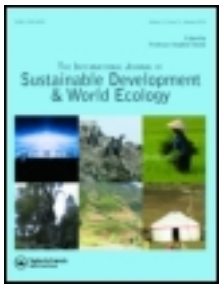

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Landscape indicators for the evaluation of tourist landscape structure

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Landscape structure has been analysed in many European countries with the aid of indicator-based landscape assessments, geographical information system (GIS) and remote-sensing techniques, applied mainly in landscape ecology and geography. The objective of this paper is to present a developed framework of landscape indicators and appropriate spatial metrics for the analysis of tourist landscape structure and its application in the coastal tourist landscape in Kos Island, Greece. With the aid of GIS analysis techniques (viewshed and spatial statistics), our results revealed both intensive and extensive tourist landscape development during the period 1981–1995 and a trend towards stabilization for the period 1995–2002. The spatial distribution of land use patterns, the evolution of a complex system of transport networks and increased building density resulted in decreased visibility towards the sea and in fragmentation of the initial landscape – an early sign of landscape identity loss.

Keywords: tourist landscape; landscape indicators; landscape metrics; spatial structure; landscape assessment; tourism development; GIS; Kos-Greece

Introduction

In Europe, landscape is recognized as a basic component of the natural and cultural heritage and as an important part of people's quality of life (Council of Europe 2000). However, many European landscapes have been gravely damaged in recent years by unappealing built developments, loss of natural elements, neglect, erosion and other factors. The loss of the aesthetic value of tourism coastal landscapes is well known (Briassoulis 2002). Furthermore, tourism development has often been accomplished through an insensitive use of space. Extensive rebuilding and expansion of tourist infrastructures along the seashore, uncontrolled urbanization and multifunctional land uses, excessive road network extension and spatial fragmentation have in many cases, resulted in homogeneity of landscape elements (Green & Hunter 1995; Antrop 1998; Terkenli 2002). The Greek coastal landscape is especially prone to tourism pressures and environmental, economic, social and aesthetic impacts (Coccossis & Tsartas 2001) for the aforementioned reasons. Therefore, the tourist landscape emerges as the product of tourism activities which tend to dominate an area and 'affect' its appearance (Terkenli 2002). According to Clare Gunn (1979, p. 409), the tourist landscape is the total physical and visual environment utilized by all tourism activities, including the whole context and infrastructures of tourism development (transportation, services, information and all such developments that attract people to a destination).

A thorough literature review indicated that the interdisciplinary fields of landscape science and tourism studies so far lack research on tourist landscape's state (structure), in the context of a more general attempt to understand better the changes that a landscape undergoes through the impact of tourism development.

Among the methods of landscape analysis, landscape character assessment (LCA) has been proven to be a well-accepted tool of landscape identification and assessment, of understanding landscape change and of engaging stakeholders in sustainable development (Swanwick & Land Use Consultants 2002). Also, many European countries have recently developed landscape policies which require indicators that describe, evaluate and communicate highly relevant landscape aspects such as landscape states, landscape change, landscape policies implemented by public institutions, the behaviour of society in relation to the landscape, or the degree of awareness and enjoyment of the landscape by the various populations. These countries have followed a rather proactive approach towards the implementation of indicator-based landscape assessment (Wascher 2005) and have developed methodologies in terms of spatial resolution and policy orientation, resulting in impressive landscape monitoring and product reporting at the national level. Meanwhile, geographical information systems (GIS) and remote sensing have offered geographers and ecologists unique capacities to quantify land cover pattern and understand spatial heterogeneity and landscape structure (Turner & Carpenter 1998). These technologies have simplified landscape structure characterization, through measures referred to as landscape pattern metrics, which have been developed and applied in the field of landscape ecology (McGarigal & Marks 1995). Landscape metrics first appeared in the late 1980s,

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incorporating measures from both information theory and fractal geometry (Shannon & Weaver 1964; Mandelbrot 1983) and were based on categorical, patch-based landscape representations. Since then, researchers in the field of landscape ecology have developed a large number of metrics for quantifying landscape patterns, as well as their effects on disturbance regimes (O'Neil et al. 1988; Turner & Gardner 1991; Mc Garigal & Marks 1995; McGarigal et al. 2002; Uuemaa et al. 2009; Kadlecova et al. 2012; Xie et al. 2012).

Another significant attempt towards landscape indicator classification was undertaken by the Organization for Economic Cooperation and Development (OECD), in 1993, through the 'Pressure–State–Response' model, in an effort to investigate the cause and effect relationships between humans and the environment. However, in the science of tourism, indicators have so far been formed on the basis of socio-economical aspects of tourism (Komilis & Vagionis 1995; Parpairis 2000; Coccossis & Tsartas 2001; White et al. 2006; Brown & Reed 2012); while – to our knowledge – no landscape indicators have been proposed specifically for the assessment of the tourist landscape and especially metrics best suited for use in urban [tourist] landscapes (Parker et al. 2001).

Indicators may provide input into management 'what-if' scenarios, signalling the more essential environmental, economic and socio-cultural impacts of a heavy development (Briassoulis 2002) and therefore show problematic aspects of tourism development (Foronda-Robles & Galindo-Perez-de- Azpillaga 2012).

The main aim of this research is the analysis and assessment of fundamental structural elements and their interrelationships, in a tourist landscape through time, especially with the aid of quantitative methods and tools. More specifically, to describe long-term spatio-temporal landscape change using a group of landscape indicators and relative metrics in order to understand the formation of the Greek coastal tourist landscape and its transformation in time. The proposed indicators were formed on the basis of the most crucial and most common impacts on the morphology of the tourist landscape, namely urbanization, fragmentation of space, land use multifunctionality, road network extension and deterioration of views. Emphasis was given to the morphological appearance, since landscape morphology constitutes a product of variable natural and human impacts, thus becoming a mirror of the human imprint upon the land. Landscape morphology is the first and foremost aspect of place (identity) construction and representation, involved in tourism consumption, advertizing, recording and development, broadly speaking.

