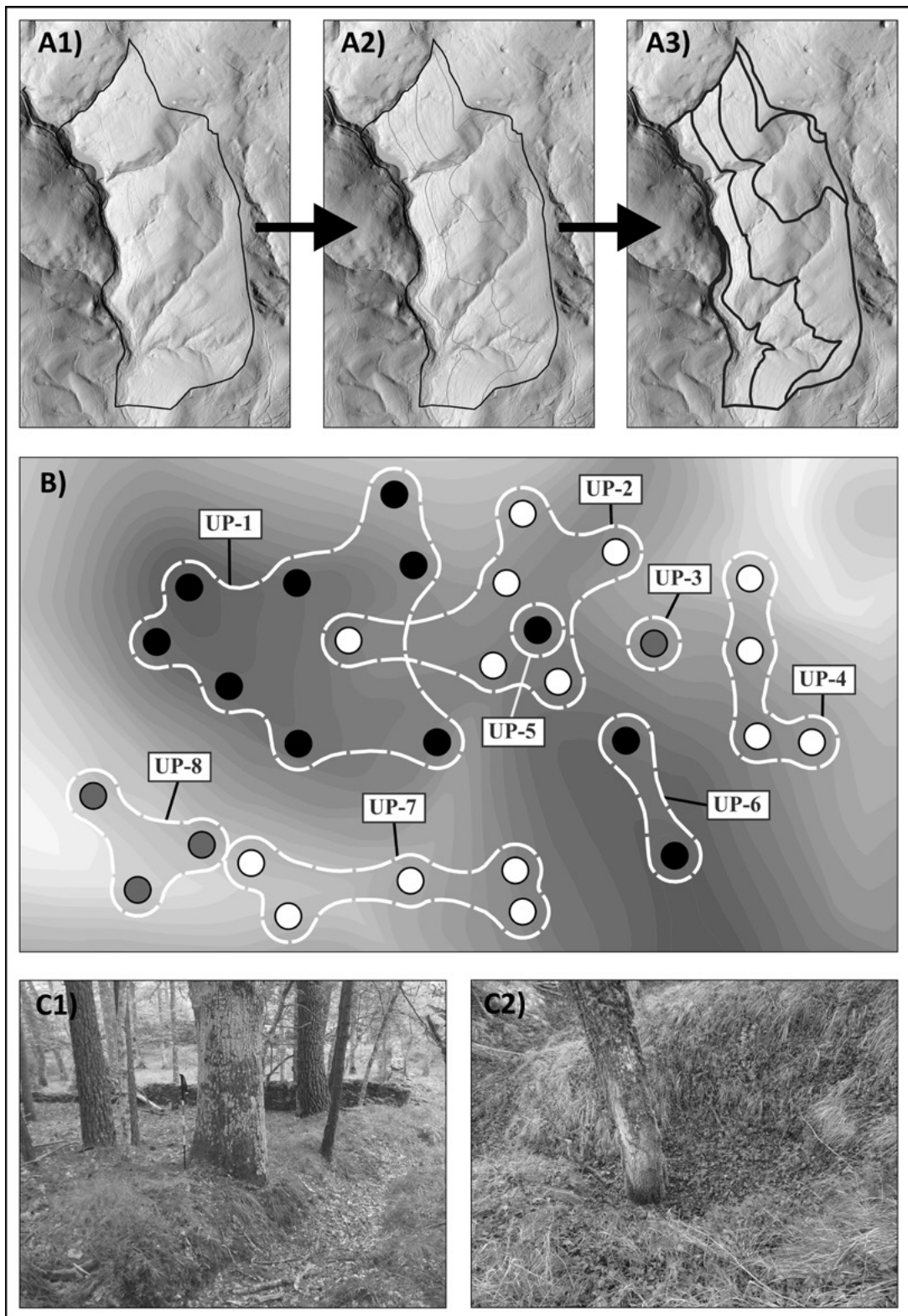


Figure 6.4. Archaeological survey. A) Preparation of the routes, Sample Units, from the contour lines: A1) Delimitation of the area of study, A2) Visualisation of the coverage of the contour lines and A3) Definitive delimitation of the Sample Units, in this case every 50 metres of difference in level and the perimeter of the area studied; B) Formation of GPPUs- PUs; C) Examples of stratigraphic relations between elements: C1) Oak after the delimitation of an old woodland nursery and C2) Oak after a limekiln.

school (Cambi & Terrenato 1994). However, PUs seek and intend to be differentiated in terms of their typology and chronology, in a similar way to Stratigraphic Units, but on another scale and with other objectives. Indeed, the organisation of PUs according to anteroposterior relationships is truly a challenge for the Landscape Archaeology we are developing, allowing us to obtain valuable information about the continuities and changes within elements of the historical landscape. Another difference with TUs is that, moreover, the number of PUs may swell as a result of other information that may be georeferenced with certain precision (toponymy, documentation, bibliography, oral information...), thereby providing a more complete perspective of the territory under study.

From a strictly spatial point of view, each of the PUs can be deconstructed into one or more homogenous points termed *Georeferenced Points of the Prospection Unit (GPPU; Georeferenced Points of the Archaeological Survey Unit)*<sup>4</sup>, which are the basic units of spatial registration in the field –obtained by means of GPS navigator– and those which help trace the definitive morphology of each PU in the subsequent process of publication. The elements of interest identified (PUs) are characterised and collected in a database with standardised files which have a graphic version, and all linked to a Geographic Information System (GIS) that allows numerous cartographic operations to be undertaken on the basis of their characteristics and positioning.

Type of information		Specific information
Identificational and positional information		Prospection/Archaeological Survey unit
		Element code
		Denomination
		Coordinates
		Physiographic position
		Gradient
		Geometry
Environmental information	Natural characteristics	Geological substrate
		Potential vegetation
	Anthropic characteristics	Toponymy
		Land use
Archaeological and patrimonial information		General typology
		Specific typology
		General description
		Observations
		Orientation
		Dimensions
		Topological relations
		Chronology
		Sketch
		Photographs
		Level of conservation
		Level of patrimonial protection

Table 6.1. Main sections in the field file (Martínez & Rodríguez 2019, 439).

Targeted prospecting uses the same registration system described above, and was justified by the need to systematise the profound knowledge possessed by members of the Abadelaueta ethnographic association about various patrimonial elements that are present throughout the length and breadth of the municipal territory of Zigoitia, which is more than 100 km<sup>2</sup> in size, and collected in turn via direct contact with

<sup>4</sup> The geographical coordinates taken in the field sometimes have a certain degree of error, due to forest cover, which must be corrected with the help of map viewers. This editing work is done during the subsequent laboratory work.

the locals. In this case, the goal was to identify, undertake an initial evaluation, photograph, geolocate and incorporate into a single document different structures, remains and historically productive installations which are in serious risk of disappearing, thereby creating an preliminary document-diagnosis and a valid protocol for its later management and assessment (including its cataloguing in the shapefile format apt for GIS platforms). This project to inventory the patrimonial elements present outside the inhabited nuclei, in the forested and mountainous environment, completes the patrimonial knowledge that does exist in the inhabited nuclei and is directly related to the intervention that had been previously carried out in the demarcated zone of Oketa.

Alongside the tasks of prospecting and cataloguing, explorations were carried out of bibliographies, documents, toponyms, oral sources, historical and contemporary cartographic and visual resources, environmental archaeological analytics and dendrochronology. Without intending to carry out an exhaustive examination on this point, we would like to outline certain issues of a theoretical-practical nature that we consider important when it comes to developing our research, and which therefore may serve as a point of reflection in order to tackle projects with similar characteristics and objectives in other places.

Within the document and bibliographical sources, the local archives (the municipal archive of Zigoitia and Administrative Council archives of Acosta-Okoizta, Apodaka, Berrikano, Buruaga, Eribe, Etxabarri Ibiña, Etxaguen, Gopegi, Gorostitza, Larrinoa, Letona, Manurga, Mendarozketa, Murua, Olano, Ondategi, Zaitegi and Zestafe) reflect municipal control of the resources in the jurisdiction, since local councils in the medieval, modern and, to a large extent, contemporary eras enjoyed direct management of or, at the very least, political influence over supplying the towns and the multiple associated productive cycles. In this sense, they also present an interesting normative capacity (bylaws and decrees which regulate the extraction, transportation and consumption of goods) and arbitration in primary jurisdiction conflicts, whose traces are preserved in the written documentation.

At the provincial level, the Archive of the Historical Territory of Álava (Archivo del Territorio Histórico de Álava, ATHA) includes the documentation preserved from the General Councils (Juntas Generales) and permanent Provincial Council (Diputación), bodies that gradually increased their powers from the fifteenth century on. Especially after the 18th century, the latter came to oversee (without necessarily possessing) the forestry, hydraulic and mining resources in the territory, and it has the authority to concede authorisation and economic-technical aid in order to carry out a multitude of public and private works. For its part, the Provincial Historical Archive of Álava (Archivo Histórico Provincial de Álava, AHPA) manages the documentation produced by notaries and the State Administration in the province of Álava (work and land-use contracts, wills, purchases and sales, rentals...), becoming one of the richest text collections when it comes to trying to include as far as possible the private sphere and counterbalance the public documentation. Lastly, in the Diocesan Historical Archive of Vitoria-Gasteiz (Archivo Histórico Diocesano de Vitoria-Gasteiz, AHDVG) we can obtain valuable demographic information (birth and death certificates), wills and parish possessions, shrines and religious brotherhoods.

The third level of written documentation would be made up of state archives and collections, in which the Royal Chancellery Archive in Valladolid (Archivo de la Real Chancillería de Valladolid, ARCHV) stands out. One first tracks any conflict over forest, pastoral, hydraulic, industrial, mining resources, and so on amongst the local judicial bodies and at the highest level at the Royal Courtroom and Chancellery (Real Audiencia y Chancillería), whose headquarters in Valladolid took care of judicial processes concerning the northern half of the old Castilian Crown, with a wide variety of sources which span chronologically the time period between the sixteenth and nineteenth centuries. An interpretation of the voluminous

judicial records provides a very detailed insight into the reality of the regulations, transgressions and, in sum, the everyday praxis of the distinct activities undertaken in the mountainous-forested spaces.

With regard to the bibliography consulted, we should observe that in first place there are experts with whom we continue to work and they are carrying out specific studies about the Spanish Civil War (Josu Santamarina), grindstones (Javier Castro) and historical boundary markers (Joseba Alonso). Much of their knowledge has been incorporated into our patrimonial inventory. As a foundation, there are old patrimonial collections which refer especially to rural, military and religious architectures (Victorino Palacios and Micaela Portilla). Besides the historical works related to the area of study, the local Abadelaueta association publishes periodically an ethnographic monograph (Akelarre) which has also been of great use. Of course, one must be familiar with all the archaeological work that has been carried out in the municipality of Zigoitia and, in this sense, the annual journal *Arkeoikuska*, published by the Basque Government, is a very useful tool. It includes a record of most of the archaeological activities carried out in the last four decades, a search which can be complemented by the official intervention reports that are deposited in the Archaeological Museum of Álava.

Whilst information originating in the written sources is admitted freely in landscape studies, we believe that analyses of toponymy and oral sources are still in the development phase. This is surprising if we bear in mind that the oral tradition has been one of the main historical means of cultural transmission. In our opinion, the problem rests on three issues: first, the excessive academic separation that different disciplines defend as part of their status and as a survival tool as autonomous areas of knowledge and management; second, the persistent belief that anthropology-ethnography-toponymy only concern themselves with bland aspects of societies, whilst history (the written record) and archaeology (material culture) would focus on the more lasting components –and would even therefore be considered more serious disciplines– of past societies (González 1992). To these issues is added a third question, which is more tangible in our opinion, of overcoming the existing epistemological abyss between the present (a synchronic focus, permanence) and the past (a diachronic focus, change) with the resulting risk of falling into erroneous suppositions and temporal correlations (Fernández 2006, 37).

At least in our case, the toponymy and oral sources have been key in order to anticipate and plan the fieldwork, contextualise the findings and suggest questions and interpretative pathways which would not have emerged in other ways. It is also our policy –although not the only one– to include the perspective of local agents (the *EMIC* approach) and contrast that with the perspective of the researcher (the *ETIC* approach). We are convinced that one of the strongpoints in territorial studies (whether local or regional) must be universal understanding of the environment in which the research takes place and not just that of the specific discovery. If this is not the case, it can be as serious as an archaeologist concentrating solely on ceramic fragments recovered in a dig, without dealing with the context in which they appear and their stratigraphic location. In this sense, toponymy and oral sources are especially valuable in order to establish the terrain of the data obtained, as well as to reveal the abovementioned individual or group perception about historical phenomena, especially in certain aspects related to the daily reality (Rodríguez 2015, 50-53).

As regards work on toponymy in Zigoitia, we possess the classic collection by José Antonio González, *Cuadernos de Toponimia*; a total of eight volumes published between 1985 and 1998 in which the different *cuadrillas* (districts) in the current province of Álava are covered. Gerardo López de Guereñu's work is also significant as a basic reference in regard to the location of abandoned sites. Besides the bibliographical resources there are two search engines which should be mentioned on account of their user-friendly design and the interactive possibilities they provide in offering searches on the basis of certain criteria (thematic, geographical, and so on). On the one hand, there is the Euskaltzaindia database. And on the other, there is Basque Government's own platform; in this case, through the enormous task of data

collection undertaken in recent years (since 2010), excellent municipal maps have been produced which are being published gradually. Once the tools are ready, we want to note that, based on our experience accumulated in various projects, we believe that toponymy should be studied in three different spheres: 1) the geolocation of toponyms, as precisely as possible; 2) the analysis and grouping of place names in thematic clusters; 3) probing the historical depth of toponyms, checking them against the documented sources.

Insofar as work with oral sources is concerned, it is clear that it requires prior design and a systematised record. In our case, we use a combination of non-structured interviews and guided enquiry by means of a previous template. It is never quite a full survey because we do not pay attention to quantitative-statistical data. Nor are there any closed questions of a formulaic kind because we consider it more appropriate to cede space to the free recollections of the informants. In spite of this margin of freedom, there is always a prior thematic guide common to all the meetings which is quite similar to the archaeological survey field file but which introduces information provided by the archives, bibliography, cartography, toponymy and visual survey. We have also taken into account the template established by the Etniker project at the level of the Basque Country as a whole, the heir to José Miguel de Barandiarán's Ethnographic Atlas of Vasconia (Atlas Etnográfico de Vasconia) project which began in 1969 and whose goal was the 'systematic registering of all the cultural facts which make up traditional life in a locality' (Manterola & Arregui 2005, 402).

Furthermore, one must take care of the selection process for informants, who should be people with extensive life experiences who are very knowledgeable about the setting and have a good clear memory. They do not need to be –and sometimes it is even better that they are not– specialists in the matter under study, since their responses would be shaped by that very specialisation, with the exception of when we are trying to re-establish professions and skills at risk of disappearing. The interviews were chronicled by means of a digital recording device, photographic documentation and, in part, video format, by using an identifying code that included the informant's name, the date, the place and the type of record. To the contextual information provided by the informants we can add quite an interesting chronological value, although limited logically to the nearest two or three generations.

A study of this kind requires a huge cartographical foundation that, besides reflecting the findings and capturing geographically the relevant issues, serves as a base from which to undertake certain spatial analyses. Apart from private-use GIS software, both the Basque Government (geoEuskadi) and the Provincial Council of Álava (geoAraba) possess powerful online spatial data infrastructure (SDI) platforms in order to visualise and download basic and thematic (environmental, toponymic, archaeological and patrimonial) cartography. There are maps (dating from the eighteenth century on) and orthophotographs (dating from 1932 on); LIDAR layers; and photographic collections dating from the late nineteenth century on, included in the different documentary collections that we described above.

With respect to archaeometric methods, five test-pits were carried out in order to complete a landscape characterisation of the area, which were not generally associated with anthropic deposits as such but rather certain structures: 1) inside an old shepherd's hut in a forest setting (associated in turn with a charcoal pile and pollarded trees); 2) in the livestock pen outside the aforementioned hut; 3) in the charcoal pile located next to the hut and the pen; 4) in a historical plantation of pollarded chestnut trees which is more than 250 years old; 5) in a meadow at the summit of Mount Oketa at 1000 metres in height. The samples obtained, which were beforehand floated except those aimed at the study of pollen, were studied according to carpological, anthracological and palynological criteria, whilst also dating several specimens of suitable coals by means of radiocarbon, although at the time of writing this article we have not yet received the results.



Figure 6.5. Old shepherd's hut associated with a charcoal pile and pollarded chestnut. Extraction of dendrochronological samples.

Also with the goal of fortifying the chronological dimension, to date dendrochronological analyses have been undertaken on twenty-eight trees, whilst attempting to diversify altitudes (615-936 metres) and species (*Fagus sylvatica*, *Quercus robur*, *Quercus faginea*, *Quercus pyrenaica*, *Castanea sativa*, *Quercus ilex*, *Fraxinus excelsior*, *Acer monpesulanum*, *Tilia platyphyllos*, *Alnus glutinosa*, *Betula pendula* and *Taxus baccata*). Besides establishing temporal criteria in particular specimens, a table is being created with data stemming from other interventions in forest environments in Álava, for which there are at present 150 records. We hope that in the near future this table will become a referential chronotypological series when it comes to dating specimens on the basis of species, thickness and altitude, with an acceptable margin of error. Furthermore, the age of the trees is proving to be a very valuable tool when it comes to dating relatively other elements (enclosures, pens, folds, huts, limekilns, charcoal piles, etc.) which are in contact with the woodland. In the same way, the combined study of charcoal piles and woodland in the environment is also very interesting.

### The (preliminary) results of the Zigoitia project

A total of 1071 Archaeological Survey Units have been identified, that is, more than 1000 material elements with different characteristics, morphology and functionality which lead us directly to historical forms of planning, delimiting, exploiting and living in the territory. We are waiting to receive the data stemming from pollen analyses and radiocarbon dating, and the excavation of the documented sources has still not been completed. However, we can already advance some important issues.

Forest exploitation has been a key activity in shaping the landscape of Zigoitia, especially in its northern part, precisely the area that today is protected from the natural point of view. There are a total of 284 significant units (26.5 per cent of the total), among which pollarded beech trees (*Fagus sylvatica*), oaks (*Quercus robur*), Pyrenean oaks (*Quercus pyrenaica*) and, to a lesser extent, chestnut trees (*Castanea sativa*) stand out on account of their number. In a much more residual way, specimens have also been preserved of artificially pollarded silver birch (*Betula pendula*), alder (*Alnus glutinosa*), evergreen oak (*Quercus ilex*), Portuguese oak (*Quercus faginea*) and large-leaved lime (*Tilia platyphyllos*). Pollarding has been an activity in these woods since at least the Late Middle Ages (Aragón Ruano 2001). It consists of periodically pollarding the branches from a height of 120-180 cm upwards in order to avoid felling trees at the root, thereby guiding and maximizing the useful life of the specimen in a context of intense and varied forest use that exceeded the natural regeneration cycle of the forest.

Pollarded trees present a visual reflection of a tendency which has been confirmed by the historical orthophotography and anthracological, carpological and pollen analyses carried out in the Human and Social Sciences Centre (Centro de Ciencias Humanas y Sociales, CCHS) at the Spanish National Research Council (Centro Superior de Investigaciones Científicas, CSIC): the existence of a planned disposition to make pasture land out of the rugged pollarded woodland, with the exception of the more exposed

and higher areas in which we have only recorded taxa native to meadows and pastures in the test-pits (*Ericaceae* and *Rosaceae*). The aim was to make compatible the extraction of wood for civil and naval construction, the manufacture of tools and engineering pieces, the obtaining of charcoal for fuel and livestock grazing, and including the human and animal consumption of the fruits of the trees as well.

There was, in fact, a conscious search for and selection of the most suitable species (*Fagus*, *Quercus* and *Castanea*) for these goals, either by means of pollarding itself or by thinning out (selective chopping, thereby leaving space between the valid specimens) and the pertinent felling legislation (Aragón Ruano 2009). If we focus on the morphology of the trimming (Pardo *et al.* 2003; Aragón Ruano 2013; Martínez & Rodríguez 2013), we can distinguish three subtypes (Figure 6.6): form A (candelabra) is related to the heavy use of branches for making charcoal, although also to a lesser extent for producing lumber and implements; form B (glass) is the most appropriate for obtaining planks and beams for construction, without forgetting charcoal, for which it can also be used; form C (gallows and banner) would be aimed fully at obtaining civil and naval building materials, including specialised pieces.

Thanks to the dendrochronological analyses carried out at the Dendrochronology Laboratory of the Arkeolan Foundation, we find preserved beech specimens dating from between the eighteenth and twentieth centuries, with characteristic trimming for obtaining tools or certain non-specialised construction pieces (form B) and, especially, for the manufacture of charcoal for domestic and industrial use (form A). The *Quercus* genus has also been represented quite broadly since at least the eighteenth century, with one specimen of *Quercus pirenaica* that has been calculated by means of dendrochronology to be approximately 450 years old. In this case, one observes a greater specialisation in civil and naval construction which required some curved pieces for the ships' hulls (forms B and C), without overlooking the use of charcoal (form A) which seems to have accelerated in the last 150 years. This is consistent with the historical forest bylaws which prioritised charcoal made from beech over that made out of oak or Pyrenean oak and with the results of the test-pit carried out in a charcoal pile, in which the *Fagus* and *Quercus* genera are represented fairly equally. We should take into account the fact that architecture and engineering were sustained to a large extent by rough non-trimmed specimens, so that many ancient specimens were reconverted through pollarding into charcoal when the wood exceeded an optimal age threshold. Chestnut has been represented since the eighteenth century, and never in forms associated with large-scale charcoal production. Indeed, it usually appears in isolated form, in small residual groups or in the formed of planned plantations of a reticular shape, substituting artificially the mixed beech and oak woodland.

The charcoal cycle also took material form in charcoal piles (73 significant concentrations detected) which can be of a simple or stone terraced typology if we pay attention to the absence or presence of stonemasonry (Figure 6.7). In both cases, their location was determined by the presence of suitable woodland, water and extraction routes for pack animals, carts and sleighs termed *narrias*. Furthermore,



Figure 6.6. Morphology of the trimming: form A (candelabra); form B (glass); form C (gallows and banner).

and based both on the data collected in the visual survey and on the written documentation, we can distinguish charcoal piles between those termed *en oya* (with a central hollow), more typical of an early chronology (prior to the nineteenth century), which used more artisanal methods and yielded a lower production (and were 3-4 metres in diameter) from others known as *lanteguis*, which were flatter and larger (6-10 metres), and which adhered to a more intensive industrial exploitation typical of the 19th and twentieth centuries. As we already noted, the species associated with these centres are beech (*Fagus*) and, to a lesser extent, oak and Pyrenean oak (*Quercus*).

To conclude with the silviculture, we should mention the presence of woodland nurseries (*mintegiak*) that were demarcated by local dry (without the use of mortar) sandstone walls, of variable dimensions, whose chronology we cannot date back with any certainty beyond the nineteenth century, the era of the great contemporary repopulating which included autochthonous conifer species, except in certain cases that will be studied in the near future in which there are reliable indications to suggest a late medieval or early modern chronology (pollarding higher than 100 cm in diameter thereby breaking directly wall sections) (Figure 6.7). These centres also helped to restore the balance between natural woodland growth and the intensive exploitations carried out therein.

Livestock herding has been another essential activity in the zone, and proof of that are the seasonal settlements detected (25 PUs) for holding and sheltering livestock and herders. The documented and oral sources reveal the combined presence of bovine, equine, porcine, ovine and caprine livestock. Although the larger livestock were not usually stabled at altitude (seasonal transhumance), the pens and folds built from stone to which we are referring seem to be mainly related to the smaller (ovine and porcine) stock. For some specialists, this occupation pattern dates to the seventeenth century, and not before, parallel to the profound changes which widespread corn cultivation brought to the territory. From that time on, bovine livestock, which was already less in numerical terms than its ovine equivalent, would be managed by means of a semi-stabling model, leaving the higher pastures more free to be occupied by ovine and caprine stock, the use of which was growing rapidly (Aragón Ruano 2017).

