

# Viewing places: GIS applications for examining the perception of space in the mountains of Sicily

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## Abstract

Geographical Information Systems (GIS) are increasingly used to appreciate how past people experienced their world. Two key approaches, visibility and cost surface studies, have been the dominant form of analysis to help archaeologists to reconstruct and visualize space, in other words to help archaeologists understand what it was like to be 'there' in the past. This paper seeks to question the use of these analyses in Mediterranean landscape archaeology with a discussion of the results from a series of interviews with the inhabitants of Troina, a town in the Nebrodi Mountains of Sicily. Focusing on the visualization of the results from a photo elicitation study, I aim to show how people construct images of the space in which they dwell. The results suggest that we need to review the assumptions that we make about landscape perception in archaeological research and the (GIS) methods we use to study them.

## Keywords

GIS; Mediterranean landscape archaeology; photo elicitation.

## Introduction

In my work as a Mediterranean landscape archaeologist, I am interested in how field-survey data are viewed not simply in terms of a pattern of sites, but more importantly how we understand past human activities and experiences within a region. In the last decade there has been increasing discussion of how we may use anthropology, ethnography and historical geography to make sense of or question the way that we think about our archaeological data (Barker 1995; Bintliff and Sbonias 1999). At the same time, there has been a dramatic rise in the utilization of statistical and visualization tools, including Geographical Information Systems (GIS), to see the landscapes of data more clearly (Gillings et al. 1999; Ayala and Fitzjohn 2002; van Leusen 2002). Attema (2002: 18–27)

and Witcher (1999: 13–22) have proposed that GIS should be used as a tool not only to visualize the distribution of material in relation to environmental variables but ultimately to enable past social dimensions or even perceptions of landscape to be understood. Attempts to visualize past space have so far been limited to the analysis of movement and vision, in the hope that these techniques may enable us to understand subjective aspects of landscapes, as emphasized within phenomenological approaches to space (Witcher 1999: 13–22). Yet, there have not been any serious attempts to integrate our historical or anthropological data within our GIS analyses (Attema 2002: 18–27).

The aim of this paper is to address the ways in which GIS is used to create landscapes of perception; specifically to reconsider how archaeologists have attempted to re-construct how people created their sense of place in the world. Within this discussion, I will focus on a series of interviews with the inhabitants of Troina, a town in the Nebrodi Mountains of Sicily. The issues raised during these discussions and in particular from the GIS visualization of their responses to a photo elicitation study highlight concerns that I have about how archaeologists attribute significance to natural markers in the landscape and current applications of GIS to reconstruct people's sense of place.

