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Theoretical conceptions for a holistic, transdisciplinary approach to contemporary landscape

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Abstract

In recent years the concept of landscape has undergone rapid expansion. This expansion, however, has not been accompanied by a parallel development in the definition of theoretical and methodological principles, nor has it achieved sufficient consensus for its application in scientific and/or administrative fields. The range of divergent ideas that currently persist and coexist around the concept of landscape, and which are biased towards disciplinary specificities, have given rise not only to terminological imprecision, but also to a lack of standardisation of study, evaluation, management and planning methodologies. This article aims to provide an overview of the different acceptations that have been developed in relation to the concept of landscape from the second half of the 20th century to the present day, with a view towards contributing to the conceptual and disciplinary plurality that exists regarding landscape as an entity. This study, however, also attempts to transcend this analysis by advancing towards the definition of a conceptual framework on which to redefine the concept of landscape by considering the multiplicity of dimensions that may be attributable to this concept and advocating a holistic, transdisciplinary, open, integrative approach to these dimensions.

Keywords Landscape, Dimensions, Transdisciplinary systems, Holistic approach

Introduction

Landscape has long been a subject of study and attention in Europe, and the semantic evolution of its conceptualisation has an extensive history. From its original aesthetic connotations, its traditional morphological, visual, spatial or territorial consideration (Jones and Stenseke 2011) it has incorporated a variety of meanings according to the prevailing concerns and societal trends, initially slowly and, in the last two decades, at great speed. This has led

to a rapid expansion in the concept of landscape over the last years, acquiring multiple meanings.

For decades the concept of landscape has been instrumentalised by a number of fields of knowledge and on the basis of a wide variety of views and interests, and is nowadays a central topic of growing interest for many disciplines, both in the natural as well as in the human and applied sciences. In recent years we have witnessed the proliferation of landscape-related studies and research projects as well as the publication of a wealth of scientific literature on the subject. The abundance and variety of these studies can be explained not only by the range of considerations that have been made over time regarding the concept of landscape and the diversity of the objectives with which research has been approached, but also by the plurality of disciplines involved in the study,

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analysis and management of the same, which includes geography, architecture, urban planning, geology, archaeology, anthropology, history, landscape ecology, agriculture, botany and environmental psychology, among others, a fact that has led to the development of numerous approaches to landscape, each with its own perspective, concepts and methods.

This expansion of the concept of landscape in recent decades has not, however, been accompanied by a parallel development in the definition of theoretical and methodological principles with which its study and management has been approached, nor has it achieved sufficient consensus for it to be applied in scientific and/or administrative fields (Benedet et al. 2020).

This polysemy of the concept of landscape, which stems from an extensive evolution in which the notions and meanings that various authors and disciplines have created, constructed and reconstructed at different moments in history converge, has resulted in terminological imprecision. Divergent ideas relating to the concept of landscape currently persist and coexist, though these tend to be biased by disciplinary specificities, and face the difficult challenge of offering a response to the complex disciplinary overlaps and integrations required by the current reality (Nassauer 1995). So while each of these disciplines has contributed to the collection of important knowledge and a new and deeper understanding of the landscape through the presentation of new findings within their specialisation that have allowed for scientific progress, knowledge transfer across disciplinary boundaries has rarely been achieved due to the lack of a common approach that overcomes the differences between disciplines. This hinders the exchange of knowledge and creates problems in terms of transcending disciplinary boundaries (Nassauer 1995). A holistic synthesis of the landscape concept requires more elaborate transdisciplinary cooperation.

Efforts in this direction are proceeding slowly, as the holistic nature of landscape offers a multiplicity of approaches and each perspective employs its own concepts and methods, which are not always similar or comparable, meaning their applicability for landscape analysis, assessment and planning is not yet clear. This disparity between different conceptions of landscape has led not only to terminological imprecision, but also to a lack of standardisation in terms of study methodologies and a situation in which integrated theoretical and analytical frameworks that adequately address the study, assessment, management and planning of landscape have yet to be formulated (Terkenli 2001).

In this sense what is required is a redefinition of the term landscape that reflects its current usage. The current situation demands a conception of landscape that contemplates a substantial shift from being a concern

that relates to certain specific fields of specialisation to one that encompasses natural, cultural, spatial, temporal, social, economic and other dimensions as well as many levels of meaning (Jones and Stenske, 2011; Selman 2006).

But while the definition of a common concept, objectives and language under the umbrella of a transdisciplinary landscape science is nowadays a necessary and complex task in terms of landscape research, when it comes to landscape protection, management and planning, transdisciplinary synthesis and cooperation is unavoidable if we are to address the numerous environmental, social, territorial, cultural, aesthetic, economic and other issues relating to landscapes. These problems are global in scope and of such complexity that the individual landscape-oriented disciplines alone cannot provide the knowledge required for their understanding or resolution (Décamps 2000; Fry 2001; Moss 2000; Naveh 2000).

In this sense the enactment of the European Landscape Convention (hereafter ELC) by the Council of Europe in 2000 has propelled this change and influenced interdisciplinary and transdisciplinary landscape research and management (Pătru-Stupariu and Nita 2022). The origin of the convention stems from the interest sparked by landscape in the final decade of the 20th century and the beginning of the 21st century (Mata 2012), which gave rise to a progressive awareness of landscape in society that, in turn, led to an exponential increase in interest by public administrations and scientific institutions at the time. As a result, landscape would begin to be incorporated into legislation in many European countries as well as international regulations on natural and cultural heritage. The consideration that citizens should contribute to preserving the quality of landscapes and that public authorities should take responsibility for defining a general framework to ensure this quality initiated a process that culminated in the signing of the ELC.

Prior to this, landscape had indeed constituted the focus of attention in other agreements of similar or even greater importance than that of the ELC. Until this time, however, the consideration of landscape was linked to a somewhat partial conceptualisation that associated it primarily with specific natural spaces of exceptional character, historic cities, monuments, etc., in such a way that the territorial scope of these agreements was more reduced and the consideration of landscape more limited than that of the ELC, where it is referred to as natural or rural landscape (Zoido 2009).

This Convention can be considered as the main policy instrument at a European level for landscape research, protection, management and planning (Antrop et al. 2013; Brandt et al. 2012). Its ratification today by a large number of European countries has encouraged public

authorities in these countries to study, protect, manage and plan their landscapes appropriately. Landscape, then, has received an additional restorative boost in terms of its consideration and intention and, at the same time, been subjected to extensive revision in terms of functions and responsibilities; a revision that is supported by significant documentation as well as theoretical, methodological and practical orientations for its implementation. Likewise, numerous initiatives have attempted to address implementation of the same on the basis of a series of principles and general measures for their correct application. Along these lines, the European Union has included references to landscape in important documents such as the *European Territorial Strategy* (1999) and the *Territorial Agenda of the European Union* (2007). Similarly, in recent years we have witnessed the emergence and creation of a number of specific centres whose aim is to offer guidance in the application of the ELC, provide public bodies with suitable tools for the correct management and planning of landscape, develop landscape catalogues, and promote working methodologies and landscape analysis, etc. However, not all of these initiatives are based on integrated or transdisciplinary research.