This goal was accomplished through the following specific objectives, which were:

(1) To develop a framework of tourist landscape indicators based on existing landscape metrics and GIS analysis techniques such as viewshed and spatial statistics. To use the above framework to describe quantitatively the landscape spatial structure.

(2) To apply the above framework to different time snapshots of the tourist landscape in order to quantify its transformation in terms of space and time thus detecting changes for a period of 20 years. The test area for this research was the coastal landscape of Kefalos on the island of Kos, Greece, in 1981, 1995 and 2002. A detailed description of our *a priori* knowledge about this area is provided in the next section.

Methods

Study area

The (type of) tourist landscape under study, here, was the most commonplace category of coastal summer resort landscapes, encountered in tourist regions around the world, typified by a beach and some kind of small- or medium-scale urban settlement, as well as tourism infrastructures of various sorts. The study area, Kefalos bay, is situated in the southern part of Kos Island, which is located in the south-eastern Aegean Sea, opposite to the coast of Asia Minor, at the entrance of Halicarnassus Gulf (Figures 1 and 2). Until the early 1970s, Kefalos was an agricultural region with relatively intensive agriculture and indigenous species of reeds and sedges in the river plains. With the establishment of Club Mediterranee in 1980, organized (package) mass tourism gradually gained a stronghold, as the seaside started being occupied by bungalows, apartments, 'tavernas' and cafeterias. In 1990, tourism development slowly extended towards the interior of Kefalos valley. Land use changed in the form of growing urbanization and abandonment of agriculture seems to be the main transformation factor for the area and its landscape. The interest in this particular area was that it is based on the mixed model of large tourist hotels (such as the Club Med), local family units and a moderate state of tourism development. This is typical of many tourist areas in Greece and represents an intermediate case between extreme cases of either completely tourist or completely rural landscape.

Data pre-processing

In order to capture, as clearly as possible, the tourist transformation of this coastal landscape, black and white aerial photographs of a scale 1:30,000 were scanned at a resolution of 1000 dpi for the years 1981, 1995 and 2002. The 1980s were a transformative decade for the study area; thus, capturing the state of the landscape at the beginning of this decade was considered very important. The second date (1995) was chosen as indicative of the time when tourism development and landscape changes had become very noticeable during our study period. The final date of 2002 marked the end of our fieldwork research and the establishment of an evolving life cycle for Kefalos (personal observation, 2012).

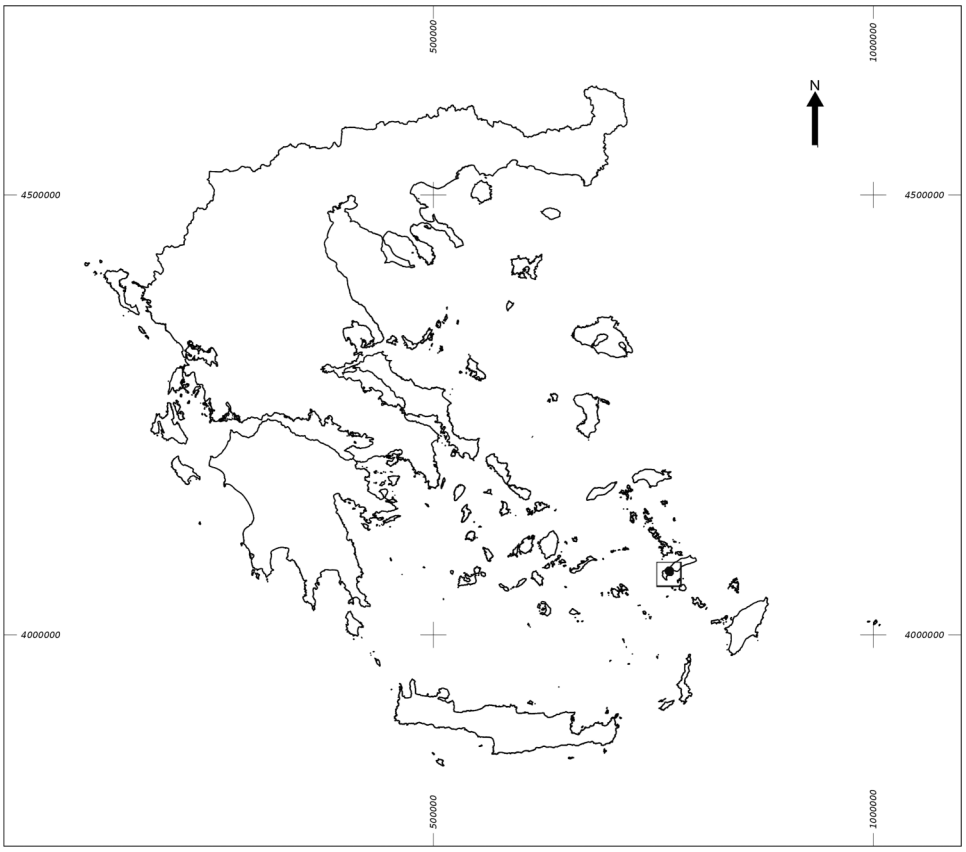

Figure 1. Location of the study area.

