# SPACE, PRESSURES AND THE MANAGEMENT OF THE GREEK LANDSCAPE

by
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ABSTRACT. Landscapes are the result of the interaction of natural and human factors, with many dimensions; they are part of natural and cultural heritage and an important component of the quality of life. Greece has heterogeneous and mixed landscapes issuing from both geomorphology and the impact of complex human systems. Despite the existence of many and early legislative efforts, Greece has a relatively poor history of spatial planning and landscape has been particularly neglected. The adoption of the European Landscape Convention (ELC) in 2010 provides an updated strategic context for integrating landscape in spatial planning. In this article, we seek to contribute to the discussion of landscape policies and the inclusion of the landscape level in the spatial planning national framework. We identify the dominant landscape types by categorizing landscapes at the national scale with reference to the (combined) presence of three different components: geomorphology, land cover and coasts/islands. Then, we investigate the most important processes of change for each type and link these processes with spatial planning policy. The identification of these dynamics sheds light on current and future trajectories of the changes of Greek landscapes, thus providing challenges for its management in the context of the ELC. The case study concerns the regional level; we focus on Attica, Thessaly, Epirus and the Cyclades and identify the principal characteristics according to the proposed landscape typology.

*Keywords*: landscape assessment, landscape typologies, European Landscape Convention, Greece

## Introduction

Landscape studies are an area of research that has emerged through multi-sectoral and transdisciplinary approaches (Tress *et al*. 2003). These approaches include disciplines as diverse as landscape ecology and cultural geography (Antrop 2006) and research practices range from field experiments to literary criticism. This is a result of the complexity of landscape and a constant and dynamic interaction of its material and immaterial dimensions (Luginbühl 2007). The material dimension is composed of the physical-geographical features of the area which create the fundamental forms and shapes, such as the relief, the geomorphology, the climate, and so forth; the biosphere, which is composed of the living organisms and their spatial formations and interactions; and man-made constructions, which consist of the small- and large-scale works of societies in the physical and biological setting and includes fields, roads, buildings, urban formations, and other artefacts (Howard 2011). The immaterial landscape dimension is composed of the *espace vécu*, or the relationship that people develop with the area they live for both the individual and the social, collective level (Jakob 2008); the aesthetic dimension, which evaluates landscapes on the basis of aesthetic criteria that are formed by personal and social processes, more are more homogenized recently due to the globalization of an "aesthetic culture" (Warnier 1999); and the symbolisms, which are "overlaid" on the material dimensions of the landscape as a series of meanings, symbols, ideologies and identities (Cosgrove 2003).

The most common definitions of landscape illustrate this diversity clearly: '[landscape] means 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 2000, ch. 1, art. 1). They also acknowledge the many dimensions of the landscape, which is part of natural and cultural heritage and an important component of the quality of life 'in the cultural, ecological, environmental and social, illustrating the importance of recognizing, protecting and managing all landscapes, even the ordinary ones, the "everyday areas"' (Council of Europe 2000, preamble).

Another inherent characteristic of the landscape, already mentioned in the definition above, is its dynamic nature. Landscapes change constantly over different temporal scales, from the ephemeral to the short (months and years), the medium (decades) and the long term (millennia and geological time) (Marcucci 2000). These changes are the result of interacting natural and cultural factors that act upon each other, often over different temporal scales. Historic examples include the large-scale urbanization of Europe over the course of the nineteenth and twentieth century which, along with deforestation and the expansion of arable land and the introduction of many alien species, transformed

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European landscapes and negatively affected natural processes and biodiversity across the continent (Emanuelsson 2009), processes that would typically change otherwise over centuries or millennia, but also creating new formations of habitats and diversity. The current "de-agriculturalization" of many rural areas of Europe (Antrop 2004) has counteracted upon former developments and new dynamic balances are being formed.

In this article, we seek to contribute to the discussion of landscape policies and the inclusion of the landscape level in spatial planning and management in the context of the European Landscape Convention (ELC), which attempts to bring landscape-related planning to the forefront and consider all types of landscapes at all levels of spatial planning. In more detail, we seek to discuss the hierarchies in spatial and particularly landscape planning that bring new issues of management across different scales. Moreover, another goal is the analysis of the dynamics of landscapes to illustrate their importance in spatial planning at the national and regional level. The object of study is a spatial and landscape planning system – that of Greece – which has more or less disregarded landscape as a spatial unit of policy concern.

The driving forces of landscape change used here have been analysed at a conceptual level by Bürgi *et al*. (2005). They identify five major types: socioeconomic, political, technological, natural, and cultural, with strong linkages, dependencies and feedback loops over 'several temporal and spatial levels' and with different rates of change: 'constantly slow and constantly rapid change, accelerating change and decelerating change, isolated rapid change in the distant past, and isolated rapid change in the near past' (Bürgi *et al*. 2005, p. 862). They also separate 'primary, secondary, and tertiary driving forces, as driving forces characteristically have to be interpreted in nested scales of explanations' and 'intrinsic and extrinsic driving forces' (Bürgi *et al*. 2005, p. 859). Hersperger *et al*. (2010) build on this approach and develop four conceptual models for linking land change with driving forces and actors to enhance communication and generalizations of different research approaches.

Examples of applied approaches are many in the literature, especially in the last decade when geographical information systems became widely accessible. These approaches refer to different scales, with local and regional ones being more abundant (e.g. Plieninger 2006 for forest and agroforesry landscapes; An *et al*. 2011 for urban sprawl; Detsis *et al*. 2010 for Mediterranean agricultural landscapes; these are only a few examples of a fast growing body of research). They may also refer to a specific driving force for one or many localities (e.g. Fonderflick *et al*. 2010 for the impact of public policies on agricultural practices, landscape and biodiversity; Hersperger and Bürgi 2010 for political driving forces and landscape changes associated with them) or to many driving forces to one locality (e.g. Campos *et al*. 2012 that combine social and environmental data to monitor landscape changes and their physical, ecological and socio-cultural drivers).

Here, we follow this approach and separate driving forces to intrinsic and extrinsic (Bürgi *et al*. 2005), or direct and indirect (Antrop 2006), or proximate and underlying (Campos *et al*. 2012) to understand the dynamics of changes at the national and local levels. Indirect or underlying driving forces act typically at the international or national levels and affect processes, decisions and actions of the agents that change landscapes, such as globalization that affects economic decisions and actions and influences social norms and attitudes, or the growing importance of services in the economies of developed countries that affects many small-scale processes and decisions (see Antrop 2006 for an analysis of Europe). Direct driving forces, on the other hand, are forces that immediately affect the agents of landscape change (see also Bieling *et al*. 2011). They may be nested in or influenced by indirect driving forces negatively or positively (e.g. Chorianopoulos *et al*. 2010 and An *et al*. 2011 for urban sprawl; Calvo-Iglesias *et al*. 2009 and Tzanopoulos *et al*. 2011 for abandonment of agriculture and population decline).

Such an issue, central to this article, is urbanization and urban sprawl in Greece. Unlike urbanization in general, which is a process that characterizes almost all human societies in the last two centuries at varying degrees, urban sprawl in Greece is distinct from this overarching process of urbanization. Although both processes describe the same phenomenon – more population in cities and bigger urban areas – urban sprawl in Greece represents a spontaneous and unplanned activity, resembling cases in Africa, Asia and Latin America rather than the planned urban growth of Europe. These types of changes satisfy most of the four major challenges faced by landscape-change studies according to Bürgi *et al*. (2005, p. 857): they refer to 'processes and not merely spatial patterns', they link 'data of different qualities', and consider 'culture as a driver of landscape change'.


