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The transformation of a cultural landscape: the Empordà, northeast Spain

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Landscapes are cultural creations that bear the imprint of successive human histories. The landscapes of the Empordà region have undergone a series of transformations from prehistoric to modern times, the complexity of which is being unravelled in a novel interdisciplinary study that has important implications for present-day environmental and heritage management.

The Empordà is a rich agricultural region that occupies a privileged geographical position because it lies astride the main inland route linking France with Spain, is open to the Mediterranean and is largely shut off from the interior (Fig. 1). Throughout its history, the Empordà has been an area of passage and contact, and this has generated a rich archaeological and historical record that spans the past 6000 years from the first neolithic colonizations, through the later Bronze Age, Iberian, Roman and medieval periods to the present day. The region thus presents a particularly well developed sequence of changes involving conquest, colonization and migration at the hands of Greeks, Romans, feudal lords, and a succession of pre- and post-industrial entrepreneurs.

The main aim of the Empordà project,[1] begun in 1996, is to examine the evolution of social space in the region and to demonstrate how the present-day landscape is a consequence of processes contingent on historical events, thus underlining the fact that past decisions form the initial conditions of what are often perceived as present-day crises. An additional aim is to provide social and environmental data relevant to contemporary debates on the sustainable future of the Mediterranean generally. In particular, the research seeks to examine the role of social and political power structures in directing the historical evolution of land-use conflict in the region. Issues of conflict – frequently centred around the management of river systems and wetland areas – are seen as a key thread linking the chronological trajectory of landscape evolution.

Figure 1 *Location of the Empordà research area.*

Human ecodynamics and the cultural landscape

Cultural landscapes are human creations. They constitute the results of long-term interaction between people and the natural environment. They should be regarded as historical constructions that can be properly understood only in terms of the conjunction of evolutionary biophysical processes and social, political and ideological events. It is this interdependence, linking human agency and environmental dynamics (human ecodynamics) acted out over the long term, that defines the landscape.[2] This implies that contemporary issues relating to agricultural production, industry, tourist expansion and the natural and cultural heritage should be seen in a long-term perspective as the latest in a sequence of changes brought about by past economic and political decisions that have intended and unintended consequences. And to adopt a human ecodynamic approach[3] is to acknowledge that research on the inherent complexity of cultural landscapes is best undertaken through an integrated interdisciplinary methodology.

Aims and methods of the Empordà interdisciplinary project

The primary research aims of the project are being addressed through an approach to land-use conflict based on data from archaeology, historical ecology, geomorphology, hydrology, medieval history, human geography and sociology.[4] Methodologically, aerial photography, satellite imagery and geographical information system (GIS) technologies, are proving valuable, together with the development of a multiscale framework for dynamical modelling. These research methods provide the context within which the interaction of social and natural dynamics can generate viable futures for the Empordà. These methods can be summarized under two main headings:

- Environmental monitoring and landscape management

  Operationally, this involves the integration of four primary research axes:
  - remote sensing and GIS
  - landscape history (archaeology, archival research, demography and historical land use)
  - environmental dynamics (lithology, geomorphology, soils, vegetation, hydrology)
  - landscape management (community dynamics and social networks, local decision-making structures and contemporary land-use conflict)
- Dynamical modelling
  - multiscale modelling framework
  - dynamical simulation models
  - landscape sensitivity mapping (LSM).

A multiscale methodology integrating GIS and dynamical modelling is being developed to provide the context for designing a land-management strategy that minimizes land-use conflict. In addition, a landscape sensitivity mapping (LSM) system is being developed as part of the GIS to help generate future sustainable pathways for the landscapes of the Empordà. The ultimate aim is to design an interrogative tool that can be used in monitoring the susceptibilities of the landscape to changing social, political and economic circumstances. The LSM is designed to integrate structural, functional, organizational and perceptual criteria that define a series of landscape states related to different organizational scales, from the local (micro) scale to the European (macro) scale. These categories form the fundamental units for investigating landscape resilience and its sensitivity to change. The basic research questions being asked are therefore: what are the primary axes of change operating in the Empordà landscapes over time, and what are their attributes (Table 1)?

These investigations aim to achieve a useful definition of sustainability and to construct qualitative measures of resilience for individual locations in the study area that reflect the welfare needs of the community and the requirements for the

Table 1 Primary axes of change in the Empordà landscapes and their attributes.

Axes of change	Attributes
Social	• relations of production • land ownership • demography
Political	• administration • regional/local government
Cultural	• recreation/leisure • conservation management
Economic	• agriculture; mass tourism • eco-tourism
Biophysical	• rainfall variability; floods • soil structure/erosion • loss of biodiversity • coastal erosion • wetland disturbance • hydrological balance

maintenance of biodiversity. Such issues have a general relevance to understanding human exploitation strategies and their consequences, regardless of whether we are dealing with a prehistoric or a contemporary environment.