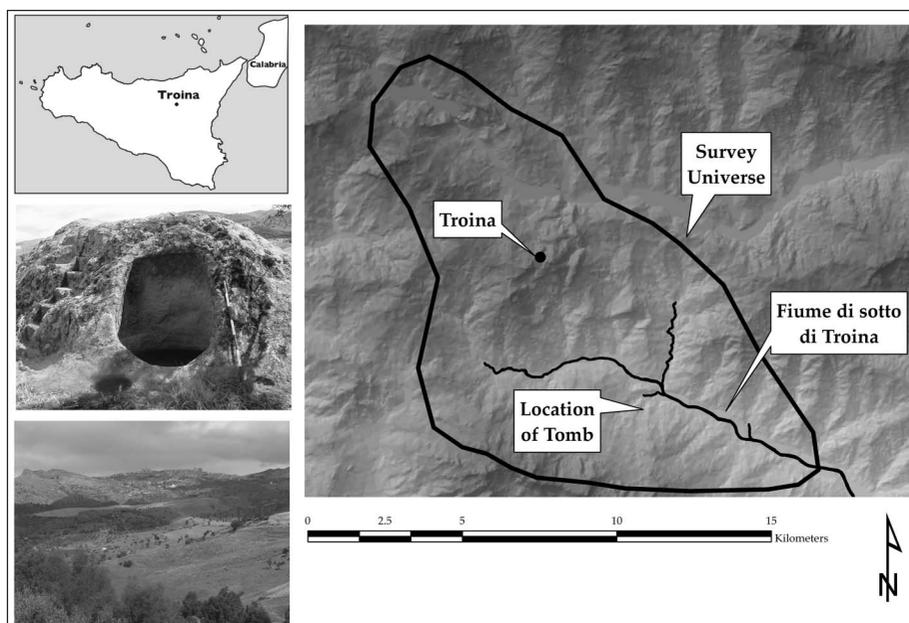
### **The Troina Project**

The Troina Project is an interdisciplinary landscape project that has involved excavation (Malone and Stoddart 2000a, 2000b; Malone et al. 2004), geoarchaeological research (French 2002: 210–23; Ayala and French 2003: 229–35; Ayala 2004) and an intensive archaeological field survey in the valley of the Fiume di Sotto di Troina (Fitzjohn 2003; Ayala 2004). As part of the field survey, GIS was adopted to provide, at its most basic level, the means with which all of the archaeologists involved could access data and visualize the spatial extent and density of archaeological artefacts across both individual sites and the entire survey region. Further to this, GIS was used to investigate the effect of modern erosion on site distribution (Ayala and Fitzjohn 2002: 337–8) and to model land use change over the long term (Ayala 2004).

While the use of GIS provides a range of possibilities for visualizing and interpolating field survey data, it may be used to produce little more than maps of concentrations of finds that can be used by an archaeologist to view the overall distribution of sites that are dated to particular time periods. Arguably, it might be possible to ascribe a function to particular sites and areas of a region, which may enable the archaeologist to reconstruct land use and activities across a region but it is not easy to move one stage further and appreciate how people operated or viewed the space in which they lived. In Western European archaeology, two forms of GIS enquiry have dominated examinations of past perception: visibility studies and cost surface analyses. The premise of the first form of analysis is based upon the assumed significance of vision in both the present and the past and has predominantly been carried out on the inter-visibility of monuments and the views of or from particular spaces (Tschan et al. 2000: 28–47; Wheatley and Gillings 2000: 1–27; Lake and Woodman 2003: 689–707). When and on what archaeological data these forms of analyses should be applied has been widely debated. In part, these debates influenced our consideration of whether these techniques could be applied to the data from the

Troina Project. There were several other concerns that have influenced the application of these techniques to viewing the space around Troina. During the course of the field survey at Troina, a number of prominent prehistoric rock-cut tombs were recorded on upper slopes of the mountains and on hillsides across the survey universe (Fig. 1). Emphasis has often been placed on the views commanded from rock-cut tombs and how they were part of funerary landscapes, possibly affirming territorial control (Leighton 1999: 122–4). It would have been possible to examine the visibility of the tombs in GIS. Their presence has some connection with visibility, they are after all predominantly located on hillsides and rock outcrops. But how something is viewed is not necessarily dependent on how visible it is or how much can be seen from the location. Indeed, how I viewed these rock-cut tombs, what I saw en route to them or observed from them, changed not only because of differences in vegetation or the effect of light conditions but more importantly according to my experiences and the context in which I encountered them.

Cost surface analysis, on the other hand, is a method devised to incorporate principles of movement to understand human action and perception across a defined space (Bell and Lock 2000: 85–100; Harris 2000: 116–23; De Silva and Pizziolo 2001: 279–86). Yet, inevitably these calculations are always based on perceptions of difficulty or ease. The results reveal our concerns, not necessarily those of the current or previous inhabitants of a place. Perception of difficulty or cost is highly personal, and as such people will view space in particular ways that will change through time. In my short time of carrying out field survey in the region of Troina, I felt that my ability to navigate terrain and the ease at which I traversed between the different sides of the valley became significantly better.



*Figure 1* Map of Sicily with location of Troina. Map of the Fiume di Sotto di Troina valley, with survey universe, location of Troina and location of tombs marked. Photograph of rock-cut tomb discovered on field survey and photograph of the view from the front of tomb towards Troina.

At the end of a field season I found it relatively easy to walk certain routes that I would not have wanted to walk at the outset of fieldwork. Furthermore, there were certain areas of the valley that I felt were easier to walk depending on the temperature or position of the sun during the day. We may need to consider other factors in our interpretations of space: the places that receive the highest temperatures may be seen as less pleasant to work in or walk across at particular times of the day or at certain times of the year, while at other times the converse is true – it is the coldest areas of the valley that are seen as the less attractive areas in which to work. Consequently, if we want to get closer to thinking about past perception rather than viewing the valley in relation to the difficulty of walking along certain routes because of a calculation of friction, it may be just as appropriate to view the valley in terms of the mean monthly temperatures (Fig. 2), rainfall or wind-chill factor.