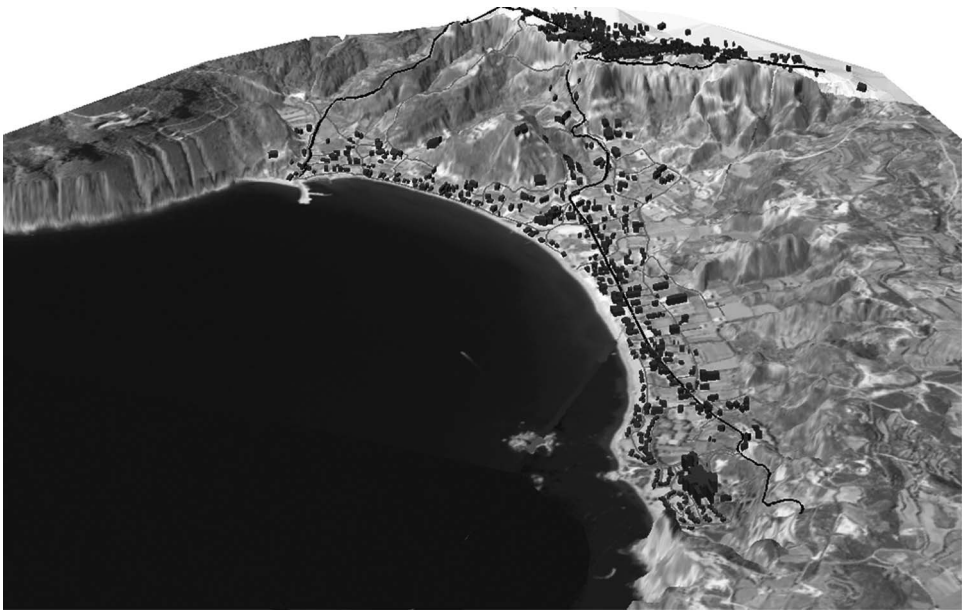

Figure 2. Perspective view of the study area of Kefalos (exaggerated).

In order to create the Digital Terrain Model (DTM) of the area, topographic maps (1:5000) were scanned and their contour lines were digitized at a 20 m interval. A triangulated irregular network (TIN) based on Delaunay criteria was used in order to produce the final DTM. All GIS layers were georeferenced to the Greek national grid EGSA 1987. Aerial photographs were orthorectified, using the DTM created above, topographic maps and the corresponding camera calibration files. The georeferenced maps, the orthorectified aerial photographs of the three time periods (1981, 1995 and 2002) and fieldwork (questionnaires and *in situ* identification) were subsequently used to derive

land uses and transportation networks (digitized), through photo-interpretation.

Landscape indicators

The derivation of the proposed landscape indicators was based on a methodological framework (Gkoltsiou & Terkenli Forthcoming 2013) which constitutes of two main axes, the elements of analysis and the qualitative, quantitative methods and tools. The analysis of tourist landscape elements concluded with two basic classes: (1) human-made elements and (2) natural elements. Built or human-made elements include: (1) those targeted towards or specified for touristic use (i.e. hotels, B&B), (2) those belonging to tourist attractions and (3) those forming the basic infrastructures of a tourist destination area (road networks, electricity, water systems, etc.). Natural elements comprised: (1) purely physical environmental elements, such as water, air, soil and vegetation, (2) vegetation species (indigenous of not) surrounding the tourist infrastructures and (3) geographical particularities and tourist attractions in and of themselves.

A landscape analysis of existing methods and tools, by presenting a combination of structural indicators and qualitative landscape assessment methods, concluded in the development of tourist landscape structure indicators. The resulting proposed set of indicators – tailored to various types of tourist landscapes – was formulated on the basis of the two landscape aspects which comprise landscape structure: landscape composition and landscape configuration – a classification scheme borrowed from landscape ecology.

The selection of these indicators and their respective classification scheme rested on the assumptions that: (1) the complexity of landscape elements, shapes and sizes is indicative of the degree of human intervention in nature (Forman 1995, p. 139), (2) the more developed an area for tourism purposes, the higher the degree of its network connectivity and the larger the percentage of its landscape occupied by tourist infrastructures and (3) the spatial configuration of landscape elements and land cover types expresses landscape evolution and transformation at a specific place, during a specific time period.

The quantitative nature of these assumptions, as well as the formal/morphological character of the landscape structural characteristics (landscape composition and landscape configuration) led us to adoption from landscape ecology of our proposed set of tourist landscape indicators: (1) percentages of land uses and number of patches, (2) shape complexity of land cover types, (3) building density, (4) spatial distribution of built elements in the tourist landscape, (5) degree of development of the transportation network and degree of connectivity and (6) degree of visibility towards the seashore (Table 1).

Table 1. Proposed landscape composition and configuration indicators and their relative metrics for tourist landscape analysis.

Tourist landscape structure indicators	Landscape/spatial metrics
1. Percentage of touristic and non-touristic land uses and number of patches	Percentage for each land use (from thematic maps) and NP (number of patches)
2. Shape complexity of land cover types	Patton's shape index (DI)
3. Buildings density	Kernel density, patch density
4. Spatial distribution of built elements in tourist landscape	Nearest neighbour distance index
5. Degree of development of the transportation network and connectivity	Indices α, γ
6. Degree of visibility towards tourist landscape of interest (seashore)	Viewshed (number of observers who can see the point in question)

Land use/cover

The percentage of land uses in a tourist landscape was one of the most important landscape indicators considered for the assessment of the landscape's composition, since it affects the transformation of the tourist landscape, depicts the general tendency of change and through mapping indicates the geographical distribution of these land uses. In order to calculate the above indicator, thematic maps for the time periods 1981, 1995 and 2002 were produced using orthorectified aerial photographs and photo-interpretation. The total percentage of land use change and the percentage of each category were quantified by a change matrix for the periods of 1981–1995 and 1995–2002.