There is a curious notion, the *cel* concept, about which locals retain a strong memory and which refers to public enclosures that were used communally for the overnight shelter of smaller livestock in a settlement or rented out to the highest bidder whilst the stock grazed in permitted areas by day. Morphologically, they do not share any similarity with the *seles* or meadowlands (*saroiak*, *sarobeak* or *gortak* in Basque) which are present on the northern slopes of the Basque Country and which have been examined thoroughly by several authors (Díaz de Durana 2001; Gogueascoechea *et al.* 2011; Etxezarraga Ortuondo & Aragón Ruano 2020). The latter demonstrate standardised dimensions (winter and summer *seles*), a circular terrain with one central (*austarri*) as well as several perimeter boundary markers. However, the function of both is reasonably similar, with the particularity that the *seles* detected in the high mountains of Zigoitia did not become forest or agricultural exploitations regulated by a *caserío* (farmhouse) as was the case with many *seles* progressively from the fifteenth century onwards.

Continuing with the typical material matter typical in the organisation and demarcation of productive areas, one should make mention of the identification of several vegetal enclosures dominated by the presence of hawthorn (*Crataegus monogyna*) and often accompanied by the hazel (*Corylus avellana*), silver birch (*Betula pendula*), beech trees (*Fagus sylvatica*) and oaks (*Quercus robur*), all located on outlying tumuli of the raised land. These smallholdings had varied functions: woodland nurseries, pastures and shelter for livestock or small areas for crop cultivation at altitude.

Yet if one dividing element exists repeatedly, it is the stone boundary marker (57 PUs), truncated pyramidal monolithic blocks which on occasion reach a height of up to 70 surface cm and which lead us to the necessary appropriation and organisation of the territory in multiple aspects (Figure 6.7).



Figure 6.7. A) Charcoal pile with Stone wall; B) woodland nursery (*mintegi*) demarcated by local stone wall and associated with a pollarded beech (*Fagus*); C) stone boundary marker with incised cross.

There are jurisdictional boundary markers which divide political constituencies between population nuclei, municipalities and provinces, often presenting epigraphy with the initials of the entities delimited. Many other landmarks indicate communal or private smallholdings of forest, livestock or agricultural use. In some cases, we have also detected boundary markers at the edge of some traditional road. Independently of their function, there are often visible orientation marks on the upper base, indicating the direction of the boundary towards the nearest landmarks or stone and tile crosses and *testigos* (pieces) carved into the boundary marker as a means of validation during the frequent *apeos* (examinations) which were carried out communally, bringing together representatives of the parties involved, professional specialists and, quite regularly, judges who had to settle a dispute raised by some discontented party.

Economic activities required inhabitable places (141 PUs, 13 per cent of the total) that, without being absolutely stable, could accommodate livestock herders, charcoal burners, tilers, limekiln workers and stonemasons (Figure 6.8). Establishing specific allocation criteria based on a typology is complicated, since all of them are similar, and very much so, so that the spatial relationships of contiguity are usually a determining factor when it comes to deciding what their functionality is, although we are aware, from oral and documented sources, that such huts (known as *chozas*, *cabañas* and *txabolas*) served indiscriminately as temporary shelters for many inhabitants of the forest. The remains preserved are usually limited to a half-excavated quadrangular or rounded floor in the ground which is small in size (4-6 m<sup>2</sup>) and may have a non-mortared dry stone base, but which presents in general elevations and a roof made of plant material with a tile surround in specimens of a certain appearance, in the last hundred years. They were places of rest after a long working day rather than in which to live comfortably, and proof of that is their small surface and low overall height (some 100 cm) as well as that of the access point (some 50 cm). Unsurprisingly, they made use of natural hollows or rocky outcrops in which to place the weak artificial structures. As regards the occupancy patterns, they could be isolated, although a certain concentration in structures and professions has been observed.

There are other elements which reflect traditional activities that complemented those more typically linked to agricultural, livestock or forest work. We have documented up to 30 beehive spaces where honey was produced thanks to wooden *cups*, *hods*, *crates* or *plank hives* in which the beehives were located. The first two were hollowed out logs which were arranged horizontally, on a slight slope; the latter two were quadrangular structures made from planks, arranged horizontally (*crates*) or vertically (*hives*). These elements were arranged in local non-mortared dry stone with a side access for maintenance and an exposed south side in which the hives were placed. On occasion, with the objective of protecting the honey from any animal incursions, perimeter enclosures were erected around the beehive that were sometimes more than two metres in height at the top of which was a protruding canvas layer intended to make improper access even more difficult. Their spatial access indicates that they were typically connected to farmhouses and agricultural or livestock spaces not too far from rural nuclei, although

we preserve some specimens which are clearly located in areas of forest exploitation at a certain altitude (alongside pollards and charcoal piles). Establishing a chronology for this kind of architecture is complicated because it experienced constant modifications through time; although in some cases the oral and documented sources establish a more than two-hundred-year-old continuity in space and function.

For its part, the supply of and trade in snow and ice is represented in two circular stone structures, whose disparate diameters seem to indicate domestic production for the smaller element in Siskiño (300 cm in diameter) and more intensive professionalised exploitation in the icebox in Murua (800 cm in diameter) (Figure 6.8). Although traditional forms of snow usage for storage, transportation, delivery and use as ice are known since antiquity, and they continued to a greater or lesser extent through different historical cultures until the nineteenth and early twentieth centuries, when snow and ice production became more industrialised, its manufacture and consumption became more widespread at all socioeconomic levels; in other words, it began to be more a part of regular daily life in the sixteenth century and reached its peak in the seventeenth, eighteenth and much of the nineteenth centuries, to later decline and disappear progressively between the late nineteenth and early twentieth centuries (De Planhol 1995). There are various reasons for the boom in snow and ice production during the modern era: its complete acceptance for medicinal purposes, especially in combatting fevers, to relieve congestions of the respiratory system, to reduce inflammations, to alleviate pain resulting from fractures and burns and to stem haemorrhages; the popularisation of consuming cold drinks, ice creams and slushies in festive contexts and during social gatherings; and a favourable climatic framework termed the *Little Ice Age*, which coincided fully with the boom in these fabricated structures (Cruz 2005; Fagan 2008).

The relative proximity of the city of Vitoria-Gasteiz, which had its own iceboxes in the High Mountains of Vitoria but which were never sufficient to supply the whole population, encouraged the search for ice in the surroundings of Gorbeia and Oketa from at least the mid-eighteenth century on, and it is against this background that we should contextualise the icebox in Murua, which would in winter store the copious amount of snow originating in the most important surrounding levels (1000-1400 metres) to be distributed in the spring and summer amongst the towns of what today is the municipality of Zigoitia and the city of Vitoria-Gasteiz itself, at a preestablished price.

Historical transformational centres documented in the municipality of Zigoitia rise to 124 elements, which implies 11.5 per cent of the total Survey Units. Due to their number (95), limekilns stand out. They are very recognisable installations of 300-350 cm in diameter and a similar height (known thanks to the archaeological excavation of several specimens) which were dug into the ground itself, on a slope, leaving an access corridor and tunnel and a food supply on the most exposed side. Generally speaking, these were not stone works, although we have been able to detect masonry around the perimeter. The concave base usually has a ring and, occasionally, putlog holes which serve to build the limestone vault



Figure 6.8. A) Hut (*choza*, *cabaña* or *txabola*) serving as temporary shelter for many inhabitants of the forest; B) ice house with circular stone structure; C) limekiln with putlog holes.

that must be fired to obtain the powdered lime (Figure 6.8). The settlement pattern of these small family industries was repeated, quite close to the inhabited nuclei and near streams or natural springs and vegetal fuel. They were also installed in places close to local communication routes. The contiguous presence of limestone seams was not as decisive as this material could be transported over several kilometres if necessary. Far from being a surprise, we have come across similar customs in other places around the Basque Country. Although it was not a professionalised activity, in the modern age lime was used a lot in the rural environment, especially during the eighteenth, nineteenth and early twentieth centuries, in hygiene, construction and agriculture (in order to combat acidity and soil depletion through liming) (Burgi *et al.* 2008). In any event, it is quite complicated, in archaeological terms, to establish precise chronologies beyond knowing when they were abandoned definitively, for which purpose depreciated deposits and/or their subsequent uses as rubbish dumps are analysed (Martínez 2015). The abandonment of these small kilns coincided with the push towards large factories in constant production during the early twentieth century, in face of which they could not compete (Ibáñez *et al.* 1992).

It is precisely in relation to the chronology and use of these kilns that an interesting debate has emerged, because some researchers contend that most limekilns were used originally for producing iron in the Middle Ages (by means of *haizeolak* or pre-hydraulic foundries) and only in recent times were they devoted to limestone calcination. The experience accumulated through the documentation scrutinised in numerous geographical and chronological spheres, alongside several specific cases analysed archaeologically, lead us to disagree with this theory. Nevertheless, we believe that each case should be evaluated after undertaking exhaustive archaeological interventions. Meanwhile, the presence of limestone blocks in the vicinity and/or visible ferric scoria is an initial factor which helps to define the historical trajectory of the installation.

Although there are already monographs about the preindustrial centres related to hydraulic energy (Palacios 1998; Martín 2002), the oral sources consulted have indicated the presence of twelve flour mills, one likely foundry (Figure 6.9), a sawmill and a small hydroelectric plant which have not been catalogued in the patrimonial databases of the Basque Government and the Provincial Council of Álava. As is usual, the infrastructures preserved in the flour mills should be consigned to the eighteenth and nineteenth centuries, although according to the documents the mill could be dated even further back some centuries. Both the sawmill and the hydroelectric plant date to the early twentieth century. As regards the sawmill, it is possible that its roots extend to the medieval era, but we should wait for a future specific intervention to contribute corroborating data. Finally, we cannot forget a small kiln for ceramic construction material that is preserved alongside several limekilns to the North of the expanse of Okarantza. In a similar way to the limekilns, the geographical dispersion of the tile kilns was conditioned to a great extent by the presence of productive resources: streams or natural springs for providing water (moulded), vegetal elements for fuel and areas of clay extraction and sand in order to shape the pieces. As explained in other works (Rodríguez 2020), the interesting fact about these centres is that they point to a progressive process of replacing traditional medieval construction materials with other more typically modern ones, more in tune with architectural and urbanistic advances in matters of safety, comfort and health (brick, tile, paving stone, pipes, guttering, and so on, which would replace mainly wooden structures).

Water was also a source of life for domestic, livestock and agricultural supply. A total of 69 natural springs which have been collected artificially have been identified, some of which feature troughs for animals and traditional laundry sites. Where they exist, they are simple stonework architectures which collect the water flow in a catchment tank. In spite of their simplicity, they are strategic points which were well known by people who traversed the mountainous areas. Continuing with source water, Zigoitia has been essential for the contemporary hydrologic supply for Vitoria-Gasteiz. Initially water was taken

from several natural springs during the second half of the nineteenth century and transported by cast iron pipes to the deposit in El Campillo, 20 kilometres away. This supply improved in the 1930s thanks to two small reservoirs or deposits in the course of the River Zubialde (Elejalde & Ulibarri 2007). With agricultural and livestock aims, we have identified 16 artificial ponds which were filled thanks to nearby natural springs or, simply, the addition of rainwater.

Continuing with extraction activities, and thanks to the tireless efforts of Javier Castro and the Abadelaqueta association, in Zigoitia there has been cataloguing of 45 areas of exploiting millstones (*grindstones*) with no less than 120 stones of different sizes (45-160 cm in diameter) preserved in three distinct phases of execution (Castro 2018) (Figure 6.9). All the *grindstones* are made of very good quality sandstone, from the Early Cretaceous geological period, the best kind of rock to be used in flour mills. The preliminary studies suggest that some of these quarries were active from the second half of the ninth century until the mid-twentieth century. In spite of the economy generated by this artisanal occupation, the gradual decline of the profession began in the mid-nineteenth century and has fallen into oblivion today. Beyond the points of exploitation, generally in the open air (simple straight front, several sides or taking advantage of scree-rivers of blocks), the activity required roads to transport the manufactured stones and seasonal shelters for the stonemasons, elements that have been able to be identified, as already noted. There are also some examples of quarries of stone for construction (Figure 6.9), areas of sand or clay extraction and, chronologically contemporary (second half of the nineteenth century and early twentieth century), surface mining samples and underground galleries of passages in order to search of minerals. On two occasions, they were accompanied by aerial cables to transport the extracted material.

With a religious and/or funerary aspect, there has been documentation of intersections associated with historical byways, commemorative steles, possible locations of shrines hitherto not included in the available patrimonial catalogues, tumulus concentrations which have been difficult to interpret until the undertaking of specific archaeological interventions, crosses that used to mark hills and strategic heights, in which Christian religious symbolism was blended with more mundane desires to obtain good crops and harvests. Lastly, there is a small group of sarcophagus covers which form part of the medieval parish necropolises and which were reused in more recent eras to construct enclosed smallholdings, placing them upright.

Although it was not amongst the original research objectives, the significant presence of material remnants related to the Spanish Civil War of 1936-1939 (92 PUs; 8.6 per cent of the elements identified) and the major trauma this implied for these rural communities in Zigoitia, both as regards the armed conflict and the later establishment of the Francoist dictatorial regime, encouraged the taking into account of several preserved wartime landscapes. We relied, moreover, on the collaboration of Josu Santamarina, a specialist archaeologist in this subject matter who was undertaking research which should result, in the near future, in a doctoral thesis. Chronologically, they are well secured remains, and they serve moreover as references *ante quem* with which to date relatively other traditional structures which have been affected by them.

During the early months of the military conflict after the coup d'état in July 1936, Zigoitia became a *no man's land* in which wartime skirmishes and reprisals against the local civil population on the part of both sides were frequent (Aguirregabiria 2014). Between November and December 1936, the Basque Army and Republican militias launched a major offensive on this area, with the objective of taking Vitoria-Gasteiz and then advancing on the logistical hub of Miranda de Ebro, with both towns in the hands of the rebels. This Republican military manoeuvre was also an attempt to break the Francoist ring of control around Madrid, forcing troops to be diverted from there towards the North. What became known as the Battle of Villarreal ended during the last days of 1936, with many losses and little success.

From then on and until the fall of the Álava Front in April 1937, Republican troops fortified their positions in the high mountains of the northern part of our area of study (in Oketa, at a level over 1000 metres), while the Francoist forces dug in around the towns in the south of the municipality and their nearby hills, creating the so-called Zestafe-Nafarrate Line (Salgado 2007; Aizpuru 2008).

The Republicans established successive zig-zag lines of trenches, marksman positions, pillboxes, bunkers and auxiliary buildings around Mount Oketa (Figure 6.10), whose fortified summit was a place which is still, today, startling and in which several archaeological test-pits were carried out in July 2020 under the direction of Josu Santamarina and with the participation of the authors of this paper and the Abadelaqueta association. In general, the Republican side used local sandstone masonry in their constructions, in turn making new use of herders huts, pens and livestock corrals, grottos, stone exploitations (Figure 6.9) or the stonemasons huts themselves. One should also mention the use of a chasm in the setting of Siskiño in order to control a Disciplinary Battalion made up of people with criminal charges against them or whose adherence to the Republican cause was under suspicion who, amongst other infrastructures, carried out forced labour on the so-called Red Way (*Camino de los Rojos*), a road running through the forest which was never finished but which attempted to link Oketa with the rear-guard locality of Ubidea, in order to move troops and arms (Tabernilla & Lezamiz 2004). An aerial cable was also built, along the lines of that used in mining operations, with the function of supplying and transporting war material, and the concrete foundations and metal nuts and bolts used to anchor the towers from which the transport cables reached out have been preserved to this day. Another site that has been worked on extensively through archaeological methodology is that of the Ketura pillboxes, on the frontline, in which there still remains today graffiti made by the Republican militiamen who built the concrete shelters (their names themselves, the battalions, their political affiliation, symbols, dates, etc.) (Santamarina 2018).

The Francoist positions also present local masonry in the part made up of trenches, but the concrete pillboxes that dot the trench lines and the marksman positions are very recognisable because the material with which they were made was more typical in Francoist defences than in those of the Republicans, in which, with some exceptions local non-mortared stonework predominated. Within the defensive lines and in the space between them it is typical to find bullets, shells, mortar shells and munition from aerial bombardments. Logically, some of these remains require the immediate presence of police technicians in order to deactivate them. The spaces of memory linked to the Spanish Civil War are varied and complex. In the setting of Iñarbaltza, very close to trenches of the Francoist side next to the village of Zestafe, there is across which remembers the figure of Alejandro Linati Bosch, an official from Catalonia who died at the Battle of Villarreal. His family erected the monument after the war, and it was used as another element of political and religious propaganda. Nowadays, it suffers



Figure 6.9. A) Possible foundry-forge that was not catalogued before the archaeological survey; B) one of the many millstones (grindstones) documented in the inspection, preserved in the quarry. It was never used; C) stone extraction quarry in Oketa, reused as a refuge and military checkpoint during the Spanish Civil War.

periodic attacks by unknown persons who consider its continued existence to be a glorification of the old dictatorial regime.

The occupation and exploitation of a territory is articulated necessarily through a road network which links towns, people, products and ideas. We have identified up to 118 elements related to traditional byways (11 per cent of the total). Once the different stretches have been identified via archaeological survey, the analysis of byways demands an intense effort following publication, aided by cartography, orthophotography and LIDAR layers, since when it comes to more historical highways, the roads are more discontinuous and, what is more, the different routes were transformed many times according to particular historical periods, specific objectives and the means of transport available. Moreover, one must take into account the fact that the routes are sprinkled with other significant elements: fords and bridges (in the form of upturned arches and horizontal wooden platforms supported by stone buttresses on the edges); boundary markers and historical woodland which delimited the route (whose dating helps to locate the context of the byway); crosses and intersections at crossroads; and shrines and small chapels.

There are long-distance routes: for example, the three roads which connect the Álava plains (Llanada alavesa) to Vizcaya and the Cantabrian passes through the territory of Zigoitia and its towns, using the mountain passes of Altube, Barazar and Urkiola (Figure 6.10). These connections are home to cobbled roads and the larger historical bridges and, in the case of the *via Zatica*, it is documented in written form as related to the San Vicente de Acosta Monastery in the late 9th century (Portilla & Azcárate 1995). In any event, these early medieval routes became as a general rule more important vehicular (carriage) highways or more modest bridle paths through the late medieval and modern ages, presenting constant repairs and reforms which are attested to by the bridges preserved, whose materials we can locate to around the eighteenth century (Palacios 1998). Thanks to the presence of an unaltered ford on the rocky bed of a stream, we have even been able to capture wheel marks measuring 120 cm in length between the carriage axles.

Most of the traditional byways connect nearby towns, with road platforms that have never been paved, except when they have coincided with the great trade routes already mentioned. On many occasions, discontinuous routes have been affected by contemporary local trails and roads. But we want to call attention, within this local network, to the 'lost forest byways' which used to connect towns with forest, livestock and (basically stone and mineral) high-altitude mining exploitations, winding along the contour lines (Figure 6.10). They are easily recognisable because they present concave sections excavated in the ground without any stonework at all and usage platforms always less than 150 cm, which points to use by livestock herds, small narrow carriages and *narrias* (sleighs with no wheels).



Figure 6.10. A) Military trenches and auxiliary buildings on top of Mount Oketa; B) remains of the paved road which connect the Álava plains (Llanada alavesa) to Vizcaya through the territory of Zigoitia and its towns, using the mountain pass of Barazar; C) one of the 'lost forest byways' which used to connect towns with forest, livestock and (basically stone and mineral) high-altitude mining exploitations.

There were, however, some exceptions, such as the well-known Red Way (*Camino de los Rojos*), which was used for military purposes during the Spanish Civil War, and the Oil Company Way (*Camino de los petroleros*), which was constructed in the mid-twentieth century in order to access the mining deposits in Soliño and the northern face of Mount Oketa.

### **Final discussion**

As we have seen, this research project on archaeology and forest patrimony in the municipality of Zigoitia has exceeded its initial expectation, which was to achieve greater knowledge of the historical landscape of a strongly orographic territory and develop some intervention techniques adapted to the specificity of the case study. We sought to fill in as far as possible a gap in the archaeological studies carried out in wooded and mountainous environments, in which the most characteristic material elements preserved are related to the lifestyles of a rural community which has exploited to the maximum the resources in its surroundings. Although initially the plan was an intensive study of a significant but reduced area (4 km<sup>2</sup>), the encouragement of the local population (especially the Abadelaueta ethnographic association) and the support of provincial and municipal institutions led to an extension of the focus of research to the whole municipal territory, incorporating 100 km<sup>2</sup>.

The identification, characterisation and analysis of more than 1000 significant elements puts us in a privileged position to interpret how everyday life developed for those communities outside the rural nuclei and their immediate surroundings, in distant spaces in which there has been a predominance of land use linked to forest, livestock, mining and so on, uses which have coexisted through time follow different and changing organisational patterns which have not always been tranquil. The exploitation of resources implies planning, appropriation and, in general, a form of living on and perceiving the domesticated territory, and that is reflected in areas of seasonal occupancy, religious symbols and demarcating elements. Furthermore, we have been able to recover a whole series of 'uncomfortable' material elements related to the Spanish Civil War.

With this text we attempt to explain the potential of studies of mountainous areas, which to date do not match in number those archaeological works focused on kinder landscapes. Ultimately, they are all related to one another. In this sense, we want to bring to the archaeological sphere a range of material elements which are still typically defined as ethnographic, stripping them of historical depth and thereby preventing their incorporation into studies of past cultural landscapes which we consider necessary. The experience accumulated has shaped certain strategies of action which we hope may be useful for other studies carried out in other places. For our part, beyond the methodological tools demonstrated, if we are proud of anything in this project, it is the protagonism embraced by the local society, which has controlled all aspects of the process of research and transmission.

To conclude, we want to influence the patrimonial study processes that are being carried out. The identification of elements and significant areas has multiplied by five the patrimonial inventory of a municipality in which there was knowledge of 75 groups of archaeological patrimony and 121 of constructed patrimony, most of them concentrated in the population nuclei. Besides these, there were records of some megaliths, fortified habitats or prehistoric workshops, ancient shrines and abandoned medieval settlements. In contrast, the new elements and areas of interest (1071) are concentrated precisely in spaces which were 'emptied' of any cultural patrimony and 'loaded' only with environmental value (legally recognised as a Natural Park) which reinforces the mistaken notion of a pristine, primitive and unaltered territory. Clearly, this is not a question of undermining the splendid natural foundations of Zigoitia, but of including cultural possessions in administrative and planning policies which are being carried out today without taking them into account. In sum, this is about implementing an already existent legal notion of landscape but which has had to date little effective repercussion (Abella 2016).

