

# The legacy of nature enshrined in cultural landscapes

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## I. INTRODUCTION: OBJECTIVES AND METHODOLOGY

The aim is to consider Nature as a whole as an object of study in Physical Geography, but in close connection and interaction with Human Geography, because the subject matter and *raison d'être* of Geography is, inescapably, the study of the «humanised landscape» (García, 2001: 45). Nature can also be called the «physical environment», «natural environment», «natural landscapes», «ecological environment» or «ecological complex». However, in this work of research, for the sake of both brevity and clarity, Nature will be used as the equivalent of «natural landscapes» and «physical environment». What is important in any of these denominations is that the natural elements can be conceived as external to human activity, but at the same time as conditioning elements of the said activity to varying degrees and on different scales; an aspect in which the great French geographer Max Sorre was a pioneer at the end of the first half of the 20<sup>th</sup> century, while still being a valid reference today (Sorre, 1943: 15). Having assumed this approach to Nature in Physical Geography, the enormous influence of

human intervention (or anthropogenic action) over the centuries on the physical environment can be inferred and demonstrated. In this sense, many so-called «natural» landscapes can be considered cultural, since they are the tangible and demonstrable result of the material and immaterial culture of human societies. Human societies use the said landscapes, to different degrees, and in doing so humanise them. With this argument and several examples (mostly from the Iberian Peninsula), the aim is to clarify the fallacies and insufficiencies of neo-determinism, which is still the dominant epistemological approach among those who, such as researchers and professionals, consider themselves «naturalists»: geographers, biologists, ecologists, forestry engineers and geologists, etc.

Similarly, since the mid 20<sup>th</sup> century, the prevailing neo-determinism has assumed the explanatory reductionism of the theory of the monoclimate, or natural (or general) climate, for the evolution of natural ecosystems, as explained by the North American F.E. Clements from 1916 onwards. This theory has been criticised by very few geographers and naturalists. In this respect, the prestigious French geographer, George Bertrand, stands out. He pointed out that this theory of «the climate cycles...is nothing more than a dangerous creation of the spirit» (Bertrand, 1972: 120). Later on, this geographer-naturalist did not exactly create what could be called a new theory to improve on and thus make that of F.E. Clements null and void, but he did provide a new, enriching approach to the study of the landscape. It was his study of the physical environment called «Geosistema, Territorio y Paisaje (GTP)» (Bertrand & Bertrand, 2000: 256). Despite this contribution, the said theory of F. E. Clements (with some additions to the original) is currently still dominant in research and legislation concerning the conservation and management of Nature. This means there are many errors of «stagnation», «actualism» and «determinism» that work to the detriment of the possible fruitful relationship between Man and Nature, the so-called «sustainable development». In favour of sustainable development, and as a certain improvement in the knowledge of the evolution of Nature, a novel and still little known theory (or theoretical approach) has been presented. The theory has three basic tenets of epistemological argument: It is Polygenic, Territorial and Diachronic. This theory provides a new paradigm in the evolution of ecosystems and biogeographical landscapes. It is based on a rigorous methodology and has several applications that can already be empirically developed (Calonge, 1999).

In short, a new paradigm of the Theory of Knowledge in the argumentation concerning the evolution of the physical environment

and its cultural landscapes is proposed. This supposes applying a new theoretical approach as a valuable epistemological contribution that is susceptible to being applied in the socio-economic consideration of the natural environment. This new theoretical approach, based to a great extent on Nature as heritage embodied in cultural landscapes, has been reached through the repeated application over decades of a methodology with an inductive development that consists of the collection of scientific knowledge and its subsequent empirical demonstration. To be precise, there has been research done using the extraction of information from diverse sources (maps, reports, bibliography and other sources), which have been verified and enriched with fieldwork and from which original images, measurements and graphics have been derived. This involves enriching checks and qualifiers of the reasonable hypotheses with which each work of research begins. This methodology has been applied in all the basic subjects of Physical Geography (Climatology, Geomorphology, Biogeography and Hydrogeography) separately, as well as in the integrated analysis and planning of the physical environment as a whole. The creation and results of these research works have frequently been debated in diverse congresses and scientific meetings. Opinions have also been given and garnered in university lectures with students from different cycles or levels of the study plans. The debates in these research and teaching forums have served to improve and polish our knowledge of the role of Nature in Physical Geography. In addition, it should be pointed out that, unfortunately, we have often come up against incomprehension due to the specialisation and fragmentation of Physical Geography that is deeply rooted in Spain's academic university sphere.

