Abstracts in English

Mapping the landscapes of today and those yet to come

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The ways of representing reality have evolved over the centuries and today, with globalisation and the Internet, they have changed for good. Alongside this phenomenon, contemporary artists have helped to revise classical systems of representation and are increasingly exploring new formulas for reading and representing today's complexity. With this paradigm shift, mapping the landscape is opening up new horizons with real future challenges, where the conventional, two-dimensional map is becoming an increasingly limited structure for representing a reality as complex as the landscape. Without giving up on cartography, this requires us to consider new methods that allow us to represent physical reality as well as how it is viewed or perceived. Today, the ways of understanding and conveying the complexity of the landscape are increasingly diverse (plans, photographs, 3D animations, augmented reality, information technologies, etc.) and none alone is sufficient for achieving an integrated vision and interpretation.

The chapter summarised here first lays out a list of challenges about how to map today's landscapes, which have arisen from the creation of the landscape catalogues of Catalonia. It then asks what kinds of cartographies will be needed to represent the landscapes to come.

Mapping the landscape based on the experience of the landscape catalogues

After centuries of history, what is found on a map is usually interpreted and read as something true, final, fixed and objective. In general, public administrations do not make decisions about an area without depending on cartography. Thus, the landscape catalogues of Catalonia have done nothing more than follow in detail the provisions of the regulation implementing the Landscape Law of Catalonia, which calls for a very specific type of representation. This is of the cartographic variety, subject to the needs of the public administration. For example, experience has shown that when reflecting proposals in landscape directives, the representation of certain landscape structures and values have made the definition and territorialisation of these landscape directives possible and have linked them more to spatial and urban planning.

Creating the landscape catalogues involved great innovative and imaginative power when interpreting, making an inventory of and cartographically representing landscape elements, values and dynamics and when reflecting landscape quality objectives on a map—without the help of many prior references—while remaining fully aware that the final stage has not yet been reached. Some of the following considerations arose from these catalogues with regard to cartography:

A map of land use is not a landscape map. If the landscape is understood as a combination of nature and culture, of past and present, of knowledge and feeling, it may be agreed that landscape, territory and environment are not the same, despite being very connected. One of the first consequences of this observation for mapping is that a map of land use represents a certain physical portrait of the territory, showing an objective structure of it, but it is not a landscape map in itself.

Representing fuzzy boundaries. The map of the 135 landscapes of Catalonia presents the especially complex challenge of representing boundaries on a map that are fuzzy. This lack of precision is even more problematic for public administrations, which require clear and precise boundaries.

Representing landscape diversity. The map of the landscapes of Catalonia aims to illustrate the enormous diversity of the country, but is closer visually to a typical map of political and administrative divisions than the landscape map desired. How can this diversity be represented? How can the character of each landscape be represented?

The issue of the scale and use of the cartography. The landscape catalogues were created on a scale that was optimal for instruments of spatial planning (1:25,000), though more detail is given in some places. The effort to zoom in from the regional scale to the local scale is essential for developing local landscape policies, but since the landscape catalogues were designed and created for the regional scale, the shift in this kind of cartography from a regional sphere to another, more local one requires a more detailed basic level of information than what is found in the landscape catalogues, and not only a direct translation from one scale to another.

The challenge of mapping values. Natural, aesthetic, historical, social, productive, identity-related and spiritual values were identified throughout the catalogue creation process, attributed by the stakeholders involved in the landscape and by the populations that enjoy it. When representing landscape values derived from the impressions or emotions aroused in the population, a great effort of imagination had to be exerted to overcome classical cartography's models of representation.

Representing changes in the landscape on a map. The landscape is dynamic, while a conventional map is a static representation that hinders expression of this ongoing change. This challenge is joined by another: the difficulty of mapping the evolution of social preferences regarding this landscape. Nor can the concepts of dynamic and impact be confused. If it is already difficult to decide on what is and is not an impact on the landscape, representing it is even harder.

Mapping urban and metropolitan landscapes. There is a long tradition in Catalonia to map the most rural landscapes, but this is not so much the case with respect to urban landscapes, especially when representing the changing and swift dynamics that occur or the values that arise there. 3D simulations and Google Earth may be a big help, but they are just images and not maps in the usual sense of the term.

All landscapes are important. It is common that maps designed to represent future projects, strategies or specific proposals focus on concrete spaces of varying extent and leave the rest "blank". But the innovative factor in landscape policy today is rooted in avoiding the extreme differentiation between outstanding landscapes and others that are not so remarkable and that at first glance seem to have no value. Focusing only on certain spaces and ignoring or minimising the importance of the rest seems to be at odds with the principles of the European Landscape Convention.

Mapping landscape directives. Mapping the landscape directives, which aspire to represent a highly complex reality on a map (regulations), will require a direct, clear and precise kind of cartography.

Maps of cross-border landscapes. The landscape catalogues have also raised new questions when dealing with a common cartography on both sides of a border, such as the integration of landscape values and challenges and respect for equivalences between both languages when defining the legend.

The necessary convergence between disciplines. The landscape's professional and research-related fields are increasingly dealing with the landscape jointly and in combination with different disciplines (geography, architecture, environmental sciences, cartography, design, agronomy, telecommunications, etc.), which brings increasingly suggestive mapping solutions that transcend traditional approaches.

Emerging landscapes, emerging cartographies

The enormous mutability of contemporary landscapes leads to the constant emergence of new forms of landscape, emerging landscapes that herald future transformations and that must be read, understood, represented and responded to appropriately. What are these emerging landscapes and what representations could respond to this contemporary phenomenon?

Landscapes of climate change. In the process of energy transition that Catalonia is experiencing today, renewable energies, and primarily solar and wind energy, are taking on special importance to the point of shaping new energy-sector landscapes that have never been seen before. Achieving a map of wind turbines or solar panels in Catalonia, for example, is not difficult. What is hard to resolve is representing the balance between coming energy infrastructure and the landscape on a map that helps to communicate and raise awareness at the same time.

Landscapes of the new rural paradigm. The rural world is undergoing a paradigm shift that is generating changes in the way we experience it and manage it. A map of the evolution of land use would enable us to understand what is happening, but would not reflect the true dimensions of this historical change in all its weight. This could be joined by collaborative cartographies that identify and give visibility to the true main stakeholders in the emergence of these new rural landscapes, which place their actions and potential within everyone's reach and generate discussion.

Landscapes resulting from urban explosion. The great capacity of the urban peripheries to constantly reinvent themselves and to become places of exchange where new values continuously emerge, makes them landscapes that constantly herald new changes that must be reinterpreted and recreated. How can the swift and changing dynamics inherent to these spaces be reflected? Is it possible to represent the hybrid or versatile natures of the urban peripheries on a map? Moreover, an increase has been noted in the number of interstitial micro-spaces. How can we represent their fleeting nature, their potential for use or their significance for the population?

Landscapes that recover a lost identity. There are landscapes that recently have seized the imagination of the population, such as the landscape of the memory of the Battle of the Ebro that took place in 1938 during the Spanish Civil War (1936-1939). The challenge today probably does not strictly lie in mapping a battlefield, but in knowing how to use landscape representation to convey the memory of the place to new generations, meaning representing the many perspectives and voices of these re-experienced and reinterpreted landscapes.

Landscapes of the financial crisis. One increasingly visible type of landscape arises from the financial crisis and can be seen in the form of new, half-finished residential neighbourhoods that have turned into ghost urban areas. How can the potential differences between inhabited and non-inhabited areas be represented on a map? How can seasonality be expressed? And what about the new identities emerging in these spaces?