These statistics helped us to understand tourist landscape evolution, for which it was crucial to have explicit knowledge of the components of tourism development, and, more specifically those relating to the tourist landscape (Inskeep 1991).

A similar indicator was the number of patches (NP) for each category, which when compared through different time periods, could provide information about the fragmentation of the landscape as well as about the size of each type.

Land use/cover class shape complexity

A basic indicator for the assessment of the attributes of the elements and land cover types of a tourist landscape was also the shape complexity (Forman 1995) of tourist elements. According to Forman (1995), the analysis of shape becomes quite useful in the prediction of the present and future landscape situation; an analysis that may be supported by Patton's shape index and its change through time. Patton's (1975) shape index describes the relationship between patch area and boundary perimeter as shown below:

$$\mathrm{SI} = \text{Gap perimeter}/2^{*}\sqrt{\text{Gap area}^{*}\pi}. \qquad (1)$$

The above ratio provides useful information about the potential edge effect that may be present in a specific patch.

The out coming value is often standardized to a simple Euclidean shape (e.g. circle or square with index equal to 1), for easier interpretation (Koukoulas & Blackburn 2004).

As was expected, human activities tend to introduce normality and homogeneity in the landscape, producing uniform and elongated shapes (Forman 1995; O'Neil et al. 1988; Turner & Ruscher 1998, in Wrbka et al. 2004). Therefore, in landscape analysis, as the geometrical complexity of land cover types decreases, intensification of tourist land uses tend to increase and landscape heterogeneity tend to decrease (Odum & Turner 1989; Alard & Poudevigne 1999; Hietala-Koivu 1999 in Wrbka et al. 2004). In this piece of research, we calculated the shape index for each patch and for the whole land use/cover class the distribution of values was available. Here, we discussed changes to the average shape complexity for each class.

The density of the built elements

The density of human-made or built elements comprised an important urbanization indicator for the tourist landscape, which constituted not only of a structural index but also a functional one, describing the density of coastline urbanization along the seashore and disruption in the continuity of the tourist landscape.

In tourism, density refers to the number of accommodation units per spatial unit, which to a great extent determines the overall character of the development (Inskeep 1991, p. 311). In the current study, the most appropriate metric for the quantification of building density was patch density (PD), applied in landscape ecology (McGarigal et al. 2002),

$$\mathrm{PD} = (n_i/A)\ (10,000)\ (100)\,, \tag{2}$$

where n_i = number of patches of patch type (class) or landscape I, A = total landscape area (m^2).

We also employed a kernel density estimator which indicated the main trends and intensity in space. The kernel estimation can be conceptualized as a moving function usually in the shape of a circle or square that is applied over a fine grid of locations in the area of interest and 'visits' each point in this fine grid. Distances to each observed event that lies within the region of influence (e.g. within a radius r for a circle) were measured and contributed to the intensity estimate of the origin according to how close they were to the origin.

The notation of Bailey and Gatrell (1995) was followed here to express the kernel density estimation $\lambda_\tau\,(s)$:

$$\lambda_\tau(s) = \frac{1}{\delta_\tau(s)} \sum_{i=1}^{n} \frac{1}{\tau^2} k\left(\frac{(s - s_i)}{\tau}\right) \tag{3}$$

with s representing a location in the grid covering the study area and s_i representing the location of each observation. $k()$ is known as *kernel* and the researcher can choose from a list of symmetrical to the origin bivariate probability density function, while τ is the bandwidth (radius) and $\delta_\tau(s)$ is an edge correction factor. For this study the quartic density function was used as kernel, with τ equal to 100 m. This bandwidth was closely related to the development of the specific study area and thus capable of showing the main trends of development.

Spatial distribution of built elements in the tourist landscape

According to research findings by Geoghegan et al. (1997), the spatial distribution of built elements in the landscape severely affects its value. The spatial distribution of tourist elements offers a critical measurement of landscape urbanization, the degree and the type of tourist development, and the scale and the degree of maintenance of local landscape identity (Herold et al. 2005).

One of the oldest-applied distance statistics, because of its functionality and ease to understand and calculate, is the *nearest neighbour index* (*ENN*, Clark & Evans 1954). This index compares the average distance from the closest neighbour to each point at a random distance. With the aid of nearest neighbour index (ENN), it was possible to analyse element patterns (clustered, evenly spaced, random) and, therefore, develop a clearer idea of landscape structure.

More specifically, if the observed average distance is about the same as the mean random distance, then this ratio will take the value of 1.0. If the observed average distance is smaller than the mean random distance, that is, if points are actually closer together than would be expected on the basis of chance, then the nearest neighbour index acquires a value of less than 1.0, providing evidence for clustering. Conversely, if the observed average distance is greater than the mean random distance, then the index will assume a value greater than 1.0, evidence for dispersion, whereby points are more widely dispersed than would be expected on the basis of chance. In order to give more detailed information about the spatial distribution of tourists' uses, we subdivided them into three categories: tourist accommodations, club-restaurants and commercial uses.

Degree of network connectivity

The degree of network connectivity was another significant tourist landscape indicator, we employed, since network development greatly affects accessibility towards tourist attractions. According to Lynch (1993), the analysis of linear spatial elements, such as road network, constitutes one of the basic axes of landscape analysis. Transportation network development and connectivity are indicators of the development of the area and the transformation of its landscape through time (Bradford & Kent 1977). These indicators were valuable tools for the comparison of different networks, or for the follow-up of a particular network through time (Bradford & Kent 1977).