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All these underline the importance of spatial planning and management of landscapes. Since landscape studies are an emerging and relatively recent area of studies (Tress *et al*. 2003), the integration of the landscape level for the ordinary planning framework and not just the special landscapes is poor at the local, national and EU levels, with notable exceptions, especially at the national or the local level. Some characteristic examples include the Landscape Convention of Catalonia in 2005, used as a voluntary scheme for establishing consensus between local stakeholders and developing suitable actions for the assessment and management of landscape.[1] The ELC (Council of Europe 2000) provided a common framework for contextualizing and conceptualizing landscape as a planning and management object. This framework is wide enough to be transferred and applied to different national planning, conservation and management settings, yet also narrow enough to provide a common pan-European approach (Jones 2007). Greece has a relatively poor history of spatial planning compared with other European countries, and landscape has been particularly neglected. According to Terkenli (2004, p. 277), Greek policy was dominated until very recently by 'the fragmentary, peripheral and haphazard preoccupation of the design sciences with practical landscape issues'. The ELC, officially adopted in 2010 and ratified today (April 2014) by 38 countries, provides an updated context for integrating landscape in spatial planning national framework (Gourgiotis and Tsilimigkas 2011).

In this article, we focus on two different landscape levels in spatial planning and management. The dominant landscape types are identified at the national level with the use of three different components: geomorphology, land cover and coasts/islands. For these landscape types the driving forces are discussed. Then, we focus on the regional level to stretch landscape particularities in characteristic cases of the major types and discuss the interplay between the different levels with the use of basic landscape metrics and the implications for landscape planning and management.

## Spatial planning and landscape management

In European countries, the landscape level in spatial planning has a long and diverse history, dating back to the nineteenth century for countries such as the UK and the Netherlands (Howard 2011). Until quite recently though, in most European countries landscape policies were equated with the protection of "special" landscapes and not what in the ELC names "everyday" or "ordinary" landscapes (Jones 2007; Howard 2011). Moreover, most of the policy approaches treat landscapes as "scenery" (Olwig 2007) and do not take into consideration the processes that have shaped them and continue to change them.

In Greece, landscape protection was introduced very lightly in the legislative framework in 1950 (law 1469/1950; see FEK 1950) that nominated areas as Landscapes of Outstanding Natural Beauty (*Topia idiaiterou fysikou kallous*, or TIFK). Many areas were identified, natural and man-made, but despite the designation, little if any other management or planning was applied. As will be discussed later in the article in more detail, the most important driving forces active at the time, urban sprawl, or urbanization by construction of block of flats in *historic centre* clusters were not mentioned or regulated at all, not even in the nominated areas, and therefore the designation remained on paper mostly.

The next step was 20 years later with the Legislative Decree (LD) 996/1971 (FEK 1971), concerning forest protection, which designated 'National parks, aesthetic forests and preserved monuments of nature', special landscapes, defined for the first time with "aesthetic" as well as ecological and geological criteria. The LD 996/1971 demanded protection of these areas, but again this protection was not horizontally integrated into the spatial planning framework and therefore was not successfully enforced, with the exception of some national parks (the Olympus Mountain National Park and the Samaria Gorge National Park) that were indeed protected and managed. A law for environmental protection adopted fifteen years later (law 1650/1986; FEK 1986) linked the protection of landscapes with the protection of nature, although man-made landscapes were also mentioned. But again, the lack of integration with the driving forces made the framework theoretical to a large degree, as no regional differentiations or regional and local processes of designating and managing landscapes were provided.

Again after fifteen years (law 2831/2000; FEK 2000) the revision of the regulation of the Central Building Constructions introduced normative instruments on the protection of the architectural heritage, by including into the protection of 'traditional settlements' and 'buildings to be preserved' their surroundings, indirectly introducing landscape qualities. Although landscape is not directly mentioned, this is the first act of actively preserving

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Table 1. Legend of landscape typologies.

| | RGB | CAT | Major Landskape types * | Code | Landscape typology components ** | | | | Area (km2) | % of total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Land Cover (A) | Coastal (B) | Elevation (C) | Slope (D) | | |
| | 100,0,0 | 1 | I | Ar1pl-flat | Ar | 1 | Pl | Flat | 1425.03 | 1.09% |
| | 110,0,0 | 2 | I | Ar1pl-semi | Ar | 1 | Pl | Semi | 200.15 | 0.15% |
| | 120,0,0 | 3 | I | Ar1pl-frag | Ar | 1 | Pl | Frag | 10.03 | 0.01% |
| | 130,0,0 | 4 | I | Ar1semi-flat | Ar | 1 | Semi | Flat | 265.56 | 0.20% |
| | 140,0,0 | 5 | I | Ar1semi-semi | Ar | 1 | Semi | Semi | 121.22 | 0.09% |
| | 150,0,0 | 6 | I | Ar1semi-frag | Ar | 1 | Semi | Frag | 20.49 | 0.02% |
| | 160,0,0 | 7 | I | Ar1moun-flat | Ar | 1 | Moun | Flat | 17.01 | 0.01% |
| | 170,0,0 | 8 | I | Ar1moun-semi | Ar | 1 | Moun | Semi | 33.14 | 0.03% |
| | 180,0,0 | 9 | I | Ar1moun-frag | Ar | 1 | Moun | Frag | 15.26 | 0.01% |
| | 190,0,0 | 10 | II | Ar2pl-flat | Ar | 2 | Pl | Flat | 567.31 | 0.43% |
| | 200,0,0 | 11 | II | Ar2pl-semi | Ar | 2 | Pl | Semi | 151.75 | 0.12% |
| | 210,0,0 | 12 | II | Ar2pl-frag | Ar | 2 | Pl | Frag | 10.9 | 0.01% |
| | 220,0,0 | 13 | II | Ar2semi-semi | Ar | 2 | Semi | Semi | 0.44 | 0.00% |
| | 230,0,0 | 14 | II | Ar2semi-frag | Ar | 2 | Semi | Frag | 2.18 | 0.00% |
| | 255,170,0 | 15 | III | Ag1pl-flat | Ag | 1 | Pl | Flat | 28249.07 | 21.60% |
| | 244,163,0 | 16 | III | Ag1pl-semi | Ag | 1 | Pl | Semi | 5054.33 | 3.86% |
| | 238,159,0 | 17 | III | Ag1pl-frag | Ag | 1 | Pl | Frag | 299.13 | 0.23% |
| | 221,147,0 | 18 | III | Ag1semi-flat | Ag | 1 | Semi | Flat | 5496.93 | 4.20% |
| | 213,142,0 | 19 | III | Ag1semi-semi | Ag | 1 | Semi | Semi | 3730.03 | 2.85% |
| | 199,133,0 | 20 | III | Ag1semi-frag | Ag | 1 | Semi | Frag | 803.65 | 0.61% |
| | 184,123,0 | 21 | III | Ag1moun-flat | Ag | 1 | Moun | Flat | 705.98 | 0.54% |
| | 173,115,0 | 22 | IV | Ag1moun-semi | Ag | 1 | Moun | Semi | 994.21 | 0.76% |
| | 161,107,0 | 23 | IV | Ag1moun-frag | Ag | 1 | Moun | Frag | 392.02 | 0.30% |
| | 153,102,0 | 24 | II | Ag2pl-flat | Ag | 2 | Pl | Flat | 4497.93 | 3.44% |
| | 145,97,0 | 25 | II | Ag2pl-semi | Ag | 2 | Pl | Semi | 1938.71 | 1.48% |
| | 130,87,0 | 26 | II | Ag2pl-frag | Ag | 2 | Pl | Frag | 292.59 | 0.22% |
| | 124,82,0 | 27 | II | Ag2semi-flat | Ag | 2 | Semi | Flat | 3.05 | 0.00% |
| | 111,74,0 | 28 | II | Ag2semi-semi | Ag | 2 | Semi | Semi | 20.93 | 0.02% |
| | 98,65,0 | 29 | II | Ag2semi-frag | Ag | 2 | Semi | Frag | 19.62 | 0.01% |
| | 0,40,0 | 30 | III | Fo1pl-flat | Fo | 1 | Pl | Flat | 8238.86 | 6.30% |
| | 0,50,0 | 31 | III | Fo1pl-semi | Fo | 1 | Pl | Semi | 8356.16 | 6.39% |
| | 0,60,0 | 32 | III | Fo1pl-frag | Fo | 1 | Pl | Frag | 1128.95 | 0.86% |