Recycled landscapes. Some landscapes resulting from the recycling of infrastructure or products of economic activity, like old plants, warehouses or old industries, are beginning to have meaning for the population. Successful ways of representing these recycled landscapes do exist, but the question that must be asked here is how these representations can properly reflect the community's feeling of identification among landscapes whose appearance and function are changing.

In search of more referential landscapes. Everything indicates that in the future, new referential

landscapes will be created in addition to current and traditional ones (Montserrat, the Pyrenees and the Costa Brava), and the population will begin to identify with landscapes that are now insubstantial, but everyday. It will be necessary to continue exploring the potential resulting from the combination of real-time mapping techniques and social networks when capturing, understanding and synthesising the evolution of the values attributed to the landscapes and spaces considered most significant.

Landscapes of mobility. The proliferation of new bypass roads and variants brings new challenges to cartographic representation, since new lines are changing the perception that the overwhelming majority of people have in some populations. Something similar happens with airports where low-cost companies operate, which have given rise to new peripheral landscapes and for which we need more comprehensive representations of the new realities they generate.

Virtual landscapes with identity. There are landscapes that arise and become visible anywhere, even in places without real landscape. These are the perceivable landscapes that can be viewed from a smartphone, personal computer, tablet or television; those that are created with augmented reality, etc., that continuously encourage creativity when interpreting, representing and communicating about landscapes and that may end up generating new identities.

To this list of emerging landscapes must be added others, such as landscapes resulting from a growing drift towards the neglect of certain coastal tourist infrastructure, certain landscapes of leisure and consumption, new urban landscapes stemming from important demographic changes, the role of art in articulating new urban spaces and the presence of aerial advertising, each with very different challenges of representation.

We face the challenge of attempting to represent the highly complex reality of the landscape, where the instruments provided by traditional cartography are insufficient and fall short, and we must find other tools and make current ones evolve. Planning systems based on conventional cartography will probably have to be gradually replaced or complemented by others that afford a place to other recreations of the landscape, such as photography and the visual and graphic arts, to name just three artistic aspects, as well as the enormous possibilities offered by new technologies and social networks. Furthermore, we need methods and tools that enable us to interpret the signs that anticipate important changes in landscapes and to identify the formulas that can best recreate them so they can be understood, managed, planned and discussed. In other words, emerging landscapes require emerging cartographies.

Maps of aesthetic and symbolic values of the landscape: from the landscape catalogues to the landscape project

Jordi Bellmunt

Landscapes are not the same for everyone; they depend on different perspectives, on different depths of objective or simply on many specific cultural backgrounds. This complexity when interpreting and representing landscapes was noticeably present in the process to create the landscape catalogues of Catalonia, in which I participated together with my colleagues from the Polytechnic University of Catalonia. The work to create the catalogues was a genuine research laboratory into landscapes, their reality and interpretation, their representation and even their future use. The creation of the catalogues not only involved the difficult work of identifying, defining and delimiting different territorial realities, but entailed an even more complicated task: standardising these territorial realities. We searched for genuine common denominators of thought and wills that allowed us to write consistently about qualities and differences.

In the context of the landscape catalogues, aesthetic values are related to a landscape's ability to convey a certain feeling of beauty based on the colours, diversity, form, proportions, scale, texture and unity of the components that make up that landscape. Symbolic and identity-based values, on the other hand, correspond to the identification that a certain group feels towards the landscape. Both symbolic and identity-related values refer to elements of the landscape or landscapes as a whole with a great symbolic or identity-related aspect for local populations, which establish relations of belonging with them or develop expressions of identification towards them. In the scale of work in the catalogues, identity was valued as an expression of each territorial area or of specific parts of the territory. This set of values also included landscape elements to which legendary aspects are attributed.

In the work performed on the Landscape Catalogue of the Terres de Lleida, managing the different landscapes that characterise this land of contrasts was especially important. With regard to aesthetic values, various landscape structures and elements that clearly influence the structure of the landscape or that work as singular aspects of the territory were considered and defined. This effort of representation, which was repeated in the Landscape Catalogue of the Comarques Gironines, generated some documents that speak of large territorial certainties in terms of landscape, but also of great doubts and no shortage of opportunities for improvement. It is worth highlighting that the challenges that appear when representing the landscape often turn not just

into a difficult graphic problem in search of consistency, but also into the beginnings of project-based concern. Thus, this chapter views mapping not as the end goal, but as a valid and complementary instrument for creation that is respectful of the values of the environment.

We can attest to the particular difficulty of mapping the landscape. When working with different layers of information, it is very common that the resulting plan or map is not easy to read or intelligible; the findings obtained with technical tools (like geographic information systems or GIS) must often be validated or corrected so they may be understandable. To do so, it is essential to clearly know what each of the projects carried out aims to accomplish. As an architect, I have no special interest in adding maps, choosing colours or determining limits; I feel much safer in the dynamism of our contemporary landscapes, and this is very difficult to map. By way of example, I will describe some of my experiences in this regard.

First, the Port Aventura Activity Corridor project (Vila-seca, Tarragona) designed an internal road connection between all tourist resources in the complex. After studying the place and assessing the environment, we chose to absorb landscapes and activities by creating a new route full of experiences, sensations and stimuli and streamlining steps, walks and shortcuts. The project ended up becoming the public space of one of the most private spaces on the Catalan coast.

A second example is the development of the Landscape Quality Charter of the Maritime Cities of southern France, meaning the urban agglomerations from Agde to Montpellier. This project required two levels of analysis: the general level, to define the types of landscapes; and the more particular level, which demanded a good degree of detail to determine the actions to be undertaken to improve the situation of the small towns and landscapes of the area.

Third, the project to create the Landscape Charter of Matarraña (Teruel) had to result in a working tool to improve aspects that we understood as deficient; an element to detect and identify areas where work should have been done to improve the quality the landscape of this region in Aragon. The approaches focused on reducing the sphere of the urban peripheries and on making newly built elements suitable in the context of the magnificent settings of Matarraña. This process required an effort to represent the qualities and defining elements of the landscape that would also end up being an instrument for defining projects.

The project of the Water Park over Llarga beach (Salou, Tarragona) consisted of implementing a programme of seven swimming pools, locker rooms and restaurants in the magnificent natural amphitheatre of the cape of Salou, characterised by lush pine trees contained by terraces made with small dry stone walls. New walls were established in order to strike up a new dialogue with the place and the built elements, non-exempt of stone language, were strategically located for the purpose of being practically undetectable from the outside. Overall, the intervention is the result of work to adapt to existing formal languages in a very special landscape, conceived with the idea not to implement the programme in a predominant way, but to feature all the landscape elements of the place. The same happens in the Botanic Park in the same town, where the preexisting landscape was limited to a large pit with debris. The new project took advantage of existing levels to remake the surrounding agricultural plots into enclosed gardens, even giving them a labyrinth-like appearance. The Botanic Park of Salou project transformed a dubious programme into a reinterpretation of our mental landscape of the Mediterranean, resurrecting the place and offering the city a new tourist and urban alternative.

The last example refers to various projects carried out in the Sicilian landscapes of Etna (Italy). While developing the landscape plan for the area of Acireale, four types of particular landscapes were identified with very diverse and even contrasted characteristics, for which adjusted methods of interpretation were sought. This landscape plan required very extreme decisions to be made in order to reverse the situation and recover the many landscape values. Both this project and the others undertaken in the area developed and almost sublimated the proposal of dry stone walls as an essential element for organising the respective projects. In the case of the Botanic Garden of San Leonardello, the intervention was adapted to the area with a plant exhibition programme that revisited certain stereotypes about old scientific gardens. The space appropriated a magnificent landscape, destined to become the image and symbol of a new cultural complex.