Beyond my personal observations and changing perceptions of the Troina region, it was conversations with farmers and members of the local community, the Troinese, which led me to question the use of a visibility study or cost-surface analysis to understand the archaeology and experience of the Fiume di Sotto di Troina valley. An integral component of the 1999 and 2000 seasons of field survey and geoarchaeological research was the conversations that were organized with local inhabitants (Ayala 2004). These conversations provided an invaluable source of information relating to land-use change and the presence of archaeological sites in the Fiume di Sotto di Troina valley. Further to this, the interviews started to reveal the complexity of what we, as archaeologists, may have referred to as the Troina landscape. For example, a number of the farmers and shepherds to whom we spoke about their movements in the valley were adamant that distance was

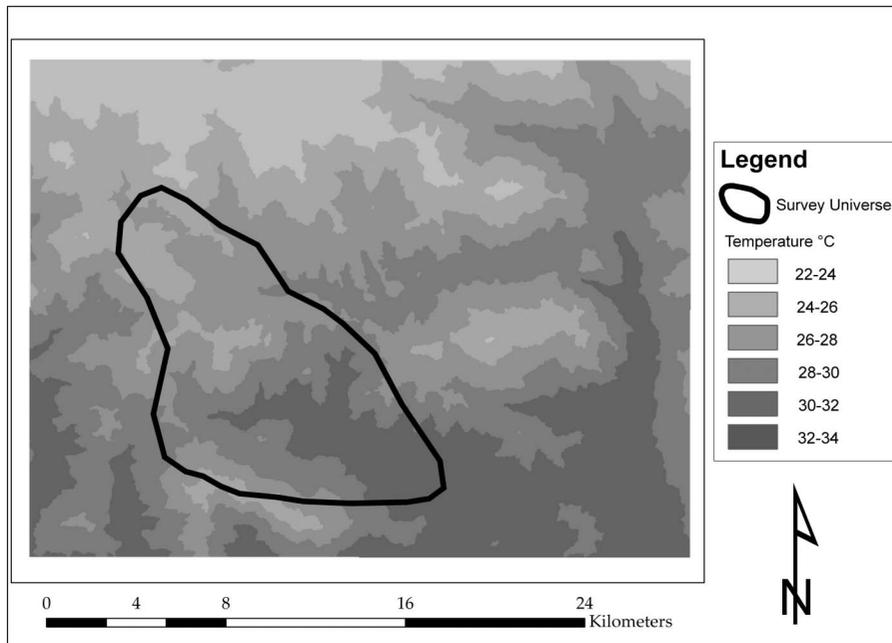


Figure 2 Representation of the average temperatures across the valley of the Fiume di Sotto di Troina during the hottest month of the year.

not an important determinant in relation to their everyday tasks: what had to be done was simply done, regardless of the distance that had to be travelled. In fact to our surprise a number of individuals assured us that travel was no different now by car than when they only had a donkey or had to travel by foot. Although others may disagree with the farmers' notion of movement in the valley, we cannot ignore that they perceived the valley in a very different way from how archaeologists often consider space; perceptions of difficulty or cost-benefit were not relevant to their calculation of travel or the tasks that had to be completed.

During the interviews, we often used the Istituto Geografico Militare (IGM) maps of the region to provide points of reference for discussion and to locate areas that were discussed by the interviewees. The way that people referred to the locales on the map, their movements through the mountains, valleys and within the town had resonance with the response of de Certeau to the urban landscape of Manhattan (de Certeau 1988: xiii–xiv). De Certeau has argued that people create a sense of locality, of familiar *heres* and *theres* in a particular space in a similar way to that of speakers performing language systems. Walking in the city or town is like speaking within a language system: the pedestrian re-appropriates the city of the cartographers and planners according to their own interests and rules. In this sense, like a language system, a city, such as Manhattan, has a static and structured text of cartographic spaces, a grid of named streets and spaces that can be read, but this is not how people use and dwell within the city; the movements of pedestrians along the streets and avenues of Manhattan are different. He argues that, to understand the cityscape, we cannot simply inscribe the paths of pedestrians on the named avenues and streets of the map and read the text of spaces, as it is only the through act of walking along the streets or passing by that people construct a meaningful world (de Certeau 1988: xiii–xiv).