some landscapes by direct action on the driving forces. The same indirect actions were introduced in another law (3028/2002 FEK 2002) on the protection of antiquities and cultural heritage, which again introduces the conservation of landscapes indirectly through the surrounding areas of these antiquities on the basis of special characteristics or qualities.

In 2010, Law 3827/2010 (FEK 2010) ratified the ELC in Greek law. Before the particular law, all the legislative instruments briefly analysed above attempted to protect landscapes by simple normative prohibitions, intending to preserve certain landscape forms and qualities, but this has proven inadequate, due to the absence of a framework of spatial policies for sustainable landscape management. At the same time, many sectoral policies touch indirectly the landscape with uncontrolled, mixed and chaotic effects. After 2010, in the new framework, the landscape is incorporated into spatial planning at different administrative levels, unlike previous frameworks for which landscape was linked only with special qualities or characteristics through difficult to police prohibitions. The first real inclusion of the landscape level in spatial


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Table 1. Continued.

| | RGB | CAT | Major Landskape types * | Code | Landscape typology components ** | | | | Area (km2) | % of total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Land Cover (A) | Coastal (B) | Elevation (C) | Slope (D) | | |
| | 0,70,0 | 33 | IV | Fo1semi-flat | Fo | 1 | Semi | Flat | 5380.5 | 4.11% |
| | 0,80,0 | 34 | IV | Fo1semi-semi | Fo | 1 | Semi | Semi | 12810.91 | 9.79% |
| | 0,90,0 | 35 | IV | Fo1semi-frag | Fo | 1 | Semi | Frag | 4921.34 | 3.76% |
| | 0,100,0 | 36 | IV | Fo1moun-flat | Fo | 1 | Moun | Flat | 3147.46 | 2.41% |
| | 0,110,0 | 37 | IV | Fo1moun-semi | Fo | 1 | Moun | Semi | 11354.05 | 8.68% |
| | 0,120,0 | 38 | IV | Fo1moun-frag | Fo | 1 | Moun | Frag | 10029.31 | 7.67% |
| | 0,130,0 | 39 | II | Fo2pl-flat | Fo | 2 | Pl | Flat | 2499.48 | 1.91% |
| | 0,140,0 | 40 | II | Fo2pl-semi | Fo | 2 | Pl | Semi | 4007.8 | 3.06% |
| | 0,150,0 | 41 | II | Fo2pl-frag | Fo | 2 | Pl | Frag | 1464.71 | 1.12% |
| | 0,160,0 | 42 | II | Fo2semi-flat | Fo | 2 | Semi | Flat | 28.78 | 0.02% |
| | 0,170,0 | 43 | II | Fo2semi-semi | Fo | 2 | Semi | Semi | 151.75 | 0.12% |
| | 0,180,0 | 44 | II | Fo2semi-frag | Fo | 2 | Semi | Frag | 317.01 | 0.24% |
| | 0,190,0 | 45 | II | Fo2moun-semi | Fo | 2 | Moun | Semi | 0.87 | 0.00% |
| | 0,200,0 | 46 | II | Fo2moun-frag | Fo | 2 | Moun | Frag | 3.92 | 0.00% |
| | 0,0,40 | 47 | III | We1pl-flat | We | 1 | Pl | Flat | 987.67 | 0.76% |
| | 0,0,60 | 48 | III | We1pl-semi | We | 1 | Pl | Semi | 42.3 | 0.03% |
| | 0,0,80 | 49 | III | We1pl-frag | We | 1 | Pl | Frag | 0.87 | 0.00% |
| | 0,0,100 | 50 | IV | We1semi-flat | We | 1 | Semi | Flat | 171.37 | 0.13% |
| | 0,0,120 | 51 | IV | We1semi-semi | We | 1 | Semi | Semi | 30.52 | 0.02% |
| | 0,0,140 | 52 | IV | We1semi-frag | We | 1 | Semi | Frag | 6.1 | 0.00% |
| | 0,0,160 | 53 | IV | We1moun-flat | We | 1 | Moun | Flat | 83.72 | 0.06% |
| | 0,0,180 | 54 | IV | We1moun-semi | We | 1 | Moun | Semi | 11.34 | 0.01% |
| | 0,0,200 | 55 | IV | We1moun-frag | We | 1 | Moun | Frag | 0.87 | 0.00% |
| | 0,0,220 | 56 | II | We2pl-flat | We | 2 | Pl | Flat | 276.02 | 0.21% |
| | 0,0,250 | 57 | II | We2pl-semi | We | 2 | Pl | Semi | 8.72 | 0.01% |

*Major landscape types: built up space (I); coasts and islands (II); level areas (III); mountains (IV).
**Landscape typology components. (A) Land cover: artificial surfaces (Ar); agricultural areas (Ag); forest and semi-natural areas (Fo); wetlands and water bodies (We). (B) Coastal: non-coastal (1); coastal (2). (C) Elevation: plain 0–400 (pl); semi-mountainous 400–800 (semi); mountainous 800– (moun). (D) Slope: flat 0–0.04 (flat); semi-steep 0.04–0.10 (semi); steep 0.10– (frag).
*Source*: authors' own analysis.

planning came one year later with the revision of the Regional Planning Studies for Spatial Planning and Sustainable Development (*Prodiagrafes meleton axiologisis – anatheorisis kai exidikefsis thesmothetimenon periferiakon plesion xorotaxikou sxediasmou kai aiforou anaptyxis*), which incorporated a specific chapter for landscape assessment (YPEKA 2011). But the lack of comprehensive national or regional landscape typologies makes this framework not immediately applicable in spatial planning. With this article we attempt to address this gap at the national and regional level with the introduction of landscape typologies that can provide the raw material for landscape management and its integration in spatial planning framework.