## **II. NATURE IN GEOGRAPHY: PHYSICAL GEOGRAPHY CHOPPED UP AND IRRELEVANT. EVALUATION OF THE STATE OF THE QUESTION**

According to reliable information from the web page ([www.age-geografia.es](http://www.age-geografia.es)) of the Association of Geographers of Spain (AGE) in reference to the current study plans in the undergraduate degrees of «Geography & Territorial Planning», and also the research practice of geographers in the Bulletin of the said association (BAGE), as well as in other scientific journals specialised in Geography, it can be said that Physical Geography has four basic but totally separate aspects (Climatology, Geomorphology, Biogeography and Hydrogeography); even that it has «super-specialisations» within each of the parts.

Thus, the study of Nature among geographers in Spain is absolutely fragmented. This means that there are very few serious works of research on the physical environment as a whole, considering all four basic parts. Faced with this dominant situation, a few critical voices have been raised; yet this includes such a significant and learned one as that of the great geographer Don. Jesús García Fernández, who pointed out that geographers in academic Physical Geography «instead of considering themselves as parts of a whole, have all become apart from or even outside Geography» (García, 2001: 48). In order to achieve this specialisation, the great majority of the geographers of the physical environment have subserviently followed the dictates of diverse professionals of the natural sciences: geologists, meteorologists, biologists, botanists, engineers, etc. Thus, for example, the cited geographer, J. García Fernández, attributed the role of «gregarious» to geographers with respect to botanists (García, 2002: 10). This is to say, in my opinion, that the great majority of geographers of the physical environment have in fact abandoned the profession of geographer and have contributed to the irrelevance of Physical Geography in both a social sense and in the recognised scientific spheres of prestige.

On the one hand, Physical Geography's lack of importance and value in the study of Nature as a conditioning factor of human activity on the territory is, first and foremost, the result of not giving due importance to the notion of diverse scales (or superficial dimension) in specialised research. It is well known in this respect that geographical space is divided into three basic scale types («macro», «meso» and «micro»); as well as a total of seven or eight territorial units depending on the superficial dimensions with their natural (or physical-ecological) characteristics. Nevertheless, their application to research by the scientific community of naturalists has been relatively scarce (Bolós, 1992: 41). However, as the brilliant French geographer Max Sorre pointed out in the mid 20<sup>th</sup> century, it is important in geographical knowledge to elucidate the scale in which research is carried out because the scale conditions the methodology and results of studies. I believe it pertinent to reproduce his farsighted reflections comparing, with respect to the climate, the macro-scale (regional climate), the meso-scale (local climate) and the micro-scale (micro-climate): «the notion of regional climate responds to an abstraction and represents an impoverishment in relation to the idea of local climate...the local climate is the fundamental notion...The local climate should not be considered as a facies of the regional climate. They both sustain the same relationships of the individual with the species, which has no

real existence...it is important not to confuse the notion of micro-climate with that of local climate» (Sorre, 1943: 14).