In conclusion, we may note that our maps, those in our electronic devices and on our tables, are elements undergoing a process, often alongside other aims of our work and studies, and sometimes take flight, often pushed by an uncontrollable force no matter how much we may wish to restrain it. Our preparation of drawings, plans and maps is unpredictable; our craft overflows and the imagination of our mental maps shuns reason in an exercise of freedom and poetry.

Mapping landscape dynamics in the landscape atlases of France

Elise Soufflet-Leclerc

The French Ministry of Ecology, Sustainable Development, Transport and Housing, which is also responsible for landscape policy, is promoting the creation of landscape atlases: documents created from collaboration between the central and regional governments to serve as foundations of shared knowledge on the landscapes under its responsibility and thereby ensure implementation of Article 6*C* of the European Landscape Convention on identifying and assessing landscapes.

Understanding the landscape as the result of a complex sum of geographical and therefore objective realities, and of social and cultural realities that shape our view of the territory, the method used to create the landscape atlases takes three complementary views of it into account: first, analysis of the forms of the territory, a geographic and tangible examination based on field observation and also on cartographic and statistical analyses; second, assessment of social and cultural representations, an analysis that requires locating protected landscapes as well as collecting, analysing and territorialising the representations of unique landscapes and landscapes characteristic of the places or vital settings of the population; and third, identification of landscape dynamics, which involves field observation, the analysis of maps and old photographs, the study of statistical archives and the creation of an inventory of projects carried out by organisations or companies through surveys conducted between the main stakeholders of the territory. The identification of landscape dynamics on a certain scale (regional or landscape unit) allows us to highlight the challenges that the authors of the landscape atlas have had to face, an approach that demonstrates the positive or negative impact of the current transformations and of the possible future evolution of the singularity of a certain landscape.

As a general rule, the scale of analysis for the landscape atlases of France is 1:25,000, but the magnitude of restitution or of work is 1:100,000. Updating the landscape atlases every ten years allows for monitoring of the physical transformations and transformations related to the population's perceptions of the territory.

A steering committee, composed of representatives of different administrations, professional bodies and involved organisations, is in charge of managing the project to create the landscape atlas. This involves hiring multidisciplinary teams coming from the private sector. As such, each atlas is the result of an own creation process and of a specific working group. And though this diversity raises issues when creating regional summaries, and even more so for national summaries, it makes for an extremely rich and often innovative ensemble.

The landscape atlases began in 1992 and currently cover more than 82 % of France. The first generation of landscape atlases is continuing to develop at a good pace, in time for the second to be created, the result of updating landscape atlases that are more than ten years old.

Change is inherent to the landscape, as a consequence of the evolution of natural systems and social systems, each with its own temporalities and spatial scales. The dynamics of the territory cover all sectoral dynamics, analysed from an objective point of view: urban, demographic, agricultural, forest, facility, infrastructure, energy or social dynamics. To turn them into landscape dynamics, the emotional dimension, the dimension of perception, must be incorporated. The parts of the territory that are directly visible only reflect the result of these dynamics, and to decipher them it is necessary to bring a focus based on multiple criteria as well as a holistic focus.

The focus based on multiple criteria (or analytical approach) works by decomposition: it focuses on landscape elements, meaning the material objects that make up the landscape structures characteristic of a certain landscape—objects perceived not just in their material aspect, but also through historical, naturalist or social filters. This analytical focus is the perspective adopted by the various spatial planning experts and officials.

The holistic (or systemic) approach, on the other hand, studies objects in all their complexity and is interested in how the elements of the landscape interact, meaning the notion of landscape structure, a concept that would correspond to systems formed by elements of the landscape and the tangible or intangible interrelations that connect them, as well as the way the population perceives them. The territory is perceived as a single unit. These identified landscape structures act as a framework for carrying out projects to protect, manage and/or plan the landscape.

The typology and assessment of the dynamics are closely related to a matter of scale: scales of analysis, scales of restitution and scales of validation. Identifying and assessing landscape dynamics involves the use of time scales, spatial scales and indicators (archive data, statistical data, the comparison of photographs and maps, etc.). Likewise, mapping opens the door to a series of choices, not just when reflecting dynamics, but also when explaining and locating them. It is important to realise that archives and libraries have maps that are genuine treasures for studying the dynamics of a territory over time.

The landscape atlases are not just documents for landscape policy; above all they are a tool in the service of all other policies, designed for regional planning policy makers, elected officials and citizens. They must be accompanied by a certain educational approach, but also by action, and they must

explain how the state and the communities see the landscape at a specific scale. The map work entails this territorialisation of concepts and analysis. Likewise, the maps must be based on modern principles of communication and adapted to current uses. The selection of the geographic references and formats (on paper and digital format) is essential for guaranteeing they are used and disseminated correctly. The digital maps must be able to be downloaded and processed through data streams. Reciprocally, the fact that the mapping focuses on the landscape facilitates the integration of geo-referenced data from other sectoral policies, like data on natural environments, the evolution of urbanisation and heritage protection.

Mapping the dynamics and intangible values may bring significant advantages by combining supplementary media such as synoptic charts, photos, photographic series or 3D animation techniques in order to convey the complexity of the landscape and its sensitive dimension. Furthermore, the development of digital technologies should help to facilitate access to this mapping and to reduce the cost. For example, maps allow us to interpret the photographic series presented by the photographic observatories of the landscape, for they show everything lying outside the frame of the photograph and allow for objective explanations, in addition to helping us to dissociate local dynamics from global dynamics. At the same time, the photographic series illustrate the dynamics represented in two dimensions in the maps in an educational way.

In order to enhance the quality and relevance of the dynamics analysis, the availability and structure of the data must be enhanced. By updating the landscape atlases every ten years, they can be entered into a virtuous cycle that aims to capitalise on knowledge, put it in the service of the actions carried out in a territory and evaluate the actions to update knowledge. In this process, map production becomes the essential thread for ensuring consistency between the aforementioned documents, for moving between scales and making observations and comparisons. Geographic information systems (GIS), or information systems in general, respond to this need. In France, the Information System on Nature and Landscape (SINP) is the tool designed by the Ministry of Ecology, Sustainable Development, Transport and Housing to process all data related to the forms of the territory, the social perceptions and dynamics of the territory.

Improvement to the structure and standardisation of data at different scales of the territory is one of the requirements for creating regional, supra-regional and national summaries of the landscapes, a commitment that will also require stabilisation of the landscape vocabulary, especially in relation to landscape dynamics.

The summarised chapter ends with the conclusion that mapping is a political action that forces a choice: it is an action that manifests, demonstrates and transmits concepts. Likewise, despite the technical difficulties, the mapping of landscape dynamics is indispensable for helping us to understand the transformations underway. Reflecting the landscape in a map is necessary for situating the landscape at the centre of all decision-making as well as for making it more accessible to engineers, naturalists, managers, urban planners and the general population. Maps help to make the complexity of the landscape more intelligible. This is a necessary step so that the choices made in relation to our territories can shape them not from unconsciousness, but from full consciousness, to benefit the quality of our living environment.

Mixed reality mapping: new technologies for the maps of the future

Volker Paelke

The world of maps and geographic information has evolved considerably in just a few decades, moving from the exclusive use of analogue cartography to other types of geoinformation. The contrast is clear if we compare the process to make paper or analogue maps with the process to make dynamic maps that use mixed reality.