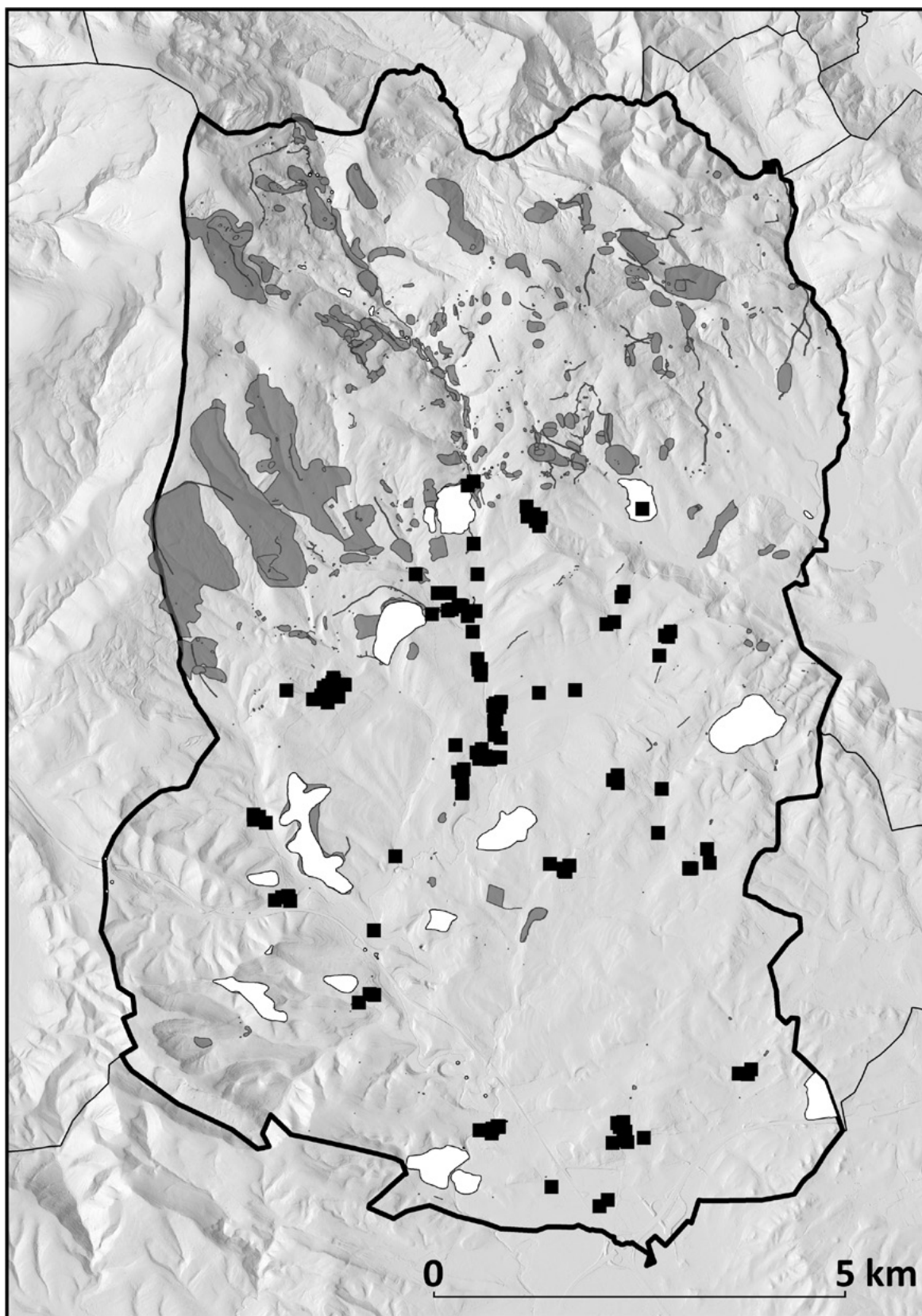


Figure 6.11. Comparative map between known archaeological elements (white polygons), known architectural elements (black squares) and the new documented elements (grey polygons).

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# Agrarian Archaeologies in the Basque Country. Long-term agrarian landscapes and practices in a social context

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## Summary

The main purpose of this work is to make a critical balance on the archaeology of landscapes and the cycles of agricultural production in the Basque Country, based on the experience of the research group on Heritage and Cultural Landscapes of the University of the Basque Country (UPV/EHU). The chapter is structured in three parts. First, the emergence of this line of research is analysed in a historiographic perspective, exposing the different theoretical approaches, methodologies and topics that have been addressed. Second, two case studies are presented to illustrate the main lines of research developed, over the last years, by our research group: a) the artefactual dimension of the agricultural production spaces through the analysis of terraced field systems; and b) the construction and transformation of agrarian landscapes in the long term, based on the example of the project carried out in Aizarna and Akoa (Gipuzkoa). Third, new lines of research are suggested for the future, both in terms of methodology and topics, as well as the processes of heritagisation.

## Keywords

Agency; Local societies; Seles; Terraces; Long-term approach; Uplands; Forests; Ecological History; Biomarkers; Environmental history.

## Introduction

Although Jean Guilaine was not the first author to use the term, we owe to this prehistorian the definition of an Agrarian Archaeology as a well-defined line of research. This was, indeed, the title selected for a collective volume edited in 1991, with the illustrative subtitle ‘à la croisée des Sciences de l’Homme et de la Nature’ (Guilaine 1991). An ambitious work agenda was proposed in this work, which defined some basic principles: the consideration of landscapes as an archaeological object; the overcoming of the Rural Archaeologies based only on habitational areas; the use of a wide range of different records; an interdisciplinary perspective; a diachronic approach; an attention to the social dimension of agricultural spaces (Guilaine 1991: 19-27). Nonetheless, the concept of Agrarian Archaeology has not succeeded to consolidate in academic circles, especially in the Anglo-Saxon world. For instance, the recent *Encyclopedia of Global Archaeology* includes a number of entries related to various thematic, methodological or theoretical perspectives, but does not use this term or a similar one: ‘Agriculture: Definition and Overview’, ‘Agrarian Landscapes: Environmental Archaeological Studies’, ‘Agroforestry: Environmental Archaeological Approaches’, ‘Agrarian Landscapes of the Historic Period’, ‘Agricultural Practice: Transformation Through Time’, ‘Archaeobotany of Agricultural Intensification’, etc. (Smith 2014). Another good example is the collective project *EARTH: The Dynamics of non-industrial agriculture: 8,000 years of resilience and innovation*, promoted by the ESF, where only one isolated reference to this concept is made in the preface (Anderson, Peña-Chocarro 2015: xii). Paradoxically, and despite the

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centrality of the primary sector in the societies of the past, Archaeology has tended to focus this topic not as a thematic speciality, similar to many others that can be found in the discipline's universe, but rather in a transversal or even implicit manner (e.g., Korstanje, Quesada 2010; Kintigh *et al.*, 2014).

In contrast, the category of Agrarian Archaeology has had a good reception among Spanish archaeologists, especially in studies regarding protohistoric, medieval and modern societies. As a proof of it, some referential publications can be found in different collective volumes (Orejas 2006; Kirchner 2010; Mayoral Herrero *et al.* 2021), research projects (Fernández Mier, Alonso 2016), PhD theses (Narbarte Hernández 2020) or in the activity of research groups like INCIPIT (<https://www.incipit.csic.es/>), Llabor (<https://arqueologiaagraria.wordpress.com>) or ARAEM (<https://grupsderecerca.uab.cat/araem/>). This line of research has received new impetus in recent years, as a result of the increasing attention paid to the historical dimension of cultural landscapes, to the relevance of economic and political practices at the local scale, or to the analysis of particular topics like the resilience, sustainability and governance of agricultural spaces. The relevant work recently published by M. Fernández Mier with the title 'De la

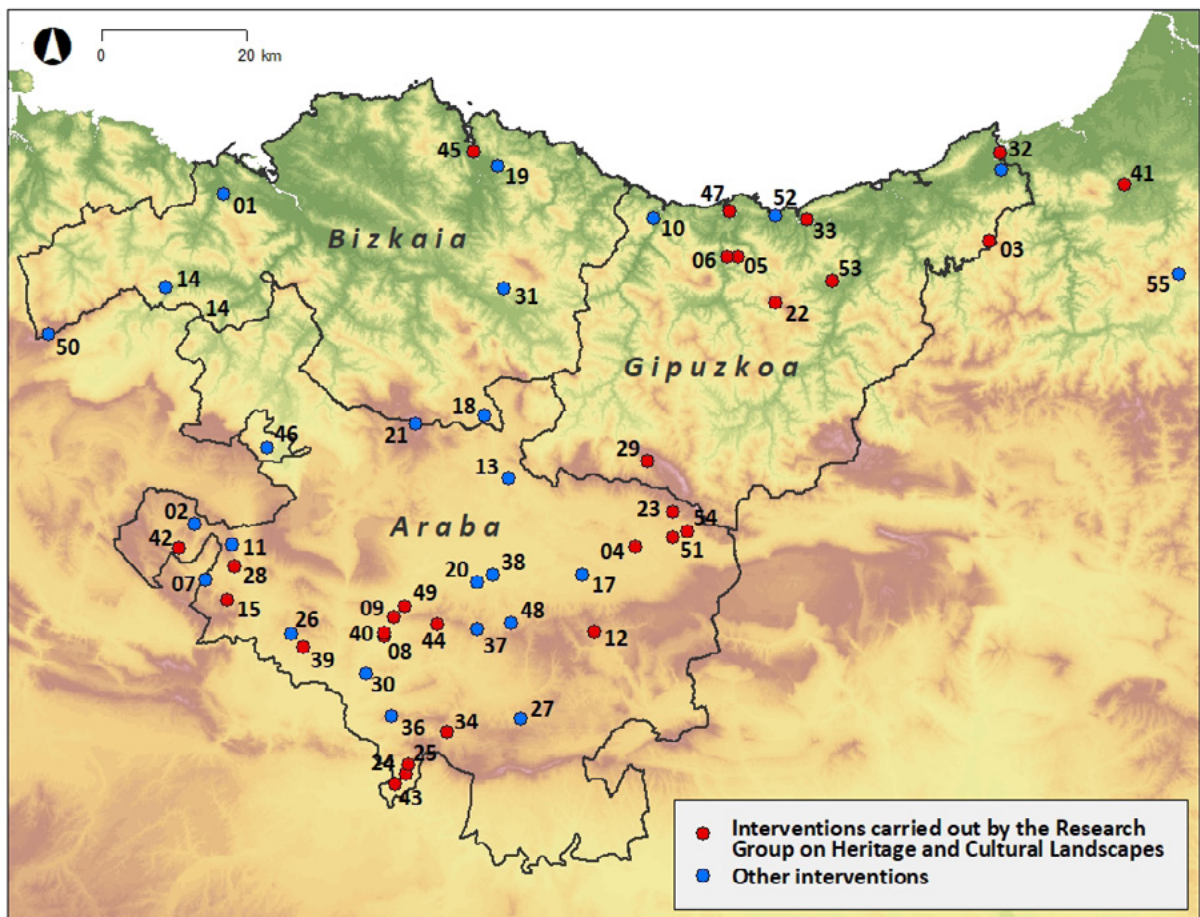


Figure 7.1. Locations cited in the text. 01, Abanto. 02, Acebedo. 03, Aiako Harria. 04, Aistra. 05, Aizarna. 06, Akoa. 07, Alto de Castrejón. 08, Arganzón. 09, Arganzón castle. 10, Astigarribia. 11, Astúlez. 12, Azazeta. 13, Bagoeta. 14, Balmaseda. 15, Berbeia. 16, Bidasoa estuary. 17, Dulantzi. 18, El Limitado. 19, Ereñozar. 20, Gasteiz. 21, Gorbea. 22, Hernio. 23, Idubaltzaburu. 24, Labastida. 25, Labastida castle. 26, Lake Arreo. 27, Las Gobas. 28, Los Castros. 29, Malla. 30, Mavilla. 31, Momoitio. 32, Oiasso. 33, Oría. 34, Pagoeta. 35, Pieza Redonda. 36, Portilla castle. 37, Prados de Randulanda peat bog. 38, Salburua wetlands. 39, San Martín de Lantarón. 40, San Miguel de Arganzón. 41, Sara. 42, Tobillas. 43, Torrentejo. 44, Treviño castle. 45, Urdaibai estuary. 46, Urduña. 47, Urola estuary. 48, Vitoria mountains. 49, Zaballa. 50, Zalama peat bog. 51, Zaldundo. 52, Zarautz. 53, Zizurkil. 54, Zornoztegi. 55, Amaiur.

Arqueología del paisaje a la Arqueología Agraria' exposes some of the main thematic areas addressed over the past years (Fernández Mier 2018). But also the Archaeologies focusing on Protohistory, the Antiquity or the Early Middle Ages have made valuable contributions in the last years (e.g., Ballesteros-Alias *et al.* 2006; Orejas 2006; Mayoral-Herrera, Sevillano-Perea 2013; Grau Mira 2017; Mayoral Herrero *et al.* 2021).

This chapter aims to present a synthesis of the studies carried out over the last decades on the agrarian landscapes and practices of the Basque Country. A long-term perspective will be adopted to this purpose. However, as well-known syntheses of reference and divulgative works have already been published for Prehistory (Iriarte 1995; Iriarte, Zapata 1996; Pérez 2012; Ruiz Alonso 2014; Iriarte 2015), our attention will focus principally on the landscapes of the Historic period. The agrarian landscapes of the last two millennia have begun to be studied systematically only in recent times. Although we aim to present the widest perspective possible, our approach is based on a specific research line developed inside the Research Group on Heritage and Cultural Landscapes of the University of the Basque Country ([www.ehu.es/en/web/culturalheritage/home](http://www.ehu.es/en/web/culturalheritage/home)), complemented with the contributions made by other researchers.

To this purpose, the text is structured in three parts. First, a historiographic approximation will be made to contextualise the emergence of Agrarian Archaeologies of the Historical period in a context of expansion and renovation of the discipline, which will be helpful to understand why some topics have received more attention than others. Second, the methodological, thematic and theoretical trajectory of the Research Group on Heritage and Cultural Landscapes will be presented, emphasising two of the topics addressed by different projects focusing on the comprehension of agricultural landscapes and practices: a) the artefactual dimension of the agricultural production spaces through the analysis of terraced field systems; and b) the construction and transformation of agrarian landscapes in the long term, based on the example of the project carried out in Aizarna and Akoa (Gipuzkoa). Third, some potential lines of future work will be defined, and some general considerations will be proposed as a conclusion.

### **Agrarian Archaeologies in the Basque Country: trends, methodologies, and topics**

#### ***Antecedents: on the wake of Prehistoric Archaeology***

The last third of the 20th century has been a key period for the methodological, conceptual, and thematic renovation of Archaeology in large parts of the Iberian Peninsula, including the Basque Country. Although no historiographic synthesis is available for the moment, it is enough to revise some of the most actualised states of the art to understand the relevance of the work made in these years (e.g., Llanos Ortiz de Landaluze 2009). It is in that context where we find the antecedents of what we now call Agrarian Archaeologies.

In the Basque Country, the first works allocated to this topic were based on paleoenvironmental records, particularly in the areas of Archaeozoology and Archaeobotany. These lines of research have been explored since the 1960s by different archaeologists working on the economies, the vegetal landscapes and the anthropisation of the environment in prehistoric times. Authors like Jesús Altuna, Pedro M. Castaños or Cristina Peñalba, among many others, carried out the first works based on these perspectives, permitting the realisation of multidisciplinary projects, the formation of new specialists (it is worth mentioning the production of M.J. Iriarte and L. Zapata) and the formulation of new work agendas.

Although these authors principally set their attention on prehistoric contexts, they occasionally extended their chronological ranges to cover phases or to analyse sites corresponding to the Historical period. Equally, the resort to Ethnoarchaeology or the study of oral sources has implied the study of more recent phases. Among the earliest examples can be cited, for instance, the works concerning human diet in medieval castles like Aitzorrotz (Altuna 1981), Roman occupations like Aloria (Cepeda *et al.*, 1990-1991), the transformation of vegetal landscapes over the last two millennia (Iriarte Chiapusso, Zapata Peña, 1996), the vegetal macro-remains of the important Roman port of Irun (Peña-Chocarro, Zapata, 1996), the ironworks of Oiola (Zapata, 1997), or the analysis of ‘traditional’ forest management (Zapata, Peña-Chocarro, 1998).

A second research line developed in these years has focused on the realisation of inventories and catalogues of archaeological sites for each territory. Even if the identification of prehistoric sites has been privileged, several elements linked to agriculture and husbandry have been found as well. To cite only one example, the study of high mountain pastures, where megalithic monuments are placed close to the traditional shepherding spaces, has provided significant results in areas like Urbia (Gandiaga *et al.* 1989); this line of research has been further developed in later years (Fernández Mier, Quirós Castillo, 2015).

Regarding the incipient Archaeology of the Historical period, the first relevant works date from the 1990s, based on the study of agricultural and husbandry production areas by means of morphological analyses. The innovative PhD thesis of I. García Camino constitutes a fundamental landmark in the development of this line of research. Inspired in other studies realised in the northern Iberian Peninsula, this author analysed the parcel system of the archaeological site of Momoitio in Garai (Bizkaia), a study that is still referential in the region (García Camino 2002: 115-118). Another field explored in the 1980s and 1990s is the study of the so-called *seles* (‘korta’ or ‘saroi’ in Basque language), spaces individualised inside the common lands in medieval and modern times, which are distinguished by their characteristic circular shape.<sup>3</sup> The first studies in this field were driven in *seles* like Gorostarbe, Mendabio and Altzusta in Urnieta (Gipuzkoa), whose *austarritza*, or central milestone, was excavated with variable results (Agirre Mauleón, 1996; 1997; San José, 1998).

Summarising, the antecedents of Agrarian Archaeologies in the Basque Country developed during the second half of the 20th century through environmental studies, the identification of parcel morphologies and more or less punctual findings in the framework of research projects primarily focusing on Prehistoric Archaeology. Actually, it is only since the beginning of the new millennium when Agrarian Archaeologies have really begun to develop as such, implementing new research methods and reorienting the theoretical bases in social terms, in line with the path marked by I. García Camino and other pioneers of an Archaeology of the societies of the Historical period.

### ***From palaeoecological studies to a social perspective: a ‘new’ Rural Archaeology***

The emergence of a ‘new’ rural archaeology in the Basque Country in the late-20th century occurred in a context of deep transformations experienced by the European Archaeologies as a result of the changes in institutional, conceptual and methodological frameworks, whose most evident trace is the deep impact exerted by rescue archaeology (e.g., Schreg 2014; Stagno 2018; Van Dommelen 2019; Costello 2021)

In the Basque Country, three main factors have determined this transformation. First, the creation of the University of the Basque Country (UPV/EHU) in 1980 originated favourable conditions for the

<sup>3</sup> <https://www.geo.euskadi.eus/seles-geocuriosidad/s69-geocont/es/>

institutionalisation and strengthening of archaeological studies focusing on records of the last two millennia. Second, the implementation of the Basque Cultural Heritage act (1990, 2019) permitted the creation of a new professional sector, new protocols, and a renewed attention on archaeological heritage in a context of strong territorial transformations. Additionally, the Basque Government promoted the redaction of a new archaeological inventory, which is still in constant growth, permitting a widening of the concept of archaeological heritage. Third, as a consequence of it, the Archaeology of the Historical period has been strongly consolidated, characterised by a high degree of experimentation and innovation. In the last decades, increasing attention has been set on a variety of topics: the Archaeology of Management, Urban Archaeology, the Archaeology of Architecture, as well as a myriad of studies focusing on ceramic materials, churches, farmsteads and rural settlements, castles, funerary spaces, etc. Consequently, a huge volume of new archaeological records has been built, permitting to visualise new topics that had hitherto remained unexplored. One of the fields that best illustrate this renovation is, indeed, the study of agrarian practices and landscapes.

The inventories redacted by the Basque Government since the 1990s have permitted to catalogue a large volume of archaeological ‘sites’, areas of archaeological presumption and archaeological interest areas in rural contexts. This new situation has opened a path for their preservation, but also for a systematic intervention both in preventive terms and in the context of research projects. Hence, the archaeological inventories have been completed with new categories and types of evidence, like deserted settlements, farmsteads, terraced field systems, *seles*, landscapes, ‘minor elements’, etc.

It is not possible in this text to make an exhaustive balance of the interventions made over these years, but we would like to highlight some of the topics that have received most attention, based on the experience of our research group.

First, the realisation of preventive and planned interventions in large land surfaces has been an important factor of renovation for the Rural Archaeologies over Europe (Bofinger, Krausse 2012). As these works have provided continuous records on significant portions of entire landscapes, an unprecedented degree of visualisation has been achieved regarding low-intensity domestic-use spaces, cultivation areas, empty areas, hydric networks, pathways, etc., revealing the dynamic and changing nature of rural spaces (e.g., Campana 2018, Catteddu 2017). In the Basque Country, this line of research has been conducted through the extensive intervention on deserted villages of medieval origin, such as Zaballa, Zornoztegi, Aistra or Bagoeta, in the Alavese plain (Figure 7.1). In the last decades, the agrarian landscapes of this region have undergone deep changes as a consequence of the land consolidation policies (e.g. Quirós-Castillo 2012, 2020, Azkarate *et al.* 2011). The reconfiguration of many land plots has modified the morphology of landscape components (way systems, hydric networks, parcels, dedications, etc.) but also the memory of past uses, the micro-toponymy and, in summary, the material traces that are still nowadays recognisable in other neighbouring regions. Consequently, new difficulties have been set on the application of morphological and ethnoarchaeological studies or the use of land survey, which have provided relevant results in other parts of the Iberian Peninsula (e.g. Kirchner 2010; Mayoral, Sevillano Perea 2013; Fernández Mier, Alonso 2016; Grau Mira 2017) or Europe (e.g. Leveau *et al.* 1999). The analysis of deserted villages permits to easily link residential and productive spaces, but also limits the possibility of delimiting and clearly identifying more distant productive areas.

The extensive studies carried out in deserted villages have not only demonstrated the remarkable urban diversity of medieval settlements in the Basque Country, but also evidenced how, during the 10th-12th centuries, relevant changes were operated on them. In Zornoztegi, residential areas were turned into intensively cultivated lands regularly manured with domestic waste. Conversely, in Zaballa, gardens and orchards placed close to the households were completely reconfigured by the realisation of a dense system of terraces and irrigation channels (Quirós Castillo 2009).

In Gipuzkoa and Biscay, where such extensive interventions have not been undertaken, the studies on rural landscapes have focused on the inhabited areas. Attention has therefore been set on the areas of materialisation of the dominant memory and ideologies (García Camino 2002), and especially on the *baserria*, or ‘traditional’ farmstead model, which has been the basis to indagate the evolution of the habitations themselves (e.g., Igartubeiti: Santana *et al.* 2003), but also the agricultural areas and husbandry practices associated to them (Narbarte Hernández 2020).

Second, the Archaeology of medieval towns in the Basque Country has made relevant contributions to the comprehension of the local economies, the consumption patterns and the productive practices of past rural societies. It is relevant to point out that most medieval town foundations were operated on earlier rural occupations. Among many other examples, the studies realised in Gasteiz (Azkarate, Solaun 2013) or Gesaltza Añana (Plata Montero 2020) can be cited. Additionally, these records have recently begun to be complemented with those generated by the intervention in currently inhabited villages and hamlets (e.g., Aizarna, Amaiur, Azazeta or Pagoeta), in line with other experiences realised in the northern Iberian Peninsula (Fernández Fernández, Fernández Mier 2019; Narbarte Hernández *et al.* 2018).

Yet, if these first studies have focused primarily on the habitational areas, attention has since then been progressively reoriented towards a conscious and intentional analysis of agricultural production areas. Among many other examples, we can cite here the preventive works carried out in the terraced field systems of Santa Juliana de Abanto (Varon *et al.* 2013) or in the Rioja Alavesa region, in the sites of Torrentejo (Quirós Castillo, Nicosia 2020) or Pieza Redonda (Rodríguez, Martínez, 2015). Parallely, the detection of terraces and other kinds of earthworks has permitted a re-delimitation of around 100 deserted villages through different projects promoted by the Basque Government.

On the other hand, the analysis of habitational spaces provides relevant information on basic aspects of agrarian archaeology, like the consumption patterns; the agricultural practices carried out inside or close to the settlements; or the forms of storage, undoubtedly the most studied topic over the last years. The heuristic nature of the storage systems has been recognised by many authors, due to their capacity to enable the analysis of agrarian practices, as well as the political and social dynamics of both political and moral economies (Wolf 1966; Halstead 2014; Balbo 2015; Manzanilla, Rorhman 2016; Bogaard 2017; Prats *et al.* 2020a, 2020b). The works carried out in the Basque Country have focused on the study of the forms of surplus accumulation by local elites or churches (e.g., Alfaro *et al.* 2017), the risk management strategies of the peasant communities (Quirós Castillo 2013), the social mobility (Quirós Castillo 2020b) or the interpretation of domestic spaces (Azkarate, Solaun 2013).

Another aspect that has been indagated through the study of domestic spaces and metallurgic production areas is that of agricultural implements. The combined study of a number of silex and iron objects found in Roman, medieval and modern sites in the Basque Country has shown a much more complex reality than expected. The finding of silex sickles in late Roman contexts or the unexpected abundance of iron objects in early and high medieval villages suggests that, in contrast with the dominant paradigms, Basque peasantries had access to a discrete number of agricultural, husbandry or artisanal iron tools during the Historical period. Additionally, the contexts of consumption are complemented with the studies realised in many forgeries, principally found in Bizkaia and Gipuzkoa (Larreina, Quirós Castillo 2018; Franco *et al.* 2015).

But, beyond strategies and methodologies, one of the main features of all these archaeological interventions is the use of social interpretative frameworks, which acknowledge the relevance of a diversity of subjects and agents: peasant communities and groups, seigneurial powers and other elites, urban societies, etc. In this manner, the archaeological record has gained increasing relevance within

the Great Narratives on the medieval, modern and contemporary societies of the Basque Country, even if it still remains largely unexploited. A second factor that is worth to highlight is that these 'new' Rural Archaeologies have permitted to reconstruct dense, complex, and multidimensional archaeological records, paying special attention to the so-called Archaeological Sciences.