De Certeau's (1988) notion of the relationship between cartographic classification of a defined space and the perception of the individuals who operate within that space echoes the way in which archaeologists are often guilty of visualizing their arbitrarily defined survey universe as the past landscape, a space that contained, defined and was viewed by its inhabitants in the same way. To understand landscape in any region in the past, we cannot simply inscribe the locations of activity, the sites or the paths between these sites onto a map of our survey universe; it is only through considering the act of living at and moving between the sites that we will be able to appreciate how people constructed their world (Ingold 2000).

Interested in developing my understanding of the relationship between everyday experience and the construction of place, the number of interviews was expanded to include a range of people of various age, gender and occupation in order to provide a broad section of the local population. These interviews were carried out to investigate how the modern inhabitants might perceive the space that the archaeologists had defined as their survey universe and *the* landscape of Troina. Further to this, I was unhappy with the way that many archaeologists discuss landscape perception and use particular techniques in GIS to appreciate the perception of prehistoric people. I am not trying to argue that the existence and perception of the current inhabitants is commensurate with those from the past. However, by engaging with a large number of people who occupy the region, I hoped to develop my understanding of the nature of place construction instead of merely projecting my own perception of the place on to the past.

A major component of the interviews was based upon a number of techniques used in environmental psychology, sociology and anthropology that included the use of a variety of visual media to discuss perceptions of the region. Here, focus is given to one particular aspect of the interviews: a photo elicitation study (Milgram and Jodelet 1976; Harper 2002: 13–26; Beilin 2005: 57–68) as the results of it were visualized within the Troina Project GIS as a means to develop my comprehension of how to examine *dwelling* in the past.

Photographs have often been used as a tool in environmental psychology to examine landscape preference: the types of landscapes that people prefer and reasons for their preference, and what is aesthetically pleasing. Implicit in their use is the assumption that the participants will regard them as representations of *places*. Yet, there is a theoretical and empirical distinction between evaluations of pictures and evaluation of the places that they represent (Scott and Canter 1997: 263–81). Paintings and photographs of landscapes require an interpretation of the scene by the perceiver (Hodgson and Thayer 1980) and particular aspects of the scene are given importance by the artist or researcher of the painting or photograph (Danford and Willems 1975). Further to this, one of the main problems of using photographs is that humans create landscapes when they are actually in place and through the synergy of sensory experience, not just vision (Zube 1984: 104–10; Uzzell 1989). Despite these issues, the use of photographs has been endorsed as a valid simulation to examine landscape as long as the image represents a normal view, that is, a photograph taken from the position in which a view would typically be seen. The time of day and the seasons in which all of the photographs are taken and viewed should be similar (Brown and Daniel 1987); furthermore, the researcher must consider the photographs only as tools to elicit longer and more comprehensive interviews (Harper 2002: 13–26) and in the full knowledge that they are not the real experience of being there (Scott and Canter 1997: 263–81 with references).

To investigate the archaeologists' classification of the survey universe as a landscape and the perception of the individuals who operate within that space, I investigated the boundaries of our survey universe. The limits of our survey universe corresponded roughly to the officially defined limits of Troina on the IGM map. Along the route, I took a series of twenty-four photographs of vistas and features, images that I felt represented Troina, in other words were intrinsically 'of Troina', and also those that I felt did not (Plates 1a, 1b, 1c and 1d). During the recognition task, I showed the photographs to the participants and asked them to respond to some specific questions. I was interested in their response to the subject of the photographs, not their perception of the aesthetic quality, the importance or value of the scene, or even whether they could identify where or what it was of. In the first instance, I was interested to see if they felt that the photograph was 'of Troina'.