During the lengthy process to produce analogue maps, cartographers provide them with all the information that one might need because the intention of the user is unknown. In contrast, on a more advanced level of sophistication, maps can incorporate interactive and dynamic systems, which improves communication by bringing dynamism to the map-making process. Such dynamic maps can respond in real time to changes in the environment and in data, as well as interaction with the user, with more elaborate or complex visual presentations, which are interpreted more easily and can improve how the information is perceived. At a second level of cartographic sophistication, the interaction changes how the map is presented, for example by allowing the user to choose between themes, scales or styles of presentation. Other, more complex interactions can expand or modify the same model, for example by recording changes in the environment. Changes in real time for acquiring unprocessed data, with the adjustment of sensors for example, involve a greater degree of complexity. At a higher level of sophistication, the user interacts directly with the physical environment through a real-time system in which the resulting changes affect the entire processing and visualisation sequence. Finally, direct integration with the environment means that the presentation

generated from the model is integrated cohesively into perception of the real environment. Especially promising are systems that combine mixed and augmented reality, in which computer-generated graphic objects are integrated into the user's vision, thereby lightening the effort of perception represented by the change of context between the use of a map and the spatial functions themselves. While the possibilities provided by the first two levels described are already being used in a generalised way in applications like Google Earth, exploration of the results that could be obtained with greater levels of sophistication has only just begun. Moreover, many unexplored issues remain for finding the best ways to exploit these possibilities to ensure effective communication.

The practical knowledge accumulated over centuries of work in the field of cartography has been complemented by research into the cognitive and perceptive bases of the use of maps in recent decades. Furthermore, the growing use of geoinformation by a large number of users that are not necessarily experts in handling geodata has required improvements in communication and interaction in this discipline. The development of interactive maps, and especially of Internet-based map applications, personal navigation systems and location-based services, has led to extensive research on the usability of mapping applications, aimed at aspects of both visualisation and interaction.

Mixed reality works by integrating real, computer-generated interactive graphics and other audiovisual resources into real environments. With the advancement of basic technologies, the development of mixed reality applications has acquired growing interest, and in recent years the first applications of this type have appeared for smartphones aimed at the general public. However, these applications are very limited from the standpoint of content. Research into the field of mixed reality has created a wide array of basic technologies in various stages of refinement. These technologies usually provide a low degree of functionality, like precise spatial positioning obtained by combining GPS data with optical tracking. To some extent, other, more complex components are compatible with specific mixed reality tools. As for visualisation techniques, different types and their impact on the user are being compared during the research.

While mixed reality-related research is being conducted in many different fields, this technology is closely linked to existing expertise in geoinformatics and cartography, since mixed reality systems work with large volumes of inherently spatial data.

The basic structure of a mixed reality system consists of a series of hardware and software components. According to the type of application, the positioning and rendering may require a model of the environment obtained through sensors that determine the position and orientation of the user's current view on the environment as the basis for adding information. The integration of the information relative to the position and the orientation by means of sensor fusion algorithms is an essential component in mixed reality systems and one of the fields in which research is being done. In addition to these data, mixed reality applications should manage a spatial augmentation model. A number of libraries and toolkits are available for developing mixed reality software, even if they mainly focus on technical aspects. To date, no standard method has been established to create and share mixed reality content.

There are various technologies for integrating augmented information into the user's view. One approach is the transparent optical screen system, based on a special viewing device that is often placed on the user's head and is known as a head-mounted display (HMD). This device creates an optical combination by superimposing graphics onto what the user sees in the real world. The alternative to HMD is an image-mixing system that uses a video camera to capture the view the user has of his/her surroundings so that the final result may be viewed on a conventional screen. At present, all mixed reality applications aimed at mass consumption use an image-mixing system.

In-depth study of user behaviour has identified the core functions of cartographic and geodesic applications compatible with mixed reality interfaces, such as identifying objects or areas in the surroundings, obtaining specific information on position and orientation or collecting data related to location in space.

As for mixed reality applications, the most prominent augments the real world environment with additional information by providing labels and data related to nearby elements. These types of applications have been popularised in mobile platforms like tablets and smartphones, even if more elaborate visualisations, like virtual reconstruction for example, require more precise positioning and orientation than what can be provided by a mobile phone or tablet.

In the field of urban planning, one of the most common applications of mixed reality is the visualisation of spatial information that does not appear in the view of the user, like historical data (for example, constructions or objects that have already vanished) or future planning projects (for example, building models). For urban planning, image-mixing devices can be used in which the images of the real environment provided by a camera in real time are expanded with additional information. Another application is called sub-surface visualisation, which monitors hidden infrastructure in urban environments that is not visible to the naked eye, such as underground installations for example (power lines, water pipes, etc.).

With regard to applications in the field of cartography, mixed reality can be used to extend con-

ventional paper maps with real-time information, as well as the possibility of interacting with them. Mobile devices provide utilities such as positioning and route plotting, the real-time updating of information and dynamic adaptation to the user's needs. Augmented analogue mapping can provide additional functionality by means of a mobile device that ensures remarkable integration between device and analogue map, combining the strengths of both.

In conclusion, emerging technologies like mobile devices and new types of sensors and screens offer great potential for improving communication and users' interaction with their environment through geoinformation. Moreover, mixed reality is still a fairly unexplored pathway for integrating many of these technologies in related applications and ensuring their implementation in situations currently dominated by maps. Indeed, the use of mixed reality as a user interface paradigm that seamlessly integrates spatial information in the real environment with experience and mapping applications may be of great use for creating mixed reality maps. However, despite recent technological advances, research into this field is still at an early stage. The steps to follow consist of developing, codifying and disseminating knowledge that can incorporate the principles of cartographic design into mixed reality maps, and later bring this technology to spatial content providers through the development of appropriate and easy-to-use custom-created tools.

From reality to representation: from cartography to choreography

Carles Llop

The landscape is not represented, but is lived as a fusion of active and contemplative action, actors and spectators of the vital reality of space and time without the possibility of freezing it in a single and definitive representation. If reality is short-lived and escapes us at every moment, we need registers to preserve it. This is the purpose of representation: a set of registers that synthesise many perceived moments through the sensorial and mental development of an image that evokes a space, with different protagonists and at different times. Representation is therefore a simulation, an interpretation and its intentional description of reality. Both reality and landscape are representations that we make; the first, to show us the context in which we are; the second, to formulate a perception we have of it. Between the two representations, it is interesting that the synthesis provides meaning.

The landscape can be likened to a constructed vision, to a frame of physical and phenomenological dimensions of observed and interpreted reality at the same time. Representation is therefore a set of impressions that fix what is experienced on a personal level and through a subjective filter. This set of perspectives we have could be called *landscape registers*, archives of memory that shape the basis of how we perceive the landscape.

This representative power of reality is also its weakness. The partiality of the image, which is a result of the selection, intentionality and presentation of what we are describing, challenges us about the conditions of ways of seeing and ways of understanding. And we realise that we are unable to represent all components of a reality, much less synthesise it. Reality and landscape mix on many levels of interpretation, ranging from mimesis or reproduction of models to inventive simulation that manages to substantially distort reality or that may also lead to true impersonations of the same.

Without wishing to create a genealogy of the different representations of reality through the development of landscapes, I cite those that have made a particular impact: the rock paintings of Cogul (Lleida), the Mughal garden and the imaginaries created by its study and representation, Cresques' rich navigation charts, Petrarch's sensational and lush description of the ascent to Mount Ventoux (France), Aby Warburg's studies on the influence of the stars in the frescoes of Palazzo Schifanoia in Ferrara (Italy), the many multi-dimensional registers of the photographs of David Hockney or the synthesis of space via the photographs of Andreas Gursky. In all its manifestations, reality is seen through the subjective weight it generates in the way of drawing, photographing or describing; an explosion of new impressions in the receiver. Thus, representation becomes a new landscape.