On the other hand, and secondly, Physical Geography's fragmentation and lack of relevance is due to the fact that geographers of the physical environment, and most other naturalists, have underestimated the enormous importance of the diachrony of human intervention on the physical environment in the form of natural landscapes. Only a few naturalists have admitted this in the academic university sphere in Spain. Such is the case of F. González Bernáldez, who stated that «a very large proportion of the «natural» landscape is the product of the interaction between man and nature» (González, 1985: 153). He even pointed out that, in the Iberian Mediterranean sphere, this fact is very pronounced and ostensible: «for instance, the Iberian Peninsula is a highly adequate stage on which to view the conversion of Mediterranean woodland to orchards» (González, 1985: 152). He also added that this action has been especially intense in the case of the olive groves in Southern Europe (Figure 1).

*Figure 1.* **Olive trees and stone pines in a humanised landscape in the South of Italy (Vibo Valentia, region of Calabria)**



*Source:* The author.

Similarly, the abovementioned defects of fragmentation, excessive specialisation and the scarce relevance of Physical Geography in research into Nature, in my opinion, leads to two negative consequences. On the one hand, the absence of any understanding between specialists, thus making the adequate advance of important research more difficult. Such is the case, for instance, of the biogeographical demarcation of the Mediterranean sphere, which does not coincide with that estimated by specialists in Climatology. So there are wide swathes of European territory that remain undefined in so far as their natural characteristics of a biogeographical and ecological nature are concerned (Quézel & Médail, 2003: 23). The second negative consequence is that both university scientific groups and public opinion are frequently mired in confusion, accepting with neither truly scientific rigour nor common sense such important matters as the so-called «Global Climate Change». In this respect, there has been no serious scientific debate, it is simply accepted as having been established and being true, and receiving greater importance than the really great problem of air pollution (Calonge, 2013: 177). Faced with these two serious problems, which are obstacles to the advance of geographers and naturalists' sound research, one of the possible solutions would be to achieve progress by demonstrating the intense materialisation of human intervention in Nature, at the same time creating large and very different extensions of cultural and natural landscapes.

### **III. THE INHERITANCE OF NATURE IN CULTURAL LANDSCAPES AS PARTICULAR EXPRESSIONS OF THE DIFFERENT POSSIBILITIES OF THE PHYSICAL ENVIRONMENT**

There has been human intervention (or anthropogenic action) in Nature in Southern Europe for millennia. The consequences have been so significant that a great part of the natural landscapes are, nowadays, cultural landscapes; that is, they show the signs of the material and immaterial (or spiritual) cultural subsistence through the biotic and abiotic elements in the territory of different human groups. In this respect, paleo-environmental, archaeological and socio-economic history research provides ever more arguments and examples. Thus, the diachrony of natural history and human intervention in Nature acquire ever greater explicative importance concerning the future of Nature. The latter has therefore had such defining characteristics as the decrease and fragmentation of the habitat of the wild flora and fauna. This has resulted, in some cases, in some species becoming practically extinct over

wide areas; or turning them into surviving «relics» in small territorial enclaves. For instance, paleo-environmental and archaeological research has shown that, in the «Mid-Douro Valley» (in the Province of Valladolid), during the Second Iron Age (2,500-2,000 years ago), there were species of fauna (deer, brown bear, Iberian lynx, etc.) that today are only «relics» in mountainous areas or in exceptional enclaves in the extreme North and South of the Iberian Peninsula. Even during the start of the Roman occupation of the Douro River Valley, it has been proved that there were beavers (*Fiber castor* Linnaeus, 1758) close to what is now the modern city of Valladolid, in the River Pisuerga, as well as the bird of prey known as the white-tailed eagle (*Haliaeetus albicilla* Linnaeus, 1758). Of these two species, there is no historical evidence, but it is believed that they may have disappeared from the Douro River Valley some time during the Middle Ages due to the agricultural intensification of human intervention (Calonge, 1995: 535).