The timeliness of this research, therefore, is suggested in the Guidelines accompanying the Convention (Council of Europe 2008: 8): “The various texts relating to the convention and the various experimental practices already being developed or operational in different European states show a diversity of approach to knowledge production that also reflects the diversity of cultural concepts. However, there is an acute awareness of the inadequacies of the most frequently used theoretical and methodological instruments for operational needs. Too often, they belong to compartmentalised disciplinary universes, while the landscape demands adequate responses within cross-disciplinary time and space constraints which can meet the need for knowledge of the permanent changes at local level”.

As a result this research constitutes an attempt to overcome the aforementioned disciplinary compartmentalisation; a compartmentalisation that remains present in many of the theoretical and methodological tools used in the study and planning of landscape. The aim of this article, therefore, is to offer a more transversal theoretical-conceptual framework that allows for a transdisciplinary approach to landscape research that transcends conventional specialised approaches and adapts to the requirements established by the ELC, thereby contributing to a response to these insufficiencies detected in its implementation in the study and planning of landscape. Many of these insufficiencies relate to the development of landscape initiatives and projects that, while they claim to offer an integrated study and to be inter- or trans-disciplinary in nature, in reality are not

necessarily collaborative or developed within an integrational framework.

In this regard, this article starts providing an overview of the different accepted meanings that have been developed in Europe with regard to the concept of landscape from the second half of the twentieth century to the present day and in a variety of cultural and scientific trends. The aim of the study is to formulate a contribution to the conceptual and disciplinary plurality that exists with respect to landscape as an entity. Furthermore, this article also intends to transcend this analysis in an effort to demonstrate how landscape research during this period has developed along different trajectories that have yet to converge into an integrated transdisciplinary landscape science that is able to transcend disciplinary boundaries and define common frameworks that allow knowledge to be compiled and synthesised.

In this respect, this research takes steps towards the presentation of a new conceptual framework on which to redefine the term landscape in such a way that it reflects its current consideration and lends itself to transdisciplinary research. The idea is to offer a broader but also a clearer, more precise theoretical conceptualisation of contemporary landscape that serves as a basis for the development of an analytical framework for the study of the same that contemplates an integrated vision that transcends disciplinary specialisation and allows for transdisciplinary landscape research in an effort to regulate the complexity of real problems in a landscape context and encourage the development of landscape planning projects from the perspective of integrative frameworks. With this in mind, a conceptual basis of contemporary landscape is presented that takes into account the multiplicity of dimensions that may be attributable to this concept and advocates a holistic, transdisciplinary, open and integrative approach to these dimensions that allows scientists, experts from different fields and the various actors involved in decision-making to work together to establish joint research-intervention actions on the basis of transdisciplinary approaches (Décamps 2000; Naveh 1995b). Likewise, this article, therefore, constitutes an invitation for future research to contemplate an integrational, transdisciplinary approach to landscape that addresses the inherent complexity of the same.

The concept of landscape in the 20th and 21st centuries

The evolution of the concept of landscape has a long history, and while originally it was linked to a conceptualisation that had pictorial roots and a philosophical component that led it to be considered initially as a primarily visual phenomenon, over time it has incorporated a variety of meanings according to the prevailing societal

concerns and trends (Hunt 1994; Watkins and Cowell 2012).

In the case of Europe, two 20th-century turning points in this evolution and broadening of the concept of landscape may be located. The first of these took place in the mid-20th century, and coincided with the transition from a more perceptive and descriptive, almost artistic conception of landscape to a more systemic conceptualisation based on a comprehensive understanding of landscape that combined its physical structure and ecological processes. This consideration was rejected by humanist geographers such as Relph, Yi Fu Tuan, Buttner, Mercer o Powell, among others, who approached the study of landscape from a more phenomenological and existentialist perspective. The second turning point occurred at the end of the 20th and beginning of the 21st centuries and was based on the social interest aroused by land in relation to quality of life and environmental sustainability (Iranzo 2009; Moyano and Priego 2009; Pattacini 2021). As a consequence, landscape was afforded a legal character and became an element of territorial planning, leading to the appearance of new methods of approaching landscape studies.

As a result of the emergence of these diverse approaches to the conceptualisation, study and treatment of landscape, from the first third of the 20th century to the present day numerous national schools and academic and professional traditions dedicated to landscape research emerged in Europe within the context of notable disciplinary schools (Alba and Romero 2022) and a significant number of reviews and publications emerged that attempted to offer a historical representation of this multiplicity of landscape studies, such as Ayuga (2001), Gómez and Riesco (2010) and Maderuelo (2005), among others. For purely operational purposes, in the development of this article, and in an effort to synthesise concepts in such a way that it would be possible to assemble, in just a few pages, the wealth of diverse approaches that arose around the concept of landscape from the second half of the 20th century to the present day, the decision was taken to deal with the study and analysis of landscape by grouping trends into (a) models based on expert knowledge, (b) models based on perception, and (c) models that combine both descriptive typologies in a comprehensive and complementary manner.

Models based on expert knowledge

This heading covers those trends that are based on expert knowledge and are often conditioned by their ascription to a specific field of knowledge. These include a number of scientific models, the application of which is based on the objective judgement of experts. For the purposes of categorisation it is possible to distinguish a number of

disciplinary approaches, which are in turn subdivided into distinct schools.

Many disciplines linked to landscape study contemplate, in an initial stage of their development, the use of analytical methods that are based on a conceptualisation of the landscape as an element made up of various components. These are analysed separately, as if each of them constituted an isolated element, in order to arrive at a final synthesis through the juxtaposition of the various sectorial studies. Opposing this tendency are those methodologies that contemplate a systemic approach to landscape and propose new methodologies that allow for integrated analyses that necessarily encompass physical, biological and human elements (Bolòs 1975).

Behind this holistic trend, which occurred over the second half of the 20th century, lie the foundations of what is today known as Landscape Science, the fundamental elements of which are set out in Rougerie and Beroutchachvili (1991) and Bolòs et al. (1992). In the development of this science it is possible to distinguish two traditions that still operate today. One of these falls within what is known as the Anglo-Saxon School, which is characterised by the perpetuation of conceptions of landscape derived from very pragmatic assumptions and from positions closer to descriptive and taxonomic aspects relating to land-use technologies. The other methodological tradition stems from the German School and developed in Eastern European countries, spreading to Western Europe through the French Geographical School of Toulouse-Le Mirail.

The German School devotes particular attention to landscape studies and is characterised by the fact that it has always presented a progressive, innovative programme. So, as specialised literature on the subject coincides in pointing out, this school was the first to propose the concept of landscape *per se*. As María de Bolòs (1992) says, Sigfried Passarge was the first to write a book on landscape (1919-20), perhaps the first scientific treatise on this discipline, and this gave rise to a science that was initially considered a branch of geography, namely Landscape Geography. This school is founded on the basis of physical geography, in such a way that, via methods of integrated chorological analysis (Gómez et al. 1994), landscape is considered as the meeting point for a number of spheres (lithosphere, hydrosphere, atmosphere and biosphere). In this area of landscape study, the work of the German geographer Ferdinand von Richthofen should be highlighted.

Later, in the first half of the 20th century, the work carried out by Troll (1939, 1950), the founder of Geoecology, or Landscape Ecology, stands out. This ecological approach to landscape focuses mainly on the relationship this has with the environment. Landscape is understood more comprehensively, as an element in which

the disciplines of earth sciences and ecology come into contact.