### ***The Archaeological Sciences and the Agrarian Archaeologies***

The centrality of experimental sciences to contemporary archaeologies is a global phenomenon and has been described by many authors. At present, their increasing and even hegemonic presence has generated some frictions between the 'enthusiastic' researchers that claim for their use as the beginning of a new epistemological phase (Kristiansen 2014) and the sceptical ones, who question the empirical and irreflexive dimension that is associated to their working horizon (Sørensen 2017). Some authors establish a causal nexus between the increasing scientific complexation of the archaeological practice and the theoretical poorness of the resulting archaeological narratives (González Ruibal 2014), while others argue that archaeological science is agnostic in theoretical terms or, actually, that it is making relevant contribution to this field (Martíñón Torres, Killick 2015). For instance, the recent advances in the study of paleoenvironmental records have replaced the ecological and economic optics of the previous decades with a diversity of interpretative perspectives. Similarly, the studies on the provenance of archaeological materials have led to overcome the diffusionist models and build more complex narratives (Martíñón Torres, Rehren 2016).

But, beyond these necessary debates, what is out of discussion is the fact that the multiform universe of Archaeological Sciences is contributing to a deep renovation in the gathering and interpretation of archaeological records of the Historical period. Even if the integration and discussion of these new information is partial and imperfect, there is no doubt that the process is irreversible. Consequently, a solid environmental history has begun to consolidate in the framework of increasingly interdisciplinary studies, enhanced by a progressive inclusion of experimental sciences in the historical and archaeological narratives (e.g., Izdebski, Mulryan 2018; McCormick *et al.* 2012).

This scenario has also conditioned the emergence of Agrarian Archaeologies in the Basque Country and, more generally, in the northern Iberian Peninsula. Two factors can be cited. On the one hand, the creation of interdisciplinary projects, which has encouraged the study of records and topics hitherto marginal and relegated to mere appendixes or highly specialised works. On the other hand, the realisation of specialised thematic studies through the formation of new researchers. Summarising, the increasing alphabetisation of the archaeologists working on Historical societies in the use of paleoenvironmental studies or archaeometry has transformed those that used to be considered as 'auxiliary disciplines' into the core itself of the discipline's ontology.

The results of archaeological interventions on historical contexts of the northern Iberian Peninsula remains unpublished to a high extent. The number and entity of the published monographs resulting from archaeological projects is very limited, especially when compared to other European traditions. Nevertheless, after the seminal monograph on the Peñaferruz site in Asturias (Gutierrez González 2003), several collective volumes have been edited in the last years, incorporating more or less systematically, and from inter- or multidisciplinary points of view, the contributions of an increasing number of specialists. Among these works, we can cite the examples of Zarautz (Ibañez Etxeberria, Sarasola Etxegoien 2009), Zaballa (Quirós Castillo 2012b), the Cathedral of Vitoria-Gasteiz (Azkarate, Solaun 2013), Ereñozar (Neira 2018) or Zornoztegi (Quirós Castillo 2019b). In all these works, relevant contributions have been made on the production and consumption patterns of agricultural products, the husbandry practices, the storage systems and, occasionally, the spaces of agro-pastoral production.

These specific subjects reveal how the research lines proposed by Agrarian Archaeologies have been progressively consolidated, providing increasingly complex interpretative frameworks.

In a first moment, these works were achieved by specialists in Prehistoric Archaeology. However, the pass of time has created the conditions for the formation of a new generation of researchers who have either centred their activity in specific problems of the societies of the Historical period or acquired a multi-chronological and transversal profile. The latter approach, along with the increasing hegemony of the paradigm of experimental sciences in Archaeology, may also have had an unexpected negative outcome, that is the risk of sectionalisation and creation of sub-disciplinary micro-communities that dilute the holistic character of the archaeological interpretations. In fact, the main reason for the existence of Agrarian Archaeologies is the necessity to analyse past societies through the innovative integration of a wide range of records, approaches, and perspectives on a social basis, articulated around the study of productive activities within pre-industrial societies. The key idea, in short, is to explore the double humanistic and experimental ontology of the archaeological episteme until its last consequences.

This is the main reason why our research group has potentiated the first model: the formation of new researchers in paleoenvironmental disciplines such as Archaeozoology, Archaeobotany, Geoarchaeology, or Isotopic Geochemistry, based upon a solid humanistic basis and seeking the convergence of both perspectives. Of course, this position has entailed a number of difficulties regarding the acquisition of specialised formation; the access to adequate materials; the dialogue with the interpretative frameworks previously established by other historians and archaeologists; and, generally, the overtaking of the margins of sub-disciplinary micro-communities. Hence, this strategy has been aimed at overcoming the frictions provoked by the integration of the new paleoenvironmental records within the historical narratives, building new documents oriented to specific historical topics and establishing collaboration agreements with other laboratories and specialists. In the medium term, it will be possible to blur or beat the watertight compartments and the rooted habits inherited from past times.

One of the fields in which this line of research has been more productively applied is the analysis of agrarian landscapes through the study of archaeobotanical proxies. The studies focusing on the Historic period have experienced a significant multiplication due to the availability of a large volume of data generated by paleoclimatologists, geologists or botanists, the improved resolution of radiocarbon dates, or the increasing attention paid to topics like past climate changes, the transformation of the agricultural landscapes, or the agency of different social groups. Bearing in mind the geographic and socio-political diversity of the last two millennia along with the formative characteristics of the deposits, it is not always simple to elaborate territorial syntheses based on pollen records. Nevertheless, some interpretative essays have been published over the last years on some specific periods, or areas like the Iberian Peninsula and the Mediterranean (e.g. Riera 2008; Luelmo Lautenschlaeger, López Sáez 2017; López-Sáez *et al.* 2018). In the Basque Country, some detailed studies have permitted not only to increase the critical corpus of evidence, but also to integrate them in the analysis of the social transformations linked to historical landscapes. Among many other works, we can here cite the PhD thesis of B. Hernández Beloqui, the first one specifically dealing with the study of these societies. Analysing the records of Zornoztegi, Aistra, Treviño and the Salburua wetlands, this researcher explored the variations in the medieval agricultural landscapes of the Basque Country, confronting them with the general context of the Iberian Peninsula (Hernández Beloqui 2005). Other valuable contributions have been made by authors like S. Pérez Díaz, who has studied the sequences of Prados de Randulanda, Fuente del Vaquero, Zalama or Gasteiz; M.J. Iriarte, in Zarautz, Aistra and other sites; or the groups that have studied the relevant deposits of Lake Arreo in Araba (Iriarte Chiapusso 2013; Pérez-Díaz, López 2014; Corella *et al.* 2013). These works have permitted to overcome some classical characterisation of the landscapes and agro-pastoral practices of the Roman, medieval, and modern periods, and have also pointed out specific topics like the resilience, the agency of subaltern social groups, the impact of past climate changes and

other natural disruptions, etc. Other paleoenvironmental records remain unexplored, like speleothems or the isotopic measurements of vegetal macro-remains.

Another field of development has been the study of the forms of woodland management and exploitation. Woodlands can be conceptualised as a bio-artefact, created, maintained, and managed in social terms (Rackham 1976; Moreno 1990). Even if some works existed on this topic based on either written sources (Díaz de Durana 2001; Aragón 2001), the archaeological study of forgeries (Zapata Peña 1997) or ethnographic surveys (Zapata, Peña Chocarro 1998), the extensive interventions practiced by our research group have permitted the recuperation of a set of anthracological materials of medieval chronology. The recent PhD thesis of Riccardo Santeramo is the first explicitly dedicated to the study of this kind of materials in such contexts. This work has analysed the materials recovered in Aistra, Zaballa, Zornoztegi, Treviño and San Miguel de Arganzón, from a triple perspective. First, the transformations of wood resources and arboriculture during the Middle Ages, which has made relevant contributions in terms of chronology, paleoenvironments and resource uses. Second, the different forms of forest governance, inferred through the materials recovered from different archaeological sites. This perspective has shown the importance of wood defences, the impact of ‘cerealisation’ from the 10th century onwards, the forms of resource appropriation, etc. Third, the agency of different social groups, with a very strong connection between the process of feudal seigneurialisation and the changes in the forms of woodland exploitation (Santeramo 2020). Other research projects, like those carried out in Gasteiz or in several forgeries, have highlighted the strong relationship that exists between metallurgic activities and woodlands (Zapata, Ruiz 2013). Summarising, these works are contributing to define the political and economic patterns of past societies from new perspectives (Ruiz 2015).

A third field of application for this strategy has been Archaeozoology. This speciality has a long-lasting trajectory in the Basque Country, which is recognised by several authors as a referential territory at the scale of the Ibarian Penintsula (e.g., Moreno 2013). Despite the number of recent publications based on case studies or works realised on the documentary sources, no work had hitherto explored, from a social and economic perspective, the husbandry practices and the consumption practices based on the material record. These have been the central axes of Idoia Grau’s PhD thesis. Based on the faunistic remains of seven late Roman and medieval contexts, as well as the revision of one hundred previous studies made on the Iberian Peninsula, this researcher has carried out several studies in the fields of taphonomy, taxonomy and biometry, with the purpose of understanding the evolution of this productive activity in the Basque Country and its context. These works have unveiled basic aspects of the medieval economies, including both the peasant logics — founded on diversification, the secondary products and the implementation of a mixed farming — and the seigneurial ones, through the study of the consumption patterns among the elites and the forms of rent exaction. Equally, the diachronic study of these processes has permitted to assess the transformations of husbandry in the long term, analysing processes like the agency of medieval peasantries, feudalisation, the high medieval agrarian intensification, the emergence of small towns, or the increasing specialisation of the rural economies during the Late Middle Ages. The biometric studies have also shown that the reduction in the size of domestic animals is a key factor to understand the transformations of the husbandry practices, but also of agrarian landscapes as a whole (Grau Sologestoa 2015). As a complement, the analyses of stable isotopes in the faunal remains have permitted to understand, in a more detailed way, the relationship that exists between landscape transformations (e.g. changes in the uses of wood defences from the 11th century onwards, summer pastures, etc.) and the consumption patterns.

Indeed, the implementation of C and N stable isotope analyses on human remains has been made one decade ago by means of a collaboration agreement established with the University of the Campania Region, and later with other research centres. Like agriculture, human diet is a common topic in archaeological research, even if it is frequently addressed implicitly and rarely constitutes an explicit

line of research by itself (e.g. Kintigh *et al.* 2014). Nevertheless, the isotopic studies have opened new interpretative scenarios, as it is now possible to analyse the diet of specific individuals, and thus to consider variables like gender, age, identity or social hierarchies. Consequently, this kind of studies have experienced a significant growth during the last years in the Iberian Peninsula (e.g. López Costas, Alexander 2019). Our research group has participated in this project by establishing collaboration agreements with different European research centres and, in a second phase, by forming new specialists. The first studies realised on the Basque populations of the 5th to 15th centuries exhibited a diversity of diet patterns among the rural societies of the region, resulting in a difficulty to propose direct and simple correlations between diet and other commonly accepted markers of social hierarchy (gender, age, funerary objects and objects of personal ornament, location of the tombs, etc.). Additionally, a very marked change in the diet of Basque societies was observed around the 10th century, as a result of the deep transformations experienced by agricultural practices in that period. The social structures of each archaeological site have also permitted to identify different patterns in the consumption of animal resources, being more common in places with a high social status (Quirós Castillo 2013; Lubritto *et al.* 2017).

Two PhD theses have been achieved in our research group based on these works. The PhD thesis of Irantzu Guede has focused on the multi-isotopic studies of the early medieval sites of Tauste (Zaragoza), San Martín de Dulantzi (Araba), Las Gobas (Treviño) and Momoitio (Bizkaia). Her work has permitted to identify the dietary patterns of these populations, but also aspects of residential mobility of some individuals (Guede 2018). The study has demonstrated that only a very limited number of individuals, particularly women, changed residence during their lives. Additionally, some differences have been observed in the diets of Christian and Muslim societies by the Early Middle Ages, even if sex and age differences are occasionally more significant. Finally, it has been possible to confirm the aforementioned dietary changes around the 10th century, which entailed an increase in the ingestion of  $C_3$  with respect to  $C_4$  plants, very consumed in the previous centuries.

The relevance of  $C_4$  plant consumption is one also one of the main results of the recent PhD of Maite I. García, centred in a comparative study of 6th-7th century populations in Catalonia, Madrid, and the Basque Country (García Collado 2020). This is the first detailed work specifically focused on Visigoth populations. As in the previous case, the study has revealed the inexistence of simple correlations between social status and diet, while an important subregional variability has been detected. The consumption of  $C_4$  plants was relevant in this period in the Basque Country, but not in Madrid and Catalonia. Nevertheless, the detailed studies on single individuals have shown notable differences between and inside each community. For instance, Boadilla is one of the rare examples where there is a significant correlation between the consumption of animal proteins and the age (García-Collado *et al.* 2019).

Other topics related to human diet, like the study of charred seeds found in different archaeological sites, have been carried out in collaboration with other research centres. In particular, it is worth to highlight a recent comparative work on the numerous remains recovered from the sites of Zornoztegi and Aistra. The study of more than 8,000 carpo-remains has permitted to outline the diachronic evolution of crops between the 6th and 15th centuries in the Alavese plain. More specifically, a 'producer' peasant community (Zornoztegi) has been compared to an aristocratic consumption site (Aistra), permitting to observe the strong differences in the cereals consumed in both sites (Quirós Castillo *et al.* 2020). The study of carpo-remains also permitted the characterisation of each species, a level of degree that isotopic analyses cannot reach. Additionally, a clear social distinction between both sites has been defined by the study of the productive strategies, the storage systems, and the processing of the different crops. This image can be enriched with the previous studies realised in Gasteiz or Zaballa, especially when

integrated to the archaeozoological analyses, the isotopic studies of human bones, the variations in the agro-silvo-pastoral landscapes and the vegetal macro-remains.

The latest experimental discipline implemented by our research group is the geoarchaeological study of the agrarian production areas. Again, the first step consisted in the collaboration with specialised researchers from other European countries, centred in the realisation of micromorphological, geochemical and pedological studies. These works focused on the medieval agricultural lands of sites like Aistra, Zornoztegi, Zaballa, Treviño, or Torrentejo (Figure 1), revealing the imprints of medieval and modern social practices — maintenance, intensification and extensification, implemented by the peasant groups over the long term — in the construction of the ‘traditional’ agricultural landscapes (Quirós Castillo 2009; Quirós Castillo *et al.* 2014; Quirós Castillo, Nicosia 2019). As all these works had focused on the Mediterranean sector of the Basque Country, the second step aimed at undertaking the study of the Cantabrian region. The recent PhD of Josu Narbarte Hernández, co-directed by J.A. Quirós Castillo and E. Iriarte, has focused on the geoarchaeological study of the agrarian and husbandry spaces of several locations in Gipuzkoa and the Atlantic Pyrenees (Aizarna/Akoa, Sara and Zizurkil; Figure 1), with somehow unexpected results (Narbarte Hernández 2020). The study, based principally on the combination of pedological and geochemical analyses with the study of a wide range of other records (i.e., documentary, ethnographic and oral sources, toponymy, aerial photographs, etc.), has permitted the recognition of some common trends, but also significant differences between the Cantabrian and Mediterranean watersheds. In particular, the Cantabrian communities show a higher resilience than the Alavese ones, especially when their agrarian landscapes are analysed in the long term. From a diachronic point of view, five main phases are distinguished between the recent Prehistory and the present, resulting from a complex interaction between encompassing systems, local communities, environmental changes, and differential productive strategies. Such evidence questions some of the established paradigms of the dominant historiographic narratives, like the pristine nature that medievalists usually attribute to the Early Middle Ages when characterising the ‘origin’ of agrarian landscapes; the impact of the creation of the ‘traditional’ Basque farmsteads in the Cantabrian region during the Modern Ages; or the processes of disarticulation of the common-pool goods in the early-19th century.

Summarising, the implementation of experimental sciences in the archaeological study of agrarian landscapes and practices, based upon the work agendas founded on a social archaeology, has permitted to bridge the epistemological and ontological gap between both approaches.

### ***Beyond cultivated areas: Outlands, Uplands and Forests***

The last years have witnessed an explosion of archaeological studies focusing on outlands, uplands and forests, which, according to Modernity’s pattern of rationality, had traditionally been considered as peripheric or marginal spaces (e.g. Rendu, 2003; Galop *et al.*, 2014; Rendu *et al.*, 2015; 2016; Gassiot, 2016; Durand 2016; Gassiot & Pèlachs, 2017; Palet *et al.*, 2017; Fernández Mier, Tente 2018; Costello 2020). The liberal thought of the 19th century not only enhanced the symbolic and social de-capitalisation of these spaces, but also favoured the dismantling of the ‘traditional’ uses, considered as inefficient and unproductive from an economic point of view. During the 20th century, the logic of Capitalism has promoted new forms of use, like forest monocultures, generating stereotyped representations that oppose the urban-centred Modern cosmivision to a distant rurality that is considered in terms of alterity. In the present post-industrial phase, we assist to an increasing tertiarization of the rural world, promoting an aesthetic vision of its landscapes, as sanctioned by the European Landscape Convention (2000). In this context, archaeological narratives have the potential to generate contra-hegemonic and alternative discourses that may be critical (Alonso 2017; González-Ruibal *et al.* 2018).

The point of departure, as Eugene Costello has recently pointed out, is that concepts like *marginality* or *upland* are contingent, changing and culturally determined. The physical environment does not determine uses or practices, even if it certainly facilitates or prevents social agency. However, it is indeed in those spaces where rural societies exhibit their high capacity of resilience (Costello 2021). On the other hand, outlands, uplands, and forests are indispensable environments for pre-industrial rural societies, not only for the obtention of economic resources that we can consider as ‘complementary’ to the centrality of the agricultural spaces, but also in terms of socio-political practices, construction of shared and exclusive identities, construction of territorialities, forms of domination, creation of social memories, etc. In other words, economic logics are not enough, by themselves, to explain the historical density and relevance of these spaces.

Several factors explain why outlands, uplands and forests have become one of the main topics for Rural Archaeologies in the last decades. First, the traditional Archaeology, defined by academic compartments specialised in specific periods, is being replaced by a new ‘Archaeology of problems’, which acknowledges increasing relevance to the most recent centuries (e.g., Grau Sologestoa, Quirós Castillo 2020b). Second, the exploration of these environments, which had previously remained opaque to the archaeological agendas, has been made possible by the implementation of methodological innovations like the use of LiDAR sensors, the availability of a higher chronological resolution of the paleoenvironmental records, the implementation of Archaeological Sciences, as well as by the availability of new paleoenvironmental records from peat bogs or wetlands (e.g., Carrión García 2013). Third, and most important, Rural Archaeologies have experienced a conceptual and theoretical renovation that has re-defined their thematic priorities and has replaced the site-centred paradigm with that of *continuous landscapes*. Such reorientation has permitted to characterise the socio-economic relevance of uplands and outlands for pre-industrial societies, revealing their heuristic capacity to analyse complex systems of interactions, negotiations, disputes, and conflicts derived from the maintenance of a tense balance in these fragile agro-ecosystems.

In the Basque Country, the studies focusing on these spaces have been addressed through four different, although often converging approaches. First, there is a long trajectory of ethnographic studies. Beginning in the early-20th century, a dense labour of documentation and data gathering has been carried out on the ‘traditional’ lifestyles of Basque people. The work of classical authors like José Miguel de Barandiaran, Telesforo de Aranzadi or Enrique Eguren has been continued by the Ethnographic Atlas of Vasconia, and many of the testimonies gathered by them have been employed in the framework of ethnohistorical and ethnoarchaeological projects (e.g. Peña-Chocarro *et al.* 2003). A second, more specifically archaeological approach has consisted in surveying and excavating high mountain occupations, especially in areas where prehistoric monuments overlap with traditional pastoral areas. Reference has already been made to the pioneering works made in the pastures of Urbia (Gipuzkoa), which have been complemented over time with other studies, among which we can cite in particular the pluri-annual project lead by J.A. Mujika in the Aralar mountain range (Agirre-García *et al.* 2010). A third line of research has been promoted by the Basque Government and by local institutions in the context of the actualisation and ampliation of the archaeological inventories, and the creation of heritage management figures. Mountain forgeries, snow-wells, *seles*, farmsteads, estuarine landscapes, forest environments, etc. have been inventoried in different specific projects, offering new insights on the historical and archaeological depth of ‘minor’ elements or ethnographic evidence (e.g. Rodríguez Fernández 2020). In this context, a ‘Forest Archaeology’ is being formalised, with its first results in the Vitoria mountains, Gorbea, El Limitado, or Aiako Harria (Martínez Montecelo 2020; Bengoetxea *et al.* 2019; Narbarte Hernández & Del Amo 2020) evidencing the historical and heritage richness of woodlands. Additionally, these works converge with previous studies made on the written sources, among which we can highlight the labour of authors like A. Aragón (2013) or R. Díaz de Durana (1986).

The fourth approach includes the line of research promoted by our group, based mainly on a regressive perspective and the integration of diverse records. For brevity, we will here make mention to only two specific projects.

Between 2014 and 2017, our research group hosted the European project ARCHIMEDE (Archaeology of Commons: cultural heritage and material evidence of a disappearing Europe), led by Anna Stagno, which is currently being continued by the project ANTIGONE (Archaeology of sharing practices: the material evidence of mountain marginalisation in Europe). Both projects adopt a holistic perspective for the study of common-pool resources (De Moor 2009), from their double dimension as social practices and management systems. To this purpose, several mountain areas of southern Europe are studied in a comparative perspective, applying the parameters of Historical Ecology and the Micro-Historical Studies, with an emphasis on the regressive analysis proposed by M. Bloch (Stagno *et al.* 2021). In the Basque Country, the mountain areas of the eastern Alaves plain have been addressed — a region where our research group has developed an intense archaeological fieldwork over the last years. The mountain areas that surround the plain are traditionally divided into ‘lower mountains’, placed close to the settlements, and characterised by the presence of wooded pastures and temporary cultures, and ‘higher mountains’, where no traces of temporary cultures are found, but wooded and open pastures are found in areas like the Aizkorri-Aratz plateau (Figure 1). The integrated study of oral and written sources, archaeological and ecological survey — oriented to the documentation of biomarkers or living elements of the landscape — has permitted to analyse the deep transformations of forest and highland landscapes according to a diversity of uses during the Modern period. The project has also permitted to decodify the intricate mechanisms of regulation, confrontation, negotiation, and interaction deployed by local communities and encompassing systems in a space that is only apparently ‘marginal’ and segregated from the ‘Great History’ (Stagno *et al.* 2020). Equally, the intensive studies realised in places like Malla have permitted to document long occupational sequences articulated around husbandry activities, with different degrees of intensity and forms of pasture exploitation (Stagno 2018). Interestingly, this sequence can be correlated to the paleoenvironmental records of the nearby peat bog of Arbarrin (Pérez Díaz *et al.* 2020).

In the case of the Hernio mountain range (Gipuzkoa; Figure 7.1), the archaeological study of the uplands has been articulated around the so-called *seles* or *saroiak* (see 2.1) (Narbarte Hernández *et al.* 2021). These bio-artefacts can be defined as individualised spaces inside the common lands, juridically defined as private goods and subject to a particular regulation that is recognised by the collectives managing the common goods (Etxezarraga, Aragón 2020). Materially documented since the Late Middle Ages, they are of particular interest for the analysis of mountain spaces. First, because they are easily recognisable in both the documentary sources and the materiality of landscapes, due to their circular morphology. Second, because they have been subject to deep functional transformations over time, according to the economic, political and social transformations of the local communities and the encompassing systems. Third, because they have made the object of numerous disputes and conflicts that show the dynamics and the multiple agencies of the different subjects involved.

The 17 *seles* of Hernio, documented since the Late Middle Ages, have been studied from a long-term perspective (15th century to present), integrating documentary sources, toponymy, ethnographic evidence and the archaeological analysis of the landscape. While the former illustrates, in particular, the conflicts, the forms of property and the uses of these spaces, the latter are more useful to decodify the variability of the landscape. Hence, three landscape units have been defined according to their uses, morphology and altitude: 1) high mountain pastures; 2) wooded pastures and degraded forests; and 3) dispersed habitats. The implementation of these methodological approaches has permitted to reconstruct, with a high degree of detail, how rural communities appropriated and managed mountain spaces, and the impact of the liberal policies of the 19th century to dismantle the common goods and

generate new territorial dynamics that are still nowadays clearly recognisable (Narbarte Hernández *et al.* 2021).