This decline in the biodiversity of the Mid-Douro Valley, caused by human intervention over various millennia, is still happening, just as it did over the time scale of centuries. For instance, the landscape of wheat fields of the extensive area of «Tierra de Campos» (mostly in the current Provinces of Valladolid and Palencia) was the producer of the traditional society's staple food and, therefore, a highly valued generator of wealth. This was such that, in the second half of the 18<sup>th</sup> century, the people of this area despised those of the landscape of pinewoods and the food industries of the «Tierra de Pinares» in Valladolid and Segovia: «in an insulting way they call those of this province (Segovia) «pinariegos», viewing this country as the most impoverished and least pleasant of the two Castiles, arguing that it provided no more than pine trees and pine nuts» (Ucero, 1784: 359). However, from the end of the 1970s, the cultural landscape of the cereal growing «Tierra de Campos» has entered a period of crisis and has undergone the phenomenon of rural exodus in a very intense way, with a sharp ageing of the population and a sharp drop in population density; while, in the abovementioned districts of the «Tierras de Pinares» in Segovia and Valladolid, the traditional cultural landscape of the resin and pine nut industries subsist, while also, in part, experiencing very significant changes (Figure 2). In addition to the great advance of the furniture industry, agriculture (irrigation and new crops) and animal husbandry (stabling in sheds) both intensified. Consequently, in the 1980s, these two districts doubled their population densities (over 20 inhabitants per Km<sup>2</sup>), had less elderly population and more economic resources than the other, previously richer, district of «Tierra de Campos» (Calonge, 1987: 12).

*Figure 2.* Landscape of the centuries old culture of pine trees for resin. Example of a mono-specific woodland (*Pinus pinaster* Aiton) on the plains of the Douro River Valley (Province of Segovia, Spain)



*Source:* The author.

Another good example is that of the Province of Soria, whose predominantly traditional natural-cultural landscape, determined by extensive transhumance livestock farming and, to a lesser extent, by cereal crops without irrigation, in the first thirty years of the 19<sup>th</sup> century was highlighted as «one of the richest and most populated provinces of Spain» (Del Río, 1828: 109). On the contrary, the profound crisis of transhumance livestock farming and the sharp rural exodus from the last three decades of the 20<sup>th</sup> century have converted the province into the least populated in the Autonomous Region of Castile & Leon, and even one of the least populated in the entire country.

The network of livestock transhumance routes and other minor routes associated with them («cordeles», «veredas» and «cañadas») are still generally in existence throughout the Iberian Peninsula. Though



they are hardly functional as the basis of transhumance livestock farming for thousands of heads of livestock (especially sheep), they still form ostensible remains of the Peninsula's traditional cultural landscape linked to this type of extensive, centuries old livestock farming. Their biogeographical repercussions on Nature have been highlighted as relevant at the end of the 20<sup>th</sup> century in the Cantabrian Mountains (Bertrand, 1972: 72). These transhumance journeys of livestock and farmers or shepherds have even clearly altered the original territorial distribution of the vegetation; so Mediterranean species (coming from the South and centre of the Peninsula with the flocks and herds) are still abundant, at the end of the 20<sup>th</sup> century, among the native «Euro-Siberian flora» of the mountains of Asturias and Cantabria (Bertrand & Bertrand, 1986: 302).

This «human control of the environment» has also been demonstrated in the tree whit pasturelands (dedicated to farming, pasture and forestry) situated mostly in the South-West of the Iberian Peninsula (González, 1981: 162). It has even been demonstrated that human intervention has not only modelled the cultural landscape of tree whit pasturelands, but also, in some cases, holm oaks (as well as cork trees and oak) have been planted anew from at least the 16<sup>th</sup> to the 18<sup>th</sup> centuries. This is something which is highly relevant in the humanisation of the landscape as a cultural fact, one which has still not been assumed by most professionals of the Natural Sciences (Calonge & Ramos, 2006: 41). Similarly, it is worth considering the fact that the agricultural landscapes, transformed and modernised in the last three decades of the 20<sup>th</sup> century with irrigation and greenhouses, originated in the traditional dry agricultural landscapes which are the expression of the material culture of the traditional rural society of self-consumption based on the production of wheat, olives and vineyards (Martín, 1988: 469).