The Empordà landscape as long-term history

Viewed in a long-term perspective, the evolution of the landscapes can be conceived as a succession of eco-historical periods, articulated by specific social–political regimes and broadly defined by changes in the natural landscape that have occurred as a result of human modification. Our research is focused on the manner in which these changes have been produced, with respect to specific political, economic and ideological criteria.

Over the long term a series of major structural transformations in the organization of political space have occurred in the Empordà; for example, the emergence of urbanization, with the development of the first towns in Iberia, such as the Greek city of Emporion and its Iberian counterparts, Ullastret and Mas Castellar de Pontós; the subsequent Romanization of the landscape, and with its decline the new feudal kingdoms with their contested territorial jurisdiction, leading in turn to a sequence of early modern and contemporary appropriations of the land. These transformations represent an historical sequence of extractive economic strategies that have sought to appropriate the land for political or economic gain. Thus, the history of the Empordà can be viewed as the history of land-use conflict, frequently related to water, because the region contains many natural lagoons and wetlands. We are also therefore involved in research on the reconstruction of palaeo-landscapes, the superficial hydrology having changed dramatically during the past 10,000 years.

From the Iberian Iron Age to the Romans

In chronological terms, our research begins in the Iberian Iron Age (650–50 BC), before the first period of Greek colonization. Analysis of over 400 archaeological sites of all periods suggests that the landscape was orchestrated by a series of oppida (small towns) that functioned as nodal points around which groups of dependent smaller sites clustered. The oppida were situated in easily defended locations and were generally constructed with fortifications (Fig. 2). On the plains adjacent to these sites we have found many clusters of silos (pits) that were used for grain storage. We are investigating the location of all the sites in relation to specific kinds of resources, and also their spatial relationships with other sites. Preliminary analysis of the known sites shows that there are clusters concentrated in the Ter and Fluvià valleys and on the coastal fringe (Fig. 3). In addition, it appears that the number of sites increased during the Middle Iberian period (fifth to fourth centuries BC), and that this change represents a pattern of more intensive territorial exploitation.

Around 580 BC, the colony of Emporion was founded by the Greeks as part of the expansion of their commercial interests. From their capital, Massilia (Marseilles), Greek merchants established a chain of small ports and factories around the Gulf of Lyon and along the northeast coast of the Iberian peninsula. Emporion was situated at a strategic point on the Gulf of Roses, between the rivers Fluvià and Ter (Fig. 3), which provided ideal communication with the landscapes of the interior. When the Greeks arrived in the Empordà, the local populations already had commercial relations with the Phoenicians and, on a smaller scale, with the Etruscans. Ultimately, however, Greek commerce was to dominate the coastal zone between Massilia and Emporion. During the fifth and fourth centuries BC, Emporion developed as an urban centre with an important commercial network that reached the French Midi, Rousillon, the entire southeast coast of Spain and the Balearic Islands. Most of this influence can be traced from the presence of Greek imports, especially of Attic pottery (Fig. 4). It has also been suggested that, in return, Emporion exported cereals to Athens and through this connection consolidated its position as a redistribution centre of Attic pottery in the northeast Mediterranean.[5,6]

During the summer of 218 BC, a Roman army commanded by the consul Scipio landed in the port of Emporion. This action marked the start of the Second Punic War and, for the Iberian population, the beginning of a systematic conquest quite distinct from that of the previous Greek colonial administration. During the first phase of the Roman occupation, Emporion acted as the base of the conquerors' army, whence they quelled a revolt of the indigenous tribes in 197 BC. This was the last revolt of the Iberian population of the Empordà. It also marked the beginning of the complex processes of colonization that were gradually to transform both the landscapes and the patterns of land use, and ultimately lead to the incorporation of the indigenous Iberian population. Collectively, these changes – and particularly the superimposition of a network of roads centred on the Via Augusta (Fig. 3) – produced a set of constraints upon which the future evolution of the landscape was to be based.

The end of Roman rule

Our research is already revealing new information on settlement history and changing patterns of land use. This shows that these changes have been correlated with discontinuous shifts in the organization of social space, which together can be defined as distinct eco-historical periods.[7]

One such period separates late antiquity from early medieval times. The invasions and movements of Germanic peoples in Iberia during the fifth century AD separated late Roman from early medieval Iberia politically. In AD 415, at the invitation of Rome, the Visigoths crossed eastern Tarraconensis in an attempt to bring the provinces back under Roman control. This was the first phase in the long and confusing process whereby Rome gradually lost all influence in Iberia. However, Tarraco, the capital of the province of Tarrconensis, remained in Roman hands until invaded by the Visigothic King Euric between AD 470 and 475, just before the dissolution of the Western Roman Empire. As a consequence, the distant and disputed Roman imperial power was replaced by a new