The above indicators refer to the structure as well as the function of the landscape. Function basically concerns the constitutional dimension of connectivity, in contrast to structure, which refers to natural connectivity in a tourist place. The greater the tourism development, the greater the degree of connectivity in the landscape studied (Pearce 1995).

The most common indices to describe the evolution of transport networks were the alpha (α) and gamma (γ) indices.

The alpha (α) index is the ratio: *existing circular connections/max number of circular connections*, and varies between 0 and 1 (maximum connectivity).

$$\alpha = u/(2v - 5), \tag{4}$$

where e = number of edges, v = number of nodes, $u = e - v + s$, s = number of unconnected graphs.

The gamma (γ) index is the ratio: *existing links/max number of links* and presents the percentage of connectivity for a given network,

$$\gamma = e/v. \tag{5}$$

These two indices when interpreted together can help us understand the way (circular or radial) a network is developed. For example a large gamma (γ) index which is not followed by a large alpha (α) index indicates a possible radial development.

Degree of visibility towards points of interest

Building development along the coastline affects quite severely (by blocking) the views towards the sea and, as a result, alters landscape character and both visitor's and local's *sense of place.* One of the most fundamental elements analysed in a LCA is visibility towards tourist attractions. Visibility has already been much investigated by landscape researchers (landscape architects, planners, etc.), within the frame of visual landscape assessment methods (Porteous 1996). Weinstoerffer and Girardin (2000), used 'openness', for this purpose, as an indicator, defined by the ease with which an observer can obtain an extensive view over the landscape. Visibility ratings were considered one of the most basic tourist landscape indicators, due to the crucial role that viewing plays in the tourist experience and the enjoyment of the landscape.

Our visibility index was based on techniques of visibility analysis deriving from the GIS environment (Lynch & Gimblett 1992; Gulinck et al. 1999; Germino et al. 2001; Wing & Johnson 2001). The proposed indicator referred to the visibility ratings comprising a measure of how many times the seashore was seen from all the possible viewing points-nodes of the transport network system.

For purposes of index calculation, and, therefore, estimation of the visual impact of tourism infrastructure on tourist landscape viewsheds were estimated for all the time periods of the study, using the DTM created earlier. The selection of the groups of viewpoints for visibility analysis rests on the following criteria: (1) critical points of circulation to which tourists have easy access and (2) critical points of circulation from where tourists have visual access towards various directions (also suggested by Fairweather & Swaffield 2001). Apart from the qualitative dimension of this indicator, there also exists a significant quantitative one: for each visibility category (number of observers that have eye contact with a specific point), the visibility area may also be calculated in acres or square metres, via viewshed maps.

Results

Percentage of land uses and number of patches

According to the results, in 1981 arable land occupied the largest part of the landscape (67.23%), whereas it decreased in 1995 and 2002 (Figures 3 and 4). On the other hand, tourist accommodations, settlement, olive groves and residual spaces demonstrated a significant increase in size from 1981 to 1995 (Figures 3 and 4). Meanwhile, planting structure, club restaurants and commercial uses, remained almost unchanged, although club restaurants and commercial uses first appeared in this coastal landscape in 1995 (Figures 3 and 4).

A decomposition of landscape changes and interchanges was shown with the help of a change detection matrix for each period. The change detection matrix for the 1981s–1995s periods (Table 2) showed that during this period, settlements occupied the largest part of the study area and only a small percentage of them were turning to tourist accommodations.

As shown in Table 2, 17.5% of residual spaces converted to arable land, 11.8% converted to tourist accommodations and 10.6% converted to planting structure. 27.4% of olive groves were turned into arable land and 11.3% to residual spaces. 53.4% of arable land remained the same, 20.7% converted to residual spaces, 11% to olive groves and small percentages to tourist accommodation, settlement and planting structure. Similarly, planting structures demonstrated a large percentage of non-change (76.3%).

For the period of 1995–2002 the change matrix in Table 3, presented a large percentage of non-change in planting structure (99.6%), in residual spaces (98.4%), in olive groves (86.7%) and in arable land (91.4%). Specifically, olive groves converted to arable land (10%), residual spaces (2.5%) and to tourist accommodations (0.5%). The number of patches for the years 1981, 1995, 2002 shown in Figure 5 with settlements and tourist uses, showed a dramatic increase in the expense of arable land and planting structures.

Land use/cover class shape complexity

The complexity of the circle is a good benchmark for Patton's index with shape complexity of 1. The square has a shape complexity index of 1.13 interpreted as 13%