Thus, the traditional, natural Iberian landscapes (and the agricultural ones too) are the result of human intervention over a prolonged period of time in history, simplifying the biodiversity and selecting and extending the plant species with a socio-economic interest: for instance, the holm oak, the olive, the cork tree, oak trees, pine trees, etc. That is how the natural landscapes that we enjoy today were generally created, even though they are «low entropy» with respect to the original wild species and respond to the «cultural demands» (González, 1985: 153). This can also be seen in the so-called «Iberian steppes» which have a relatively low biodiversity, but have official protection as original, native, natural landscapes. However, this

original, natural characteristic is surrounded by controversy because of the decisive human intervention involved in its genesis (Figure 3). In short, the «Iberian steppes» could have a clear definition as a cultural landscape; something which must currently be left to future research to decide. Nevertheless, it can be stated that, as enclaves within typical «steppe» landscapes, even today they are still changing traditional agricultural landscapes with lagoons and wetlands, into new, officially protected environments, and thus they are transformed into «a reality of singular eco-cultural characteristics» (Naranjo et al., 2016: 441).

*Figure 3.* **Countryside with cereal crops and vegetation of the «Iberian steppe» type (Tierra de Campos, Province of Palencia, Spain)**



*Source:* The author.

So, in order to understand Nature embodied in natural landscapes (with enclaves and agricultural interactions), it is necessary to apply a theoretical approach that can explain the origin and evolution of the biogeographical landscapes and even the ecosystems. This would involve leaving aside the theories in vogue up to the present day and putting into practice a new, more coherent and accurate epistemological approach for diagnoses and subsequent applications.

#### IV. TOWARDS A BETTER UNDERSTANDING OF THE EVOLUTION OF NATURE: THE POLYGENIC AND TERRITORIAL-DIACHRONIC THEORY

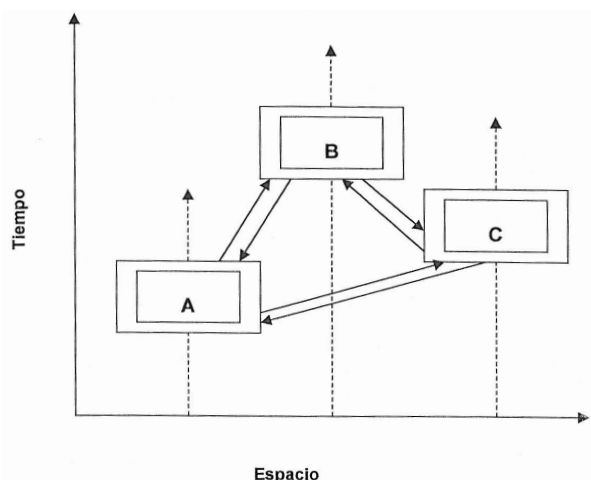
As has already been pointed out, in order to explain the evolution of the biogeographical landscapes and ecosystems (henceforward natural landscapes or Nature), the mono-climax (or natural or general climax) theory of F.E. Clements is neither coherent nor reasonable. This theory does not allow the genesis and character of cultural landscapes to be understood as Nature heritage interrelated with the complex, multidirectional incidence of human intervention. The geographer G. Bertrand, mentioned above, had briefly criticised the mono-climax theory (the work is not monographic research) at the start of the 1970s. Then, in the 1980s, this same geographer once more disqualified the mono-climax theory, considering it «a dogma», and thus incompatible with acceptable scientific approaches in the Natural Sciences (Bertrand & Bertrand, 1986: 307). Despite such criticisms, the said theory is still basically accepted and followed by the majority of teachers and researchers of the Natural Sciences. Such is the case of botanists in Spain with great academic prestige (Rivas et al., 1987: 9). Nevertheless, from the perspective of some university geo-botanists (in a very meritorious publication) the mono-climax theory has been criticised with the solid argument that, for the case of the Iberian woodlands, «the more or less permanent character associated with the idea of climax is becoming more and more questionable» (Blanco et al., 1997: 562).