In synthesis, the archaeological study of outlands, uplands and forests, carried out from the perspective of Agrarian Archaeologies, is a factor of renovation in the archaeological study of landscapes, traditionally anchored on inhabited or monumentalised spaces and, at best, on intensively cultivated agricultural lands. Additionally, it permits to understand the multiple anthropic uses and the transformations the spaces perceived as ‘natural’ have been subject to, revealing their actual nature of artefacts, constructed, and managed over time.

### **Conceptual and methodological bases of Agrarian Archaeologies at the light of the Basque experiences**

Once we have presented the main subjects and methodological aspects of Agrarian Archaeologies in the Basque Country, and particularly in the Research Group on Heritage and Cultural Landscapes, in this section we aim at formulating their conceptual and methodological bases in more theoretical/general terms.

The first thing to be outlined is that Agrarian Archaeologies must be understood not as a repertory of technical or procedural intervention protocols, but as a form to declinate the archaeology of landscapes by setting in the centre of the analysis the social relations implied in the primary productive activities, which are the majority in any pre-industrial society. Additionally, this line of research is currently in process of construction, and thus in permanent conceptual, methodological and practical re-elaboration. For this reason, it is difficult to delimit in terms of normativity, so we will here prefer the use of the plural denomination (Agrarian Archaeologies) rather than the singular one

The key concepts that define this line of research are, principally, *landscape*, *agrarian practices* and *archaeology*. The notion of **landscape** is complex, ambiguous, and multi-dimensional, which has led to very different definitions in different disciplines and specialists. From a strictly archaeological point of view, the landscape can be conceived as a subject of study, a source for the study of the past, a resource in the past and in the present, a representation of a space or territory, a portion of space perceived and appropriated in a symbolic and ideological dimension, the materialisation of cultural identities; a repository of a social memory, a heritage good, etc. (p.e. Johnson 2007; Orejas, Ruiz del Árbol 2013). Agrarian Archaeologies have assumed this complexity and the multiform character of landscapes. Hence, the ‘economy’ being the point of departure, the productive dimension is largely transcended. In words of B. David and J. Thomas, landscape archaeology is ‘an archaeology of how people visualized the world and how they engaged with one another across space, how they manipulate their surroundings or how they were subliminally affected to do things by way of their locational circumstances’ (David, Thomas 2008, 38). The second concept, **agrarian practices**, must also be understood in a dense and complex way. Reducing Agrarian Archaeologies to the study of agrarian spaces would be a useless simplification to understand the social role and the diversity of the primary sector in pre-industrial societies. The most common productive strategies in the Historical period have been those based on mixed farming, which have integrated, complemented and regulated a wide range of dedications and practices, not only of ‘economic’ nature, which some authors have defined in terms of pluri-activity (Mardsen 1990). The third notion is **archaeology**. This is another concept in continuous re-elaboration and revision (Kristiansen 2009). As it has been said along the previous pages, the emergence of Agrarian Archaeologies has been possible in a context of deep revision of the chronological, thematic, and methodological compartments in which the discipline has been traditionally organised.

In an extremely synthetic manner, we could say that Agrarian Archaeologies adjoin three main areas of intervention: the study of archaeological landscapes; the analysis of the agricultural production cycles from the perspective of the *chaîne opératoire* and the anthropology of production (Lemmonier 1992; Mannoni, Giannichedda 1996); and the investigation of the social practices that are developed in the previous two areas. Among these practices, we can point out the study of the forms of appropriation and construction of territorialities; the mechanisms of construction, maintenance and questioning of the social order; the social memories and the ideological mechanisms of social cohesion and exclusion; the forms of solidarity, reciprocity and negotiation that are typical from moral economies; the forms of domination reposing on the principles of political economies; etc.

Regarding theoretical aspects, our proposition is founded on three main axes. First, the notion of *multiple agencies*, bound and informed by the theory of practices, is the central axis of the social analysis (Reckwitz 2002). Against the binary positions that oppose elites and subalterns, local societies and encompassing systems, structures and individuals, we adopt a process-based approach, focusing on the routines that define social order and social reproduction (Quirós Castillo, Tejerizo 2020). In this manner, we aim to visualise the agency of the subaltern groups and the richness of nuances in the processes of subordination in the rural world, as well as to delimit the capacity of action of the dominant groups. To this purpose, it is useful to recall the notion of gentry hegemony, proposed by E.P. Thompson to delimit the agency of the powers acting at the local, supra-local or global scale (Thompson 1995).

Second, postcolonial theory provides an essential ethical dimension to question the Modernity's patterns of rationality and explore new forms of intelligibility of the practices, the agents and the rural landscapes in the past. Such a perspective questions the notion of *progress* and the linear nature of historical time, opening the path for plural temporalities that will provide a sense to the 'conservative' and 'traditional' character of the rural world (Ingold 1993; Oliver 2020; Lucas 2021). Social history and archaeology are best equipped to analyse change rather than permanence, the forms of intensification or extensification of agrarian production rather the tasks of maintenance and stability. Additionally, this approach questions the euro-centric cosmovision based on the opposition between centre and peripheries, privileging instead a network-based perspective.

Third, the tradition of a social Rural History that prioritises *micro-historical analyses* combined with bottom-up and top-down perspectives is another useful conceptual framework for the study of rural societies (Moreno 1990; Erickson 2006). In the case of the Agrarian Archaeologies of the northern Iberian Peninsula, these approaches are rooted on the contributions made by the *Annales* school, on the one hand, and historical materialism, on the other. Equally, the influences of the Anglo-Saxon experiences related to Ecological History and the Landscape Archaeologies are relevant, especially in the last decades (Fernández Mier 2018).

However, as pointed out above, one of the main stimuli provided by Agrarian Archaeologies is their experimental nature, open to new theoretical and methodological contributions. In fact, it is particularly difficult to define a specific methodology of Agrarian Archaeologies. In the same manner as it is not possible to define a 'method' for the archaeological study of landscapes (David, Thomas 2008), in the case of Agrarian Archaeologies the theoretical motivations, the study goals and the notion of archaeological record itself guide the methodological itineraries adopted in each case. Nevertheless, some global notions can be outlined. First, the consideration of agrarian landscapes as continuous and complex records, which makes the concept of 'site' become short or inappropriate. Second, the consideration of agrarian landscapes as palimpsests (Rippon 2012), built as scraps, rather than large-scale sites stratified according to the analytical logics developed by the Archaeology of the second half of the 20th century. Third, the adoption of long-term analytical perspectives, overcoming the sectionalised paradigm that is still predominant in Academia. Fourth, the need to combine a wide range of proxies, which determines

a multidisciplinary or even interdisciplinary dimension of the research projects. Consequently, a new ontology of the archaeological records is proposed, especially in what regards the old diatribes between the universe of texts and that of materiality. Written sources are re-read from the perspective of the material records, while material records are informed with the written sources. Additionally, as outlined in the previous section, the archaeological record of agrarian spaces contemplates much more elements than buildings, monumentalised spaces or objects. Actually, the main methodological challenge faced by Agrarian Archaeologies is how to make dialogue the different sources of information. This challenge requires the conformation of wide working teams, but also a high degree of alphabetisation in areas like bioarchaeologies, geoarchaeology, historical ecology, toponymy, ethnography, etc.

Last but not least, Agrarian Archaeologies have an evident applied social dimension in, at least, three specific directions. First, developing new forms of intelligibility between societies and agrarian landscapes, on which specific valorisation and heritagisation policies can be formulated. S. Pérez-Vitoria has reported that rural heritage has nowadays become a ‘mean to make money, which trades with spoils of peasantry’ (Pérez-Vitoria 2010, 70). Second, understanding pre-industrial social practices and agrarian landscapes, so as to design ambitious policies in the fields of environmental sustainability, local development and land management that will be able to face the ecological emergencies that threaten contemporary societies. The ongoing pandemic is the most evident manifestation of these umbalances and the scarce resilience exhibited by many institutions and collectives. Third, recovering the ‘traditional’ agrarian practices, based on the archaeological societies of Africa, America or the ‘peripheric’ areas of the Western world, opens the way to build alternative development models to the ruling post-industrial hegemony. Among other examples, we can here cite the works promoted by J. Van der Ploeg, who has advocated for a ‘re-peasantisation’ of the Western societies (Van der Ploeg 2008).

## Topics and case studies

### *Terraces and human agency: research experiences in the Basque Country*

Among the research lines developed in the Basque Country in the framework of Agrarian Archaeologies, the study of terraced agricultural fields is, without a doubt, one of the most relevant. As prominent elements of the rural landscape, terraced fields are often the most visible example of human-induced transformations of the natural environment, whose construction and maintenance with productive purposes implies the mobilisation of considerable amounts of work and material resources. However, the awakening of a research interest specifically focused on them has been gradual and highly dependent on the aggregation of empirical knowledge. Certainly, the increasing amount of data available from the results of both planned and preventive archaeological interventions, along with research experiences arrived from other European contexts (e.g., references), progressively set academic attention on the artefactual dimension of these elements. Consequently, methodological innovations have been developed for their study, opening the way for increasingly precise and intensive interventions, resulting in the establishment of research procedures of a deep analytical power.

In this line, the first archaeological interventions executed in the terraced fields of Momoitio (Biscay) or Astigarribia (Gipuzkoa) were barely a complement to the excavation of the early medieval churches and necropolis in both sites (Figure 1). The archaeological project of Momoitio, for instance, took place between 1982 and 1985, in a moment of effervescence for the studies of early medieval settlements in Biscay (García Camino, 2002). Once the chronology of the first temple of San Joan and the surrounding necropolis were established in the Early Middle Ages, several test pits were opened in the surrounding terraces in search of their correlative settlements, with negative results. Nevertheless, several fragments of common pottery were retrieved from the terrace fillings, whose chronologies covered a wide time lapse between the late Iron Age and the 9th century. Although these findings were never problematised

as agricultural deposits, the presence of these materials may be related to some form of social practice, like the use of domestic waste as manure for intensively cultivated fields (Poirier & Nuninger, 2012).

In the case of Astigarribia, the research project was focused on the parish church of San Andres. The temple's apse was excavated between 1969 and 1970, permitting the identification of primitive early medieval building and a polyphasic necropolis (Barandiaran, 1971; 1975; Etxeberria, 1987). In sight of the entity of these findings, a new research project was programmed between 2002 and 2004, with the realisation of multiple test pits both inside and around the church (Pérez Centeno & Piá, 2002; 2003; 2004; Pérez Centeno, 2004). Again, no early medieval settlement could be detected, but some of the test pits excavated in the terraced fields that surround the temple revealed the existence of consistent stratigraphic sequences. Their main feature was the presence of Roman and early medieval pottery encompassed within the deepest deposits, that is beneath the present-day agrarian fillings. As in the previous case, these evidence were not specifically addressed, their study being limited to a concise stratigraphic description and a typo-chronological characterisation of the materials retrieved.

In contrast, the works developed over the past two decades in the deserted villages of Zaballa (2007-2008), Zornoztegi (2007-2009) and Aistra (2007-2016), in the Alavese plain (Figure 7.1), have involved a qualitative change in the investigation of terraced agricultural fields in the Basque Country. In all three cases, the study of agricultural spaces is a key element of the adopted theoretical and methodological approach (Quirós-Castillo, 2009; 2012; 2019). Indeed, the reconceptualization of such spaces as socially constructed entities has permitted to set the focus on their relevance as the convergence point between diverse social and ecological relations. Such reconceptualization has come along with the design of



Figure 7.2. Aerial photograph of San Julián de Aistra, with the early medieval terraces on the foreground.

specific methodologies for the study of these kinds of spaces, often based upon the combination of open-area excavations in the habitats and other kinds of interventions in terraced agricultural fields. This has permitted the recuperation of bioarchaeological records, key for the paleoenvironmental characterisation of the medieval contexts (e.g., Hernández-Beloqui, 2011; 2012), as well as the realisation of geoarchaeological studies on the terrace fillings, from which relevant lines of interpretation can be derived in relation to the collective actions that underlies to their construction and maintenance, or the agricultural practices developed above them (e.g., Nicosia & Polo-Díaz, 2012; Ruiz del Árbol, 2012).

The integration of all these records has permitted a much richer and more articulated characterisation of the mentioned archaeological sites, but has also opened the way for regional-scale comparative analyses. For example, the small terraces located close to the early medieval habitat of San Julián of Aistra have been dated in the 5th-6th centuries, that is at the same moment in which the site's first occupation took place (Figure 7.2). The stratigraphic study of their fillings determined that their construction was the result of a single episode. Considering the gentleness of the local slopes and the scarce depth of the soils resulting from the fillings, these terraces have been interpreted as destined to cereal cultivation.

In contrast, the terraced fields excavated in the deserted village of Zaballa have a very different correlation with the evolution of the local settlement. In this case, the peasant community's centre of habitation was located, since the 8th century, in the upper platform of the site, but was displaced towards the bottom of the valley during the 10th century, when a church and several annexed dependencies were built in its place. The occupation of the valley with peasant domestic units provoked the local watercourses to be canalised, and the surrounding slopes to be terraced. In particular, three series of terraced fields were created in the valley's western slope, with filling of up to 1 meter depth. This landscape was again transformed at the end of the 12th century, when the peasant habitats placed at the bottom of the valley were amortised by the addition of a thick agricultural filling, delimited by a containing wall and irrigated with a regulated canal system. Consequently, peasant habitations were again displaced to the western slope, obliterating one part of the terraces built during the previous phase. All these transformations have been interpreted as the result of a seigneurial action, which persisted until the village was abandoned in the late Middle Ages.

Zornoztegi is another example in which a variable relation can be traced between the evolution of the village community and the construction of a terraced field system. In this case, the village community seems to have been originated in the 8th century, when the local material culture points to a dependent and internally hierarchised society. Between the 11th and 12th century, the settlement suffered a complete reorganisation, with the construction of a parish church and the realisation of large terraced fields by means of massive fillings of variable depth, which completely replaced the village's southern sector. A traditional explanation would interpret this process of agricultural intensification as the response to an external pressure, in this case seigneurial action. Alternatively, its causes can be searched in the internal dynamics of the local society, as the construction of a collective identity articulated around the church and its territoriality.

As a consequence of these works, the awareness of the archaeological potential of terraced field systems has transcended academic research, and has begun to be included also in the projection of rescue interventions. In the village of Abanto (Biscay), for example, the preventive excavation of a terraced field system linked to an early medieval church permitted to date their construction around the 6th-7th centuries, and to relate this process to an episode of deforestation in the area, possibly linked to the establishment of a stable village (Varón Hernández *et al.*, 2012). The volume of available evidence will likely continue to increase, thanks to preventive archaeology, in the next years.



*Figure 7.3. Aerial photo of the Torrentejo terrace system.*

Similar theoretical and methodological parameters were applied, from 2014 to 2017, to the investigations of the deserted village of Torrentejo, located in the Rioja Alavesa district, in the Ebro valley (Figure 7.1). This is maybe one of the cases in which most intensively the study of settlements and terraced agricultural fields has been integrated into a single interpretative framework, with highly expressive results. Documentary records, parcel-system studies, aerial photographs, field survey, archaeological excavation and sedimentological studies were combined to obtain a long-term occupational sequence spreading from early proto-history to the 20th century. Works were primarily focused on the surroundings of the Santa Lucía church, where the rests of a medieval settlement were excavated; but also included a terraced field system, not cultivated at present, that covers nearly three hectares of land around a sharp-sloped hill named Castrijo.

Different interventions were executed around these terraced fields (Figure 7.3). The first work implied the opening of a longitudinal trench along five superposed terraces placed close to the church. Once exposed in the open section, their stratigraphy was defined with pedological criteria, which permitted the identification of three main phases of construction (Quirós-Castillo & Nicosia, 2019). The origins of the terraced field system in Torrentejo can be traced in the 7th-8th centuries, probably related to the formation of a village community — although the oldest evidence of habitation have been dated only in the 10th century. A second phase of transformation took place in the 14th century, when the village was deserted; and a third reorganisation occurred in the 18th century. On the other hand, the analysis of written evidence, oral sources and placenames have outlined the multifunctional nature of the terraced fields. As a result, the goal of the project have been rooted to understand how terraces have been used

and transformed more than define what is an agrarian terraces and their meaning in political economy terms.

The second intervention consisted in an extensive field survey, aimed at the generation of a detailed cartography of the terraced field system. The distribution and size of the terraces, along with the entity and building techniques employed in the containing walls or the presence of off-site materials on the surface, were considered as indicators for the definition of particular terrace typologies inside the system. Eventually, these works led to the hypothesis that the construction of the terrace system of Torrentejo may have begun in the areas placed closest to the medieval settlement and spread to the whole Castrijo hill only in a later moment.

This opened the way for the third intervention, which consisted of a program of geoarchaeological core sampling distributed in different points of the terraced field system. The core records were analysed with different physicochemical indicators at intervals of 1 cm, resulting in the elaboration of a high-resolution stratigraphy where the covariation of certain indicators was interpreted as the reflection of particular environmental or anthropic processes (Narbarte Hernández *et al.*, 2020). Core TOR/2 was retrieved from the terraces placed closest to the deserted village. The stratigraphy of this core confirmed the polyphasic nature of these terraces, the oldest ones of the whole system. Instead, Core TOR/1 was retrieved from the lowermost sector of the same terraces, where the presence of a thick colluvial deposit amortised the latest phases of the village's habitations. This can be interpreted as either the result of a lack of maintenance of the uppermost terraces, or an intentional reorganisation of the local agricultural spaces after the village was abandoned. In any case, both Cores TOR/1 and TOR/3, the latter retrieved from the terraces placed farthest from the medieval settlement, ratified the existence of a new phase of terracing activity around the 18th century, affecting to the whole surface of the Castrijo hill.

The results of these works are of particular interest in a context of erosion of the 'traditional' cultural landscapes, which affects the whole Rioja Alavesa district. On the one hand, the viticulture of the region shifted towards an increasing technification and mechanisation after the phylloxera crisis in the late-19th and early-20th century. The technical requirements of this new model of agricultural production stimulated the realisation of numerous works to reduce the slopes and regularise the agricultural surfaces. In the case of Torrentejo, this meant the amortisation of many historical agricultural structures, and may have affected to large parts of the medieval settlement as well. Indeed, only 5% of the site is estimated to have remained unaffected by agricultural mechanisation, mainly due to its topography, too accidented for the introduction of these new techniques. Similar topographic alterations are one of the main reasons for which the Rioja Alavesa is the district with fewest inventoried archaeological sites in the whole Basque Country. On the other hand, this pressure on the 'traditional' landscape is in sharp contrast with the political promotion of the 'wine and vineyard cultural landscape', that local and regional institutions aim to include in the UNESCO World Heritage lists. The indifference of the hegemonic discourses on the vineyard landscape with regard to the actual historical heritage of the region can be explained by the fact that their performativity is virtually aimed at the (re)construction of a new territorial identity to promote the interests of the greater wine producers of the region. For these reasons, the realisation of intensive archaeological studies like the one developed in Torrentejo can be proposed almost as a rescue operation, aimed at documenting the scarce surviving traces of 'traditional' landscapes, many of which are on the path to extinction.

The archaeological study of terraced field systems is therefore a consolidated discipline in the Basque Country, where terraced field systems have actually been recognised since Prehistory to the Modern times (Figure 7.4). The amount of available data also permits some general considerations. Typologically, the terraces analysed in the aforementioned case studies are defined by their diversity, both in terms of constructive complexity, size, spatial distribution, and evolution over time. Regarding research

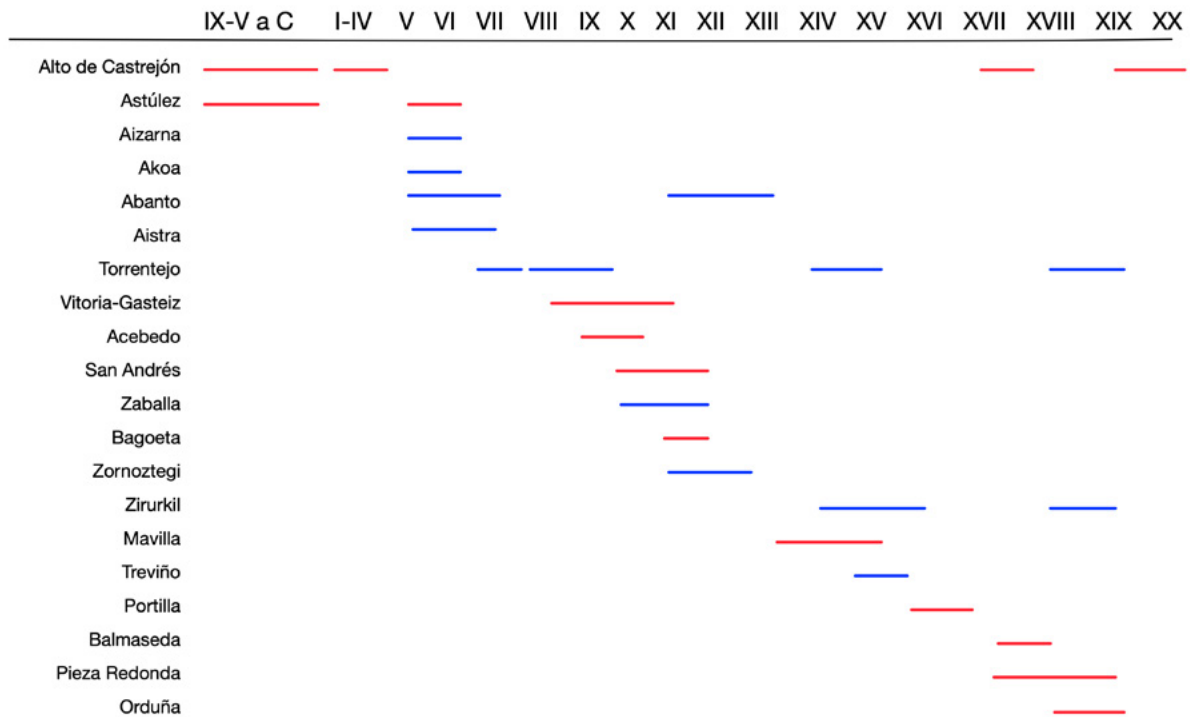


Figure 7.4. Agricultural terraced field systems dated in the Basque Country. Red colour indicates projects principally focused on inhabited areas; blue colour represents projects specifically addressing agrarian spaces.

methodologies, the common point to all cases is the absolute necessity for a complete and effective characterisation of the stratigraphic sequences, which can be achieved either on the exposed section or by core sampling. To this purpose, along with the traditional characterisation based on the sediments' colour and texture or on the chrono-typologies of the materials encompassed in each stratigraphic unit, new methods have been incorporated to the research agendas within the last few years, imported from the environmental and soil sciences. These new methods have set the focus not only on anthropic agency — reflected in the excavation of trenches, the realisation of secondary deposits (i.e., terrace fillings), or the addition of organic and inorganic matters in the framework of different cultivation practices —, but also on the pedogenetic processes related to environmental factors, many of which continue developing even in buried soils. All this has opened new lines of research linked to agricultural work as a fundamental factor in landscape transformation, and its relationship with other human and environmental processes in the long term. Besides, the micro-territorial studies have shown that not all terraced systems must be interpreted in terms of agrarian intensification, as assumed by certain evolutionistic approaches (e.g. Thurston, Fisher 2007; Balbo, Puy 2017). Building, maintaining and exploiting terraced agricultural field systems over long periods of time are dense actions, full of social implications and meanings which also affect to the local communities' collective identities. Regardless of their economic dimension, this social intervention that seeks the construction and preservation of terraced agricultural fields among different generations implies to codify a set of social practices and forms of participation that are key to the understanding of pre-industrial rural societies.

At the same time, the recent erosion of rural communities in a context of postcapitalist globalisation has also raised the problem of the increasing difficulties to apprehend and assess these landscapes, which the common figures of heritage protection often do not cover sufficiently.