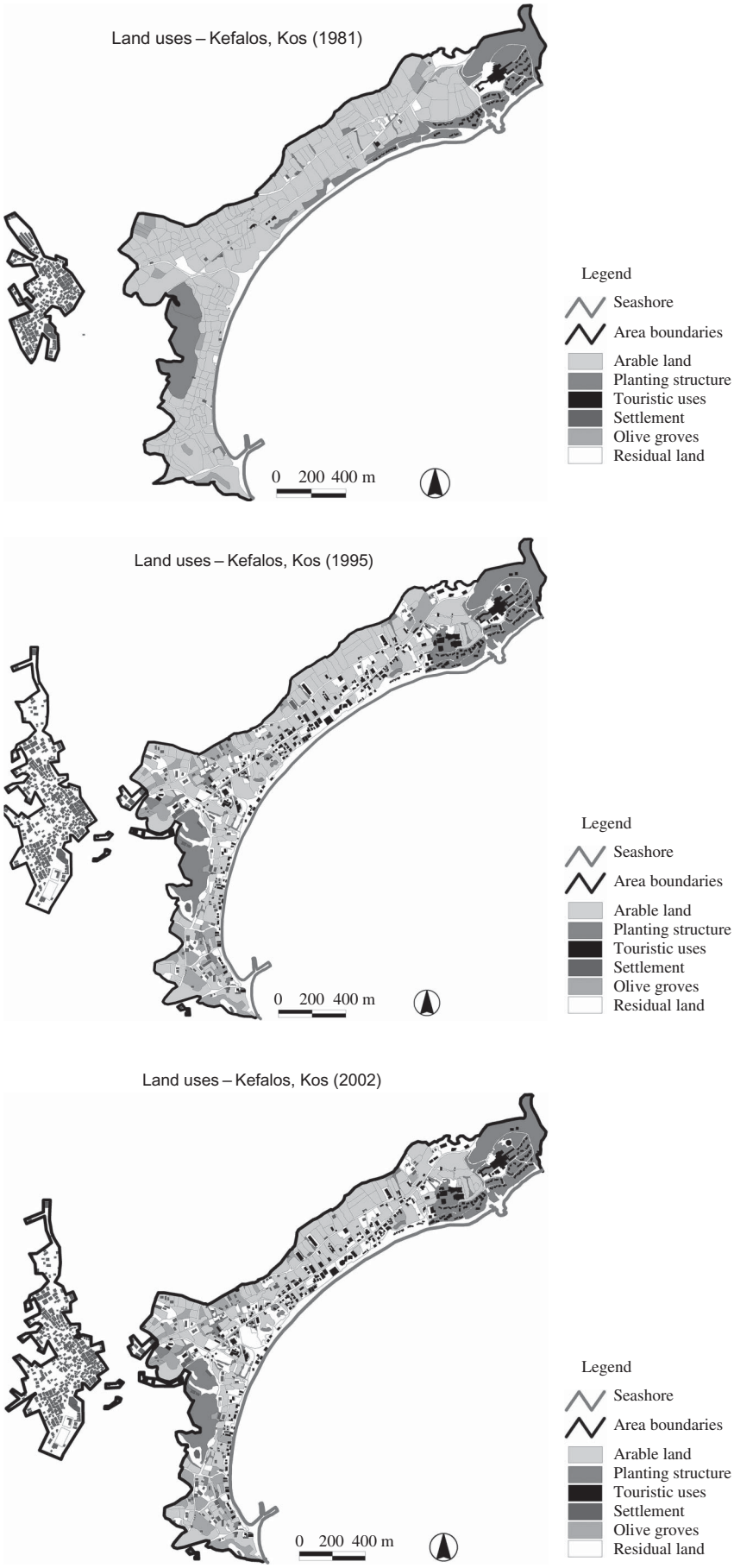

Figure 3. Temporal layer maps of the distribution of land use categories in the district of Kefalos for the years 1981, 1995 and 2002.

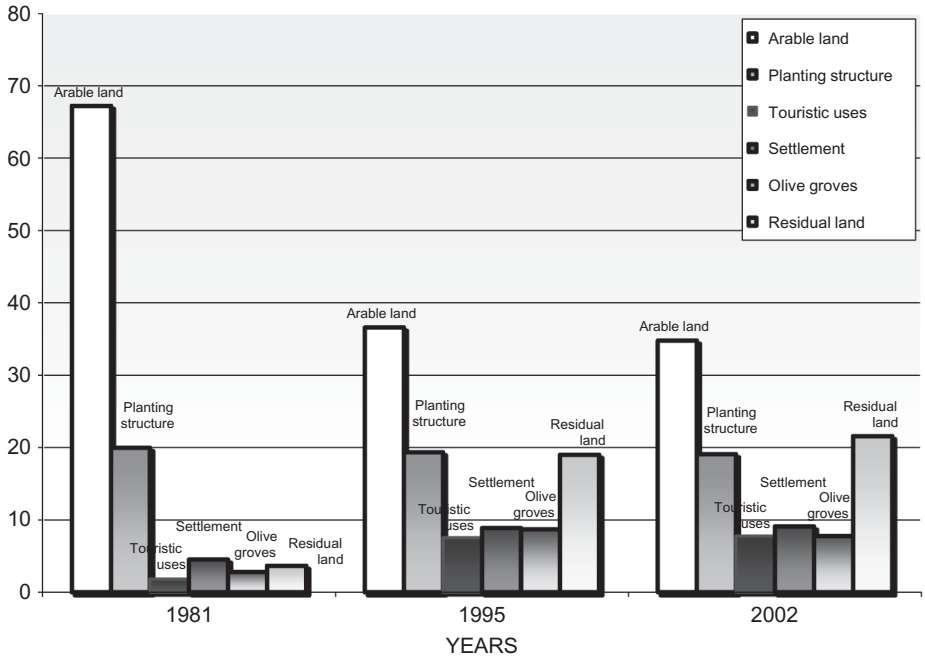

Figure 4. Distribution of land use categories in the district of Kefalos for the years 1981, 1995 and 2002.

Table 2. Land use change matrix (1981s–1995s).

		Land uses, year 1981					
		Tourist accommodations (%)	Settlement (%)	Planting structure (%)	Residual spaces (%)	Olive groves (%)	Arable land (%)
LU year 1995	Tourist accommodations	**91.7**	3.2	4.6	11.8	0.5	6.3
	Settlement	0.0	**95.3**	1.1	0.3	7.3	3.1
	Planting structure	*6.0*	*0.0*	**76.3**	10.6	0.5	5.6
	Residual spaces	*0.7*	*0.7*	13.5	**59.3**	11.3	20.7
	Olive groves	*0.0*	*0.1*	0.8	0.4	**48.7**	11.0
	Arable land	*1.6*	*0.7*	3.7	17.5	27.4	**53.4**

Note: Italics indicate false transitions.