### **Results of the photo elicitation study**

In contrast to archaeological visibility studies, either with or without the use of GIS, that aim to bring to light 'important locales' in a landscape, the interviews revealed something far more interesting. To those interviewed, what is significant in a region is not simply what is visible or visually stimulating. In fact, even those who live in the vicinity of the

(a)



(b)



(c)



(d)



*Plate 1* Four examples of the photographs used in the photographic recognition task: a. view of Roccia Pietralunga; b. view of signpost that marks entrance to Troina on the road from Catania; c. view towards Roccia Pietralunga in the valley of the Fiume di Sotto di Troina, with Mount Etna in the background; d. view of hills to the north west of Troina on the road to Cerami.

most prominent and highly visible feature in a region do not necessarily perceive it. Archaeologists often assume that natural landscape features such as rock outcrops, mountaintops or caves must have been significant in the past (Bradley 2000). The most significant monumental feature in the landscape for the archaeologists on the Troina Project was the Roccia Pietralunga, a huge sandstone outcrop that towers over the river valley and which is visible for several kilometres (Plate 1a). At the start of the project the archaeologists, assuming that Pietralunga must have been an important prehistoric monumental marker in the landscape, felt that it would need to be included in the survey universe. In fact, directly around the rock we found concentrations of material that could be dated to periods from prehistory to the modern period. Within 500 metres are two of the most important prehistoric sites found on the survey and within 100 metres is an extensive Roman site. This area has therefore been presented by the archaeologists as one of the most significant locales throughout the history of occupation in the river valley.

Interestingly, while the majority of the interviewees recognized the photograph of the rock as a part of Troina, a number had no idea where it was in the valley; those who worked exclusively in the town of Troina or who came from the north or west of the town failed to recognize Pietralunga, which stands in the south of the valley. At first glance, Roccia Pietralunga appears to be an anomaly: it is a highly visible rock outcrop, with a concentration of archaeological sites nearby which would seem to indicate that it was an important place for the valley's inhabitants throughout history, and yet none of the interviewees perceived it as significant. This conflicting evidence could indicate that there

has there been a major change in the perceptions of the landscape by the current inhabitants. However, while Roccia Pietralunga may well represent an important locale in the past, it is likely that the presence of archaeological sites is actually the fortuitous result of particular post-abandonment land use practices and the local geology (Ayala 2004). Furthermore, there are other concentrations of sites within the survey universe but they were not perceived as being as significant by the archaeologists, probably because they were not in the vicinity of such a visible 'marker'. In reality, the anomaly of Pietralunga probably has more to do with the archaeologists' preconceived notions of important natural places (Bradley 2000) and the significance of visible monumental markers than with an archaeological reality.

The places that were most commonly referred to by the interviewees, and which resulted in the most discussion, did not have a monumental marker. They were in the background of the vistas that I had photographed (Plates 1a, 1b, 1c and 1d). Places that I had not seen. These were the places where people had gone to for picnics; that produced the most delicious mushrooms; that were the favourite playgrounds of their childhood. The significant locales in the landscapes of the Troinese were related to memories of the past and experiences of the every day; they did not need to be defined by a monumental marker.

Space may be manipulated by the creation of markers, such as rock-cut tombs, but people do not necessarily view them as being significant to that space. One of the photographs shown to the interviewees was of a sign that welcomes people travelling into Troina from the south and east coast (Plate 1b). The sign is located on a long straight section of the otherwise winding mountain road; it appears to have been located at this specific point in order to maximize its impact as a marker to the town. While everyone recognized this photograph as of Troina they presented very different interpretations of the photograph from my perception of the scene and, furthermore, they interpreted it differently from each other. The majority of the interviewees talked about the photograph as the entrance to Troina, but no one focused upon the road sign, which is what might be assumed gave the image its significance. Instead, they talked about other aspects of the photograph: the bend in the road, the tree on the corner or the view of the valley. Further to this, others argued that, while this was the official entrance to the town, they did not feel like they had entered the town until they had turned the following corner or passed a particular building further up on the side of the road. The Troinese re-appropriate the town of the cartographers and planners according to their own experiences, interests and rules.