The landscape produced as a result of interpretations contains the secrets of evident reality. Attentively examining what we see enriches our observation and allows us to explore ways to bear witness and record the experience of space. But the relevance of the resources for bearing witness to and recording that experience does not lie so much in the instrument or in the procedures themselves, but in the intentionality. Representations of the landscape, as interpretations and recreations of reality, must be able to attain a level of complexity useful for identifying the space, stakeholders, facts, process and time; meaning, what we could call the *essence* and the *spirit of the place*.

Mapping the landscape involves overcoming *masquée* (hidden) reality and observing its components. No exclusive technique can represent the landscape in a highly satisfactory way. In fact, cartography (understood as the representation of the Earth over a flat surface) possesses great qualities, but also limitations and is insufficient for describing the sensitive environment and dimensions of a landscape. While this does not mean that cartog-

raphy is entering a crisis, we must understand that the landscape, as a recreation of the representation of reality, requires interpretative explorations and emotional representations that go beyond the two-dimensional drawing and proposes the *recreation* of representation as a broader and richer procedure for mapping landscapes. This recreation would be the development of a simulation, an interpretation or an intentional recreation of reality, whether profoundly subjective or with aspirations to objectivity and certainty.

The possibility of choreographic representation aspires to overcome cartography through a more choral and complex representation. From this perspective, it may be interesting to recover the multi-dimensionality of the idea of choreography as a system of representation that aims to describe and involve us in perceiving complexity; a system of recreating representation that requires less precision and more atmosphere; a system that uses a multi-sensorial, poly-descriptive, complex and multi-dimensional cartography.

Choreography also brings new dimensions for interpreting and representing the landscape, using the tri-dimensionality of graphic fields and dynamic and multi-faceted communication techniques. Using choreography as a system of representation means appropriately articulating descriptions of the supporting space (the landscape viewed) with the attributes and relations between the pieces that compose it or the figures that determine it and turn it into a landscape viewed through attributes of space (visual and physical information about location, directionality, movement, etc.); attributes of time that influence the attributes of perception and a host of synchronic and diachronic relations of the space-time of a lived place, of a landscape. In this way, a choreographic representation should allow us to understand the character of a landscape (space, location, qualities, attributes, movement, time, processes and atmosphere).

The choreographic approach has been applied to concrete experiences as part of various analytical workshops across Catalonia carried out by the School of Architecture of Vallès' Department of Urban and Spatial Planning (Sant Cugat del Vallès, Barcelona). The method of analysis used describes the layers of the territory as a record of the interpretative act of looking at the landscape: gazing, observing, describing, analysing and interpreting are actions proposed to build an atlas of the area covered. The workshops aim to explore and analyse the area under study through a layered reading and to recognise and describe the landscape through a set of various cartographies and representations brought together in the interpretative format of an atlas composed of elements that include, among others, the particular aspects present in the surface of an area due to geological processes and water run-off; the shape of the land and how it relates to local settlements; elements of heritage; the interpretation of the landscape through narratives and interviews, videos, social networks; interpretive tours through place names and artistic expressions; and the *voices* and names of the landscape that come from the ground, the water and the plant life.

We could obtain foundations for further research from these experiences, based on considerations of choreography as: a strategic proposal for a more comprehensive representation of reality; a more comprehensive and choral representation of the landscape within everyone's reach, which brings together many different understandings and sensitivities; a representation based on involvement in what has been lived, observed, interpreted, imagined and told; a representation based on many viewpoints and voices, whether in the present or over the course of time, aimed at effectuating changes and mutations in sensitivities to describe the landscape described; and an approach to representing the landscape that is accessible to all in order to provide freedom in landscape representation.

Thus, a more choreographic approach to representing reality, transcending approved representations, would allow many renewed recreations to capture the essence and the secrets of the landscape; in this regard, work must be done to open up new mechanisms and procedures.

Mapping the intangible: making the invisible visible

Miriam García and Manuel Borobio

The landscape plays an essential role in creating the sense of a place and the feeling of identity and belonging of the population that inhabit it. The contemporary definition of landscape that appears in the European Landscape Convention highlights society's role in shaping it, as it is not just understood in its physical dimension but according to how different people perceive it. Therefore, to analyse and study the landscape, it is essential that we explore its humanistic and phenomenological dimension.

In this context, we face the question of how to map intangible landscape values, if values corresponding to people's sensorial perception (and not just visual or emotional perception) of a particular landscape may be represented or symbolised. To do so, based on the study of different experiences, we carried out a series of works and mappings within a unique part of the coast of Galicia, the town of Ponteceso on the Costa da Morte, developing three great categories of values that we may conceptualise as intangible: wellbeing and tranquillity, acculturation and identity and aesthetic feeling.

As for wellbeing and tranquillity, some authors base their theories on environmental and cognitive

psychology to argue that the two main components of tranquillity are aesthetic pleasure and moderated fascination, and that together they are an essential part of optimal therapeutic settings. With respect to this issue, the work done to map sites of tranquillity in the United Kingdom since the early 1990s is one of the few examples of a contrasted methodology in which the concept of tranquillity has been put into practice for making decisions when considering the objectives, indicators, policies and plans related to the quality of life, the quality of the rural environment and management of the landscape. The main aim of all these projects consists of defining the concept of tranquillity applied to the landscape through participatory processes and obtaining graphic representation of the same in a map that expresses the different existing degrees of tranquillity. To do so, a methodology is used that transforms the values underlying participatory processes into physical elements of the territory, analysed and processed through a geographic information system (GIS).

The transfer of this experience to our area of study on the Costa da Morte made us aware that accuracy of scale also requires greater specificity for the questions that must be formulated to the population. At the same time, it was used to reflect on the very concept of tranquillity, since the most cherished values in the methodology of mapping tranquillity in the United Kingdom have to do with dreamlike images of the English countryside, meaning types of landscapes that are not those of a rugged coastline exposed to weather and the sea like the place where we were working. Our thoughts on mapping tranquillity led us to the early work of Simon Rendel, understanding that it could be a critical tool for assessing (more or less anthropised) gaps in urbanised settings.

The next category of intangible values, acculturation, designates different ways of appropriating what we call *culture* in anthropology. In this sense, the content of the term *cultural heritage* has evolved in recent decades; no longer limited to monuments and collections of objects, it also includes living traditions or expressions inherited from our ancestors and passed on to our descendants like oral traditions, performing arts, social practices, rituals, festive events, knowledge and practices related to nature and the universe, and information and techniques linked to traditional craftsmanship. This positioning with respect to cultural heritage assists social cohesion and fosters a feeling of identity and responsibility that helps individuals to feel like members of a community.

In this context, the study of place names helps us to understand landscapes as social interpretations of nature, as social constructions of the people who experience them and give them names. A place name is attached to a site after years of use and shows us how it is differentiated not just from other places, but from other cultures and societies, since each of them gives it a different name. There is no doubt that place names reflect the one of the most beautiful poetic dimensions of the landscape and help us to decipher how the personality of a landscape evolves. We were interested in these works as a tool for understanding the origin and use of the place, since place names can transform evidence of the material, but also as a tool for planning, for suspending forgetting (cultural and ethnographic reservoirs), since the mechanism for attaching the names to the place explains their relevance as landscape indicators.

We also wanted to analyse festivities, which include pilgrimages because they fit UNESCO's definition of intangible heritage perfectly. This deals with spaces linked to practices and representations, in this case of a spiritual nature, of groups of individuals with a feeling of identity and continuity. The aim was to anchor this spiritual relationship between land and sea by mapping these spiritual landscapes. To do so, a study of these procession routes was conducted, geo-referencing them in order to later link them to a visibility study of these landscapes and thereby reproducing the scenario in which these processions develop.