The Soviet school, heir to the German school, is possibly, together with the latter, one of the schools that has contributed most to the progress of landscape studies and has had the greatest influence on later trends (Martínez 1983; Panareda 1979). The rich tradition of the Soviet state in terms of geographical studies, which dates back to the 19th century, led to the natural aspect of territory becoming a salient element in Soviet landscape research. This school, like the German one, considers landscape from the perspective of physical elements and the interrelationships between these. Initially it does so on the basis of soil-related studies, later moving on to the development of theories that would consider landscape as a geographical envelope and, later still, focusing on comprehensive knowledge of the natural environment and landscape as a geosystem (Sochava 1963) under the influence of the theory of systems formulated by Ludwig von Bertalanffy in 1968.

While landscape research in France is to some extent based on Soviet and German experiences, the academic tradition of the French school with regard to the study of landscape by university teams, and its historical links to geography as a discipline, means that its contributions acquire a distinctive character, and it is at the University of Toulouse-Le Mirail where research makes the most significant contribution. In this respect, the work of Professor Bertrand (1968, 1969, 1972), among others, stands out. These have had a notable influence on the study of landscape in other countries and allowed for the conveyance of ideas and concepts inherent to the German and Soviet schools.

Bertrand adapts the concept of geosystem, of naturalist origin and attributed to Soviet authors the likes of Isachenko (1973) and Sochava (1978), to the reality of Western Europe, where the influence of man in this area is much greater. In 1968 he developed an integrated methodology for landscape from a socio-cultural point of view in an effort to establish links between nature and society. Landscape is seen as the result of man's perception and use of the environmental system, and the human component acquires a significance not seen since earlier geo-ecological proposals (Gómez et al. 1994). So, for Bertrand "the landscape is, in a certain portion of space, the result of a dynamic, and therefore unstable, combination of physical, biological and anthropic elements which, by reacting dialectically with each other, make the landscape a unique and inseparable set that is in perpetual evolution" (Bertrand 1968: 249).

Georges Bertrand's studies, and also those of other French geographers such as Gabriel Rougerie and Jean Tricart, contribute to the development of a systemic vision of geography by means of a global approach that

attempts to unblock earlier, more sectorial approaches (Bertrand 1968). So, in contrast to the methodology employed in traditional geography, which focuses on the individualised study of the "parts" that make up a landscape, the French School develops its research towards studies that are supposedly synthetic and which understand the landscape as a complex structure that combines both natural and anthropic elements and factors.

Particularly decisive in the development of this systemic approach is the integrational concept of system that Georges and Claude Bertrand (2002) developed using three different but complementary concepts as a basis, these being geosystem, territory, and landscape, which they identified using the acronym GTP (Geosystem-Territory-Landscape). Via the GTP system, Bertrand offers a theoretical and methodological proposal that allows an interactive, integrational approach to geographical phenomena in an effort to emulate the integration and interactivity between nature, culture and society.

Likewise, in the 1970s, the Besançon School, a name proposed by Wieber and with roots in physical geography and extensive references to landscape studies resulting from the French academic landscape tradition, attempted to reconcile the objective and subjective dimensions of the study of landscape using a systemic model. The members of this school, who were geographers, distinguish three types of subsystems in the landscape complex: the producer subsystem, consisting of inert (abiotic), living (biotic) or humanised (anthropic) elements; the user subsystem, pertaining to perception and affective and mental projection; and the visible landscape subsystem, an intermediate level between the two previous subsystems that complements these with an abstract zone in which are formed images and evocations of the territory that emerge from the first subsystem and offer a series of relationships and substance for the second (Brossard and Wieber 1984: 6).

In recent years, approaches very similar to geosystemic approaches have been incorporated into disciplines such as ecology and biology and grouped around what is known as landscape ecology (Zonneveld 1995), which focuses its attention on ecosystems and is devoted to the study of the relationships between the organisation of space and ecological and social processes (Matteucci 1998), the latter being understood as the interactions of living organisms in the environment in which they are organised. This trend achieved greater relevance and organisational structure in the 1980s with the creation in 1982 of the IALE (International Association for Landscape Ecology).

The Anglo-Saxon School has had a special development in countries like Australia, Canada, United States and England. This, characterized by a predominantly operational profile, has focused fundamentally on the

development of methodologies for the recognition of territory and the generation of cartographies with territorial planning objectives. Arose in the United States, this current had its greatest diffusion and development in Australia during the decade of the forties. Thus, in order to cover the needs derived from the regionalization work that was carried out in the colonial territories, relatively large and virgins, this trend sought to define homogeneous spatial units (Land Survey) in function of natural attributes, based fundamentally on the physiography, in order to extrapolate results of pilot development projects. The application of these integrated landscape analysis approaches began at the CSIRO (Commonwealth Scientific and Industrial Research Organisation) in Australia in 1958 with the introduction of the Land System Approach (Christian 1958; Christian and Stewart, 1968) and was subsequently applied in Canada, where Ecological (Biophysical) Land Classification was established via the Lands Directorate.

In England, this current had a minor development and was focused on other aspects. This was centred more on the processes that build a landscape than on the forms that define it (Gallego 2018). The concept of landscape was used as a synthetic expression of a natural region. This made it possible to carry out concise inventories of spatial units to carry out the development of territorial policies (Rivera 2013).

This method was later adopted and modified, in 1976 by the FAO (Food and Agriculture Organization of the United Nations) for the analysis of territorial resources and the planning of agricultural uses in developing countries and continues to maintain some success today in the Anglo-Saxon countries and in those that are under its influence.

In the 1980s in the United States, as a result of the evolution of environmental problems, researchers from the Environmental Protection Agency (EPA.), faced with the need for land classifications and evaluation procedures that included ecological criteria at different scales and would attempt to reduce ecological risk and mitigate impacts, developed an approximation in the definition of distinct ecological regions that would subsequently be subject to amendments (Bailey 1987, 1995; Omernik 1995).

Another direction of trends focussing on landscape study arises on the basis of the attention paid to the historical consideration of the same, of landscape as a receptacle for the history of the territory, like a palimpsest. Landscape and history, as Maderuelo (2009) points out, are two powerful concepts that are impossible to study separately as their meanings are intertwined and entangled in an infinite number of ways. In the field of humanistic geography, time and history form part of the conceptualisation of landscape and constitute a

dimension that must be analysed in the study of landscape. As Nogué (1985: 101) says, "landscape is history".

In recent decades the concept of cultural landscape has become an essential component of the study of geography, territory and planning. Along these lines a number of approaches to landscape have tried to address the complexity of the territory as a whole while also taking into account its particularities, especially those derived from its history and the links man has established with nature over time. For Alfred Hettner, one of the exponents of German regional geography, physical and human phenomena are closely related in the definition of each landscape. This same interest in landscape as an association between landscape and man can be found in the French School, and particularly in the development of human geography, one of the principal references being Paul Vidal de La Blache (Capel 1981), in whose work one can observe special attention to the immaterial characteristics and cultural aspects of man in the definition of landscape. Special attention should be paid to the American geographer, Carl O. Sauer, who, in his book *The Morphology of Landscape* (1925), distinguishes between natural landscape and cultural landscape, the latter being that landscape that has been transformed by the action of man.