Figure 2 *Remains of fortified walls and gate at the native Iberian oppidum of Ullastret, 600–200 bc (present-day Puig de S. Andreu, see Fig. 3).*

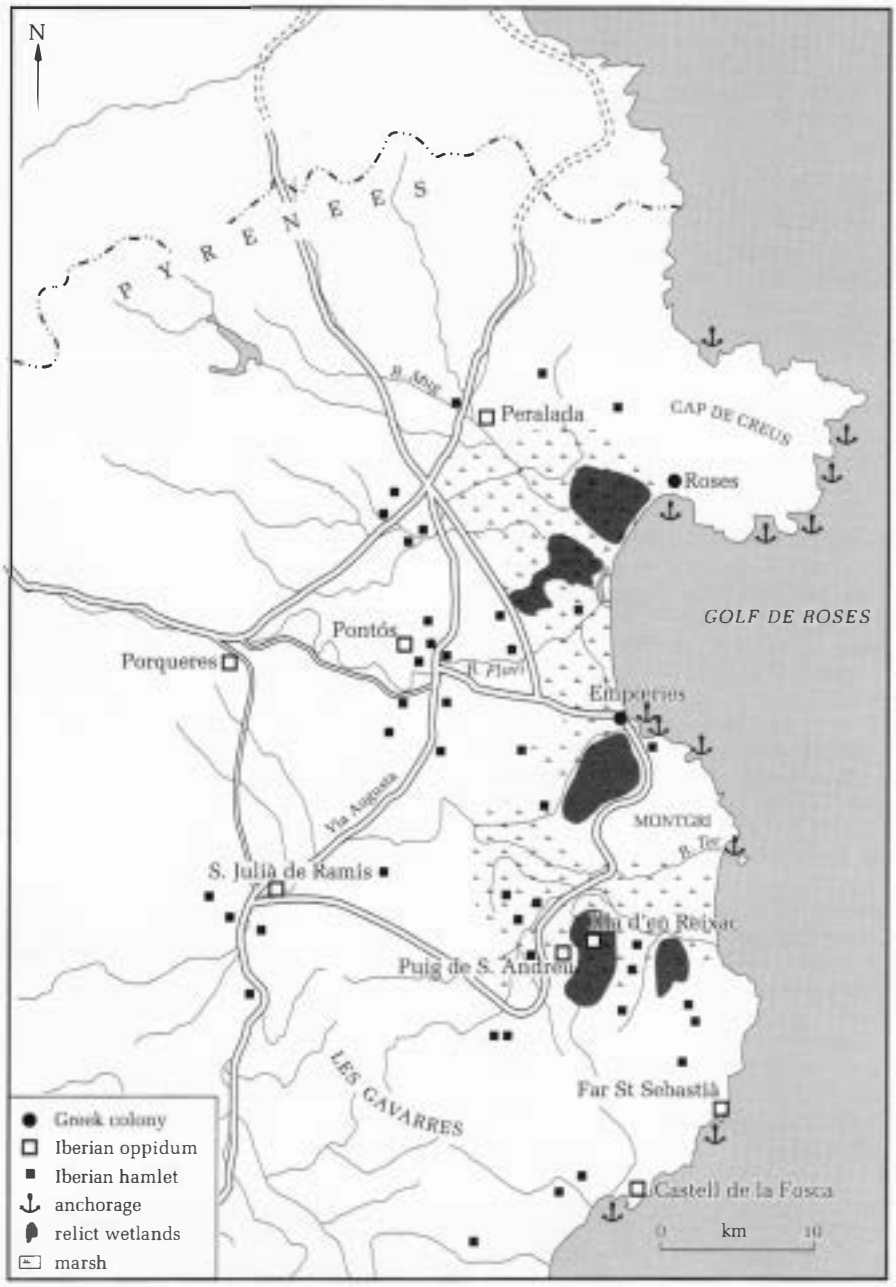

Figure 3 *The Late Iron Age cultural landscape of the Empordà, showing settlements, roads and relict wetland areas.*

Figure 4 *Imported Greek (Attic red ware) pottery from the Iberian oppidum of Ullastret.*

authority, and the Empordà, like the rest of Catalonia, became part of the kingdom of the Goths. The ensuing Saracen invasions completed the politico-military breakdown of Roman influence.

The medieval period

The establishment of Catalan feudalism marks the next major bifurcation in the historical trajectory. At the beginning of the ninth century AD a frontier was created, west of the Llobregat River, south of present-day Barcelona, between the Christians (under the initiative of the Frankish troops) and Islam. The Catalan territories were organized in the Marca Hispanica, under the dominion of the Carolingian Empire, and divided into five regions. The peripheral location of the Marca Hispanica allowed the Catalan nobility to be largely independent. In fact, it has been suggested that this period (the tenth and eleventh centuries AD) was exceptional in Catalonia for the degree of freedom enjoyed by most of the population; it thus represents an important contrast between slavery imposed by the Greco-Roman colonists and the ensuing feudalism of the later centuries.[8]

A major crisis extending from the fourteenth to the fifteenth century has also been recognized as a key period in the structuring of social space. This is largely a consequence of a combination of climatic deterioration, a sequence of bad harvests and the onset of the Black Death. We are studying the relationships that may have linked weather, demography, epidemiology and agricultural production in an effort to expose the combination of variables most sensitive to change.