Stories and the locations that make up its blind memory also form part of intangible heritage: battlefields, abandoned mines, landfills, etc. The landscapes of memory are often priceless cultural references and are certainly full of potential to explore. Deepening our knowledge allows us to rescue them and list them as landscapes worth visiting, like a living memory. A stroll along the coast of our area of study showed us many crosses facing the sea, in witness to the memory of the many shipwrecks that occurred. Thus, by recovering the charts of shipwrecks along the Costa da Morte, geo-referencing their remains and relating them to their indicators on land, we approach a mapping of sites from which looking at the sea meant confronting death.

Regarding the category of aesthetic feeling, the methodology used to develop the maps of aesthetic values and the patterns of the French and English landscape atlases or the Catalan landscape catalogues take a technical approach in an attempt to collect the components and systems that recreate the plastic imaginary. However, sometimes its plastic expressivity, its formal power is not appreciated or is only appreciated vaguely, which is often confounded between the juxtaposition of the natural or anthropic elements previously recognised in their respective mappings.

Often when science is used to study the ground, the climate and the soil, geographical features that depart from the average are eliminated. However, the artist works seeking to reduce what goes unnoticed in science to an expressive essence. Thus, we could say that the spirit is what is essential and what selects, eliminates or accentuates a singular feature of a place, in each case. We can find an approach like the

one we are outlining in some of the work of James Corner, where he uses the collage technique, taken from the art world, to emphasise certain aspects of the landscape. The ability to evoke these mappings have is a powerful tool for claiming a new way to understand the contemporary landscape. Furthermore, the value of all these approaches lies in the synthetic ability to capture what is essential and in the expressive capacity to cause other spectators to come up with new interpretations. From these assumptions, entering our area of study on the Costa da Morte and based on the expressivity of its landforms manifested through the digital model of the terrain, some maps were made in which the spaces in contact with the complex land-sea ecotone were highlighted, which give rise to the most unique spaces and components of this area from a formal point of view.

In conclusion, we can say that making progress in knowledge of the intangible values of the landscape is really a trip to the centre of humankind, of our desires and emotions, of our reference, difference and identity. These studies reveal realities of great importance to culture, discovering unknown potentials in the analysis of the landscape if only tangible elements and values are considered.

The study of the landscape stands as a cultural and ongoing dialogue. When analysing the landscape, many methodological decisions loaded with implicit values are made. In conditions of complexity and uncertainty, as is the case here, with assessment difficulties, participatory communication in decision-making processes takes on a new rationality. The legitimacy and consistency of this process is provided by civic involvement and participation, since it is what agrees on the value assigned to it.

What is not recognised is not appreciated and becomes invisible. Mapping the invisible then becomes an essential tool for experts, not just for identification but for something more important: to transmit the values and opportunities of the place.

From sacred geography to mapping the spiritual heritage linked to nature: experiences and challenges

Josep Maria Mallarach

The chapter summarised here deals with the subject of mapping spiritual heritage from a nature conservation standpoint and particularly from the perspective adopted by some prominent international and national organisations over recent years, with a historical and social focus on the European context and illustrated with examples coming mostly from Catalonia.

The Fifth World Congress on National Parks and Protected Areas, held in Durban (South Africa) in 2003 by the International Union for Conservation of Nature (IUCN), marked a turning point in terms of the attention paid to spiritual heritage linked to nature. The congress approved the first recommendations to integrate cultural and spiritual values in the strategies, plan and manage protected natural spaces and take local populations and communities into account. The World Committee on Protected Areas energised a working group (among others) on the spiritual and cultural values of protected areas, which created an initiative in 2005 centred on technologically developed countries, the Delos Initiative, which has been implemented mainly in Europe.

Also in 2003, UNESCO approved the Convention for the Safeguarding of Intangible Cultural Heritage. Since then, the IUCN's new guidelines for categorising protected natural spaces have recognised that in addition to conserving nature over the long term, these spaces must oversee the conservation of cultural values linked to nature; a wide variety of systems of governance are considered to manage them and the values of tangible natural heritage are explicitly admitted. In 2008, the IUCN's General Assembly approved two resolutions in this regard: one on the need to conserve sacred natural spaces and recognise their traditional custodians and another on the need to recognise different concepts and values related to nature held by different cultures of the world.

These events, and other related ones that we do not have room to touch on in this chapter, have had a significant impact on many international organisations linked directly or indirectly to nature conservation, overcoming the formidable forms of resistance of sectoral policies opposing them, which still cling to the old paradigm of materialism and development through continued growth. Thus, the spiritual values of nature have been appearing in conservation policies, strategies, regulations and plans in many countries, especially ones that are poor economically but endowed with very rich biodiversity. Yet the nature conservation policies promoted by Western countries have made recognition of the values linked to intangible realities late, partial and difficult. It is true that we have other concepts, *landscape* prominent among them, which better integrate the intangible aspects of nature that our societies value more, like beauty and harmony, but that does not change the fact that the dominant trend in biodiversity conservation programmes has been marked by the bias of materialistic reductionism.

Other evidence worth mentioning is the close correlation between cultural diversity and biodiversity. It is noteworthy that they are almost always linked to complex, efficient and powerful ethical or moral systems closely related to traditional

worldviews, systems of governance, science and techniques. Therefore, it is interesting to highlight the concept of *biocultural diversity,* which emerged from some approaches based on ethical criteria and on environmental and social justice.

More than a hundred years ago, the pioneers of nature conservation in Europe had a conception of nature that was generally receptive to spirituality, like what happened in North America, where the promoters of national parks always brandished moral and spiritual values alongside aesthetic and natural ones. This is how the idea was popularised that protected natural spaces were *natural sanctuaries*, a term that has been reflected in many laws around the world and shows an often ignored, but certainly important, reality: the fact that protected natural spaces are the modern, secular equivalent to sacred ancestral natural spaces.

In Western Europe, this view of the first conservationists that was open to transcendence was abandoned after the Second World War in favour of some scientific and technical materialistic approaches that have ended up monopolising conservationist discourse with the passing of time. However, most European cultural landscapes have been impregnated with spiritual values since prehistoric times and the remains of natural sanctuaries of one sort or another appear all over. Paradoxically, a series of international congresses and workshops devoted to examining the spiritual values of nature and their implementation in conservation policies has been held in the very cradle of positivist and materialistic anthropocentrism.

The whole process has aroused some conservationists' interest in the old sacred geography, a science that virtually vanished from Europe centuries ago. The human community is unable to feel good amidst chaos. Living well requires intelligible points of support that give meaning to all the dimensions of human life, and not just the material ones. Sacred geography, which lasted in Europe until the Cartesian bifurcation in the 17th century, brings intelligibility, quality and profound meaning to the landscape and to planning settlements with more meaningful spiritual value, be they sanctuaries, temples, shrines or monasteries, as well as the road networks that interconnect them.

During the centuries when Christian civilisation prevailed in Catalonia, monasteries, sanctuaries, chapels, monumental crosses that mark boundaries, etc. were established at many holy or sacred sites. However, unlike in other countries of Europe, the study of sacred geography in Catalonia has only barely begun in just a few emblematic spaces. In modern times, profound misunderstanding of sacred geography has led to the development of spatial or urban planning based on certain assumptions only aimed at meeting the material needs of contemporary society and ignoring spiritual values, with effects that have often damaged this extraordinarily rich ancestral legacy. In Catalonia, spiritual values with respect to nature have followed the dominant trends in Western Europe, although the situation has begun to change with the recent instruments of landscape policies, in which landscape intangible values have been explicitly considered—mainly those of a historical, literary or aesthetic nature. Furthermore, the mapping of spiritual natural heritage, normally linked to the planning of protected natural spaces, has re-emerged in recent years, as exemplified by the cartographies of the spiritual heritage of Montserrat (Barcelona), Montsant (Tarragona) and the Cave of Father Palau in Aitona (Lleida).