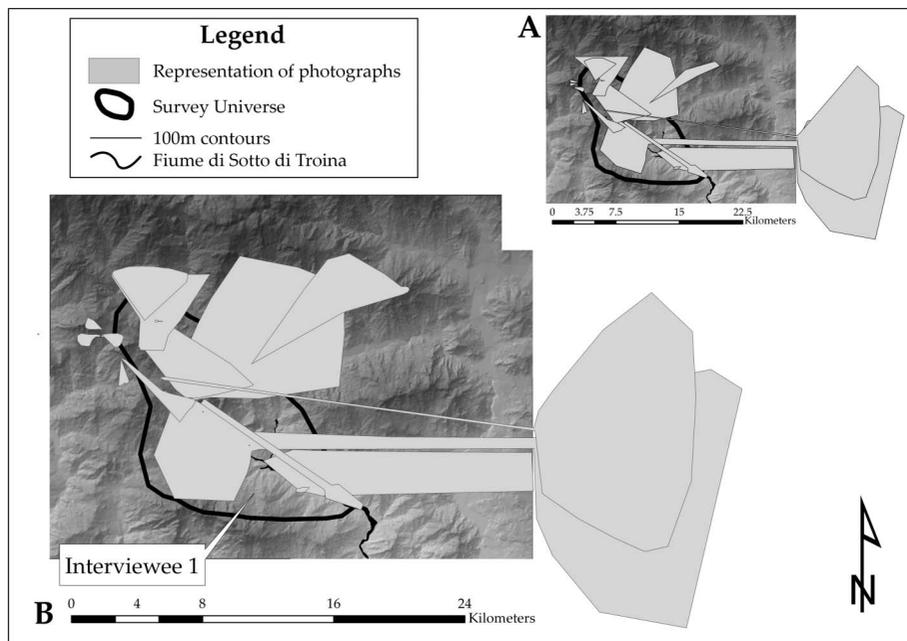
### **Viewing Troina**

In contrast to the landscape markers or routes of movement that are typically analysed and viewed within a GIS, the results of the photo elicitation study were digitized as a means to view how those interviewed responded to the images of Troina. Within the Troina GIS, two additional layers were created: a point layer that represented where each individual lived with associated information about their life and the second layer containing twenty-four polygons that represented the photographs that were used in the

interviews. Each of the polygons corresponded to the panorama in the relevant photograph, for example, the polygon that related to photograph number one represented how much space in the survey universe could be seen in photograph number one (Fig. 3a). The individual responses to the photo elicitation were then joined to each of the polygons, so that it was possible to compare the responses of the interviewees, by viewing how many photographs each person had recognized.

The integration of the photo elicitation study in the Troina GIS revealed a number of telling issues. Of most significance was that it clarified and made explicit the correlation between the responses to the photographs and the interviewee's occupation and location of their home. In other words, through the visualization of their responses it became apparent that how they viewed space and how they defined the place 'Troina' was directly related to their everyday experience. To illustrate this point, I will focus here on the visualization of responses from three farmers, as they epitomize the range of responses to the photo elicitation. These individuals have also been chosen because they lived and worked in different parts of the survey universe and their responses show most clearly the direct relationship between the location of their daily activities and their views of Troina.

The first of these three interviewees was a young male farmer who owned and worked land on the southern slopes of the Fiume di Sotto di Troina valley. He was one of the few farmers in the area who owned his own tractor and plough, and was often employed by others in the region around Troina to work on their farms. Consequently, he worked not only his own fields, on the southern slopes of the valley of the Fiume di Sotto di Troina, but across the whole of the survey universe and territory of Troina.



*Figure 3* A. Image of all of the polygons that represent the views in the photographs from the photographic recognition task; B. image of responses by interviewee one to the task with the survey universe and location of interviewee's home marked on the map.

When questioned, he felt that all the photographs were of Troina (Fig. 3b), which was unlike any of the other people who were interviewed. His ability to recognize the photographs was directly related to his activities of dwelling, his everyday experiences in and around the fields of Troina. He not only identified the photographs as part of Troina but he also discussed what he felt was the subject of the photographs, where they had been taken from, and, significantly, he explained the activities that he was engaged in at those places or how they were on route between his farm and the other places where he worked. Further to this, he discussed the routes and places that he frequented at other times, for pleasure. In other words, his work, social activities and travel composed his landscape of Troina.

The second interviewee was a middle-aged female farmer who spent the majority of her time working and maintaining a farmstead on the northern slopes of the river valley. In direct contrast to the first farmer, she felt that only seven of the twenty-four photos were of Troina (Fig. 4b). Her ideas of Troina appeared to reflect her daily life, which was centred on the farmstead and her more infrequent movements to the town of Troina in the north and to the south east. Her view of Troina was comprised from a limited portion of the survey universe.