Early modern times

The sixteenth and seventeenth centuries witnessed a period of economic and political crises. Profound changes occurred in the landscape, as a consequence of the peasant revolt of 1640 and the establishment of a treaty that created a new frontier between France and Spain, and, with it, the loss of Rousillon to France. These events represent another major bifurcation in the historical trajectory because they define a new political reality for Catalonia, from which new relations of production, land use and agricultural production emanated.

This transformation of the social and political landscape continued through the eighteenth and nineteenth centuries and was accompanied by steady demographic growth. At the same time we see the beginnings of significant intervention in the wetland areas of the Empordà. We are examining all available historical sources of information on these processes, in a geographical, social and historical perspective. An important part of this is to try to establish when wetland resources such as rice fields, wetland plants, salt and fish were first used and when their use was abandoned. Our ultimate aim is to account for the human alterations to these wetland areas during this period and to assess their implications for the long-term climatology of the region and in relation to social and demographic factors.

It is these processes – particularly the recurring conflicts over water – that collectively have created the context within which resource dilemmas in the contemporary landscapes must be viewed; the competing perceptions of farmers, conservationists and the tourist lobby who vie for control of the landscape, are ineluctably the product of history.

The communication landscape

The importance of a long-term perspective can be clearly seen in the "communication landscape" of the Empordà, and the way in which it has both enabled and constrained

settlement. Thus, the primary structuring of social space during the Neolithic and Bronze Age was made possible by the initial communication arteries – the rivers, roads. and trackways that dissect the landscape. principally on an east–west axis. This orientation dictated the initial location of settlements and defined the primary mode of passage through the wetland areas to the coast.

The importance of initial conditions in structuring processes is a fundamental property of complex dynamical systems,[3] and it has been described as "historical path dependence".[9] Thus, initial locational choices frequently determine future patterns of change, sometimes irreversibly. For example, we can see how the Roman establishment of a north–south axis, the Via Augusta, supplanted the primary east–west attractor represented by the river systems of the Empordà. This produced a "lock-in" effect that acted as the controlling force, defining the space of all social, economic and political interaction and dictating the ensuing settlement pattern. The establishment of this axis of passage persists to the present day, with the Via Augusta transformed into the modern motorway route that connects the Iberian peninsula with France and the rest of continental Europe.

Futures: archaeology and the contemporary landscape

The research methodology described here is particularly valuable because it provides us with a set of tools that can be applied to issues of archaeological heritage and, more generally, to the management of the natural and cultural landscape. Conventional approaches to resource management are based on concepts of risk and impact and on predictive models, and pay little attention to archaeological and palaeoenvironmental data. In contrast, the Empordà project demonstrates the crucial importance of understanding long-term palaeohydrological regimes and prehistoric wetland dynamics, because this knowledge tells us much about the sensitivity of these systems to change. Such data are a vital component in predicting possible future directions of change in the present-day landscape. Beyond this, the human ecodynamic perspective focuses on particular social–political outcomes observable in the past. Observing the manipulation and management of plant–soil–agriculture regimes within different types of political and ideological regime is perhaps the most instructive outcome we can achieve. Although prehistoric and early historic data cannot be mapped directly onto present-day conditions, they nevertheless demonstrate evolutionary pathways to which human ecodynamic systems are prone.[10]

In conclusion, it is worth noting that current theoretical orientations within archaeology mean that questions relating to environmental sustainability are usually treated as marginal and are often viewed as the preserve of other academic disciplines. This is especially problematic because it implies that current environmental debates are essentially separate from the social and cultural contexts discussed by most archaeologists. The challenge of getting to grips with the dynamics of environments modified by humans – one of the key issues for future archaeological research – can best be approached within a framework that combines social, cultural and environmental knowledge. Such an integrated approach to the cultural landscape can and should establish archaeology as a key element in the contemporary discourse on environmental issues.

Notes

1. The Empordà project is a multidisciplinary project framed within the Archaeomedes Programme and funded under the auspices of the Environment and Climate programme (DGXII) of the European Commission. It involves the collaboration of British, Spanish, and Dutch institutions: University College London, Universitat Pompeu Fabra (Barcelona), the Universitat Autonoma (Barcelona), the Universitat de Girona, and the Archaeologisch Adviesbureau RAAP (the Netherlands).
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