The summarised chapter's final thoughts centre around the need to link the profound causes of the systemic crisis in which we are living to the loss of the spiritual values of nature, concluding that unless we can overcome the materialistic values prevalent in the West, it will be impossible to provide a solution. A broader vision is required, rooted in the most universal and enduring values of humanity. This entails recovering a vision that restores the spiritual values of nature to their rightful place, enriched with the human wisdom common to all great spiritual traditions of humanity. Without a profound change in values of this magnitude, it will be impossible to promote the radical changes necessary to break with exponential trends that scientists widely agree are leading us straight to scenarios of global collapse.

Mapping social perceptions: tendency landscapes

Benedetta Castiglioni and Viviana Ferrario

Although the social perception of the landscape has become an important subject in scientific discussion in recent years, the concept has still not been defined clearly and unambiguously in research methods. Nevertheless, when attempting to move from the field of geographical knowledge (and in this particular case, knowledge of the landscape) to specific applications and actions, instruments are required that help to develop applicable patterns of knowledge in processes, to involve the population and to debate specific choices. Based on this finding, people have thought about the possibility of mapping social perceptions, though one may wonder if it is not inherently contradictory to claim to use a map (which is rigid, stable and *objective* by nature) to represent information as fluid, mobile and subjective as is found in the social perception of the landscape.

First of all, we must consider what we mean by *social perception of the landscape*. The starting point is the consideration of this perception as a

constitutive dimension of the landscape, inherent in the landscape, and not external or subsequent to it. The European Landscape Convention's definition explains: the landscape only exists starting from the time that a population perceives it, enters into relation with it and attributes significance and values to it. Thus, the landscape consists of both a perceptible tangibility and an intangibility related to perception, which is reality and the image of this reality at the same time.

These two dimensions of the landscape mutually relate to each other. Perceptions and representations of the landscape, meaning the significance and values attributed to the landscape, are created from perceptible forms of the area through filters and models of a distinctively cultural origin. This is a cyclical path, since it is not so much reality that influences people, but the idea that they have about reality. Based on these perceptions and attributions of values, specific behaviour is developed, actions aimed at transforming the forms of the area. Thus, the social perception of the landscape is not solely a visual perception, just as the values recognised in the landscape are not only of an aesthetic type; indeed, they refer not just and so much to *seeing* as to *living*.

If, as the European Landscape Convention states, the landscape is a concept that refers to the territory as a whole and not solely to some of its parts, the perception of the landscape must also be a fuzzy concept, referring to an extension, not only to some specific points, to certain locations in the area. Certainly, some elements of the landscape are occasionally benchmarks around which perception focuses and that assume a specific meaning, sometimes of a symbolic type, like milestones, on which it could be interesting to conduct research, but they are not the only thing that is perceived. And the perception of a landscape as a whole cannot be reduced to the simple juxtaposition of perceptions of individual portions (individual elements, individual places) of the landscape itself, nor can it refer exclusively to the expression of preferences for this or that element, for this or that portion of the landscape. The study of the perceptions of the landscape aims to understand not just the extent to which certain values or significance (of an aesthetic type, for example) are attributed to it, but also tries to reconstruct the procedures by which certain values and significance are assigned.

There is another remarkable issue: the perception of the landscape is both individual and collective, belonging to the individual and to the community. Social perception is more relevant in view of landscape understood as a product of society, as a product of a community; it does not refer to the sum or mean of individual perceptions, but rather to the perspective that arises from intersecting individual, mutually influenced perspectives. Perception is structured through cultural references that influence us all (consciously or unconsciously) in the process of attributing significance and values to the landscape and its elements. Three different levels or scales may be identified when interpreting the process of perceiving and constructing mental images: on a global scale, some landscape models may be recognised that are linked to shared cultural references belonging to a particular moment in history; on a local scale, group experience and shared social practices gain importance; and on an individual scale, individual experience and the personal attitudes of each individual predominate.

It must also be stressed that the social perception of the landscape is dynamic, never static and ever-changing: the forms of the landscape that are perceived change, the population that perceives it changes and the filters and cultural references through which it is perceived change as well.

The characteristics outlined in relation to the social perception of the landscape and with the studies that deal with it show how difficult it can be to develop cartography like this. Indeed, genuine maps on the social perception of the landscape are few and far between. However, this does not mean that, to a certain extent, studies on this subject do not use a certain cartography, particularly when the study forms part of a planning process.

Therefore, the analysis of some examples of the cartography of social perception aims to show some of the characteristics described and some problematic aspects of these maps and of the processes by which they are made, attempting to understand if, or to what extent, they may really be considered maps of the social perception of the landscape. The examples analysed in the chapter summarised here focus on three different modes of representation: community maps, the product of a community representing itself; maps that establish places that the population considers significant; and maps made collectively over the Internet.

For each of these types of maps, it is possible to discern whether they correspond to a greater or lesser extent to the characteristics of the social perception of the landscape. In each case, it seems appropriate to reflect on some questions: is the map of the social perceptions of the landscape a final product, or an instrument that forms part of a process instead? And is it the result of research into social perception, or simply the result of the population's direct involvement in the issue of the landscape, as part of the participatory or awareness raising dynamic? Indeed, a map may often be various things at once; in other words, the population's direct involvement and its representation on a map can achieve various aims at the same time, such as objectives linked to knowledge, participation and awareness raising, for example.

During 2008 and 2009, the authors of the chapter summarised here were able to study the landscape as a subject of social perception and to ex-

periment with cartographic representation during the creation of the Landscape Plan of Valsana, a small pre-Alpine region of Veneto, in northeast Italy. The markedly methodological focus of the project and its eminently operational objective seemed like a good starting point for reflecting on the social perception of the landscape and the possibility of using the results obtained in planning the landscape. To limit the field of analysis, among the many aspects that could be explored in depth, they decided to focus on an issue that seemed especially relevant in view of planning: the cyclical relationship between actions (and their specific consequences for the landscape) and the ideas that direct those same actions. To speak about transformations of the landscape effectively means being aware not just of change in the physical landscape, an objective of study evidently known, but also of change in the landscape as an image and imaginary of the area.

The aims of the study were to explore transformations in the landscape, whether tangible or intangible: documenting the conflicts between various images of reality and between diverse activities and practices that share the same space; representing the processes to affirm new landscapes and communicating with local stakeholders. The study consisted of combining direct observations, oral and written sources, all related to physical reality (practices, signals in the area) and to its representation (images) and was developed in four stages: the reconstruction of the image of Valsana in the media; the identification of tendency landscapes; interviews, debate and discussion with the stakeholders and agreement on the map.

Research into the image of Valsana was conducted by analysing the local production of tourist maps, websites, tourist guides, the local press and informational material created or published over the previous ten years. The second stage consisted of reading some elements of the landscape on the ground identifiable as remains and evidence of the processes of transformation of that landscape. Data were collected on items considered minor, generally overlooked in official databases, whose presence is related to a process undergoing affirmation. The indications were selected and ordered in groups that conveyed a meaning; in other words, a narrative sequence was used as a way to reconstruct and reveal meanings that are not shown in a noticeable manner. Later, those indications were mapped and geo-referenced; where data were accumulated that shared the same meaning, hypotheses were formulated about the presence of tendency landscapes, more or less marked according to the frequency of the same signs. Therefore, the presence of tendency landscapes was very far from being objective and had provocative content, which favoured discussion in the debate with stakeholders. The final stage of the research effectively consisted of a series of discussions with local stakeholders on the characteristics of the landscape of Valsana, on the images of Valsana that appear in the media and on the map of tendency landscapes. Some aspects of the map were modified as a result of the stakeholders' observations.