***Long-term Agrarian History from an Archaeological perspective: the example of Aizarna and Akoa***

The development of Agrarian Archaeologies in the Basque Country has evidenced the importance of agricultural production areas in the evolution of human-environment interactions over time. However, this line of research has also raised some questions regarding the nature of such relationships. A multi-scalar approach, both in terms of space and time, is therefore required to address the complexity of the multiple factors and practices involved in the construction, maintenance, and transformation of agricultural spaces.

The archaeological project carried out in the village of Aizarna and the nearby hamlet of Akoa (Gipuzkoa) between 2016 and 2018 is a good example of this. These contexts are placed in two small endorheic depressions of karstic origin on the northern slopes of mount Hernio, not far from the Atlantic coast (Figure 7.1). From the beginning, the project's design had to face some theoretical and methodological problems that clearly distinguished this context from the deserted villages described in the previous section. First, Aizarna and Akoa are inhabited and cultivated at present, which impedes the realisation of open-area excavations or the aperture of longitudinal trenches along their terraced fields. Second, rural landscapes in the Atlantic sector of the Basque Country have particular features — dispersed



*Figure 7.5. General view of the rural landscape in Aizarna.*



Figure 7.6. Soil core sampling in a terraced field placed between the farmsteads Aranguren and Bikandi (core AIZ/2), in Aizarna.

settlement, mosaic-shaped and diversified landholdings, not coincident configuration of village and parish territorialities — that make them more difficult to frame in traditional historiographic categories like ‘village community’. Third, these contexts are also characterised by the scarcity of both documentary records and archaeological remains prior to the Late Middle Ages, when the settlement network that has survived until present appears totally configured.

With these constraints in mind, a progressive intervention was designed, based upon the combination of different sources of information with the purpose of covering as much of the local surface as possible. A complete revision of the documentary records available was done at the local archive, focusing on the following aspects: 1) settlement morphology; 2) typology and distribution of different productive areas across the local territory, and their variations in time; 3) agricultural practices and their possible impact on local topography, hydrography, or soils; 4) mechanisms for collective action and the resolution of conflicts linked to resource management; 5) maintenance and revision of limits. Once the general framework had been defined for the late medieval and modern periods, this was enriched with micro-toponymic and ethnographic information from interviews with selected local informants. Finally, an extensive field survey was carried out to map the present-day disposition of different landscape elements, especially those linked to the transformation of local slopes and watercourses with agricultural purposes: terraced fields, containing walls, filled dolines, trenches, canalisations, etcetera (Figure 7.5).

These previous works permitted to identify, inside the landscape of Aizarna and Akoa, a series of areas of interest where core sampling could be performed. Two criteria were preferred when selecting such areas. On the one hand, the existence of documentary evidence of their use as agricultural areas since, at least, the late Middle Ages, the earliest moment for which a reasonably complete picture of the local landscape can be drawn from archival records. On the other hand, the lack of recent ground alterations and a topographic disposition that favoured aggradation rather than erosion, like filled dolines or, more preferably, terraced fields. Seven cores were retrieved in total (Figure 7.6), five from Aizarna and two from Akoa. Their analysis included the combination of different physicochemical analyses and the elaboration of a high-resolution stratigraphy based upon the covariation of similar proxies as indicators for particular environmental and anthropogenic processes (Narbarte Hernández *et al.*, 2019). Eventually, this strategy of punctual interventions in very specific points of the local landscape permitted to document a long sequence of human-environment interactions at the local scale, transcending the limitations imposed by the area being currently inhabited and by the lack of ‘traditional’ historical and archaeological sources.

One of the sampled cores (Core AIZ/3), retrieved at short distance from the parish church of Aizarna, additionally permitted the detection of an accumulation of charred wood and rubified clay beneath the terrace filling of the rectory house’s garden. The results of radiocarbon dating pointed to the 1st century AD, which enhanced the realisation of an archaeological excavation in the area, which took place in 2017. As a result of these works, a domestic structure of Roman chronology was uncovered,



Figure 7.7. Roman occupation documented in the Rectory house of Aizarna. Above: image of the charred structure dated in the 1st century AD. Below: Roman pottery recovered from the occupation levels.

for the first time, in a currently inhabited village of the Atlantic sector of the Basque Country (Figure 7.7). The structure, made in wood and earth and associated with Roman pottery and other materials, had been completely burnt and obliterated by a thick deposit formed in the 4th century with materials dragged from the upper part of the present-day village, then sealed by the construction of the terrace in the rectory's garden, possibly in late medieval or postmedieval times (Narbarte Hernández *et al.*, 2018). This finding is relevant not only for the unravelling of Roman occupations in the Atlantic sector of the Basque Country — where the evidence of romanisation is circumscribed to the coastline —, but also as a proof that at least one part of the present-day settlements may actually have very deep roots. In fact, this may explain the virtual absence of documented deserted villages of antique or early medieval origin, in contrast with the Mediterranean sector of the country.

Still, the oldest evidence of a significant landscape transformation in Aizarna and Akoa have been documented only in the Early Middle Ages. Core AIZ/2, for instance, was sampled in a small stream valley located among the dispersed settlement of the village, where the construction of a retaining wall and the addition of a massive filling of up to 1 meter depth had created a wide flat surface. Inside the stratigraphic sequence of the core, a first anthropogenic filling was dated in the 5th-6th century, consisting of rubified and magnetically enhanced clay sediments. This deposit was interpreted as the result of an episode of clearance of the surrounding slopes using fire, after which the burnt sediments were employed for the creation of a first terrace filling. A similar episode of early medieval deforestation and terracing was documented in Core AKU/2.

The anthropized agricultural landscape derived from these operations may have lasted for long. Magnetic susceptibility in Core AIZ/2 increased in the uppermost 20 cm of the terrace-fill, the interval commonly affected by animal ploughing, indicating a more intense thermic alteration on the terrace's surface. The use of fire between fallow and ploughing is well-documented in the framework of extensive rotation crop systems in other regions (e.g., Rippon *et al.*, 2006). This magnetic enhancement could therefore reflect a strategy of regular brush-burning and the addition of the resulting ashes or charcoal to the topsoil as a way of ensuring soil fertility over time and can be regarded as a long-term management strategy within the framework of a stable, planned agricultural system.

In the 14th-15th centuries, the agricultural landscape of Aizarna and Akoa was completely reorganised, as reflected in the stratigraphy of the core records and, for the first time, also in the local archival records. The main change in this phase was the apparition of the 'traditional' model of Basque farmstead, common to the whole Atlantic sector of the Basque Country, which is defined as a single architectural unit managing an autonomous and diversified landholding (e.g., Santana, 2001; Susperregui *et al.*, 2017). Local documentary records indicate that the oldest farmsteads of Aizarna and Akoa were established in late medieval and early modern times, following a pattern of relative dispersion and articulating a complex landscape composed of gardens, orchards, fields and forested areas (Narbarte Hernández, 2020). Core records suggest that the apparition of these farmsteads was parallel to a reorganisation of the local spaces of agricultural production. Cores AIZ/2 and AKU/2, respectively sampled very close to the old farmsteads of Aranguren and Akoarretxea, are good examples of such reorganisation. In both cases, the early medieval terraces were sealed in this phase by the addition of new terrace fillings of up to 1 m depth, possibly reflecting a productive intensification.

As evidenced from core samples, climatic instability may also have played a role in this late medieval reorganisation of the local agricultural landscape. The sedimentary record retrieved from Core AIZ/2 shows the existence of a deposit formed by coarse-grained gravels between the early and late medieval terrace fillings, which can be interpreted as the reflection of a torrential flooding episode. Similar records have been reported, also for the Late Middle Ages, in nearby regions like Asturias, where they have been interpreted as corresponding to the onset of the Little Ice Age (Fernández *et al.*, 2017). This

term is broadly applied to the period comprised between the 14th and 19th centuries, when a recurrence of low temperatures and climatic instability affected the whole northern hemisphere (Fagan, 2000), represented in the Atlantic regions of the Iberian Peninsula by increasingly irregular precipitations (Benito *et al.*, 2008). Even if the extent and impact of these climatic fluctuations has not still been completely unravelled, documentary evidence from Gipuzkoa seems to point that this might have been a relevant factor in the reorganisation of local and regional markets from the 16th century onwards, stimulating the specialisation and diversification of economic activities (Aragón, 2017). However, further research is needed to explore the nature of the relationship that exists between these climatic imbalances and the apparition of the modern Basque farmsteads, with the landscape reorganisation that it entailed.

In any case, further agricultural changes have been evidenced in both Aizarna and Akoa for the Modern period, especially after the late 17th and early 18th centuries. In this period, lands tended to be cultivated more intensively, as evidenced from core records. In all the sampled cores, a characteristic deposit of lime-enriched sediment has been reported beneath the present-day cultivation surfaces and, in the case of Cores AIZ/1 and AKU/2, above late medieval terrace fillings (Narbarte Hernández *et al.*, 2021). Lime (CaO) is a common amendment used in agriculture to balance soil acidity. Its properties are known since Roman times (e.g., Vanwalleghem *et al.*, 2004), although its use became widespread across the Atlantic Europe in Modern times (Walsh *et al.*, 1957; Clout & Phillips, 1972). The presence of these lime-enriched deposits therefore may be related to the necessity of balancing increasing soil acidity, possibly due to the addition of large amounts of manure. Indeed, there is documentary evidence that the introduction of American crops, such as maize (*Zea mays*), during the 16th century and their general expansion over the 17th, stimulated the implantation of a new cycle of cereal production, based on a biannual rotation of wheat, maize, and other auxiliary crops, without fallow. Increasing amounts of organic fertilisers would be necessary to support this intensive cycle, which was solved with stabled domestic cattle whose dejections were used to produce manure (Bilbao, Fernández de Pinedo, 1984). Hence, the lime-enriched deposits can be interpreted as the material reflection of all these changes in the local soils, with a relative chronology of between early-18th and mid-20th centuries.

Modern-period agricultural intensification also stimulated an expansion of arable land over areas formerly allocated to pasture or woods, which eventually implied the creation of a new crown of highly dispersed settlements around the original villages (Narbarte Hernández, 2020). The increase in the number of households and the subsequent reduction of mountain lands might have enhanced an increasing competition for the access to common resources like ferns and gorse, necessary to produce manure, which is reflected in an increase of conflicts between households.

As for the terraced field systems described in the previous section, the agricultural landscape of Aizarna and Akoa has undergone a rapid erosion especially since the second half of the 20th century. Such erosion is related to the impact of the Industrial Revolution, which entailed a sharp increase of the regional population and its concentration in a few industrial poles. This, in turn, enhanced a reorientation of agricultural production to satisfy the demands of an increasing urban market. The traditional cycle of biannual crop rotation was abandoned, and many agricultural fields were transformed into grasslands, with the purpose of increasing cattle population oriented to dairy production. The extent of this process can be clearly observed from the comparison between aerial images from 1956-1957 to present, but also from the geochemical signal of the local soils, where high concentrations of biogenic elements (P, Zn, Br, S, Pb) have been detected, probably reflecting massive manuring.

The crisis peasantries as a defining class of European societies, and its replacement by a new market-oriented agricultural management model, has been widely discussed in recent decades (Mendras, 1967; González de Molina & Guzmán, 2006; Van der Ploeg, 2012). Such trends involved a disruption in the forms

of land management that had characterised the previous centuries, setting agricultural production under the influence of international market fluxes that were external to the rural communities themselves. As a consequence of this, agricultural activity has progressively become marginal in Aizarna and Akoa, where many neighbours openly express concern about the future sustainability of their landscapes.

## Final remarks

In the terms in which they have been developing in the Basque Country, Agrarian Archaeologies constitute a highly experimental research space currently in construction. In the previous pages, we have aimed at synthesising the different theoretical orientations, methodologies and problem agendas that have been implemented over the last years. Far from being a monolithic line of research, it is clear that the works we can group under the name of Agrarian Archaeologies have been constantly transforming and re-orienting. Indeed, new conceptual, methodological, thematic and heritage challenges will be necessarily addressed in the future (generally, Kerr 2020).

In the first area, one of the main goals for the next years will be to generate more integrative narratives through the identification of background tendencies and the comparison between the results obtained in the different analysed agro-ecosystems. The narratives generated by Agrarian Archaeologies have been implemented very partially and imperfectly in the general narratives on pre-industrial societies. Such implementation will require the creation of shared workspaces with other specialists and the generation of alternative territorial syntheses. In the same way, a change of scale will be necessary to more efficiently address the international debates on pre-industrial rural societies. Overcoming, for instance, the gap existing between the so-called Peasant Studies, Rural History and Agrarian Archaeologies is another priority for the future.

In the methodological field, there are several challenges. On the one hand, it is essential to consolidate certain lines of research through the professional stabilisation of the researchers formed over the last years. Another challenge is that of obtaining proxies at a higher resolution through the experimentation of new techniques and the investment of scientific capital in new projects. Additionally, new conditions need to be built to make dialogue the different types of record in a more efficient way and addressing more significant problems — a task not always simple to accomplish. Regarding the research topics, the main purpose is that of making visible and providing with historical meaning those that are nowadays considered as cultural landscapes, the ‘marginal’ spaces and the social groups ‘without history’, thus fighting the cult representations of Modernity on the rural environment. As it has been recently pointed out, the Archaeology of agrarian spaces is a search for invisible people through the materiality of landscapes (Mayoral Herrero *et al.* 2021). Equally, new projects should address, in terms of *longue durée*, the notions of Anthropocene and Capitalocene (Moore 2017).

To end up, the knowledge of the past is useful and necessary when it generates collective identities, pertinence and social participation. A positive re-signification of the rural world, generating critical discourses, is another line of intervention that will be developed in the near future.

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# The archaeological study of agricultural sustainability: the cases of Konso (S Ethiopia) and Engaruka (N Tanzania)

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## Summary

This paper summarizes the results of archaeological investigations at two historic agricultural landscapes in Eastern Africa, and discusses the implications of archaeological data on assessments of the function and sustainability of these and similar systems worldwide. Focussing primarily on stratigraphic and geochemical research, these results demonstrate that an understanding of landscape change over decadal to centennial scales can radically revise our understanding of agricultural systems; results that are of relevance beyond the discipline given the renewed interest in employing ‘traditional’ or ‘indigenous’ resource-use strategies to achieve sustainable agriculture today, as outlined within the UN’s Sustainable Development Goals and elsewhere. At both the abandoned agricultural landscape at Engaruka (Tanzania) and the extant landscape at Konso (Ethiopia), field areas previously assumed to be simple stone-bounded sub-divisions of alluvial sediments are in fact carefully engineered artificial sediment traps built over several centuries. These traps have several agricultural advantages – accumulating deep deposits of fine-grained fertile soils in irrigable locations – but rely on soil erosion from surrounding slopes or within river catchments to supply these sediments. The paper discusses these trade-offs, and concludes that centennial-scale datasets that link landscape change processes to field and catchment scales can provide information of direct relevance to sustainability assessment that cannot be obtained through observational or longitudinal studies.

## Keywords

Terraced agriculture; Landscape multifunctionality; Geoarchaeology; Africa.

## Introduction

The archaeological study of agriculture relies on the fact that farming activities can leave traces that are detectable centuries or millennia later. This is most obvious at the scale of the agricultural field itself, where drainage ditches, irrigation canals and even hedgerows can leave visible remains that can be recorded through excavation. On a smaller scale, agriculture can change the structure and chemical properties of soils within a matter of years (or less), while on a larger scale even parts of a landscape apparently far removed from a centre of crop production can be radically altered over a period of decades or centuries because these distant areas may provide resources essential to the maintenance of the agricultural economy. A full understanding of the operation and development of an agricultural system thus calls for the cross-referencing of data from archaeology, soil science, palaeoecology and geomorphology, and for the examination of the links and feedbacks between the spatial scales of field, catchment and landscape. This interdisciplinary approach was the basis of two European Commission funded projects: the ERC-StG ‘Archaeology of Agricultural Resilience in Est Africa- AAREA’ (FP/200702013/ERC Grant), and the MSCA-IF ‘Resistance and Resilience of Ancient Agricultural Soils-

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tRRACES' (tRRACES-H2020-MSCA-IF-2014-657355) which studied two agricultural East African sites: Konso, in S Ethiopia, and Engaruka, in N Tanzania.

The origins of the terraced system at Konso have been traced back by anthropological studies to at least 500 years ago (Amborn, 1989) on the basis of genealogical evidence, with this chronology supported by  $^{14}\text{C}$  dates obtained by Thornton-Barnett (2018) on archaeobotanical materials recovered from an archaeological midden of one of the oldest villages of the area. The landscape includes some 40 historic walled towns surrounded by an estimated 200 km<sup>2</sup> of dry-stone agricultural terracing (Kimura, 2006). This apparent continued use of traditional dry-stone terracing, irrigation structures and preserved woodlands over several centuries has been interpreted by some as evidence of the system's sustainability, and indeed this is explicitly stated in UNESCO's decision to list Konso as a World Heritage Site in 2011 (UNESCO 2011). Moreover, this longevity has been seen by some observers as a model of highly sustainable locally managed resources use (e.g. FAO 1990).

In contrast, the 14th -19th century AD agricultural system of Engaruka has been abandoned, and for that reason it has been assumed to be unsustainable (see Stump 2010, Stump 2019 and references therein). Archaeological excavations and surveys within the former field areas at Engaruka identified the remains of ancient sediment traps (Stump 2006, 2010) which, until then, had been considered as simple field divisions or low bench terraces (e.g. in Sutton 1989, 1998). This stratigraphic reading revealed that they were part of a sophisticated sediment harvesting system that consisted in intentionally accumulating river-transported sediments behind walls engineered for that purpose (Stump 2006). By this process, ancient indigenous communities created new fertile soils, apt for cultivation, that were watered by an extensive network of irrigation canals.

Through the study of archaeological stratigraphy, archaeobotanical identification of plant remains, soil geochemistry and sedimentological modelling, the AAREA and tRRACES projects provided a detailed, long-term and interdisciplinary view of the evolution of these two agricultural landscapes, of the technologies and factors that originated their configuration and allowed longevity, and of the tradeoffs involved at different scales (Ferro-Vázquez *et al.* 2017, Lang and Stump, 2017; Kabora *et al.* 2020). This work provides a summary of the results of these two projects regarding the change through time of each site, discusses some of their most important features in terms of the past and future sustainability of both systems, and aims to provide an overview of how these data are relevant to indigenous knowledge preservation and to developmental interventions.

## Case Studies

### *The Konso World Heritage landscape*

The Konso Special Woreda (district) is one of the eight special *woredas* in the Southern Nations, Nationalities, and Peoples Region (SNNPR) of south-western Ethiopia. Its physiography is characterized by a hilly landscape with steeply sloped hills. Ranging in height from 1400 m above sea level (m asl) to 2100 m asl, the Konso terraced landscape extends for approximately 200 km<sup>2</sup> of highlands (Figure 8.1a, 8.1b). The climate is dry montane type, with rainfall ranging from between 300 mm to 900 mm per year (Förch, 2003) and temperatures varying from 15 to 33°C. Rainfall generally follows a bimodal pattern, although it can be erratic, with frequent intense storm events alternating with periods of severe drought (Förch, 2003; see also Messeret, 1990). Sorghum, maize, cotton and also coffee are currently important crops in the area, while cattle, sheep, and goats are raised for meat and milk. Bee-keeping is also an important part of the Konso agroforestry system.

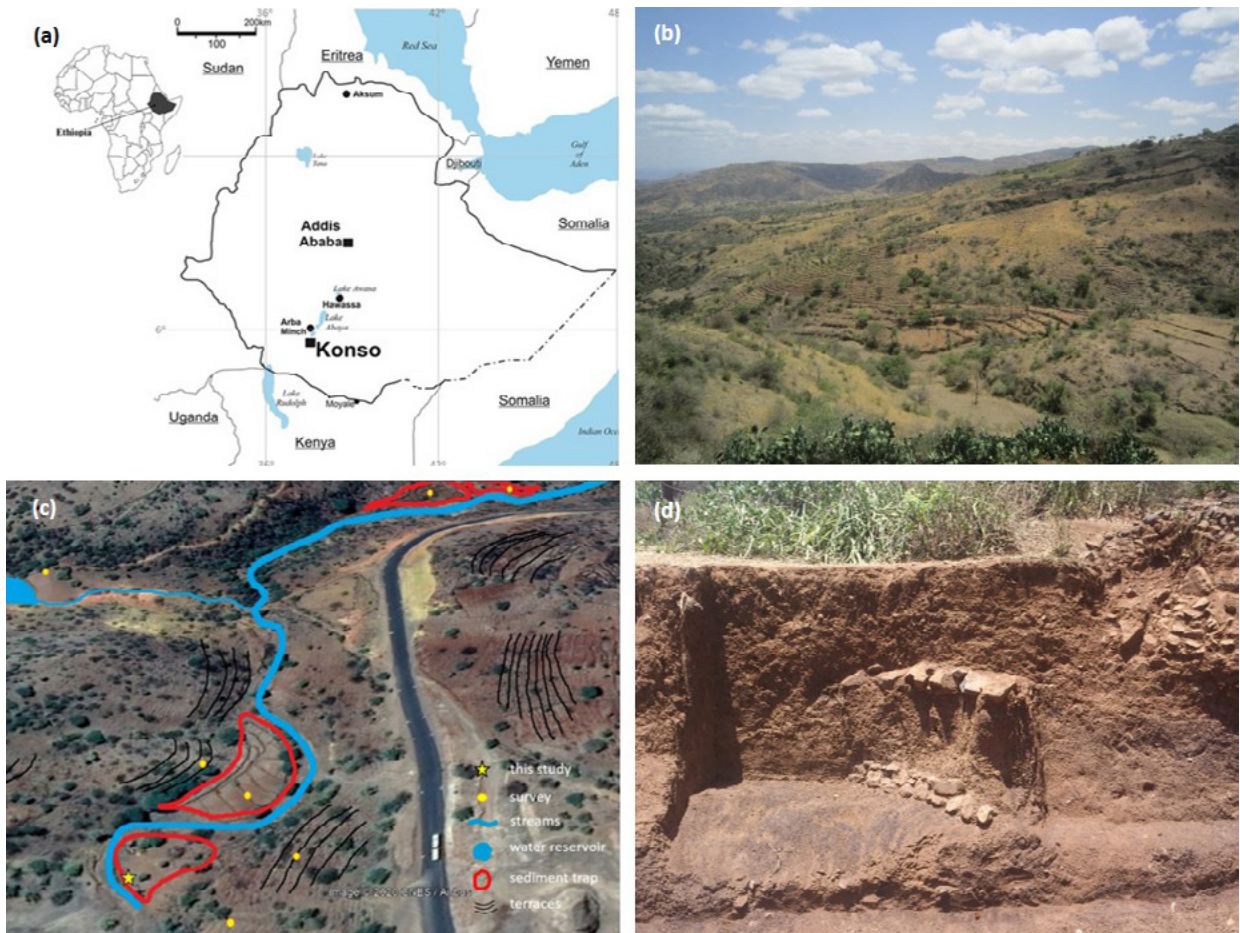


Figure 8.1. (a) Location of Konso. (b) Photograph of Konso terraced landscape with yela sediment traps (foreground) and terraced hillsides (background). (c) Graph of the survey carried out at the Kilkilo river catchment, located SW to Karati, the main village in Konso region. (d) Photograph of the section reported in this work.

An important problem in these highland areas—as in many other semi-arid and arid lands in the world—is that they are highly susceptible to soil erosion; a problem considered to be a major threat to agricultural development and food security in highland Ethiopia (ITPS, 2015; Lemenih *et al.*, 2005; Tadesse, 2001). Vertic and argic soils developed on basalts are common in stable topographical positions, but the steep topography and the high erodibility of edaphic materials have a major effect on the distribution of fertile soils, with shallow and stoney soils frequently found on hill slopes, thereby creating challenges in maintaining soil fertility.