Over the course of the 20th century, landscape attained greater theoretical, conceptual and methodological presence in other disciplines the likes of architecture, anthropology, archaeology, aesthetics, and fine arts, among others; disciplines that reassessed or rediscovered landscape as an object of study and contributed new approaches and innovative methods for the reading and interpretation of the same (Nogué 1985).

Models based on perception

This section includes those landscape study models that share a perceptual approach. In other words, they associate the existence of the landscape through the physiological phenomenon of perception and a psycho-sociological interpretation of the same (Morgan 1978). These emerged in the early 1970s as a critique of scientific methodology in the Anglo-Saxon world. As a result, in contrast to the more quantitative, theoretical models of the 1950 and 1960 s, new landscape study models that opted for a more humanised approach began to emerge. In these models landscape constitutes a complex reality in which human relationships with the environment come into play and in which phenomena that are neither quantifiable nor measurable, such as perception, intuition, beliefs, culture, behaviour, etc., are essential in terms of definition of the same. Prominent among these models are those with a psychological and phenomenological basis.

Phenomenological models are part of what is known as humanistic geography (Estébanez, 1982; García 1983a, b;

Nogué 1985). This trend began in the early 1970s in the Anglo-Saxon world through authors such as Denis Cosgrove or Stephen Daniels (Robertson and Richards 2003), represents an alternative to the neopositivist geographical approaches of New Geography by incorporating novel aspects such as sensations, value judgements, intuitions, etc. As a consequence, the concept of landscape is reformulated to “allow for the incorporation of individual, imaginative and creative human experience into studies of the geographical environment” (Cosgrove 1985: 45). The landscape comes to be analysed as a symbolic system. This is moulded from beliefs, ideologies, meanings and values, which leads it to reflect the culture and social structures of human societies (Barnes and Duncan 1992; Cosgrove 1984, 1993, 1998; Daniels and Cosgrove 1988; Duncan 1990). The two most significant lines of this current are phenomenology and existentialism.

The positivist approach believes that man's relationship with the environment must be rational, while the humanist approach advocates a relationship with space that is more affective, arising through man's experiential involvement with the place in question (Estébanez, 1982). Understood in this way, landscape neither be reduced to models nor defined in quantifiable terms (Orejas 1995). In this regard, the humanist standpoint approaches the concept of landscape from an innovative perspective, rediscovering it as a subject for study in geography, but with a phenomenological and existential reading that understands landscape as a place charged with meaning, in which humankind's experiences, activities, desires and emotions are manifested (Nogué 1985). Man's experience of place, his relationship and association with it, therefore, is essential to the humanist conception of landscape and, as such, is applicable to the study of landscape from this perspective.

Psychological landscape study models consider the human being as a key factor in the definition of landscape. For authors such as Morgan (1978), landscape only exists through the psychological phenomenon of perception. So, unlike those landscape study models that respond to descriptive and/or physical-perceptual approaches based on the characteristics of the landscape, psychological models contemplate a conceptualisation of the landscape based on society's interpretation of these characteristics and include variables that pertain to perceptual and cognitive processes.

Advances in psychology in recent years, not only on an internal level, but also in its collaboration with and influence on other fields and disciplines, have led to the emergence of what is known as environmental psychology, which brings together some subjects inherent to psychology such as perception, personality, etc., with others that belong to other professional disciplines such as landscape, architecture, urban planning, ecology, sociology,

anthropology, etc. (Mercado et al. 1987). This line of research in environmental psychology also includes studies that analyse the emotional relationships and ties that humans have to certain places and the manner in which these develop and change with time (Altman and Rogoff 1987; Manzo 2003).

Models that integrate expert knowledge and perception

Today we can observe how landscape studies that were initially more local and dispersed in nature are displaying a tendency towards cohesion in such a manner that conceptual and methodological approaches that integrate both study models based on expert knowledge and models based on perception are beginning to gain prominence.

These studies contemplate a complex conception of the landscape that starts from the understanding of it as a hybrid reality between objectivities and subjectivities (Berque 2009). The landscape is understood as a natural reality, but also an imaginary one, the result of human culture, the way in which we perceive and apprehend the world that surrounds us. This presents a dialectical character that places it between the near and the distant, the lived and the observed, the territorial and the perceived or the natural and the cultural (Wylie 2007). Linked to these dichotomies, it can be affirmed that the landscape is tension (Cano 2011; Wylie 2007). This raises the need for their knowledge, analysis and interpretation to be carried out not only from objective and material perspectives, but also from social and phenomenological ones. In this line, recent research such as that of Johnson (2007) and Wylie (2007) stands out.

In the methodological field, the methodology based on the Landscape Character Assessment system should be highlighted. This methodological approach, created by The Countryside Agency and Scottish Natural Heritage, has its origins in landscape experiences carried out by public agencies in different European countries and regions (United Kingdom, France, Italy, Holland or Switzerland) and represents a shift in the dominant conception of landscape. From its initial consideration as a primarily visual phenomenon, landscape is now understood as an intimate and complex relationship between people and place, a combination of nature, culture and perception that affords each landscape a unique character. In this respect, Swanwick (2002), author of Landscape Character Assessment: Guidance for England and Scotland, defines landscape as the relationship between people and place. It is the result of the way in which different natural components (geology, soil, climate, fauna and flora) and cultural components (historical and current land uses, human settlements interventions...) interact and are perceived. Both the objective, or morphological, dimension of landscape, in its physical and

material forms, and the subjective, or symbolic, dimension, combine to define the configuration of a landscape.

This more complex conceptualisation of landscape is also contemplated in the ELC, which raises new issues with respect to previous normative texts. Possibly the most significant among these is the definition of landscape and the challenge that this conceptualisation poses for its future. This convention begins with the definition of the concept of landscape, which in itself is innovative, since no international treaty had previously offered an objective, explicit and normative definition of landscape (Mata 2014). This is fundamental insofar as it makes it possible to apply legal measures to landscape (Zoido 2000, 2002), an application that, given the subjective nature of its foundations, was heretofore impossible, and made the management and planning of the same an inherently difficult task.

As a result, the renewed meaning of landscape that the ELC adopts, which is based on both a variety of contemporary disciplinary traditions and concepts and perceptions of landscape predominant in Europe (Olwig 2007), leads the ELC to define landscape in Article 1 as: “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (Council of Europe 2000a: 2). This definition is based on three essential notions: territory, perception and character (Mata 2008; Mata et al. 2009).

The ELC, then, from an integrational, totalising and transdisciplinary perspective, assumes, as its principal innovation, a territorial sense of the landscape question: all territory is landscape. Any territory, or part thereof, is perceived and experienced in a landscape form. Landscape, independently of its quality and the appreciation it deserves, is a specific characteristic of the territory. In this sense, the convention does not distinguish between landscapes, nor does it qualify them (Mata 2004; Zoido 2000, 2012). The most significant innovation offered by the ELC, however, lies not only in the definition it offers of landscape, but also in the consequences of this definition with regard to a landscape policy that can no longer be reduced to merely protection and safeguarding, but must also take into account change management and the development of not only those more outstanding or exceptional landscapes but also of everyday, ordinary ones (Dewarrat et al. 2003).