The responses of this female farmer did not appear to be determined solely by differences in gender or the form of work that she carried out. While she responded positively to the least number of photographs out of all of those who were interviewed, other individuals had similarly prescribed conceptions of Troina. Another informant, a

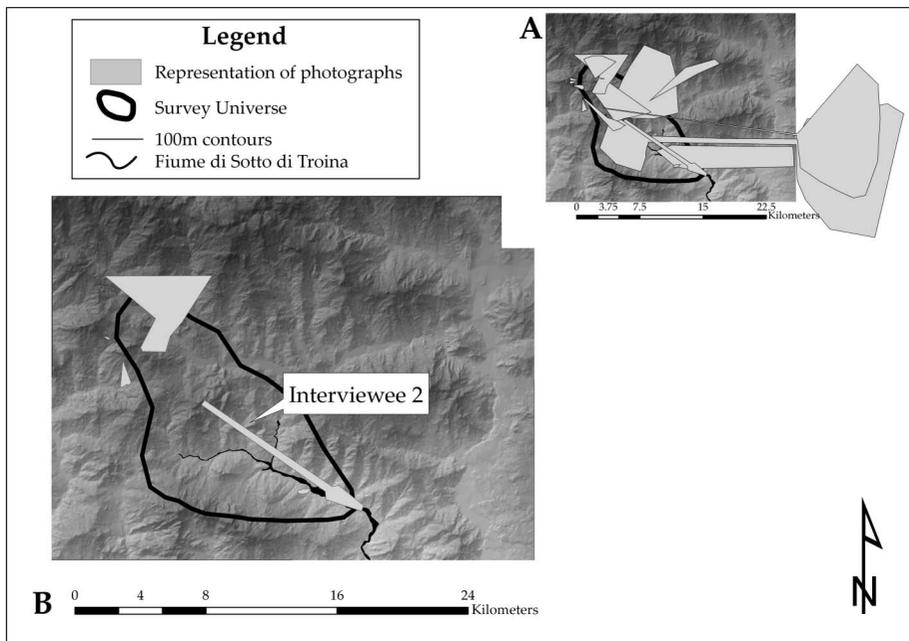


Figure 4 A. Image of all of the polygons that represent the views in the photographs from the photographic recognition task; B. image of responses by interviewee two to the task with the survey universe and location of interviewee's home marked on the map.

middle-aged male farmer, who had spent most of his life and day-to-day existence working in the south west of the river valley both on his farm and with his sheep in the fields, had intimate knowledge of the southern river valley and the northern slopes up to Troina (Fig. 5b). He felt that all of the photographs of the south-west region were part of Troina and like the first individual he provided intimate descriptions of the views in the photographs, relating stories of working with his sheep, of his childhood and memories from the more immediate past. However, he did not regard any of the photographs that were taken to the north of Troina and even some of those that were taken in the extreme south east as images of Troina. These responses reflected his movements; his concept of Troina was the result of his day-to-day activities, which took place in specific parts of the survey universe.

The responses of these three people were typical of the comments that were made by the other interviewees to the photographs. It was apparent during the recognition task that both interviewees two and three recognized far fewer photographs as ‘of Troina’ than the first farmer. However, it was not immediately apparent which photographs they recognized and why this was the case. The visualization of their responses in the Troina GIS clarified how the photographs that individuals recognized were directly related to their familiarity with the region. Recognition was not simply determined by the location of the interviewee’s home, it was also influenced by the nature of their movement within the region, and went beyond their everyday existence, their acts of dwelling, to include the activities and movements from their past, how they had experienced the region throughout their life. Just as the pedestrian appropriates the streets of Manhattan kinaesthetically