The construction of terraces is a known effective way of mitigating these risks, and this has prompted an interest in local systems of agricultural terracing as models of agricultural intensification capable of avoiding soil erosion, maintaining soil fertility and achieving higher crop yields (e.g. Bruins *et al.*, 1986; Hogg, 1988; Reij *et al.*, 1996). Surprisingly, and even after the Ethiopian Environmental Protection Authority (EPA) has calculated that 80 per cent of the cultivable land in Konso is terraced (EPA, 2004), the terraces themselves had not attracted much attention. Early studies of the Konso landscape have been addressed from an anthropological perspective (e.g. Amborn and Straube, 2009; Nowack, 1954; Straube, 1967) — much of which remain unpublished and only accessible at the Frobenius Institute library, and provide an overview of agrarian activity change during the twentieth century. These sources account for reductions in the level of stock held in Konso, changes in crops grown, and declines in the length

and frequency of fallow periods and periodic short-term depopulations, such as the sharp demographic decrease in the 1950s attributed locally to droughts. More recently, the Konso system has been studied from the ‘indigenous knowledge’ perspective, in particular addressing soil and water conservation strategies (e.g. Adams and Anderson, 1988; Beshah, 2003; FAO, 1990; Grove and Sutton, 1989; Watson, 2009), and also different environmental and agricultural aspects, including the management of forests as sacred groves and fire breaks (Demeulenaere, 2002), studies on food security — as e.g. the use of wild species in times of drought (Addis *et al.* 2013; Guinand and Lemessa, 2001)— and general overviews of the agricultural system as a whole (Forch, 2003).

The work reported upon here focused on terraced structures located on a west-facing hill slope above the Kilkilo river basin in the Sahayto area (Figure 8.1c). Prior to archaeological excavation, the geology and geomorphology of the catchment were surveyed, including examinations of examples of terrace profiles exposed by gullies and within the sides of the river bank. These surveys noted land use, vegetation, parent material, erosion features, depth of sediment profile, macromorphological signals of horizonation and polycyclism (i.e. more than one cycle of soil formation within a soil profile) and the possibility of stratigraphic sequencing. Here we present the details of one of the excavated soils (Figure 8.1d, see also Ferro-Vázquez *et al.* 2017), considered as a representative example of the multiple sections surveyed in the catchment. It is located immediately adjacent to a seasonal river, the bank of which is being eroded away by water during storm-related peak-flows, exposing the depositional sequence. The earliest deposit of the studied section is a dark brown alluvial layer, since excavation did not reach the bedrock or saprolite level.

The alluvial origin of the studied sequence is confirmed by the stratigraphic relationships between the walls and sediments within this soil: the drystone walls all consist of a single line of facing stones backed by gravel packing, and are inclined at an angle of between 50-65°, meaning that these walls are not self-supporting and are instead sustained by the fine materials transported by the irrigation water that accumulate behind the walls, forming the field surface. Thus, our interpretation is that each wall is built incrementally by no more than two-three courses at a time (Figure 8.2). Local informants confirmed that this kind of sediment trap is now rarely used for building fields but that a plot of this type is known as a ‘yela’ (details on the methodology used for the ethnographic work are provided in Kabora *et al.* 2018).

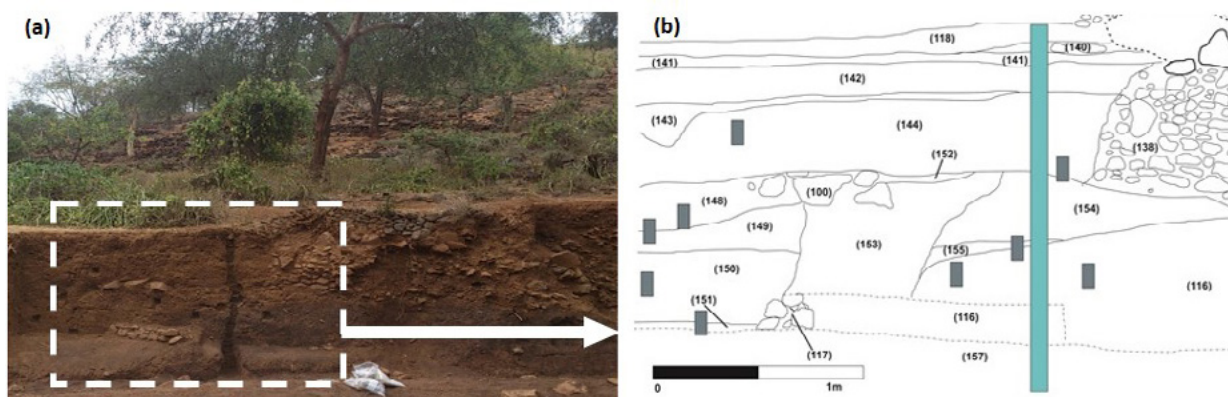


Figure 8.2. Sampling (a) and stratigraphy (b) of the studied section. The blue rectangle shows the position of the sampled soil column (40 samples), and the grey rectangles mark the undisturbed samples collected for the micromorphological study. Numbers in brackets indicate the depositional events as described in the field.

Further stratigraphic details can be found in Ferro Vázquez *et al.* (2017) and Gallelo *et al.* (2019). Summarizing, the studied cross-section can be divided in two main soil units. The upper one is represented by reddish clay layers with variable abundances of gravel from 0 to 105 cm depth. These are differentiated mainly by textural changes and sometimes separated by gravel and stone lines, the most visible one being at 35 cm depth. Below this upper unit, and separated from it by a gravel and stone layer at 100-108 cm, there is a dark, clay rich, carbonated layer that extends from 105 cm to 200 cm depth. It has been identified as a former *yela* surface due to its clear and flat upper limit, and because it ends in a terrace wall. Two soil horizons have been identified in this unit. The upper one is a black clay-rich horizon, with macroscopic carbonate precipitates. Underlying this there is a more reddish soil horizon, also clay rich and with some small Fe oxides nodules. An analogue sequence has been identified in other *yela* fields within the same catchment. Charcoal has been observed throughout the soil profile, although fragments are below 1 mm in size and highly degraded, so could not be isolated, quantified, or used for anthracological identification.

The marked differences between the upper and lower soil units indicated a change in the broader depositional conditions. To find out which processes caused these changes, data provided by the soil micromorphology, geochemistry and soil organic matter composition were used (Ferro-Vázquez *et al.* 2017). The molecular signal of the organic matter and the information obtained from micromorphological analyses indicated that fires were frequent in the catchment at the time that the earliest layers of the *yela* fields were built. From the low amount and small size of gravel in the bottom part of the section, it was deduced that the *yela* did not initially receive sediment directly from the adjacent hillside, but only material that eroded into the watercourse and was then transported within the river flow. The construction of artificial offtakes (*dotatta* in the local language) and channels (*kaba*) enabled that the flow rates getting to the *yelas* were kept low, producing an efficient particle size selection and allowing that only fine materials were sedimented. The material recorded in the earliest *yela* layers was thus composed mostly of clay and pyrogenic organic matter, with a very low abundance of coarse fragments of fresh geological materials.

In contrast, in the upper part of the studied *yela*, above 105 cm, the geochemical and micromorphological signal is quite different. Pyrogenic organic matter is scarcer, and the amount of gravel increases progressively towards the soil surface, indicating a different hydrological regime of the *yela* compared to the bottom unit. Evidence of higher proportion of fresh basalt fragments, and of larger sizes, was also found. The soil matrix in these upper layers has a red coloration that indicates a higher abundance of Fe-oxides, compared to the black coloration below, and a lower content of C and Mn oxides. No geochemical evidences of the addition of fertilizers was found in the analysed *yela*.

From these results, our interpretation of the evolution of this catchment —which we believe can be applied to the wider Konso landscape— is as follows. The charred remains produced by the burning of vegetation in the slopes would have initially provided a fertile material for cultivation which was indeed accumulated in the lower parts of the *yela*. However, as a result of extensive and/or repeated fires within the catchment, the former vegetation would have been comprehensively removed —except, perhaps, the small areas of ‘sacred forest’ that still exist on hilltops. Deforestation would have brought increased erosion and its associated risks, exacerbated by the basaltic lithology of the soil parent materials (e.g. Frankl *et al.*, 2012; Heshmati *et al.*, 2013).

The stone and gravel layer at 100-108 cm depth that separates the dark and organic bottom unit from the reddish and coarser upper layers evidences a higher energy erosive event that contributed coarse material, deposited in an uncontrolled manner, in a process consistent with the dynamics of a deforested landscape, and likely would have caused damage to fields and crops. This suggests that, at the moment of the deposition of this gravel and stone layer, the slopes immediately above the sediment trap fields

were not terraced, since terracing would have diminished soil erosion and likely avoided the deposition of such coarse materials. In fact, the bench terraces excavated and surveyed in the adjacent slopes sit directly on the saprolite, indicating that the original slope soil had been already eroded away when the terraces were built and that the pyrogenic materials of the first layers of the *yela* were deposited before the terraces were constructed. This, together with the stratigraphic evidence that the terraces system landscape expanded up the slopes from the valley bottom, indicate that the original aim of terrace construction was not to conserve pre-existing soil, as usually assumed in agronomic studies of terraces, but rather that terracing would have been adopted with the aim of protecting the fertile sediment trap fields, which would thus constitute the key agricultural resource in an early stage of the system.

As an originally unintended consequence of this first protection strategy, the terraces provided stable surfaces, which allowed the 'creation' of new soils and increased the area suitable for cultivation. These new soils created on the slopes would later act as a new controlled sediment source for the *yelas* immediately below them. In fact, the increased amount, larger size and angular shape of the gravel in the upper soil unit would indicate that the *yelas* were receiving a higher amount of material from the slopes due to runoff. The lack of rock fragments bigger than 2-3 cm points, nonetheless, to an already controlled water runoff flow, resulting in a sophisticated type of sediment harvesting system: soil was grown, eroded and carefully transported downslope together with runoff water, and then harvested in *yelas*.

A new stone layer at 35 cm depth indicates a further high energy erosive process, perhaps related to the deterioration of the terraces upslope, and could suggest a temporary abandonment of this agricultural land. This is in agreement with the observations made in test pits in slope positions (Ferro-Vázquez *et al.* 2017), in which clear morphological and stratigraphic evidence for the continued construction of new terraces above earlier examples was observed. Hardened carbonate crusts, consistent with a discontinuation of use, were documented in other (not currently cultivated) *yelas* during survey and also identified in subsurface positions in currently farmed *yelas*.

The archaeobotanical analysis of this *yela* and of middens at Konso villages (Thornton-Barnett 2019) showed that sorghum, millet, cowpea and a further legume identified only to the Fabaceae family were grown and consumed. A different suite of crops was encountered in the field than in the domestic contexts: The crops found in the fields, sorghum and cowpea, were also found in the middens, but some of the crops found into middens do not appear in the fields, suggesting that they may have been sourced from other local field areas, or traded. For example, no evidence of millets was found in the field contexts sampled, despite the recovery of pearl millet and finger millet at the village. This discrepancy between the field and domestic assemblages could be also due to the very low recovery of crops in the fields because the agent of preservation (fire) is not active enough in fields to provide a representative sample (Thornton-Barnett 2019). In addition, the combination of archaeobotanical sampling with interviews on farming practices at Konso revealed differences between the archaeobotanical assemblage (dominated by wild and economic weed taxa with relatively few millet and legume seeds) and the information provided by modern farmers and plant specialists, who reported a diverse and dynamic array of cultivated and wild taxa that play important roles today (a more detailed discussion of the archaeobotanical data can be found in Thornton-Barnett 2019).

### ***The abandoned agricultural landscape of Engaruka***

Also located at the East African Rift margins, Engaruka, in N Tanzania (Figure 8.3a) is an area today occupied by a majority Masai population that combines pastoralist activity with agriculture. Early work in the area (Sutton 1978 and 1998) reported that the 2000 hectares of visible archaeological remains at Engaruka represent an extensive irrigated agricultural system overlooked by about 37 hectares of

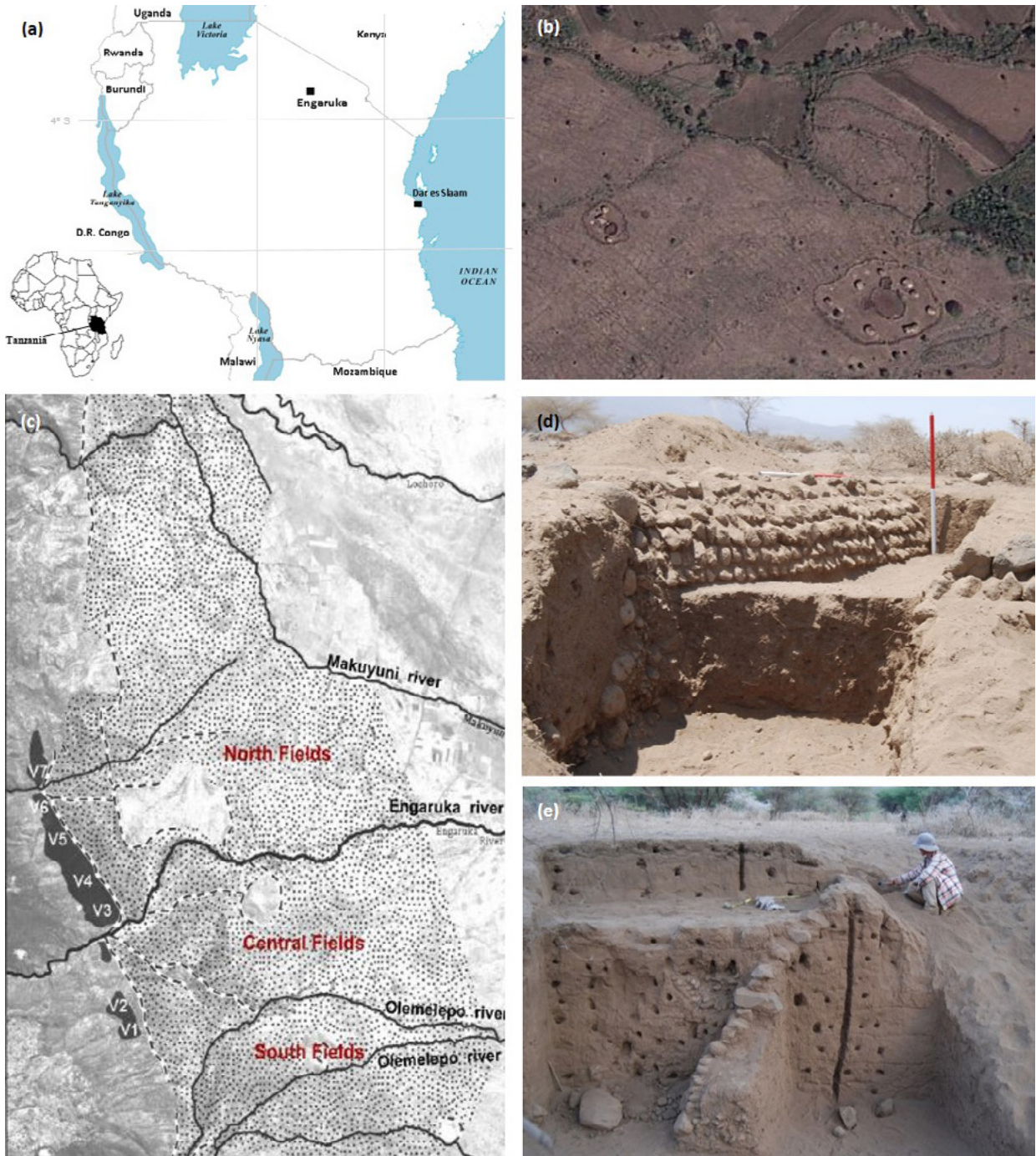


Figure 8.3. (a) Location of Engaruka. (b) Aerial photograph showing the remains of agricultural structures. (c) Map of the extension of the ancient agricultural system of Engaruka (from Kabora et al 2018): the villages are shown in solid grey, black solid lines are rivers, black dashed lines are the main irrigation furrows. The three areas of fields (North, Central and South fields) are marked in red. (d) Example of sediment trap field at the North fields. (e) Example of sediment trap field at the South fields, after sampling.

habitation sites (Figure 8.3b, Laulumaa 2006) with an estimated population of some 5000 people lived (Laulumaa 2006). This system is believed to have been in operation during the 14th to the 19th centuries (Stump 2006; Westerberg *et al.* 2010, see <sup>14</sup>C dates for the habitation area in Thornton-Barnett 2019). The archaeological work by Stump (Stump 2003, 2006) demonstrated that much of the Engaruka agricultural fields were in fact sediment traps, analogous to those described above for Konso, built by intentionally accumulating mineralogically fertile sediments carried off the much wetter Ngorongoro mountains. Water and sediments were supplied to the fields from the only perennial river of the area, the Engaruka, and also from other seasonal rivers, by primary irrigation furrows (Figure 8.3c), which then branched off into the smaller canalized streams and irrigation canals. Individual fields are interconnected by a series of smaller channels that allow distribution of water and sediment between them, with excess allowed to run off back into the canalized stream (Stump 2006).

But when the Europeans arrived in mid-nineteenth century, the agricultural system had been abandoned, which raised questions about its sustainability. The fact that the irrigation network was fed by what are now unreliable water sources (e.g., Sutton 1998, 2004) has led to the hypothesis that declining river flows were probably the reason why the agricultural system and associated settlements were abandoned (for discussions of which, see Sutton 1998; Stump 2006; Westerberg *et al.* 2010). Sutton (1978) lists, as causes for the water decline, deforestation within the river catchments, seismic disturbances to the watercourses, or regional climatic change. In contrast, more recent works by Westerberg *et al.* (2010) used radiocarbon dates from previous excavations at Engaruka with new palynological data from the nearby Lake Emakaat (Ryner *et al.* 2008), and concluded that the Engaruka agricultural system could be considered resilient, since the irrigation system would have allowed farming over comparatively dry periods during the timespan of its use. However, these works were inconclusive on whether the main identified phases of fields and furrows construction were a response to environmental stresses involving lower productivity, or otherwise to more benign conditions during wetter periods that allowed the expansion of the system. Alternative or complementary hypotheses presented by Sutton (e.g. 1998), suggest soil nutrient depletion as a possibly important factor for the abandonment of the area.

It is thus clear that addressing the question of the expansion and abandonment of the Engaruka system requires an interdisciplinary approach. The work undertaken under the AAREA and tRRACES projects in 2014 and 2016 combined archaeological (stratigraphic and archaeobotanical studies), soil science methods (geochemistry, micromorphology) and sedimentology (modelling of sedimentation rates) to investigate the evolution of the agricultural system and to elaborate on its sustainability and on the causes of its abandonment (Kabora 2018; Kabora *et al.* 2020; Lang and Stump, 2017; Stump 2006, 2010; Thornton-Barnett 2019). The research focussed on three former cultivation areas delimited on the basis of physiographical and archaeological criteria: the North, Central and South Fields (Figure 8.3c; Stump 2006; Sutton 1998). These occupy the areas at the foot of the escarpment and sit on an alluvial fan and adjacent margins of the inundation plain, and are bounded to the west by an areas of bench terraces area in the steeper slopes. The North Fields and the South Fields were most similar (Figure 8.3d and 8.3e), with agricultural sediment traps measuring from 0.3 metres up to 3.0 metres high—the highest located in the South Fields, watered by permanent furrow off-takes with further tributary canals (Stump 2006). In contrast, the Central Fields had no irrigation furrows except on the small hills, and the plots are divided by single lines of stone or by low dry-stone terraces, typically no more than 30 cm in height. The main irrigation off-takes were on the perennial Engaruka River, and the now ephemeral rivers of Olemelepo, Intermediate (as named by Sutton 1978), Makuyuni and Lolchoro (Figure 8.3c). The bench terraces in steeper slopes are smaller in surface than sediment traps, and have different shapes depending on topography and on their use—for habitation or for cultivation and, among the latter, for different irrigation requirements.

In addition to an extensive surface survey and numerous test pits, a total of 18 cross-sections were excavated in 2014 and 2016 to investigate deposits associated with drystone walls—some of them exposed in gullies initiated or expanded by the heavy rains of the 1997–1998 El Niño. The stratigraphic results from a representative cross-section (Figure 8.3e; Lang and Stump 2017) indicated that the earliest depositional event is a layer of gravels with fairly homogeneous particle sizes, which predated the deposition of a compact gravelly sand deposit, and followed successively by the deposition of sandy sediment layers, up to the current ground surface, forming an apparently simple stratigraphic sequence that gets complicated only when considering the characteristics of the wall that contains them and how earth deposits relate to it. The wall is more than 2 m high and is inclined upslope at an angle of 60–70°. This means that, similarly to Konso, the wall is not self-supporting and is supported instead by the sediments behind it. The interpretation of the sequence formation begins therefore with the construction of the founding two or three courses of the wall, which causes the accumulation of one sediment layer behind them. Upon siltation of this first structure, it follows the construction of the next two or three courses of the wall and the accumulation of a subsequent sediment deposit behind these new courses, in a process that is repeated as many times as needed (Lang and Stump 2017).

In view of the importance of the processes of water-driven sediment deposition, a sedimentological investigation was carried out (Kabora 2018, Kabora *et al.* 2020), focusing on modelling the construction of blocks of 6 x 6 m fields in a small section of the Engaruka North Fields system. The aim was to understand the sediment accumulation patterns in relation to the morphological and stratigraphic characteristics of the fields and taking into account time, water flow and sediment load as factors conditioning transport and deposition. The outcome of the obtained model can potentially be extrapolated to assess the wider landscape sedimentological dynamics. The results showed that the fields can be constructed over a short period of time, approximately 1–3 months per each 6 x 6 m field—with a height of 350 mm, which is the maximum recorded in the surveyed fields—and that it would take between 8 to 13 years to construct a block of 90 fields covering 3,000 m<sup>2</sup> (up to 27 years during prolonged dry periods). This means that an individual field could potentially be constructed over a single wet season (Kabora *et al.* 2020). It also means that, if the field blocks were constructed sequentially, i.e. finishing one field before starting a new one, the construction across the 9 km<sup>2</sup> of the North Fields would have taken thousands of years, thus pointing towards concurrent rather than sequential field development, with sediments accumulated within different fields simultaneously over successive seasons.

The geochemical and micromorphological characterization of the soils developed on these sediments show that, although geological carbonated structures abound at a landscape scale, there is no evidence of salinization of soils, a known problem in areas irrigated for prolonged periods. It is hypothesized that repeatedly accumulating new carbonate-free sediments from the rainy highlands onto agricultural plots avoided this problem. Particle size and magnetic susceptibility analyses demonstrated that the rate of water flow also varied through time and provided evidence for a managed water regime both in terms of field locations and within irrigation canals (Lang and Stump 2017). Preserved micromorphological pedofeatures indicate that some fields were kept permanently inundated, meaning that water remained available after the episodes of sediment deposition (Lang and Stump 2017). However, this is not the case for all fields, with some showing evidence of repeated wetting and drying. The micromorphological analysis has also shown that the dominant composition is basaltic (Lang and Stump 2017), which is further supported by the elemental and mineralogical composition of soils (by XRF-ED and XRD, unpublished results). No evidence of either soil nutrient depletion or the addition of fertilizers has been found, which challenges the hypotheses of soil exhaustion due to a prolonged intensive use. In addition, the analysed soils did not show andic properties, with low organic contents and very low Phosphorous retention capacity, in contrast with the source areas where these sediments were originally produced, where the wetter conditions typically allow the development of andic soils.

Engaruka's ancient system thus consists, analogously to Konso, in a terraced runoff system based on the natural erosion-sedimentation cycle, through which new soils apt for cultivation were created in the footslopes. The archaeobotanical assemblage recovered from habitational structures and from agricultural fields in sediment traps comprised different kinds of millets and legumes, in contrast to previous research that reported the evidence for just one crop—sorghum—and thus definitely discarding the possibility of an unsustainable mono-cropping system to instead include an array of different plants—sorghum, pearl millet, cowpea, and finger millet, as found by Thornton-Barnett (2019).

## Discussion

The Konso system in Ethiopia and the Engaruka system in Tanzania are analogous due to the similarities in the complex system of terraces and canals developed for water management and for the sediment capture practices identified in both sites. Archaeological research has allowed us to identify and understand these similarities, but has also highlighted differences in the particular evolution of each site, on the factors driving change, and on the function and capacities at the two sites. For example, the terraces on slopes are rain-fed at Konso, in contrast to Engaruka, where many were irrigated. Nonetheless, at both places they were designed to trap and retain as much soil moisture as possible on the slopes and reduce runoff and hillside erosion, incorporating drainage channels to enable the evacuation of excess rainfall and prevent damage to the terraces. At both sites, closer to the river banks and in the valley floors, irrigation is practiced on the sediments accumulated behind walls that trap both water and sediments. These sediment traps have had a prominent role in agricultural practice in the two systems and have been preferential production areas. The different topography determines the distinct morphologies of fields in Konso and Engaruka, which are also conditioned by the characteristics of the irrigation system. Importantly, the functioning and productivity of the sediment traps depend in both cases on the catchment or landscape scale processes, since they rely on the production and transport of sediments from areas distant from the trap itself that, at the same time, depend on the use and management at these source areas. These important characteristics of both systems are discussed below.