Another innovative aspect derived from the conceptualisation of landscape that the ELC adopts refers to the subordination of its existence to its perception by the population; in other words, to a collective subjectivity, with all the psychological and social complexity that this perceptive act implies. Landscape, therefore, is referred to as “an area, as perceived by people” (Council of Europe 2000a: 2). This perceptual character of landscape refers to its human dimension. For the first time we find ourselves

with a convention that focuses its attention on those people who inhabit and form an integral part of a territory. The ELC proposes a change in the public understanding of landscape (Priore 2004) to one that implies a call to perceive, to appreciate the landscape from the standpoint of the sensitive relationship that man establishes with the environment he inhabits and from a plurality of personal territories (Gómez and Riesco 2010).

The dimensions of contemporary landscape

The ELC defines the landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (Council of Europe 2000a: 2). On closer examination of this expanded conceptualisation of landscape presented by the ELC, we can see how it integrates into its definition important elements that establish implicit references to five fundamental dimensions that construct the concept of landscape:

- Landscape as a material dimension.
- Landscape as a social dimension.
- Landscape as a perceptual dimension.
- Landscape as a temporal dimension.
- Landscape as a link between nature and culture.

According to this definition established by the ELC, landscape as a spatial entity refers to a well-defined, organised and managed area or territory (material dimension). People (social dimension) perceive landscapes through a perception that involves not only the sense of sight, but also all the other senses (perceptual dimension), implying that the scenic and aesthetic qualities of landscape for humans must be considered. Each landscape possesses a distinctive character which is the result of the continuous interaction of both natural processes, i.e. those linked to soil, water, air, vegetation, fauna, etc. in all their manifestations and states, and human activities, i.e. those that are the result of social relations, economic, cultural activities, etc., both of which are constituent parts of the landscape (link between nature and culture). These perceptual, natural and human considerations are not static, but rather evolve over time (temporal dimension).

While these five dimensions on which the ELC builds the concept of landscape can be described separately, they do not exist in isolation, and the very conceptualisation of landscape unites them in a single synthesis. Below, for methodological reasons, each of these dimensions is described independently, despite the fact that, as we have already mentioned, in terms of landscape they do not exist separately. Likewise, while these five dimensions have been considered fundamental to the ELC's conceptualisation of landscape, the truth is that a systemic, expanded conceptualisation of landscape would suggest

that we bring together and articulate other dimensions (ecological, economic, historical, political, etc.) around these five fundamental dimensions, thereby extending the list of ELC-related landscape dimensions. However, for purely operational reasons, during the development of this research we will focus mainly on the five fundamental dimensions mentioned above:

Landscape as a material dimension

As a spatial entity, landscape has a physical-material dimension around which the scientific debate concerning landscape has been articulated during the long tradition of geographical and ecological research (Bastian and Schreiber 1994; Forman and Godron 1986; Paffen, 1973; Schmithüsen 1973; Troll 1968; Zonneveld 1988). This dimension refers to the territorial system on which every landscape is formalised and which forms its basis. It responds to the measurable, intrinsic and inherent characteristics of the territorial structures and processes that constitute it and that are manifested in the abiotic, biotic and artefactual spheres, the last of these also referred to as the technosphere by Naveh (1995a). The abiotic components refer to elements such as light, air, water, earth, etc.; elements capable of configuring the conditions for life in the biotic realm of the biosphere, which is composed of all living beings on the planet (flora, fauna, etc.) and which includes human beings capable of creating artefacts the likes of constructions, infrastructures, etc. from biotic and abiotic elements. The wide range of combinations that can be articulated between these three subsystems determine the features and unique nature of each particular landscape.

Landscape as a social dimension

This refers to a perception of landscape that transcends its physical and objective identity to become, in addition, a social construction. Landscape is constructed within the socio-cultural framework of a society and can only be understood in a historical, cultural and economic context (Dosso 2011). This dimension refers to the conception of landscape as a socio-cultural product, the result of human social practices, carried out by human beings over time in order to satisfy their material, existential and spiritual needs, referring both to those who have a intentional character linked to work processes, productive activities, rites, etc. as well as those other non-intentional or instinctive ones that contemplate their ideals, ways of life, beliefs, experiences, emotions, intuitions, perceptions, etc. As these needs vary over time, the elements that constitute a landscape are modified in order to satisfy them (Santos 2000).

Human beings, as Godelier (1989) proposes, unlike other living things, not only inhabit the environment that surrounds them, but also create their own socio-cultural

environment in which they inhabit and which constitutes their existential space, and by this we mean not just physical space, but also to experiential, emotional and cognitive space. From a phenomenological conception, the landscape configures the experiential space of the human being, this foreground of everyday experience and forms the background for the social existence of a society (Hirsch and O'Hanlon 1995). The landscape constitutes that environment which is their own, to which they are related through their nature and way of living, with which they establish a sense of belonging and which contributes to creating their identity (Rainero 2012). This relationship established with the environment, refers to the cultural construction of our surroundings (Alba 2021). As Maderuelo (1997: 11) states, "landscape is not a physical place, but a series of ideas, sensations and feelings that we elaborate on the basis of the place". This leads us to understand the landscape as an elaboration of a given territory (Álvarez 2011).

Landscape also possesses symbolic meanings that may be more or less evident, but the existence of which is linked to the intellectual efforts of human beings (Iwaniszewski and Vigliani 2011). Specifically, the symbolic dimension of the landscape refers to a non-visible reality, one that transcends its physical conception and refers to the more abstract component, or that component that is figuratively constructed by means of the various meanings that society has bestowed on it over time on the basis of its actions, behaviour, customs, ideology, ways of life and ways of thinking. It refers to the identity of the people who inhabit a landscape, the relationships they maintain with each other, and their shared history (Augé 1999; Dosso 2011). This means that this dimension of landscape cannot be understood outside the society that furnished it with meaning (Soler 2007), but also that its significance is being constructed and reconstructed over time, acquiring a polysemic nature (Bender 1993).

Landscape as a perceptual dimension

Landscape is configured as a mental construction elaborated by a person who perceives and interprets it on the basis of their sensory experience (Alba 2021). It has no identity outside perception. "Landscape is not a reality in itself, separate from the gaze of the beholder" (Kessler 2000: 17). In its conceptual consideration, its creation is conditioned by the perception of an observer who constructs and qualifies it. This dimension approximates a sensitive conception of landscape, as a sensorial manifestation of the territory (Mérida 1996), capable of mobilising all our perceptions. The landscape as a physical unit has tangible, visible, audible, olfactory and gustatory elements, the analysis of which analysis requires sensory perception.

This dimension relates to the most widespread understanding of landscape, in which this is considered as “the perception of the environment by the individual through the senses, although the majority of this perception is visual” (Gómez 1989: 28). This perception transcends the physical, integrating other perceptive and cognitive forms and giving rise to a broader, more profound perception in which ideas, feelings, sensations, emotions and experiences form an indivisible part of the landscape (Botella et al. 2014). In other words, the perceptual dimension of a landscape not only refers to purely sensory issues, but rather is influenced by our culture, our way of thinking, our way of living and being in the world, which in turn respond to a social and cultural context (Muir 1999; Tuan 1979).