## A typology for the Greek landscape

### *Methodological choices*

The typology of the Greek landscape proposed here relies on four different dimensions: land cover (A) with a focus on urban geography, coasts/islands (B) and geomorphology elevation (C) and slope gradient (D) (Table 1). These criteria follow Terkenli

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(2004) who offers a similar typology. Other European typologies that are comparable to the one used here include the comprehensive review of landscape types of Europe by Meeus *et al*. (1990), which also includes Greece (not the islands), over three dimensions (climate, slope and image) and eleven factors that include (besides soil, topographic and climatic factors) the size and shape of parcels of land, the type of crops (including semi-cultivated crops and woodland), land ownership, the degree of enclosure and historical origins. They arrive at thirteen landscape types for Europe that in Greece correspond roughly to our typology (without urban areas), as level areas are separated from mountains and most of the coasts. Emanuelsson (2009) offers a rough distinction of European rural landscapes that corresponds for Greece with the level areas–mountains–islands typology used here. Mücher *et al*. (2003) offer a very comprehensive typology of European landscapes, updated in Mücher *et al*. (2010). They consider landscapes as being shaped by climate, geology/geomorphology, hydrology, soils, vegetation, fauna, land use, landscape structure, and time and use climate, altitude, parent material and land use to arrive at a typology at four levels and 8, 36, 81 and 350 classes for each level. Their types for Greece correspond to the mountains–level areas distinction made here at the second and third levels, but urban sprawl is underestimated due to the coarse pixel size and therefore the distinction between coastal areas and urban areas is less clear.

The approach presented here has three advantages compared with the one of Terkenli (2004): it includes geomorphology and not just altitude, separating level areas on high altitudes – morphologically closer to level areas – from mountain areas; it presents a more pragmatic and close to reality on the ground approach for urban geography, including all artificial areas; and includes simplified land cover that is very important, especially for regional scales. It complements the approach of Mücher *et al*. (2010) in including the urban geography explicitly and the coastal/islands dimension. It can therefore form the basis for regional and local approaches of landscape characterization to support the recent implementation of the ELC. It can also be used along with the mutations approach for spatial planning since it takes into account natural and human elements of landscape formation and change.

## Physical and human components of the landscape

### *A. Land cover component*

Population and economic changes of the twentieth century transformed the urban geography of the country: in the beginning of the century 80 per cent of the population lived in rural areas and settlements of less than 2000 people and only 20 per cent in urban areas, while at the beginning of the twenty-first century, only 20 per cent live in rural areas with the rest 80 per cent in urban centres and especially in the greater Athens area (*c*. 40% of the total population) and in Thessaloniki (another 10%). The result is a polarized urban space with linear urban developments across the major transport links between these two centres. Another polarization has resulted from the continuing concentration of built-up areas in the coastal zone where most of the population and the economic activities are located. Greece has always economically been oriented towards the sea, partly due to the geomorphology of the continental area, but in recent decades tourism and second homes have contributed significantly towards a "coastalization", a common feature of Mediterranean countries in general (Benoit and Comaeu 2005).

Land cover assigns different types according to the broad land cover types with the use of Corine 2000 land cover data of 1:100,000 scale and $100 \times 100$ m pixel, suitable for regional scale analysis. Four types were used: artificial surfaces, agricultural areas, forest and semi natural areas, and wetlands/water bodies (Fig. 1A).

### *B. Coasts and islands components*

The coasts and islands component bring in another type of territory: coastal areas, with an area size of 132,000 km$^2$ the sea front extends to approximately 16,500 km and more than 2,000 islands and islets, 112 of which are inhabited today. Moreover, most of the population and tourism is located in coastal areas, increasing its importance and rates of change. Multiple definitions of coastal areas are found in Greek legislation, partly as a result of its importance, such as that of the YPEXODE (2003b) definition, beginning from the coastline to 5,000 m inland, corresponding to 33,000 km$^2$ or 25 per cent of the area of Greece. A 10 km coastal zone corresponds to roughly 50,000 km$^2$ or 38 per cent of the total area of Greece, while a 50 km coastal zone corresponds to almost 100,000 km$^2$ or 72 per cent of the total area. Here we adopt the 2 km zone


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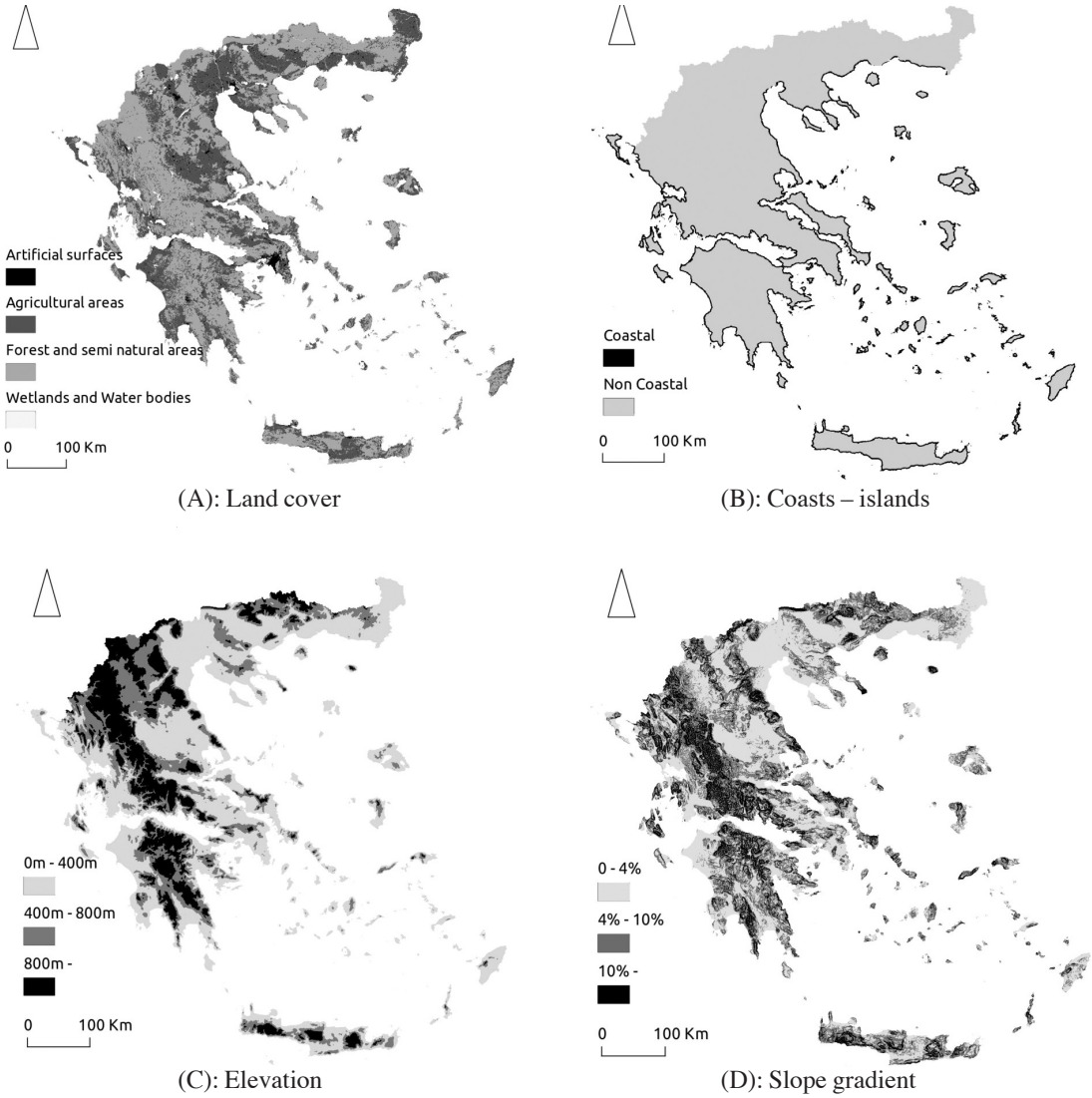


Figure 1. Landscape components for a typology synthesis.
*Source*: authors' own analysis; digital elevation model of Greece derived by Shuttle Radar Topography Mission SRTM of 90 m; Corine 2000 land cover data.