Table 3. Land use change matrix (1995–2002s).

		Land uses, year 1995					
		Tourist accommodations (%)	Settlement (%)	Planting structure (%)	Residual spaces (%)	Olive groves (%)	Arable land (%)
LU year 2002	Tourist accommodations	**98.3**	0.3	0.0	0.6	0.5	0.3
	Settlement	0.2	**97.9**	0.0	0.3	0.3	0.5
	Planting structure	*0.8*	*0.0*	**99.6**	0.0	0.0	0.0
	Residual spaces	*0.6*	*1.1*	0.0	**98.4**	2.5	7.3
	Olive groves	*0.0*	*0.3*	0.0	0.7	**86.7**	0.5
	Arable land	*0.1*	*0.4*	0.3	0.0	10.0	**91.4**

Note: Italics indicate false transitions.

more complex than circle. This index was found to range from 1 to 1.15 without major differences over the years for the arable land patches (Figure 6). The irregularity of complexity for the natural elements such as structure planting had a mean of 2 and it was almost stable for the time period 1981–1995. During the years 1995–2002 olive groves have remained stable with regard to their shape complexity.

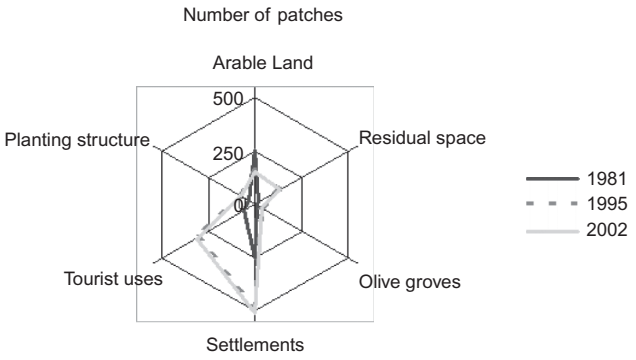

Figure 5. Number of patches of land uses for the years 1981, 1995 and 2002.

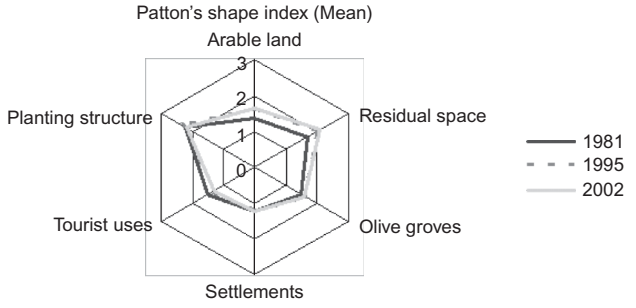

Figure 6. Patton's shape index (mean) for land use patches for the years 1981, 1995 and 2002.

However, interesting changes were noticed among the tourist accommodations. In 1981, the mode of the distribution of patch shape complexity index was 1.25 and there was a noticeable distribution of great irregularity of shape. In 1995, more family hotels were built and the mode of patch shape complexity index was around 1.50.

Lastly, residual land presented a variety of the patch shape complexity index in 1995, in comparison to 1981.

The density of built elements

The land uses with the highest values in the PD index for the time period 1981–2002 were tourist accommodations and settlement (Figure 7). Residual land, cultivated and arable land corresponded to middle values of density, while olive groves, commercial uses and club-restaurants presented the lowest values of density.

Kernel density estimations produced for spatial distributions of tourist accommodations showed that the intensity of points – hotels – in 1981, was higher in the area of Club Med (Figure 8). Areas of higher density were shown in lighter tones and vice versa (those with lower densities are shown in darker tones). In 1995, kernel density surfaces expanded all along the seafront up to the old port. Tourist accommodations presented higher densities towards the area of Club Med, in comparison to clubs and restaurants which showed higher densities in the area of the old port (not shown). In 2002, there was no noticeable difference in accommodation infrastructure densities since 1995.

Spatial distribution of built elements in the tourist landscape

The spatial distribution of built elements was measured with the nearest neighbour index (ENN) (Clark & Evans 1954) (Figure 9). For each year (1981, 1995, 2002) the above metric presented a chronological tendency for tourist land uses (tourist accommodation and club-restaurants) of less than 1, whereas, results of the same metric for built land uses presented an increase of values towards 0.50.

Degree of network connectivity

The degree and manner of connectivity in the transport network system of Kefalos, as presented in Table 4, was analysed with the aid of α and γ indices. The number of nodes and links of the transportation network increased significantly between the years 1981 and 1995 and remained stable between the following years until 2002.

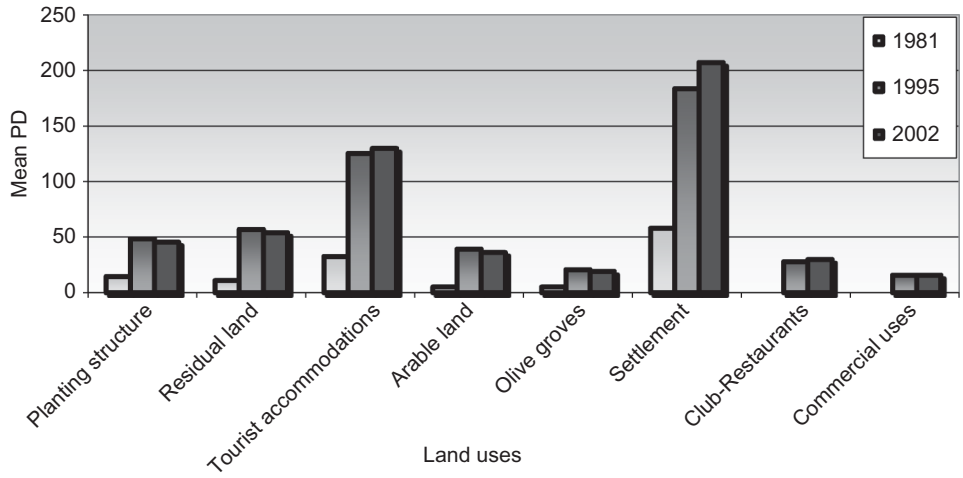

Figure 7. Distribution of PD for all land uses by year.