Landscape as a temporal dimension

Landscape is not a static, but rather a dynamic entity. It is subject to continuous change that is intrinsically linked to the passage of time. While spatial and material considerations have often been the focus of landscape research, time has not been treated in the same manner, often being relegated to a secondary role (Tress and Tress 2001). Geographers, archaeologists and historians have paid little attention to the specific temporal properties of landscape beyond dating or developing a chronology (Ingold 1993). As a result, many of the considerations made regarding landscape have been explained on the basis of static models (Vink 1983), a static perception that is still present today.

This temporal dimension takes shape in rhythms, layers, past life experiences and memories that give rise to a hidden, unexplored dimension (Jones 2007; Kolen et al. 2015; Stewart and Strathern 2003). Each landscape has its own temporality and rhythm. Time shapes the biography of the landscape, and while this is linked to human life cycles, it is also differs from them. In landscape it is possible to perceive and interpret different times and time scales, of greater and lesser duration, which have been recorded in the territory through the vestiges of the different transformations that have taken place over time, many of these the result of human activities. This temporality of landscape is not only a response to a past, but also to a present time. While the definition of a landscape contemplates different historical moments, these also coincide with the present (Contreras 2005; Santos 2000).

Landscape as a link between nature and culture

The ELC defines landscape as “the result of the action and interaction of natural and/or human factors” (Council of Europe 2000a: 2). Natural and human factors are deliberately linked in this definition, as it is these mutual relationships between the natural and the cultural that

define the core of its conceptualisation (Castro and Zusan 2009).

The Convention, in referring to this consideration of landscape as a nexus between nature and culture, focuses on the relationship between both factors in an effort to move away from arguments relating to the dominance of one factor over another or even the polarisation of the same. This relationship is mutual. Throughout history human beings have participated in the definition of landscapes by modifying them, in the same way that landscape has influenced the identity of people. People, via their actions and thoughts, are part of the landscape, just as the landscape, through human thought, becomes part of people (Tress and Tress 2001).

Landscape is not only the result of a natural process, nor is it solely cultural. Nature and culture are complementary, rather than opposing entities. Naveh (1995b: 44) defined landscape as “the tangible meeting point between nature and mind”, meaning landscape is a place where nature and culture come into contact; and this constitutes the concrete link between the two. For Tsing (2015), landscape possesses no boundaries that separate human ‘culture’ from non-human ‘nature’. It is in this dialectical relationship between nature and culture that Gandy (2013, 2022) develops his landscape research.

A holistic, transdisciplinary view of landscape as a complex system

While the various dimensions that constitute a landscape have been analysed independently, these do not exist independently (Claval 2004; Naveh 2007) and it is impossible to simplify the concept of landscape to just one of them. And while some of these dimensions can be studied independently, it is only when they are combined, interrelating and interlacing them, that we can truly speak of a landscape.

This broader concept of landscape, which has led to our understanding of it as a complex system that involves all the dimensions mentioned above, does not replace interpretations that can be made of landscape on the basis of partial studies. So even if, for strategic, methodological or empirical reasons, the consideration of one of these dimensions needs to be prioritised, coherent landscape study requires that, at least from a theoretical perspective, the relationship of this dimension with the others be taken into account in order that all of them may be integrated into a broader concept (Criado 1999).

The ELC itself, unlike previous conventions that had dealt with these factors separately and focussed almost exclusively on their natural or cultural aspects (Añón, 2001), is based on a very different foundation. It contemplates a conceptualisation of landscape that refers to a complex reality that, through a holistic, integrational perspective, combines natural and cultural, tangible and

intangible, objective and subjective, spatial and temporal, material and immaterial, individual and social components (Bertrand 1992; Martín 2008) that have often been more or less absent or dissociated in other definitions of landscape.

This idea of landscape as a whole is not new, however, but is rooted in French human geography, which considers the understanding of landscape as a specific natural-social-cultural-historical spatial entity (Vidal 1911). In this sense, Vidal de la Blache, together with other researchers, redefined the concept of landscape from a scientific point of view in such a way that it contemplated the totality of the characteristics of a territory, the significance of which was reached by mentally linking them all together.

However, despite the good attempts of Vidal la Blanche and his disciples to consolidate this synthetic approach that was already beginning to take shape at the start of the 20th century, the separation in the synthetic studies of the biophysical and sociocultural elements of the landscape in the field of geography was imminent. The study of the landscape was divided in favour of particularization and specialization, on the one hand, the social components and, on the other, the natural ones. Landscape trends favoured the dominant role of geomorphology, geography became sectoral, leaving aside some basic perspectives of the social sciences and nascent ecology (Urquijo and Barrera 2009). The consideration of the landscape from a more holistic and complex perspective was disappearing in the different fields of investigation (geography, architecture, archaeology, ecology, anthropology, biology, etc.), the sociocultural components being separated from the biophysical ones, leaving landscape science that began the 20th century divided into these aspects.

Similarly, Carl Sauer introduced this broader concept of landscape into American geography, referring to it as “an area made up of a distinct association of forms, both physical and cultural” (Sauer 1925: 25). This conceptualisation was rejected and eliminated from the field of geographical research by Hartshorne (1939), however, citing the confusion introduced by the duality of the term.

These are an example of what landscape study was like in the 20th century, when the organisation of science into disciplines meant that a more holistic, complex approach to the concept of landscape was relegated to the background. In this regard, it is possible to observe that there are several approaches to the conceptualisation, study and treatment of landscape that have been examined in previous sections and which, while they mention the principal factors or dimensions to be taken into account, omit precisely those interrelationships that signify a true systemic symbiosis (Dosso 2011). It was only at the end of the 20th century that an effort was made to develop

a broader, more integrated holistic vision. Researchers such as Naveh (1990, 1999, 2007), Naveh and Frölich (1996), Naveh and Lieberman (1994) and Claval (2004) initiated a transdisciplinary approach to the study of landscape that contemplated a broader, deeper and more holistic understanding of the concept of landscape.

These days, more and more academics are advocating the concept of landscape as a totality (Antrop 2004; Naveh 2007), making it necessary to pay attention to the systemic properties of the same (Tress and Tress 2001). The conceptualisation of landscape as a complex whole contemplates the integration and articulation of the various specific dimensions that define the same. So it is this integrated articulation that offers a totalising concept that leads to an understanding of the landscape not so much as an object, but rather as a complex system that both involves and interrelates a diversity of subsystems (spatial, temporal, cultural, social, perceptual, etc.).

This systemic conception of the landscape is based on holistic principles. The landscape is understood as a hierarchically ordered combination of the various subsystems that constitute it and which are articulated to form a single, more complex system. This means the study of the same should focus on the relationships that have been established over time between the different dimensions in order to understand it as a whole, rather than as the sum of separate entities. From the perspective of this totalising conception, therefore, landscape is more than the sum of its constituent parts. It possesses distinct qualities and a higher level of complexity. The different elements that compose it are interrelated, forming a complex system in which each one has its own significance within the whole into which it is integrated and based on the position it acquires and the relationships it establishes with the other elements that surround it. This means that if any single element changes, the landscape as a whole could also be altered in some way (Antrop 2000).