(Fig. 1B), with exceptions related to particular geophysical characteristics (slopes steeper than 4% are excluded).

### *C. Geomorphological components*

Geomorphologically, despite the fact that mountains in Greece are of moderate elevation (the highest is at 2900 m), the relief is complex with many steep ranges which form the mountain range of Pindos that effectively separates the peninsula into two major areas, western and eastern Greece and in many smaller ones. Mountainous areas in Greece cover an important part of the total area: 42.3 per cent according to the ELSTAT (Greek Statistical Service) definition (land over 800 m or over 20 per cent slope gradient, or over 600 m and more than 16 per cent slope gradient, while areas between 800 and 200 m

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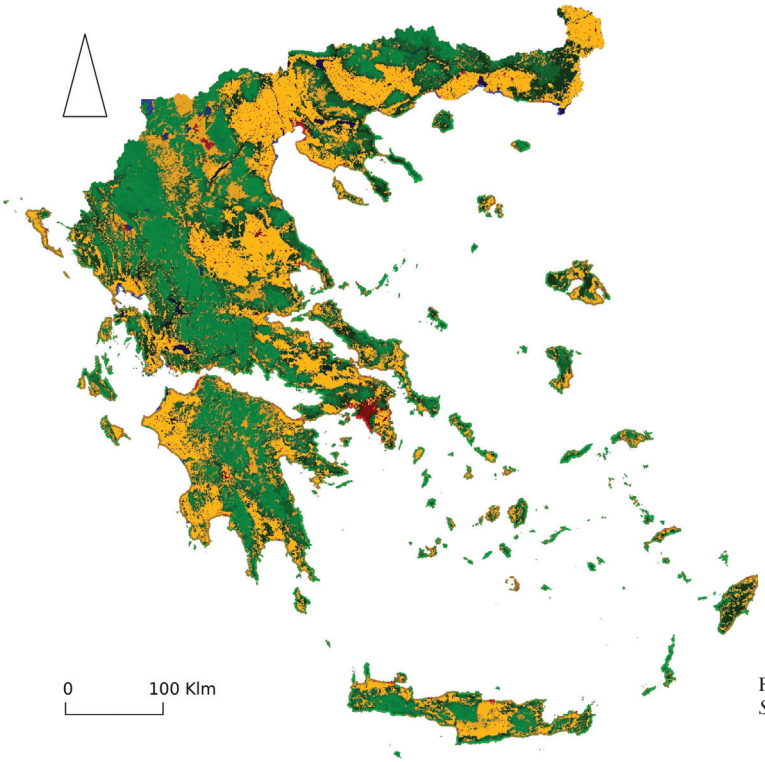


Figure 2. Landscape typology synthesis. *Source*: authors' own analysis.

are characterized as semi-mountainous and the rest as level). However, only a tenth of the total population lives there (YPEKODE 2003a). This separation reflects on climate and especially precipitation (which is nearly double on average in the western part than the eastern part) and subsequently on land cover. The other effect of geomorphology refers to the fragmentation of habitats and level areas. Very few level areas are continuous. Many of them in the early twentieth century were transformed from wetlands into suitable areas for human habitation and cultivation. This inherent fragmentation also results in a variety of habitats, combined with the fact that the peninsula is located in the transition zone between Africa, Asia and Europe, yields high biodiversity levels and many biodiversity hot-spots, the presence of rare species and a high degree of endemism (Allen 2001).

The geomorphology dimension assigns different types according to the relief and the steepness of slopes and the elevation. The approach used here applies the classification system to actual space rather than administrative boundaries and classifies as level areas of high elevation that are level. Three types of territories emerge for elevation and three for slope gradient (Fig. 1C): level areas (0–400 m); the transition zone (400–800 m) and mountain areas (>800 m) for elevation; and flat (0–4%), semi-steep (4–10%), and steep (10%) for slope gradient (Fig. 1D). For both, data come from a digital elevation model of Greece derived by Shuttle Radar Topography Mission SRTM of 90 m spatial resolution, re-sampled to 100 m.

### *Major landscape types*

The combination of these criteria yields four general types of landscapes and 57 overall sub-types out of the 72 possible ones. The largest sub-type is that of plain flat areas with agricultural cover with 21.6 per cent of the total area, followed by five forest sub-types with between 9 and 6 per cent of the total area, the rest with less than 5 per cent (Table 2). These sub-types are divided unequally between the four types (Table 2 and Fig. 2), as follows.

(I) Built-up space, which includes all settlements, industrial spaces, roads and a small strip of 500 m around major roads which is influenced heavily by the presence of these roads. This broad type includes


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Table 2. Landscape typology components and major landscape types.

| Landscape typology components | Components categories | Major landscape types: (I) Built-up space | (II) Coastal areas and islands | (III) Level areas | (IV) Mountains |
|---|---|---|---|---|---|
| (A) Land cover | Artificial surfaces | X | X | | |
| | Non-artificial surfaces | | X | X | X |
| (B) Coasts/islands | Coastal areas and islands | | X | | |
| | Non-coastal areas or islands | | | X | X |
| (C) Elevation | Level areas 0–400 m | | | X | |
| | Transition zone 400–800 m | | | X | |
| | Mountain areas 800+ m | | | | X |
| (D) Slope | Flat 0–4% | | | X | |
| | Semi-fragmented 4–10% | | | X | |
| | Fragmented 10+% | | | | X |

very different landscapes at the regional and local levels. A typical example is the settlements themselves, which can be further classified according to a number of different criteria, including the type of their development (linear, clustered, or mixed), their origin and form ("traditional", "modern", or mixed), their dispersion in the countryside, and so forth. Sub-types included here are all artificial areas, regardless of the rest of their features, with the exception of coastal/islands artificial areas which are classified in the second type. Overall, nine sub-types are included of 2,107 km$^2$ or 1.6 per cent of the total area.

Overall, the fragmentation of Greek landscapes due to artificial areas is quite low compared with the highly urbanized western and central European countries (EEA-FOEN 2011). The higher values of urbanization are regionally mentioned in Attica (Athens), which is as expected, in Thessaly and two island regions, Notio Aigaio and Ionia Nisia (EEA-FOEN 2011), while lower values, unsurprisingly, are recorded in mountain regions.

(II) Coastal areas and islands, with a distinct character compared with continental areas, due to their role as prominent nodes in the dense communications networks of the Greek peninsula and the Mediterranean in general already from the late Neolithic (Horden and Purcell 2000). All coastal/islands sub-types are included here, as this feature is considered as dominant over the rest of their features and even sub-types of settlements on islands and coastal areas are of different character than continental ones. Overall, 15 sub-types are included here of 16,264.5 km$^2$ or 12.4 per cent of the total area.

(III) Level areas, which are relatively limited and fragmented in Greece compared with central and northern Europe. Many of the plains used today for agriculture were reclaimed from wetlands in the twentieth century. All agricultural areas are included here, with the exception of coastal areas/islands, along with level areas of forests and wetlands, with the exception of small agricultural areas in mountainous sloping lands. Overall, 13 sub-types are included of 63,093.9 km$^2$ or 48.2 per cent of the total area.

(IV) Mountains for which the population increased during Ottoman times, since they were only loosely controlled by authority, with nomadic and semi-nomadic herders that linked them to winter grazing lands in fallow areas in the plains in transhumant networks (Kizos 2008). The collapse of this economy during the twentieth century brought intense depopulation and dramatically changed the landscape. All forest areas are included here, with the exception of level sub-types, along with mountainous wetlands and agricultural areas in sloping mountainous areas. Overall, 14 sub-types are included of 49,333.7 km$^2$ or 37.7 per cent of the total area.