In this respect, I believe that the said mono-climax theory is completely wrong and cannot explain the evolution of natural landscapes due to its «stagnation», «actualism» and consequently, «determinism», with no rational arguments that can be positively identified. Having listed these defects in the mono-climax theory, the abovementioned geographer, G. Bertrand, has spearheaded a new theory of the evolution of natural landscapes, which he has called «the GTP System» (Geosistema, Territorio y Paisaje). According to this theory, one must consider «the diverse environmental periods through a multipolar system with three entries» (Bertrand & Bertrand, 2000: 356). We believe that this new theory, although it supposes an epistemological advance with respect to the mono-climax theory, is still insufficient to accurately explain the evolutionary patterns of Nature. There are two reasons for this: On the one hand, it once more uses the notion of the system as a kind of integral and harmonious relationship between the elements of the natural landscapes. This is, however, simplistic and contrived, as has already been demonstrated (in my opinion) (Tuan, 1984: 252). On the other hand, the relationship that

is proposed between the geosystem, the territory and the landscape is not concrete and lacks rigour concerning the temporal facts of diachronic evolution. So, it can be appreciated that, even now, some researchers who advocate this «systemic analysis of the landscape» are dissatisfied with diachrony, because, «at the time of analysing and investigating the dynamics of the landscape, the problem of the temporal scale, which is difficult to solve, raises its head» (Fernández, 2013: 125).

So, it is still necessary to find a new theory to improve our understanding of the evolution of the natural landscapes. To this end, we believe that the theoretical approach created at the end of the last century and which has been officially registered, is still valid; this, despite being little known or applied to scientific research into the evolution of Nature (Calonge, 1999). It would, therefore, seem highly pertinent to give a brief synthesis of the basic characteristics of this theory with the help of Figure 4.

*Figure 4.* **Graphic diagram and explicative text of the Polygenic and Diachronic-Territorial theory**



Diagrammatic representation of the new polygenic and diachronic-territorial approach using the example of three different communities of biogeographical landscapes. The vertical axis shows the time factor, which refers to the diachrony of natural history and human intervention. The discontinuous vertical lines indicate temporal sequences and different variables. The double rectangular box around each of the three communities symbolises the need to establish territorial units with concrete thresholds as far as their superficial dimensions are concerned. The arrows that link the communities (A, B and C) indicate the possible contributions of unorganised individuals (from different taxa) in the various communities shown.

*Source:* Calonge, 1999.

It is called the «Polygenic and Diachronic-Territorial» theory (or theoretical approach) because they are the three basic pillars of the epistemological network (or Theory of Knowledge). In fact, research into the current state and possible evolution of each natural landscape should be polygenic in the sense that the causes of the facts are many and have a complex interrelation of flora and fauna taxa, as well as abiotic elements; hence the double arrows that interrelate the three communities or natural landscapes taken as examples (Figure 4). Similarly, research should be territorial in the sense that it fixes a spatial sphere in each case with dimensions and limits that are as clear as possible, since the scale conditions the appropriate and necessary methods and techniques that should be used, depending on the scientific contributions. This theory also emphasises the time factor, because diachrony should complete and illuminate (in many cases) the role of the physical environment and of human intervention as determinants of the current state of the natural landscapes.

We are therefore dealing with a theory that has three types of philosophical-epistemological characteristics: phenomenological, as it observes and explains the phenomena or facts «in situ»; dialectic, because of the complex relationships between the different biotic elements (vegetation and fauna) with the abiotic elements of Nature and human intervention; and also, inductive, because, from the concrete facts that make up natural landscapes, one hopes to progressively find explanations to the complex and, at the same time, rational interrelationships with other natural landscapes and spaces of greater dimensions. Thus, we believe that it is possible to overcome the serious errors and insufficiencies of the other theories currently being used in the evolution of Nature, since they fall within the defects of «creationism», «actualism» and «neo-determinism» that characterise the currently dominant scientific positivism. Overcoming these scourges is possible if we apply the said «Polygenic and Diachronic-Territorial» theory, since we believe that, in this way, it is possible to greatly improve the understanding of both the current state of the natural landscapes and their evolution, which involves concrete and viable proposals for applications to the different spatial spheres.