The map of tendency landscapes was designed to explain conflicts that are a consequence of the coexistence of various images of reality in the same territory that act as driving forces to transform the landscape. As part of a planning process, the map may serve multiple functions. Firstly, it has a cognitive function, to the extent that it reveals dynamics that do not appear in other research, but are active forces of landscape transformation. Secondly, it may be an instrument of support for decision-making, to the extent that tendency landscapes do not just represent a reading of the contingent situation, but also a dynamic scenario that can generate projects and questions the opportunity to support or block the dynamics underway. Thirdly, the map may be a useful tool for public discussion when sharing readings and strategies.

Sharing perception effectively means potentially agreeing on and sharing actions that change the landscape. The map of tendency landscapes, and through it the landscape itself, is potentially a useful instrument for explaining and reconciling the conflicts of the imaginary that guide actions in divergent directions and that diminish force in attempts to govern the transformations.

Maps of emotional landscapes

David Casacuberta

An emotional map is an attempt to represent two-dimensional spatial information associated with subjective experiences and perspectives. Situating ourselves in the sphere of landscape, an emotional landscape map therefore allows us to link basic objective properties of the landscape, such as its components or spatial location, to subjective criteria about how this landscape is lived and experienced. There is currently no systematic methodology or guidelines for creating collections of emotional maps of a region. In fact, most of these maps are associated with contemporary art, especially in current research on the interaction between art, science and technology, or in the trend of situationism and its radical approach of psychogeography.

To illustrate the concept of maps of emotional landscapes, in addition to briefly presenting some of the most paradigmatic examples (the situationist *dérive* and the works of Christian Nold), the summarised chapter focuses especially on a project to signpost the heritage of the city of Roses (Girona) and the associated digital product: Rosespèdia.

The first example of maps of emotional landscapes, the situationist *dérive*, aims to establish the effect of the landscape on people's emotions and behaviour by strolling along a route chosen at random. This example strikes a balance between a subjective perspective and theoretical analysis and provides a theoretical and artistic justification for the emotional map.

The second example, the works of Christian Nold (like the project Greenwich Map, among others), represents a technological evolution of the global concept of psychogeography and *dérive*. Nold acts as a producer in all his projects, not as a creative artist in the traditional sense. He offers an advanced technological system that may be used by the inhabitants of the area under study, who are the ones that organise the emotional review of the space in a collective creation process. Thus, even though it is an art project, it may be adapted to provide systematic data that allows emotions to be taken into account in urban design.

The signage of the cultural heritage of Roses and the digital product Rosespèdia (www.rosespedia.cat) diverge from the previous examples in interesting ways. Rosespèdia has been an attempt to solve the problems present in other examples of emotional maps described above. On one hand, the situationist *dérive* is an exercise in personal freedom and individual artistic creation, in principle accessible to everyone but hard to transmit. On the other hand, the projects of Christian Nold establish objective forms of working, but are only accessible to a small group of people, considering that the biomapping devices are expensive to build and difficult to maintain, and that tracing the routes is also a technically complex task that is not within everyone's means. However, Rosespèdia has aimed to create a product that takes a collective approach to developing the map (like Nold and unlike the situationist exercises); that may be carried out with a much more affordable budget and some associated technologies that are easy to use and accessible to a large part of the population (like the situationists and unlike Nold); that is not an independent and autonomous element, but forms part of a larger general device to facilitate people's access to the cultural and landscape values of the city from different perspectives, where the emotional tagging of heritage elements is one objective of the project, but not the only or most important one (unlike the situationists' or Nold's projects); and finally, that works not just on the urban environment, but on the natural one as well (unlike psychogeography and Nold's biomaps).

Rosespèdia is a project about the cultural heritage of Roses, which brings together scientific knowledge, popular culture and the experiences and feelings that spring from residents' direct and continuous contact with the area, the landscape and their culture. The two main elements supporting the project are QR codes and an open wiki (www.rosespedia.cat) to gather all relevant information on the city's rich cultural and historical heritage. The aim is to use ICTs in a collaborative way to try to improve how the cultural heritage is experienced, as well as to propose a more horizontal way to establish relations between people and the state of the cultural heritage. This collaborative way of working can give emotional maps new uses. More specifically, this project aims to: develop non-intrusive signage for natural and cultural heritage that does not clash with public enjoyment of the cultural elements and surrounding landscape; help residents to enjoy their cultural heritage more inclusively and horizontally through collaboration ICTs, like wikis; connect ICT processes with real elements in real space in an easy and significant way; and finally create a horizontal emotional communication system in which the emotions that can be associated with a specific heritage or landscape element are not indicated by a group of experts or an artist, but are the result of direct interaction between the users of the medium.

QR codes are based on two-dimensional bar codes that may be read with a digital camera, like those already implemented in mobile phones. Thanks to simple software, the mobile phone can read the codified information in the QR code. This information may be a URL, which the user can access through Wi-Fi, GPRS or another preferred Internet access system, or else a brief text (of around 4,000 alphanumeric characters maximum). There are various advantages to this technology: it is very economical, since it does not require infrastructure; the maintenance is very cheap (sticky paper tags may be used, if desired); and it uses free, open-code software. Moreover it is active technology, which means that the user has to actively search for the codes.

The key component of the project is the associated wiki, which provides expanded information. Without it, the QR codes would not make much sense. The main objective is to create a network of collective knowledge that encourages people to participate, to show the world what they are proud of. Everyone can collaborate according to their interests: cooking recipes, studies of vegetation, stories about the area, etc. In this way it helps to construct the collective identity of Roses. At the same time, Rosespèdia includes an emotional cataloguing system. The idea is very simple: basically, Rosespèdia's tagging system includes a whole series of emotional tags that allow the author of an entry to identify a heritage asset more specifically by indicating the feelings that it produces in him or her. In addition to the basic emotions, we have included some more complex ones that are especially relevant for dealing with culture, landscape and heritage. The tags include: pride, power, privilege, passion, love, compassion, devotion, hate, anger, knowledge, curiosity, loneliness, isolation, conflict, happiness,

sadness, hope, danger, shivers, misfortune, fear, frivolity, cold, heat, mystery, surprise, change, survival, prosperity, poverty, community and service.

The interaction between the QR codes and Rosespèdia is easy. Suppose that we walked around Roses and ran into a heritage element that especially interested us and about which we would like to know more. Using our mobile phone, we would immediately be able to connect to Rosespèdia using the web address that the QR code provides us. When we connect, we enter into a boundless land of information where we can search for environmental or historical data, discover the inhabitants' stories about the place and see old photographs, modern uses and some anecdotes about it.

By way of conclusion, it can be said that an emotional map is a tool with many possibilities yet to be discovered. The chapter summarised here briefly describes its origins and connections to situationism, showing how it currently works in the context of contemporary art by describing the pioneering work of Christian Nold and presenting a simple and participatory way to include emotions in descriptions of the heritage through signage based on Internet access via mobile phone thanks to the communicative action of QR codes.

Considering the great unifying ability of horizontal descriptions of common heritage and the activating capacities of emotions, it is interesting to defend the introduction of these electronic emotional maps as a tool to enhance people's access to landscape heritage while socially empowering them, turning them not just into consumers of culture, but creators.