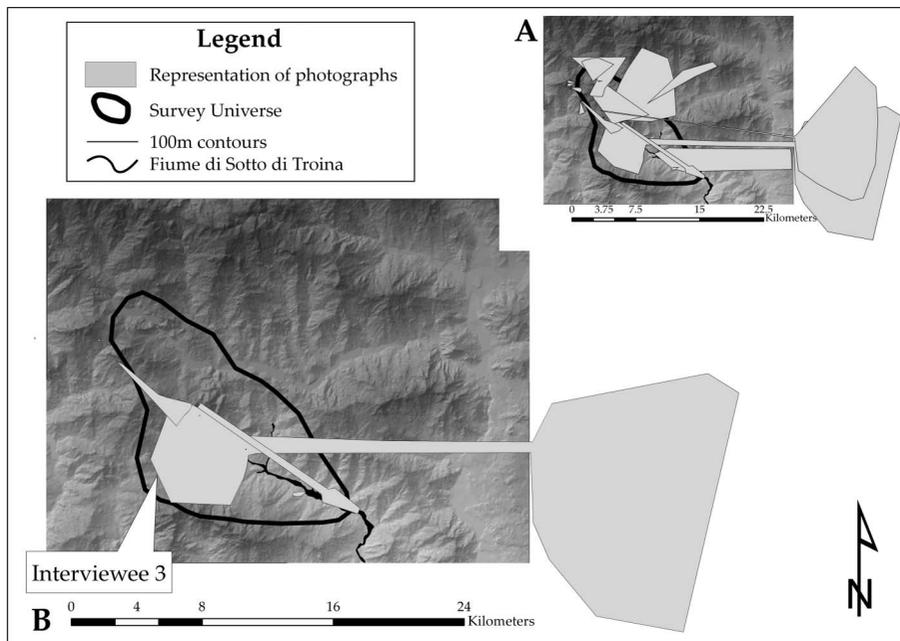


Figure 5 A. Image of all of the polygons that represent the views in the photographs from the photographic recognition task; B. image of responses by interviewee three to the task with the survey universe and location of interviewee’s home marked on the map.

through practice (de Certeau 1988: viii–xiv), so, too, do the people of Troina come to know the region through their acts of dwelling (Ingold 2000: 172), creating their own sense of Troina in contrast to the sense of the town and territory as defined on the IGM maps or by archaeologists who define the costs of movement or the visibility of particular parts of a region. It is the views and experiences of operating within the region that create their idea of the world.

## Conclusions

Landscape archaeology based upon systematic field walking has an important position in Mediterranean archaeological research. It will continue to provide an invaluable source of material evidence from which we can begin to ask some fundamental questions about the past. To date, the main focus of landscape research has been on reconstructing general trends of occupation across a region. GIS has been promoted as one of the ways in which we can start to consider issues of perception and experience; however, the majority of research continues simply to use GIS to visualize distributions of archaeological material across a region. Even when there have been attempts to produce a more humanistic form of GIS analysis we often select the sites or physical attributes of the region to focus on, rather than questioning how individuals would have created their sense of place through dwelling.

The interviews with the Troinese revealed a number of things about human perceptions of the natural environment in contrast to archaeological assumptions about them. As seen in the results of the interviews, we must move beyond using only variations of cost-surface analyses to understand movement and visibility studies to understand what people could have seen. The interviews in Troina have shown that, if we really want to do landscape archaeology and write about how people construct their world, what landscape was like in the past, we need to develop our analytical and interpretative approaches to the material, which may well lead to more unusual uses of GIS.

We have a tendency, when we write about the past, to create generalized accounts of people's lives within a landscape that usually corresponds in size with a survey universe or a region that interests us. We often fail to consider the individual in our regional analyses of material. The GIS layers that represented the photographs that the three farmers recognized (Figs 3, 4 and 5) showed quite clearly how their recognition of places was directly related to their familiarity with the region, or very limited parts of it, as a result of their everyday existence and also the recollections of activities from their past. This research was a first attempt to consider how GIS can be used to create views of lives and how people construct images of their world. Further to this, while the results of the interviews do not in any way represent an attempt to recreate the perceptions of past people, they illustrate that as archaeologists we need to consider carefully how people living at the same site or at a similar site within a region have very different daily experiences and pictures of the world.

In order for us to start to investigate past perceptions we need to use archaeological evidence to reconstruct how individuals operated within these spaces. In the Mediterranean, frequently, we have the archaeological evidence to do so as we have evidence for site-based production, land use practices and regional exchange. Consequently, our attempts to

reconstruct perceptual landscapes should be driven by data of everyday activities: the contrast in daily and seasonal movements between those who may have been involved in woodland management or transhumance with those people who had more limited movements associated household production. The results of this investigation force us to stop presenting landscapes as if they were perceived in a homogeneous way by their inhabitants. We should start to consider how to visualize the ways that the inhabitants of a region were involved in different activities in various spaces at particular times and how this created their own sense of the world. The new challenge therefore is to explore new methods of utilizing analytical tools such as GIS in more innovative ways in order to expand our understanding of past experiences of space.

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