## V. FINAL CONSIDERATIONS

The consideration of a great part of the natural landscapes as cultural, with diverse degrees of human intervention, opens up ample possibilities for improving our knowledge and management

of Nature. This is possible if we abandon the abovementioned dogmatic, inaccurate and positivist tenets that characterise the mono-climax theory. These tenets are, however, still generally followed by Naturalists and accepted by public opinion, so much so that, in Spain, they dominate the legislation concerning the protection of Nature. This aspect can be proved, but cannot be dealt with here; it must be left for a better occasion. However, if we incorporate the accurate, coherent and innovative approaches of the «Polygenic and Diachronic-Territorial» theory, then improvements in scientific research and human intervention in the natural landscapes are possible. It is also possible that they may connect with the «Objectives of Sustainable Development» for 2030, according to agreements from the recently approved United Nations Development Plan (UNDP) (Sarmiento, 2015: 94). Some possible applications for improvement in the knowledge and management of natural landscapes are worth noting. They are as follows:

- Research line, with the prominent and absolute participation of geographers, who establish a new operative typology for natural, spatial fields.
- Review of the concepts and types of flora and fauna relic endemisms and taxa. New embodiment of the territorial dimension.
- Review of the excessively simplistic dichotomy between native and exotic species (or other taxa).
- New criteria in the declaration of «Protected Natural Spaces» and the management of those already in existence, since they are greatly affected by the erroneous approaches of the mono-climax theory.
- Review of the criteria on the make-up of the flora in woodland repopulation and on the subsidies granted to this end, since erroneous criteria from the mono-climax theory are applied.
- Review of the criteria and official support in the management of rural and agricultural spaces with the denomination of «sustainable development», given that the erroneous tenets of the mono-climax theory are still being applied.
- If we accept «Global Climate Change», we must still improve the management of the natural landscapes, which may possibly be affected by such a change.

## VI. BIBLIOGRAPHY AND SOURCES

- BERTRAND, G: «Écologie d'un espace géographique. Les geosystèmes du Valle de Prioro (L'Espagne du Nord-Ouest)». *L'Espace Géographique*, n.º 2, 1972, pp.115-128.
- BERTRAND, C. AND BETRAND, G: «La végétation dans le géosystème». *Rev. Géographique des Pyrénées et du Sud-Ouest*, Tome 57 (fasc. 3), 1986, pp. 291-312.
- «La discordancia de los tiempos» In VARIOS (COORDS.): *Geografía del Medio Ambiente, El sistema GTP: Geosistema, Territorio y Paisaje*. Granada. Ed. Universidad de Granada, 2006, pp. 330-357.
- BLANCO CASTRO, E. AND OTROS: *Los bosques ibéricos. Una interpretación geobotánica*. Barcelona. Ed. Planeta. 1997.
- BOLOS, M. AND OTROS: *Manual de Ciencia del Paisaje. Teoría, métodos y aplicaciones*. Barcelona. Ed. Masson. 1992.
- CALONGE CANO, G: *El complejo ecológico y la organización de la explotación forestal en la Tierra de Pinares Segoviana*. Segovia. Ed. Diputación Provincial de Segovia. 1987.
- «Interpretación de los resultados de la investigaciones medioambientales y arqueológicas y su relación con el pretérito espacio físico vacceo del Valle Medio del Duero» In DELIBES, G. AND OTROS (COORDS.): *Arqueología y Medio Ambiente. El primer milenio A.C. en el Duero Medio*. Valladolid. Ed. Consejería de Cultura y Turismo de la Junta de Castilla y León, 1995, pp. 529-539.
  - *La necesidad de superar la teoría del monoclímax como explicación de la evolución de los paisajes biogeográficos. Hacia un nuevo enfoque poligénico y territorial-diacrónico, como marco teórico adecuado para investigar la evolución de los paisajes biogeográficos*. Trabajo original de investigación inscrito en el Registro General de la Propiedad Intelectual de la Provincia de Valladolid de la Consejería de Cultura de la Junta de Castilla y León, con n.º 2039 el día 22 de Diciembre del año 1999.
  - «Apreciaciones sobre el Cambio Climático Global. Fundamentos e insuficiencias en el contexto de la decisiva contaminación». *Polígonos*, n.º 24, 2013, pp. 185-200.
- CALONGE CANO, G. AND RAMOS SANTOS, J.M.<sup>a</sup>: «Repoblaciones y "protecciones" de los encinares ibéricos. Los ejemplos expresivos de Castilla y León». *Investigaciones Geográficas*. Instituto Universitario de Geografía de la Universidad de Alicante, n.º 41, 2006, pp. 33-48.