## Regional level

### *Case study regions*

For a first regional approach of the typology, four regions are selected, as they are considered to represent characteristic cases compatible with the proposed major landscape types. The regional level (NUTS 2 at the European scale) is selected, as it represents the spatial level of strategic planning. After a brief description of the regions, the driving forces are analysed.

(A) Attica region includes the capital of Greece, Athens and represents the urban and the built-up

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space landscape. The artificial flat landscape type (class 1) represents 9.3 per cent of the total region surface (Table 3), but in relatively few patches, indicating continuous urban fabric. It is the principal national development pole, with 50 per cent of the overall national GDP and 40 per cent of the total population with a population density of more than 1,000 people/km$^2$. The growth of the city of Athens did not respect its "history", with the exception of the monuments, which mostly concern the period of classical antiquity. Intensive building construction projects, driven by self-promoted strategies, were the principal city growth mode adopted for many decades. This practice, adopted in the 1960s, degraded the city's architectural patrimony and in general the urban landscape (the demolition of so-called neoclassical buildings are characteristic examples). At the same time, the city consumed an important part of Attica (Karidis 2006) and fragmented it, especially its forest areas that are scattered in many small patches, much smaller than all the other regions discussed here (Table 3).

(B) The region of South Aegean is an insular region, with 300,000 people residing on more than 40 inhabited islands and represents the coastal areas and the island landscape. Greek islands are considered as places of natural and cultural value, they are of very important natural and cultural heritage value. At the same time they are also some of the most visited places in the Mediterranean (approx. 2,500,000 arrivals and 15,500,000 nights stayed by foreign and Greek tourists in 2012 according to EL.STAT.) and therefore very fragile. A total of 62.3 per cent of the region is classified as coastal in the typology proposed here (Table 3; classes: 15, 16, 24, 25, 39, 40). Tourism is obviously the most important driving force in the region, but some forest area and shrub land classes represent important parts of the area (classes 39 and 40 cover 32% of the area). The pressures from tourism in the coastal strip are reflected in the highly fragmented coastal agricultural and forest areas compared with the non-coastal ones.

(C) Thessaly region represents mostly the level landscape. The agricultural non-coastal flat landscape (class 15) is the dominant landscape type, representing 32.4 per cent of the total surface of the region (Table 3) with very big patches compared with all other landscape types in all regions, reflecting a continuous, homogeneous landscape. Thessaly is located in the geographical centre of Greece and includes an extended level area ringed of mountains. Agriculture is the principal productive activity which also creates the dominant landscape characters. The region is also crossed from the principal transport and development axis that links South and North Greece with Turkey and the Balkans. Along this network and close to the urban centres, urban sprawl is important.

(D) Epirus region represents the mountain landscape. It is located in the north west of Greece, with a low population density (37 inhabitants/km$^2$) and is underdeveloped (at a level of 75% of the national GDP). The region prospered and developed until the 1950s; it lost the better part of its population in the following decades. This resulted from physical isolation due to the presence of the Pindos mountain ranges combined with distance from the national "development axis". This is reflected in abandonment of formerly cultivated areas and the increase of forest areas which represent an important part of the total land cover, in few and relatively large patches, reflecting a relatively homogeneous landscape (Table 3).

## Driving forces and spatial planning policy framework

In this section, we group the principal driving forces on Greek landscapes in the recent past and today, based on the approach of Bürgi *et al*. (2005). The direct driving forces selected reflect the most important changes in Greek economy and society over the last decades and have a lasting and deep impact of landscapes. Five are considered as the most important (Table 4): urbanization and urban sprawl in rural areas; coastalization; and abandonment/intensification of agriculture. Urbanization, urban sprawl and coastalization are dealt together, as they represent similar processes, but with different spatial level of reference or different type of process (Luginbuhl 2007). Urbanization refers here to the growth of cities, while urban sprawl refers to the gradual dispersion of buildings in the countryside, involving second homes, suburbs, tourism buildings, manufacture and services (An *et al*. 2011). The differences between them concern more than just the character of the buildings, they refer to different socio-economical driving forces. The rapid growth of the Greek cities after the 1960s intended to provide a minimum of residence to rural immigrants in cities. The urban sprawl after the 1980s served mostly the need of luxurious or holidays houses. Both cases were driven by unplanned and spontaneous private choices (Chorianopoulos


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Table 3. Principal landscape types representation in case study regions.

| Class | | Attiki (area = 3610674400) Land cover ($m^2$) | % of total | Number of patches | Mean patch area | South Aegean (area = 4622744375) Land cover (m2) | % of total | Number of patches | Mean patch area |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Artificial flat | 336355600 | 9.3 | 51 | 6595207.8 | 13299775 | 0.3 | 19 | 699988.2 |
| 15 | Agricultural non-coastal flat | 670137050 | 18.6 | 83 | 8073940.3 | 401567400 | 8.7 | 132 | 3042177.3 |
| 16 | Agricultural non-coastal semi-fragmented | 134713850 | 3.7 | 110 | 1224671.3 | 190058075 | 4.1 | 129 | 1473318.4 |
| 24 | Agricultural coastal flat | 217944700 | 6.0 | 79 | 2758793.6 | 523410500 | 11.3 | 174 | 3008106.3 |
| 25 | Agricultural coastal semi-fragmented | 109830400 | 3.0 | 80 | 1372880.0 | 266424525 | 5.8 | 246 | 1083026.5 |
| 30 | Forest non-coastal plain flat | 334639500 | 9.3 | 128 | 2614371.0 | 559877625 | 12.1 | 164 | 3413887.9 |
| 31 | Forest non-coastal plain semi-fragmented | 319623625 | 8.9 | 114 | 2803716.0 | 391699825 | 8.5 | 147 | 2664624.6 |
| 34 | Forest non-coastal semi-mountainous semi-fragmented | 326488025 | 9.0 | 43 | 7592744.7 | 132139700 | 2.9 | 60 | 2202328.3 |
| 38 | Forest non-coastal mountainous fragmented | 19735150 | 0.5 | 11 | 1794104.5 | 6006350 | 0.1 | 3 | 2002116.6 |
| 39 | Forest coastal plain flat | 172468050 | 4.8 | 128 | 1347406.6 | 512255850 | 11.1 | 397 | 1290317.0 |
| 40 | Forest coastal plain semi-fragmented | 229099350 | 6.3 | 98 | 2337748.4 | 985899450 | 21.3 | 287 | 3435189.7 |
| Total | | 3610674400 | 79.5 | 1400 | | 3982639075 | 86.2 | 2319 | |