### *Sediment traps as a key element for agricultural production*

Sediment traps remain an essential – though until recently overlooked – agronomic resource at Konso, and form approximately half of the total former field area at Engaruka, strongly suggesting they were also essential to this system. Examples of analogous structures can be found in other East African systems (see, e.g. Bruins *et al.*, 1986; Reij *et al.*, 1996; and Stump, 2006), and in archaeological and currently farmed sites worldwide where water is a major limiting resource for crop production, as shown e.g. in Ashkenazi *et al.* (2012) and Avni *et al.* (2006) for the Negev Desert; and Norton *et al.* (1998) and Sandor *et al.* (2007) for North American arid zones. An extensive review of these kinds of systems can be found in Barrow (2014). Despite the wide variability of characteristics and designs for runoff harvesting systems, they all share the same strategy of increasing water availability for crops by means of capturing runoff generated during rainstorms in levelled and dammed plots used as cropping areas (Ben-Asher and Berliner, 1994). Usually these systems are qualified as runoff-only harvesting strategies, with the accumulation of sediment being in most of the occasions considered an undesired outcome of runoff capture.

In contrast, while the structures at Konso and Engaruka are obviously irrigated, we interpret them primarily as sediment harvesting systems. This is first because of the original lack of cultivable soil at the locations where the structures are located, in contrast with other analogous systems worldwide (Barrow 2014). This lack is due, in the case of Konso, to their topographic position in relation to the water courses, at the foot of steep slopes, in the internal part of the meanders, so subjected to continuous

stream erosion, where no soil could be developed in the absence of the sediment traps. At Engaruka, on the other hand, there is the possibility of the formation of soil on top of the alluvial fan, but other environmental characteristics —such as a high salinity— make these natural soils non-cultivable, or at least of low capacity for production in the absence of anthropogenic soil accumulation. Furthermore, the sediment traps studied at both sites are in the margins of streambeds, and do not occupy the deepest part of the valley bottoms as would be expected if the aim was capturing the highest amount of water, as it is observed in other systems exclusively devoted to water harvesting (see e.g. Ashkenazi *et al.* 2012).

Technologically, sediment traps are very sophisticated: their management requires a perception and understanding of the catchment scale erosion-sedimentation dynamics and the capacity for an adequate administration of water flows, which ultimately involves an understanding of topography and climate, as well as the development of technological tools for taking advantage of them. Their design optimizes both irrigation and sediment harvest, by segmenting the fields into small areas, in some cases at Engaruka amounting to no more than 6m<sup>2</sup> (Stump 2006, Kabora 2018). This compartmentalization likely enabled farmers to judiciously distribute irrigation water in space and time, and ensures that a given plot can be entirely irrigated using the lowest amount of water under a soft, non-erosive flow (Figure 8.4). At the same time, the control of water flows enabled an efficient particle size selection, thus ensuring that the deposited sediments are apt for cultivation. The addition of renewed sedimentary materials of the adequate particle size during wet seasons helps to mitigate certain agronomic issues derived from intensive use, such as salinization resulting from continued irrigation under high evapotranspiration rates (Lang and Stump 2017, Avriel *et al.* 2019), the development of carbonate or silica crusts and cemented soils (Ferro-Vázquez *et al.* 2017, Sandor *et al.* in 2021), the formation of heavy soils on basalt parent materials (Singer 1966; Ryan and Huertas 2009), and decreased soil fertility – the latter potentially mitigated by the sediment supply, without the addition of fertilizers (compare with e.g. Tesfai and Sterk 2002 for Eritrea, and Díaz *et al.* 2011 for the Canary Islands).

It remains unclear, however, whether the design of these structures as irrigable sediment traps was intentional in its origin, or if ancient societies aimed for an irrigation-only system and sediment harvesting was adopted opportunistically. It is nonetheless undeniable that these sediments were captured consciously, and that the irrigation system was modified for accommodating the progressive increase in height of the sediment traps. In any case, this interpretation of a two-fold purpose of the riverside and floodplain fields opens the way for reevaluating the function of other runoff systems

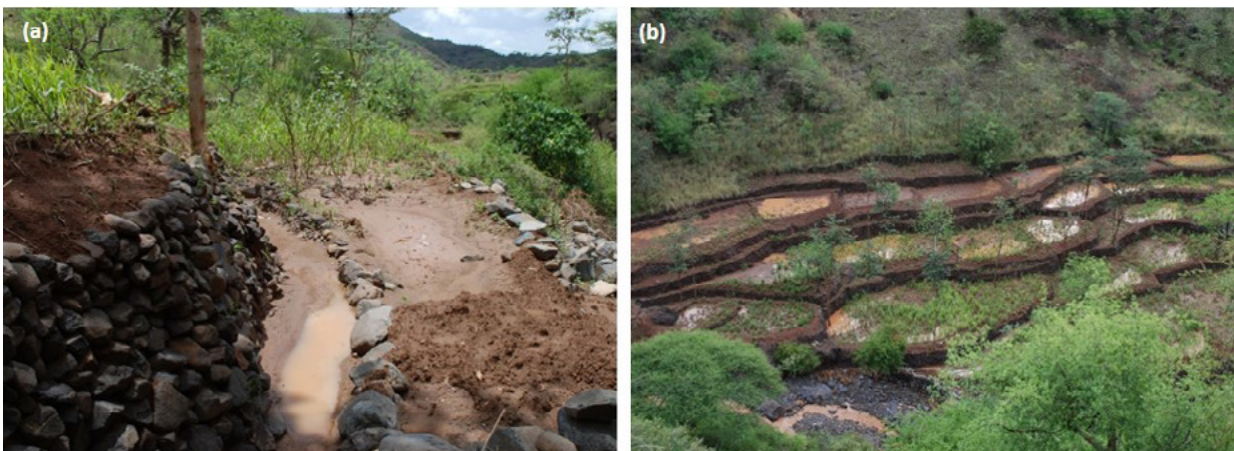


Figure 8.4. (a) Irrigation offtake (*dotatta* in local language) and channel (*kaba*) at Konso. (b) A group of *yela* sediment traps after irrigation.

featuring similar structures worldwide. Indeed, it is likely that check-dam structures previously assumed to have been designed for runoff harvesting were also designed to accumulate sediment, particularly in those cases where these are repeatedly refurbished to increase their height, as is recognized in a number of studies of desert agriculture (e.g. Hill and Woodland 2003). It is thus important to investigate whether the primary purpose of these kinds of fields is just water harvesting or if they were engineered for the capture of new arable soil, as has been discussed before for other geographical locations (see Even-Ari *et al.* 1982; Avni *et al.* 2013, citing Kedar 1967). As the research presented here demonstrates, archaeological research is well placed to address these questions.

For Engaruka and Konso, the fact that these structures are indeed sediment traps has deep implications in terms of the ecosystem services underpinning the two agricultural systems. It means that the production of a certain amount of sediment in the highlands or in the slopes is necessary for maintaining the productivity in adjacent lowlands and valley bottoms, and that this sediment has to be mobilized through erosion mechanisms, transported by water and reach the traps where it is finally accumulated. Thus, in spite of soil erosion being a generalized threat to agriculture in these sites and in many other semi-arid and arid areas of the world, it is a requirement for the functioning of these systems, since it is this process that creates new, fertile, agricultural soils and allows their continued and intensive use while maintaining a high capacity for production. Both the Konso and Engaruka systems are engineered for taking advantage of the erosion-transport-sedimentation cycle, which operate, in the case of Konso, at a catchment scale, and at a landscape scale at Engaruka. From this new perspective, soil erosion, when managed, has constituted an agronomic resource, the system having relied on it to be productive from its origins.

### ***Multifunctionality of terraces***

At both Konso and Engaruka, the construction of hillside terraces (as distinct from sediment traps) serves as an efficient means for controlling erosion and for conserving soil. This is the function traditionally assumed for terraces, which continue to be presented as models of indigenous soil and water conservation (Belachew and Mezgebe 2019). From the work of AAREA and tRRACES it is now known that the terraces at Konso and Engaruka have a diversity of functions, and that their construction was not necessarily or exclusively designed to address soil conservation. Rather, terraces can address multiple environmental and agronomic problems at the same time. In particular, archaeological investigations show that the initial objective of hillside terracing at Konso was not to conserve soil to permit or improve cultivation of the hillsides, but instead, terraces were constructed at the base of the slopes as a protection measure for sediment traps when the integrity of the traps was jeopardized by the washing of coarser materials from bedrock exposed in the slopes. As a secondary, perhaps unintended benefit, terracing served to create new usable land through the softening of the slope and the accumulation of colluvial materials. This is a traditionally acknowledged purpose of bench terraces on slopes in arid lands (see e.g. Sandor *et al.* 2021), which allows the creation of relatively level, stable fields that facilitate irrigation and enhance conditions for crop productivity; a process that allowed their use for agricultural and habitational purposes at both Engaruka and Konso. The protective function of terraces, in contrast, seems not to have been necessary at Engaruka, due to its particular topographic configuration in which the sediment traps are located on an alluvial fan, and are not immediately contiguous to steep slopes.

The control of hydrology is also a function of terraces at the two sites. While at Engaruka some or all of the terraces on hill slopes were probably irrigated, they are rain-fed at Konso. Their morphology allows, nonetheless, to trap and retain an adequate amount of moisture in both cases, thus lessening runoff and safely evacuating the excess of water towards channels that drive it to the stream; and indeed at Konso these channels act as storm drains to prevent damage to both terraces and sediments traps during highly erosive rainfall events (Hallpike 1972: 25). In addition to preventing damage to the terraces

themselves, this optimizes the use of water, facilitates water management downstream and contributes to regulate the sediment input rate to the sediment traps.

### ***Implications for the governance of resources, power relations and social organization***

Albeit with different thicknesses, a black, fire derived soil horizon at the bottom of earliest layers of the sediment traps was observed during the visual survey of the area in many of the *yela* sediment traps at the studied stream at Konso. This indicates that the burning of the slope vegetation was not a local event affecting the studied site only, but a phenomenon that affected the whole catchment. This is supported by previous studies of oral histories and traditions (Tadesse, 2010; Watson, 2009), from which settlement and ownership of land was established by the first Konso occupants by burning the forested landscape. The place where the fire spontaneously stopped was claimed as the boundary of their land. Although it should not be taken too literally, this might indicate that the use of fire as landscape management tool was a feature of early settlement at Konso, and would suggest that agricultural production and land tenure systems developed simultaneously. In addition, this observation, taken together with the fact that sediment traps are located away from where the burning actually occurred, may suggest that landscape was understood, and potentially managed and planned, as a whole. However, the questions of whether the burning was intended to provide sediment to the sediment traps, and if the farmers were aware of the advantages of adding fire residues to the soil, cannot be answered from current data.

On the other hand, although it has often been asserted or assumed that the construction and maintenance of runoff systems are labour intensive (e.g. Avni *et al.* 2013), the results of simulations of the Engaruka system by Kabora *et al.* (2020) suggest that the construction of sediment traps could be managed at household level, requiring the involvement of just a few individuals during a few weeks. The sediment accumulation rates documented at Engaruka demonstrate that field construction occurred over monthly to decadal timescales, during which small amounts of sediments were deposited through a succession of low-energy runoff events. The construction of fields was thus easier, as farmers did not need to move large amounts of sediments, and resulted in more affordable labour expenditure. This implies that no higher organizational hierarchies were required for the construction and maintenance of these structures, and indeed there is no clear evidence for social hierarchy at Engaruka, for example through differences in the scale or elaboration of settlement structures (e.g. Sutton 2004).

In addition, the design of the field system at Engaruka would allow farmers to quickly accumulate sediments and develop many concurrent blocks of fields across the system in a relatively short amount of time by concentrating the water and sediment resources in specific field blocks. Evidence of this can be also seen in the current farming practices employed in Engaruka (Caretta *et al.* 2015) as well as in the traditional irrigation-farming system in Konso (Ferro-Vázquez *et al.* 2017; Watson 2009; Hallpike 1972; Amborn 1989). This poses questions on the management of the water resources: issues of competition for water —and sediment— supply may arise among farmers, particularly when water flows are low during extended periods of drought. According to Caretta *et al.* (2015), today's general rule at Engaruka is that everyone who owns a plot and participates personally or through a family member in maintenance and repair works, is entitled to irrigation water every 24 or 34 days. The existence of such rights and responsibilities within modern and historic irrigation systems highlights the pivotal role played by social structures in the creation and operation of agricultural landscapes, though their existence can only be inferred and not defined by the archaeological research reported here.

***Past and future sustainability***

Traditional agriculture is being brought back to the international agendas in adopting the goals of the 2030 Agenda on Sustainable Development, in particular in relation with SDG 13, after the Paris Agreement on Climate Change. Traditional or indigenous systems are seen by many as the key for a change towards a sustainable global agriculture (Altieri and Nichols 2017), which could help to also increase carbon sequestration in soils and thus contribute to tackle the ‘major problem’ of land degradation (IPBES 2018). According to UNESCO, these ‘other knowledge systems’ encompass a sophisticated expertise that has been empirically developed through time by local communities, and guide their interactions with the environment, including the strategies to cope with its fluctuations (Nakashima 2000). Proponents of ‘indigenous knowledge’ note that such systems may include mechanisms for the maintenance of dynamic nutrient equilibria, efficient use of natural resources, closing of mineral and water cycles (and thus low inputs) and multifunctionality at field, farm and landscape levels (Pinto-Correia and Vos 2004). The UNFCCC has recently highlighted the importance of ‘identifying effective and context-specific adaptation measures in agriculture, taking into account the diversity of the agricultural systems, indigenous knowledge systems and the differences in scale’ (UNFCCC 2016).

Indeed, during centuries, the Konso and Engaruka systems have developed viable agronomic solutions that used and deployed the properties of natural ecosystems and the services that they provided in a smart, ‘engineered’ way, in line with the concept of nature based solutions currently defended by international organisations and NGOs (Cohen-Shacham *et al.* 2016) for providing sustainable, cost-effective, multi-purpose and flexible land management strategies capable of adapting to climate change.

A common characteristic of both systems is that they have enabled a sustained production during a prolonged timespan, apparently without requiring the application of fertilizers. In arid regions soil nutrient deficiency is an equally or even more limiting factor for agricultural productivity than the lack of water (Bremner *et al.* 2001; Fox *et al.* 2005; Aune and Bationo 2008; Stroosnijder 2009; FAO and ITPS 2015), and several studies have shown that progressive nutrient depletion is a common outcome in modern and ancient agricultural soils worldwide (Stoorvogel *et al.* 1993; Sanchez *et al.* 1997; Sheldrick *et al.* 2003; Sheldrick and Lingard 2004, Ferro-Vázquez *et al.* 2014). Fields at Engaruka and Konso benefitted from the fact that the captured runoff contributes both water and nutrient-rich sediments and organic debris from the source area to the lowland fields, thus renewing soil fertility with each subsequent sediment-capture event, avoiding fertility exhaustion and improving soil structure, in this way reducing the risk of soil degradation and in-site land desertification.

In addition, this sediment harvesting strategy has the capacity of mitigating the risk of degradation of off-site lands and water reservoirs downstream. Bewket and Stroosnijder (2003) noted the problem of downstream sedimentation caused by upstream degradation resulting from land use/cover changes that could create extensive flooding and damage on important agricultural lands when not properly managed. According to Zhao *et al.* (2017) check dams are efficient sediment control measures. They identify, however, the accumulation of sediment in check dams as a problem to be solved because it may create costly operational and maintenance issues, therefore suggesting solutions for sediment management in the check dams such as sediment pass-through, flushing, or mechanical removal in order to guarantee their longevity. These are not issues at Konso and Engaruka, since the two systems are designed to benefit from the sediment captured, which this way becomes a valuable resource.

Further aspects of both landscapes point to a highly resilient configuration. The construction of the ancient irrigation systems may have taken the issue of climate variability into account, at least in the case of Engaruka. Its design is based on the redundancy of the main irrigation features, which were able to bring water to the fields from the perennial Engaruka River if the smaller (now) seasonal streams

proved unreliable (Sutton 2004). Furthermore, the archaeobotanical results and the interview data from both sites (Kabora *et al.* 2018, Thornton-Barnett 2019) emphasized the value of multiple cropping and intercropping as a risk mitigation technique, demonstrating that, at least at present, rather than aiming for maximising yields of a single cash crop, the chosen strategy prioritizes lessening the risks posed by climate uncertainty by diversifying production both within individual plots and across different landscape niches. This diversification and complementarity of habitats in terms of landscape composition increases the ability of ecosystems to sustain their natural production capacity and to perform regulating functions (Zirbel *et al.* 2019), because different configurations serve to obtain different benefits from a specific environmental trait or combination of traits, at spatial scales that are relevant for land management (Oehri *et al.* 2020).

Thus, the Konso and Engaruka agricultural systems have, during centuries, avoided off-site land degradation and in-site soil exhaustion, simultaneously providing environmental, social and economic benefits. Over time and through climate uncertainty, the solutions for agricultural exploitation in these two sites developed locally-adapted, resource-efficient and systemic strategies for agricultural production by taking advantage of the natural erosion-sedimentation cycles (Figure 8.5). It is tempting, therefore, to conclude that these systems *are* sustainable and that, in a rapidly changing world where biodiversity-based resilience and multi-functional landscapes are key, particularly for regions experiencing more arid conditions, traditional water and sediment harvesting agricultural systems such

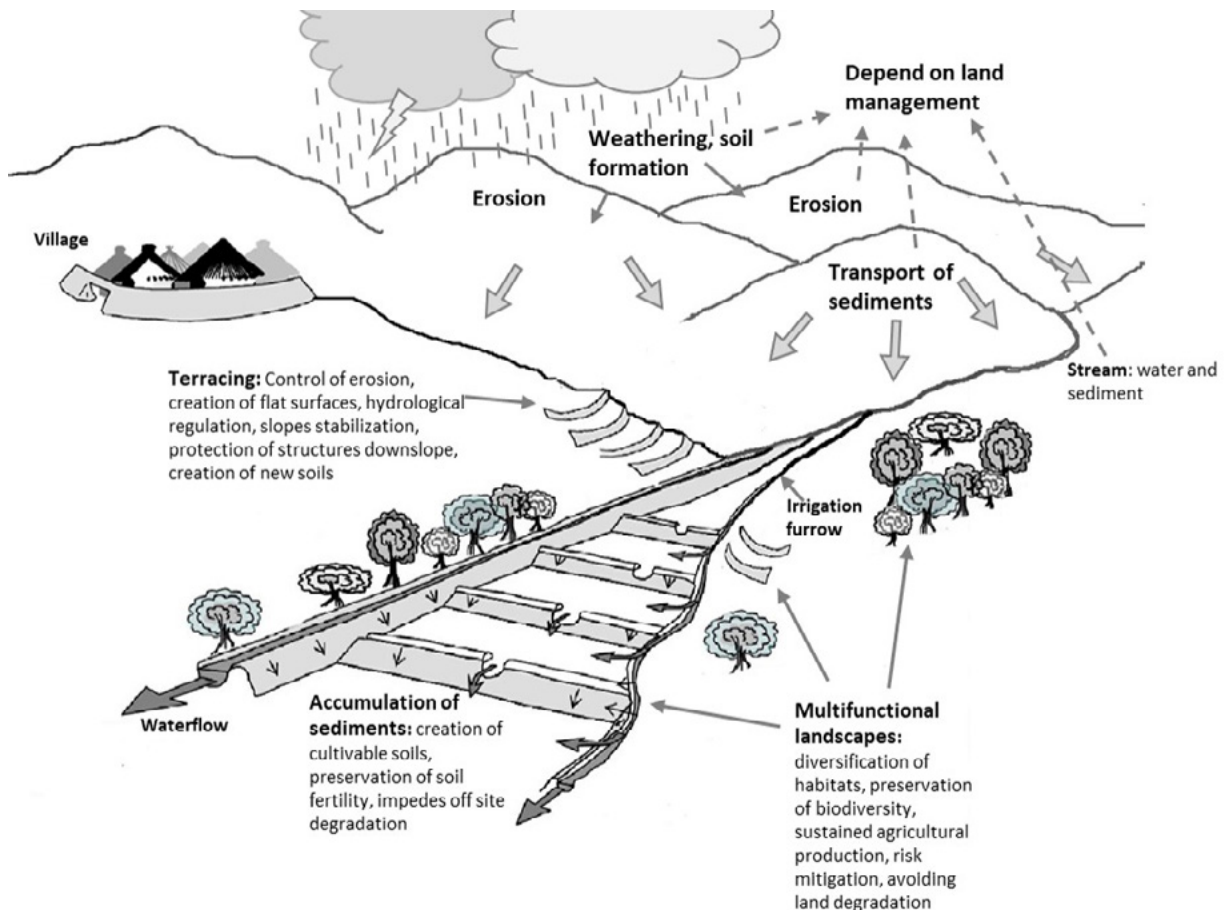


Figure 8.5. Graph of the main system functions and the ecosystem services involved in sediment harvesting systems.

as Konso's and Engaruka's can be used to help to generate sustainable food production while achieving 'land degradation neutrality' (Orr *et al.* 2017). Indeed, in the framework of the AAREA project, interviews undertaken with representatives of British and European NGOs demonstrate that information on sediment traps is potentially of direct relevance to development agencies (Richer *et al.* 2019).

However, it is necessary to keep in mind that traditional and long-lived are not synonyms of sustainable (see Stump 2010, Stump 2019). Even if these systems could be considered sustainable in their original setting, their strategies are not necessarily effective or convenient in today's scenario. In fact, the evolution of Konso and Engaruka demonstrate that the capture of sediments for agricultural production involves environmental trade-offs at a landscape scale: the amount of sediment carried off the mountains by water is proportional to the erosion of highland and slope soils which, on the other hand, depend on the land cover and use in the sediment source areas. The water and sediment supply in the lowlands can be altered by, for example, a change in grazing pressure in the slopes, or by increased afforestation that enhances water infiltration in the soil, thus reducing runoff. The same applies for the characteristics, including fertility, of the soils developed in sediment traps, as attested by the properties of the soils studied at Konso: the use of fire in slopes enabled the accumulation of highly fertile fire-derived materials in the riverside fields, improving their agronomic properties at the cost of deforestation and increasing erosion risks. Thus, when choosing to invest in creating highly productive spaces by accumulating sediments in the valleys for their cultivation, communities, households and administrations may accept, consciously or not, trade-offs between economic and environmental sustainability at multiple spatial and temporal scales. While the construction of sediment traps has had clear benefits and probably constituted an important component in food security and risk mitigation strategies (Thornton-Barnett 2019), the performance of these fields may be at the expense of environmental degradation in other parts of the landscape, which can condition the sustainability of the whole system in the long run. This, in modern terms, can be regarded as a policy decision and, before its adoption, it is crucial to recognize the long term benefits and cost of these practices taking into account the ecosystem services involved at the appropriate time and space scales.

## Conclusions

While the specific strategies that provided longevity to the Engaruka and Konso systems may or may not be adequate in other locations, they provide important information for approaching sustainability and resilience in agricultural landscapes. It is necessary to obtain a diachronic and long-term view of the processes involved in their evolution, based on an appropriate time scale, able to appraise the effect of slow variables (*sensu* Holling 1986) over time, which cannot be identified by synchronic and period-based studies.

Archaeological research in combination with earth sciences and anthropology can provide such a diachronic view of agricultural landscape development. Stratigraphic excavation (*i.e.* discerning the sequence in which events occurred) is, after all, a process of 'reverse engineering' (Stump 2019), and can thus be used to define the form, function and construction method of soil and water management techniques. This provides crucial data on the long-term consequences and trade-offs within food security strategies.

At the two studied agricultural systems, the mechanisms underpinning agricultural production, based on the natural erosion-sedimentation cycles, operate at the catchment/landscape scale. The evaluation of the past performance, as well as the current future capacities and risks of these and other analogous systems, has to take into account the characteristics and evolution of off-site areas and the connectivity between the different parts of the landscape. It is therefore essential that the research includes a landscape scale approach.

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