- DEL RÍO, M: *Vida pastoril*. Madrid. Ed. Imprenta Repullés. 1828. Valladolid. Ed. Facsímil de Ediciones Máxtor. 2010.
- FERNÁNDEZ ÁLVAREZ, R: «Metodología para la caracterización y diferenciación de las unidades de paisaje de un espacio de montaña: Las Sierras de Béjar y Candelario». *Boletín de la Asociación de Geógrafos Españoles*, n.º 62, 2013, pp. 101-127.
- GARCÍA FERNÁNDEZ, J: «Geografía Física o Ciencias Naturales». *Investigaciones Geográficas*. Instituto Universitario de Geografía de la Universidad de Alicante, n.º 25, 2001, pp. 33-49.
- «La explotación de los montes y la humanización del paisaje vegetal (cuestiones de método previas)». *Investigaciones Geográficas*, n.º 29, 2002, pp. 5-22.
- GONZALEZ BERNÁLDEZ, F: *Ecología y paisaje*. Madrid. Ed. H.Blume. 1981.
- *Invitación a la Ecología Humana*. Madrid. Ed. Tecnos. 1985.
- MARTÍN GALINDO, J.L: *Paisajes agrarios de Almería. Espacio y sociedad. De la agricultura morisca a los enarenados e invernaderos actuales*. Valladolid. Ed. Secretariado de Publicaciones de la Universidad de Valladolid y Diputación Provincial de Almería. 1988.
- NARANJO RAMÍREZ, J. AND OTROS: «Actividades humanas y espacios naturales protegidos: Los humedales al Sur de Córdoba». *Boletín de la Asociación de Geógrafos Españoles*, n.º 72, 2016, pp. 409-446.
- QUÉZEL, P. AND MÉDAIL, F: *Écologie et Biogéographie des forêts du bassin méditerranéen*. Paris. Ed. Elsevier SAS. 2003.
- SORRE, M.: *Les fondements biologiques de la Géographie Humaine. Essai d'une Écologie de L'Homme*. Paris. Ed. Armand Colin. 1943.
- SOTILLO, J.A: *El reto de cambiar el Mundo. La agenda 2030 de desarrollo sostenible*. Madrid. Ed. Catarata. 2015.
- TUAN, Y.F: «Continuity or discontinuity». *The Geographical Review*, vol 74, n.º 3, 1984, pp. 245-256.
- UCERO, P: «Sobre las utilidades del pino». *Actas y Memorias de la Real Sociedad Económica de Amigos del País de la Provincia de Segovia*. Tomo II, 1784, pp. 358-384.
- [www.age-geografía.es](http://www.age-geografía.es). Web page of the «Association of Geographers of Spain».