| Class | | Thessalia (area = 13765267125) Land cover ($m^2$) | % of total | Number of patches | Mean patch area | Epirus (area = 9093184875) Land cover ($m^2$) | % of total | Number of patches | Mean patch area |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Artificial flat | 216228600 | 1.6 | 220 | 982857.3 | 35180050 | 0.4 | 56 | 628215.1 |
| 15 | Agricultural non-coastal flat | 4455424625 | 32.4 | 120 | 37128538.5 | 780396475 | 8.6 | 143 | 5457318.0 |
| 16 | Agricultural non-coastal semi-fragmented | 416154250 | 3.0 | 300 | 1387180.8 | 247547425 | 2.7 | 218 | 1135538.6 |
| 24 | Agricultural coastal flat | 128278475 | 0.9 | 52 | 2466893.8 | 131710675 | 1.4 | 23 | 5726551.0 |
| 25 | Agricultural coastal semi-fragmented | 116694800 | 0.8 | 66 | 1768103.0 | 31747850 | 0.3 | 25 | 1269914.0 |
| 30 | Forest non-coastal plain flat | 765809625 | 5.6 | 343 | 2232681.1 | 396848125 | 4.4 | 206 | 1926447.2 |
| 31 | Forest non-coastal plain semi-fragmented | 898807375 | 6.5 | 234 | 3841057.2 | 590338400 | 6.5 | 178 | 3316507.8 |
| 34 | Forest non-coastal semi-mountainous semi-fragmented | 1345851425 | 9.8 | 208 | 6470439.5 | 1151503100 | 12.7 | 246 | 4680906.9 |
| 38 | Forest non-coastal mountainous fragmented | 1406772975 | 10.2 | 104 | 13526663.2 | 1538483650 | 16.9 | 111 | 13860213.0 |
| 39 | Forest coastal plain flat | 87950125 | 0.6 | 87 | 1010921.0 | 33892975 | 0.4 | 40 | 847324.3 |
| 40 | Forest coastal plain semi-fragmented | 203357850 | 1.5 | 85 | 2392445.3 | 59205450 | 0.7 | 31 | 1909853.2 |
| Total | | 10041330125 | 72.9 | 3693 | | 4996854175 | 55.0 | 3366 | |

*Source*: authors' own analysis.

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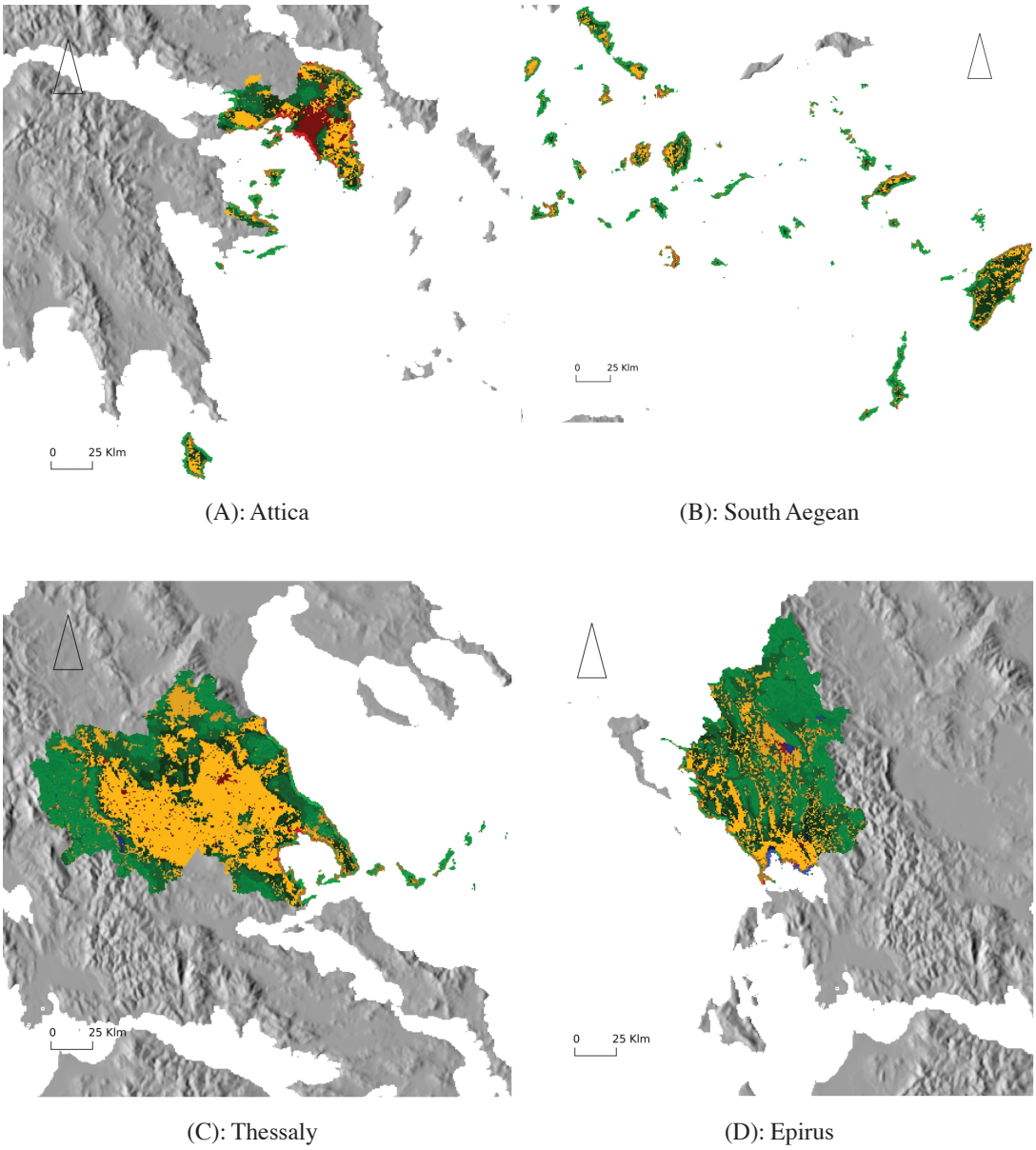


(A): Attica (B): South Aegean

(C): Thessaly (D): Epirus

Figure 3. Case study regions.
*Source*: authors' own analysis.

*et al*. 2010). By coastalization, we refer to the process of concentrated activities and populations in the coastal zone, including the islands. These higher densities are a result of urban sprawl and urbanization, but they are separated from these processes since they refer to a particular space, with distinct landscapes and high importance in terms of management for both land and water processes. The last two, intensification and abandonment of agriculture in rural areas, are also dealt together as they involve similar and complementary processes to a certain degree (Meeus *et al*. 1990; Emanuelsson 2009).


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Table 4. Pressures of the Greek landscape and landscape types.

| | Area typologies | | | |
|---|---|---|---|---|
| Processes of change | (A) Built-up space | (B) Coastal areas and islands | (C) Level areas | (D) Mountains |
| 1. Urbanization | +++ | +++ | + | – |
| 2. Urban sprawl in rural areas | – | ++ | ++ | + |
| 3. Coastalization | ++ | +++ | 0 | 0 |
| 4. Intensification of agriculture | – | 0 | +++ | 0 |
| 5. Abandonment | – | + | – | +++ |

+++, extremely strong influence; ++, very strong influence; +, strong influence; 0, limited influence; –, no influence

These pressures do not cover all possible cases of landscape change. The purpose of this article is not an exhaustive analysis because even the chosen scales (national and regional) are not sufficient for this. They can be used for understanding most of them for Greek landscapes in terms of intensity and extent of the changes. In terms of intensity, urbanization, sprawl and coastalization were the result of deep and profound changes in Greek society, with more than 4 million people moving to an urban area between 1951 and 2001, while people living in coastal areas are almost 70 per cent of the population and almost all tourism is located in coastal areas. In terms of extent, all landscape types described (Table 4) are practically covered by these degradation pressures.

*Urbanization, urban sprawl and coastalization*

Urban development in Greece in the twentieth century was different from that of Europe (Karidis 1996, 2006). One of the most important differences was the almost total absence of public housing projects (social housing) that was common in many European countries at the beginning of the century, such as Council Housing in the UK, suburbs with *habitation à loyer modéré* in France, extensive municipal public housing projects in Berlin, Hamburg, Cologne and Frankfurt in Germany, among other similar projects that had important effects on the character of urban areas. The other major difference referred to the lack of organized large-scale urban regeneration projects, which changed the city image in many European countries at the time.