This holistic conception of the landscape, one that encourages comprehensive analysis of the same by bearing in mind its complexity and incorporating a diversity of variables, scales, elements, etc., makes it possible to study it as a whole without requiring knowledge of all the elements of the system or the details of its internal functions (Zonneveld 1988). This makes it possible to approach their study by reducing their extreme complexity to more holistic entities. However, for this, it requires inter- and trans-disciplinary knowledge that involves the confluence of knowledge accumulated over a multiplicity of scientific disciplines in an effort to accommodate a wide range of disciplinary approaches and knowledge that allows us to acquire a suitable, in-depth analysis of its complexity (Council of Europe 2000a; Tress et al. 2001). Unlike other approaches, the concept of landscape as a system unites dimensions that are usually the domain

of individual disciplines. This holistic and all-encompassing conceptualisation of landscape, therefore, does not belong to any particular discipline, but rather integrates a diversity of scientific disciplines, and in order to work with these, we need to define an appropriate approach.

Multi-disciplinarity has long constituted an important element in landscape studies (Selman 2006). Multi-disciplinary approaches comprise a mosaic of studies, each resulting from the investigation and analysis of complex phenomenon carried out using the techniques of each of the disciplines involved. As a result the research process advances by means of parallel disciplinary efforts but in the absence of any integrative synthesis.

More recent trends in integrated landscape research, however, take into account both inter- and trans-disciplinarity. Inter-disciplinarity involves a cross-section of academic disciplines in a way that obliges them to transcend thematic boundaries in an effort to attain a common research objective (Tress et al. 2003). This working method contributes to the production of knowledge that is capable of offering solutions to complex issues.

Trans-disciplinarity, on the other hand, involves the transgression of disciplinary boundaries in an effort to establish close cooperation between experts and academic researchers from diverse, unrelated disciplines, the local population in general, and other stakeholders in the decision-making process with the aim of carrying out research and creating new knowledge in such a way that all the aforementioned actors participate in the process on an equal footing in order to achieve a common goal (Tress and Tress 2001).

Unlike inter-disciplinarity, the trans-disciplinary approach transcends disciplinary boundaries in a more fundamental way in an effort to integrate these into a common perspective, and involves a large number of actors and groups who transcend disciplinary interstices and facilitate the exchange of knowledge in an effort to generate new knowledge that is capable of reaching a deeper understanding of landscape. The knowledge gained from this integrated study, therefore, is more relevant than that obtained from the simple collection or sum of the various individual disciplinary contributions insofar as it allows new, complex processes and patterns to reveal themselves. However, it should be noted that the knowledge gained from this integrative study would not have been achieved without the individual disciplinary efforts. In other words, quality disciplinary research is a precondition for quality integrated research.

Furthermore, the use of this trans-disciplinary approach not only allows innovative knowledge to be achieved as a result of the integration of different disciplinary expertise, but also provides improved information for decision-making through collaborative learning. So, while the various landscape-oriented disciplines alone

do not provide the necessary knowledge to understand or solve the environmental, social, territorial, cultural and other issues that currently affect the landscape, given the global scope and complexity of these (Di Castri 1997; Hobbs 1997; Naveh 1995b), a trans-disciplinary approach to landscape provides a synthesis, a common conceptual basis, and a more complex collaboration among disciplines that is essential in terms of landscape management and planning (Antrop 2006).

Conclusions

Today's landscapes are undergoing rapid transformation, and their complexity calls for a holistic, integrated view of the concept of landscape that articulates the various dimensions that define it (material, social, perceptual, temporal, cultural, etc.). Until now, a significant number of the problems that have plagued many of the disciplines involved in the study of landscape have stemmed from having focused almost exclusively on a single dimension as a representation of the landscape as a whole. This raises the need to redefine the concept of landscape in such a way as to open up its study to the consideration of new dimensions from a more integrational perspective that contemplates its innate complexity.

In this sense, the ELC states that: "Official landscape activities can no longer be allowed to be an exclusive field of study or actions monopolized by specialist scientific and technical bodies" (Council of Europe 2000b: 4). As a consequence of this statement, the various dimensions of landscape that the ELC implicitly refers to in its definition need to be identified and understood by all the various actors involved (academic researchers, practitioners and stakeholders) from a trans-disciplinary perspective. To this end, the various dimensions that characterise a landscape need to be incorporated into the trans-disciplinary landscape concept in which the accumulated knowledge of different fields and disciplines dedicated to the study of and intervention in landscape converge.

This requires methods and procedures that are capable of integrating the multiple dimensions, functions, values, potentialities, etc. associated with each landscape in a transdisciplinary approach that responds to the complexity of this task. This implies assuming the challenge of articulating, on the one hand, a more transversal conceptual framework that contemplates new research frameworks that transcend conventional specialised approaches and define an integrational model that combines all those dimensions (physical, material, social, cultural, phenomenological, economic, perceptive, temporal, etc.) that define a landscape and, on the other hand, a disciplinary framework that contemplates the necessary conditions for researchers from different disciplines to approach its study and intervention jointly in an interdisciplinary context and, even more so, by means of

transdisciplinary approaches (Naveh 2007; Wu 2006; Wu and Hobbs 2007).

While landscape has traditionally been approached from a physical-material dimension by the natural sciences and from a cognitive dimension by the social sciences and humanities, an integrational study model would need to transcend these disciplinary boundaries in order to define common frameworks for the gathering and synthesis of knowledge (Ostrom 2009). Such a transdisciplinary approach facilitates the development of comparative and more systematic studies within and across disciplines, as well as facilitating not only the creation of new knowledge relating to landscape through collaborative learning, but also the identification of new problems and challenges and the definition of more robust solutions (Nowotny et al. 2001; Svensson et al. 2009). In the field of landscape management and planning, this transdisciplinary approach provides an opportunity for the creation of innovative knowledge. As Liu et al. (2007) points out, the integrated study of landscape reveals new and complex patterns and processes that are not evident when studied separately by the various disciplines involved. So, while each discipline has independently made valuable contributions to the understanding of landscape, these contributions are limited in that they fail to capture the full, complex reality of the same. Only a broader vision, at landscape scale, that facilitates the exchange of knowledge between disciplines can solve the problems relating to contemporary landscape.

In this context, the concept of “landscape scale” acquires an integrational character. It refers to a landscape area or unit in which a variety of characteristics, functions and meanings that are related not only to its spatial, physical and material dimension, but also to its temporal, social, perceptual, cultural, etc. dimensions, converge. This, concept, then, offers a broad framework for the analysis of the interrelationships between the different dimensions of a landscape and the development of integrated management and planning policies.

In this sense, the incorporation of the notion of “landscape scale” into spatial planning practice transcends traditional landscape planning that has tended towards sectoralism and elitism and has often been based on a partial-view perspective, given its ties to certain specific fields of expertise (Antrop 2006). The concept of “landscape scale” provides an integrative framework for broader spatial planning practices that attempt to correct this bias. This is what Selman (2006) has termed “landscape-scale planning” or “planning across landscape units”. It provides a framework for spatial planning of a holistic nature with the capacity to integrate natural, environmental, spatial, temporal, human, social, cultural and other dimensions and propose a trans-disciplinary approach.

The ELC advocates landscape research and deliberative planning at landscape scale that involves experts from a variety of disciplines as well as other stakeholders the likes of landowners, local residents, visitors, public administrators and others (Council of Europe 2000b). The gradual, differentiated implementation of the same over the last twenty plus years in European countries has increased our knowledge of landscape and contributed to landscape research from an interdisciplinary and transdisciplinary perspective. This landscape-scale planning also offers important opportunities for sustainable development and improving people’s quality of life (Selman 2006). However, there are still challenges and issues to be addressed in its implementation (Wu 2021) that are particularly important in terms of charting the future of landscape planning and protection from the consideration of integrative frameworks (Perkin et al. 2020). For while the enactment of the ELC is an important development that has prompted many countries to focus on landscape issues and led to an increase in the number of landscape-related initiatives and projects, not all of these are truly concerted, though the majority aim to carry out integrated studies and be inter- or trans-disciplinary in nature (Tress et al. 2003, 2005).

At present we can see how many inter- and trans-disciplinary experiences in the study of landscape still suffer from theoretical-conceptual and technical-methodological limitations that must be overcome (Dosso 2011). Some of these have their origin in the absence of a common conceptual framework that allows researchers from different disciplines to team up when necessary, rather than acting as competitors. Other issues have to do with the difficulty of operating across disciplinary fields that one does not master, the limited permeability of the boundaries between different fields of study, the difficulty in recognising shortcomings within one’s own discipline, the tendency towards individualism, or the bias that each discipline imposes on the others. This leads to the fact that, despite the interest in formulating comprehensive and interdisciplinary research, epistemological gaps and/or conceptual ambiguities persist among researchers who are incapable of fully distancing themselves from their original disciplinary biases. This sometimes gives rise to certain tendencies towards the imposition of one discipline over others, or towards individualism. Other limitations relate to difficulties in communication between disciplines due to the use of different scientific languages and codes. Sometimes these difficulties have their origin in inexperience in interdisciplinary work and even in institutional strategies that often hinder this type of work.

Furthermore, the fact that integrated and comprehensive theoretical and methodological frameworks that adequately address not only landscape analysis and

assessment but also landscape protection, management and planning have not yet been formulated is currently a debilitating aspect. Landscape has many facets, however, and when it comes to landscape management and planning, transdisciplinary approaches are relevant, so agreeing on the basic aspects that define a landscape and developing transdisciplinary synthesis and cooperation becomes unavoidable.

This requires the definition of relevant conceptual and methodological frameworks capable of handling the complexity of real problems in a landscape context, a task that most certainly cannot involve just one field of disciplinary knowledge. Along these lines the ELC affirms the need for the various landscape research and planning actions to cease to be an area of action that is exclusive to certain specific areas of expertise. However, more than twenty years after its implementation, one might wonder how the concept of landscape could be better integrated among the many stakeholders and actors involved in decision-making in different sectors and in such a way that the multiple dimensions of the phenomena that define a landscape can be identified and understood by all parties involved and joint research-intervention actions established (Hernández et al. 2017).

In this sense the relevance of this research lies not only in the fact that it addresses the polysemy of the term 'landscape', but especially in that it transcends compartmentalisation of the research carried out by the different landscape-oriented disciplines by introducing a theoretical-conceptual framework that contemplates a holistic, transdisciplinary vision of landscape that integrates the various dimensions that define it with the aim of improving the effectiveness of landscape research and maximising its knowledge in order to obtain a deeper vision that allows us to address its complexity. However, this line of research contemplates aspects that deserve a more specific, in-depth development that will accompany this holistic theoretical-conceptual framework of landscape in future research work. Among them, three indicators of transdisciplinarity relevant to integrated landscape analysis and planning processes need to be further explored: the establishment of a common 'language', the creation of a shared workspace for landscape research and intervention, and the definition of a methodological framework for integrated landscape-scale research and planning. Each of these is set out in more detail below:

Transdisciplinarity, like multidisciplinary or interdisciplinary, involves a diversity of disciplines, but while the latter focus on communication between them, the transdisciplinary approach transgresses the boundaries of these in a more fundamental way, involving a relevant number of actors and groups and involving stakeholders at all levels, favouring cooperation between researchers and experts from different disciplines, but also from

the local population (Clemetsen 2015). So it is precisely this integration of interdisciplinary research together with the participation of local actors that leads to transdisciplinary research (Wu 2006, 2021). To this end, clear definitions and a common 'language' between scientific and non-scientific actors within the landscape field that ensures good communication and the fluency of a shared discourse are necessary for the successful development of transdisciplinary work (Antrop 2001; Olwig 2004; Tress et al. 2003).

Integrating landscape into the landscape research and planning process requires a shared working space where there is mutual respect for differences and integrity among those involved and in which collaboration and coordination of actions at the landscape scale is encouraged. This poses the challenge of establishing an attitude that leads us to look beyond our own disciplines and ways of thinking and perceiving landscape in an effort to discover commonalities with other fields of research (Tress and Tress 2001). For this to occur, landscape reading must evolve from multi-disciplinary in nature to inter-disciplinary, to eventually become trans-disciplinary. This does not mean neglecting our disciplinary experience, but rather sharing it with others so that it benefits from new knowledge that is integrated with that of the other participants. This new knowledge transcends disciplinary boundaries and will undoubtedly be more relevant than that which results from the mere gathering of knowledge from different disciplines (Tress et al. 2003), as this transdisciplinary approach combines the contributions of each of these disciplines into a new, more profound understanding of the landscape.

It is also necessary to define a methodological framework for integrated research and planning at the landscape scale that is both flexible and includes transdisciplinary models and analytical approaches that synthesise the most appropriate methodology for each particular case, depending on the objective of the action, whether it be protection, management or planning (Tress et al. 2001). It is also necessary that this methodological framework integrate the multiple meanings, resources, values and potentialities associated with each specific, previously identified, characterised and comprehensively assessed landscape, so that it takes into account the multidimensional nature of the planning options (Plottu and Plottu 2012). This requires the help of innovative transdisciplinary research approaches and methods that are not only based on professional scientific knowledge but also take into account the expectations, preferences, desires and values of the population. The landscape preferences of the local population could, in fact, be a relevant tool for the implementation of different planning actions (Serrano et al. 2019). Hence the importance of bearing in mind the social connection created by

landscape (Kyle et al. 2005) and the affective attachment that is established between an area or region and the people of the same community (Kyle et al. 2004) when defining actions to be integrated into local and regional planning policies (Brunetta et al. 2018).

A transdisciplinary approach that involves multiple stakeholders and sectors, coordinates scientific approaches and communicates with society can contribute directly to the successful design, development and management of landscape action plans and subsequent long-term follow-up studies (Reed et al. 2021). This stakeholder involvement and collaboration is seen by Selman (2004) as an essential ingredient in landscape planning and management. The ELC itself highlights in particular the key role of citizens and local communities in defining the qualities of a given landscape and participating in its protection, management and planning (Council of Europe 2000b). This requires not only that the boundaries of academic disciplines become more porous, but also that the different actors involved, both academic and non-academic, collaborate using both quantitative and qualitative methods and criteria, and respect the multidimensional nature of actions linked to a planning decision (Angelstam et al. 2013; Plottu and Plottu 2012).

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Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests

The author declare that she has no competing interests.

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