In Greece, urban development was driven mostly by spontaneous processes of the private sector (Philippidis 1990; Karidis 1996, 2006; Economou 2004). Although urban plans were developed for some of the bigger towns after the 1960s, these were only partly implemented or not applied at all due to the inability or unwillingness to enforce their implementation. These largely *ad hoc* processes came as a result of the major increase in demand for new houses in towns and especially in Athens due to a rural exodus that increased the population of Athens from 1.3 million in 1951 to 4 million in 2001 and, in parallel, reduced the population living in rural areas to 20 per cent of the total population. Existing urban plans did not foresee or try to harness this demand and the result was an uncontrolled sprawl of urban areas in the surrounding peri-urban and rural areas, especially after the 1950s (Karidis 1996, 2006). Older parts of towns were also transformed from small one- to two-storey buildings to multi-storey ones, considered as the pinnacle of "modernity" during the 1960s and 1970s, to return to two-storey separate houses in suburbs and peri-urban areas after the 1990s. The most important outcome of this form of urban development was the unplanned growth of urban space with few if any open spaces, narrow streets, and so forth (Economou 2004; Karidis 2006). The growth of urban areas towards areas with views or close to the coast was another outcome of unplanned development.

Previous and current sprawl was assisted by Greek legislation which allowed building on all farm land with a size over 0.4 ha and many exceptions for smaller sizes (e.g. along roads), along with non-legal procedures. Once the area had been built sufficiently dense, it could be incorporated into the city limits and new building conditions applied that allowed denser building and eventually turned rural into urban areas. This mechanism of sprawl in the expense of farm land is continuing today, mostly for the dispersion of buildings in rural areas and especially in four types of areas.

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1. The coastal zone and especially on islands for second homes and for tourism-related buildings. This highly fragmented coastal zone and the islands have a particular significance for Greece, as geo-physical particularities and a cultural and historical presence have created many landscapes of geological, architectural and scenic beauty. Despite the fact that the coastline is specifically protected by the Greek Constitution (art. 24) and other existing legislation, the inability or unwillingness to enforce laws has led to widespread degradation of the coasts. Today, all coastal areas suffer from urban sprawl and increasing densities of populations and activities, a development similar to that of the coastal areas of the Mediterranean (Benoit and Comeau 2005).
2. Across the main transport links mostly for manufacture, commerce and in general services for urban areas.
3. In or around mountain settlements largely abandoned after the 1950s and re-evaluated during the 1980s, principally for second homes (Tsilimigkas 2007).
4. Around suburb settlements on the outskirts of urban areas for housing.

Although some of these processes are on the margins of legal procedures or illegal, unwillingness and/or toleration to enforce land use plans or housing laws have made them a reality. But more reasons than just illegal practices from land owners are in effect. One of these is the overall choice from the 1960s onwards to link economic development in Greece with constructions (instead of e.g. heavy industry). This central political choice was put into practice by legislative and policy assistance principally to small construction developers. Another reason is the political and voting clientele that these owners formed with promises from all political parties of "legalization" of illegal buildings. These developments have turned practically all fields or plots of land into potential real estate plots for future "development" (Karidis 2006). In all these areas, infrastructures were missing and "the state" was expected to step in and provide roads, sewage, power, drinking water, and so forth (Karidis 1996).

*Intensification and abandonment of agriculture*

Until the middle of the twentieth century agriculture in Greece was still very much based on human labour and the management systems. The modernization of these systems was a national policy goal, with large-scale projects of land reclamation and irrigation in level areas along with cheap fertilizers and plant production products and the establishment of public professional assistance to farmers. Especially for the level areas, changes from cereal cultivation already started at the end of the nineteenth century and were settled with the agrarian reform in the 1920s and 1930s which divided big estates into small farms and disrupted the link with transhumant herds (Kizos 2008). In fertile areas that could be irrigated, the modernization of cultivation techniques and the mechanization of agriculture advanced considerably by the 1970s (Moisides 1986). In other areas (such as mountainous areas and islands) intensification was not feasible, and in these areas, modern production systems were either not applicable at all or relied too much on imported and costly input. Farming was therefore marginalized or left to the elderly and "hobbyists" and the areas were abandoned (e.g. in mountainous areas), or new activities emerged (e.g. tourism on the islands) (Kizos and Vlahos 2012).

Accession to the EU in 1981 and the Common Market mechanisms completed the transition to modern and mechanized farming management systems with heavy subsidies for certain crops (e.g. cotton) in the plains. The gradual change of Common Agricultural Policy (CAP) in favour of the so-called Second Pillar measures, that is, rural development and environmental protection, until the current decoupling of production and subsidies, reinforced an ongoing separation, spatial and in terms of farming systems between highly mechanized, intensive farming systems of arable crops in level areas and part-time farmers of small and hobby farms in mountains and other areas. More recently, after the 1980s, mountains have been rediscovered by urban populations as reserves of cultural and architectural heritage and places for relaxation and getting "in touch with nature". This has led to a different appreciation of the architectural, cultural and natural capital of mountain areas and to some sprawl of buildings in and around "traditional" villages and landscapes of aesthetic and scenic beauty (Tsilimigkas 2007).

## Concluding remarks

In this article, we have mostly focused on Greek landscapes at the national and regional scale. Although this entails a certain degree of abstraction for the fragmented Greek peninsula, it has


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nevertheless proven fruitful, having clarified and identified some common themes that unite Greek landscapes rather than tell them apart. At the same time, the identification of the dynamics of change of these types has shed some light on current and future trajectories of the changes of Greek landscapes, thus providing guidelines for its management in the context of the ELC.

This process has been a top–down approach. Olwig (2007, p. 586) criticizes such expert-based approaches to landscape planning and management, since they tend to produce landscape types and landscapes as 'scenic backgrounds', rather than 'scenes of activity'. Even if the actual text of the ELC goes a long way towards acknowledging that landscapes are dynamic objects and that all landscapes have "value", the need to have "objective" and transparent criteria for defining landscape types and assigning "character" or "value" or "quality" to them usually leads to top–down approaches (see also Jones 2007 for a discussion). Here, we have used such "objective" criteria to discern between broader landscape types, but at the same time we have attempted to integrate the dynamics of change into this classification so as to avoid ending up with "museum-type" landscapes or scenic backgrounds, but with mutating entities, subject to both objective and subjective evaluations and assessments.

The Greek history of landscape planning and management demonstrates the inefficiency of expert and top–down regulatory-only approaches against some wider agents of change of society and economy. We believe that the integration of the ELC context and approach to spatial planning could resolve this dead end of planning against landscape degradation dynamics and without the consent of local societies. This does not mean that planning should endorse these processes unquestionably, but on the contrary that plans and management objectives should consider them in the context of the values and qualities assigned to landscapes.

Local approaches are the next logical step in such a process. Such approaches need to incorporate a *res publica* bottom–up approach to landscape classification and assessment (Olwig 2007) with public participation for assigning values and qualities and determining management options. The broad landscape types and the dynamics discussed here can be used for this process, which is as already mentioned beyond the scope of this article.

## Note

1. For more details, see Nogué *et al*. (2010) and the web pages of the by-product of the convention, the Landscape Observatory of Catalonia (Landscape Observatory 2014).

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