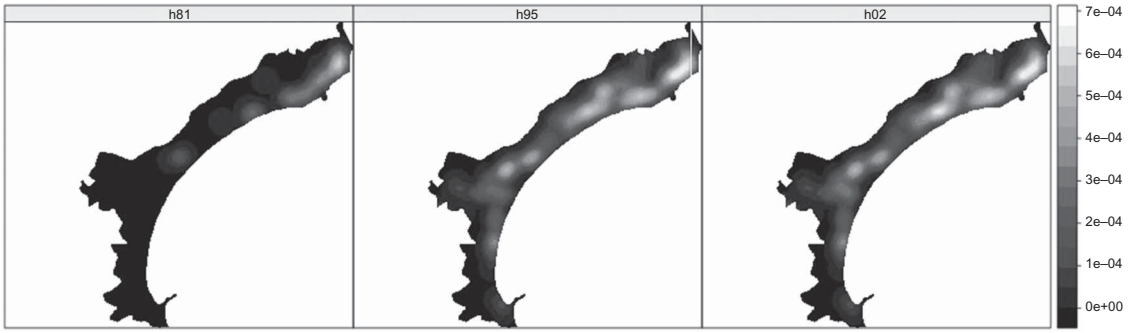

Figure 8. Kernel density estimations for tourist accommodations in Kefalos – h81: 1981, h95: 1995 and h02: 2002. Quartic kernel functions used with bandwidth 100 m (units represent point per square metre).

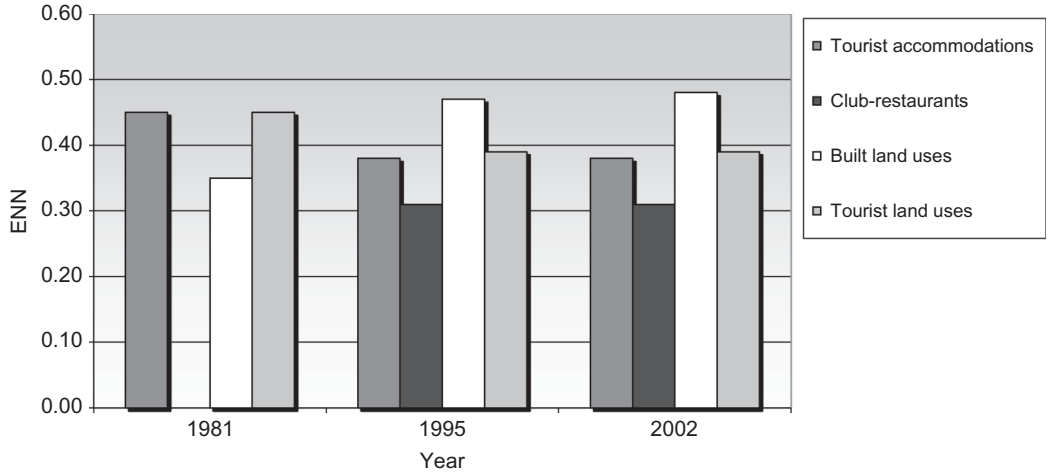

Figure 9. Nearest neighbour index (ENN) results.

Table 4. α and γ indices in 1981, 1995 and 2002.

Years	Number of nodes	Number of links	Alpha (α) index	Gamma (γ) index
1981	70	87	0.07	0.20
1995	145	170	0.09	0.39
2002	145	170	0.09	0.39

This is why, α index and γ index results demonstrated an increase of their values for the time period under study (1981–2002).

The following maps depicted the gradual development of the road network system, in the time period 1981–1995 (Figure 10).

Degree of visibility towards points of interest

The degree of visibility was assessed using viewsheds for the years 1981, 1995 and 2002 as derived from the analysis of digital elevation models (DTM) and observer points (Figure 11). Viewsheds were used essentially, to calculate which locations (i.e. grid cells) in a digital elevation model could be connected by means of an uninterrupted straight line to a viewpoint location within any specified distance. Each viewshed was computed from the nodes of the primary and secondary road network, because these were considered the most critical points of circulation, where tourists have easy visual access towards various directions of the Kefalos landscape.

The most interesting results of visibility index analysis were produced from viewpoints (nodes) along the main transport network system, as shown on the following maps, since building density and distribution were more intense.

Discussion

The tourist landscape of Kefalos and its transformation, during our study period (Figures 3 and 4) as revealed through the indicators presented above, was an area at a stage of moderate tourism development. It was characterized by linear urbanization along the seashore, moderate abandonment of agricultural land, high density of tourism structures and a simple main road network supplemented by a more complex network of secondary roads. The landscape's transformation through time was characterized by an absence of tourist land uses in the 1970s with the first establishment (Club Med) appearing in 1980. Between 1980 and 1990, the tourist landscape of Kefalos was transformed through very different stages of development both ectatic and entatic. Towards 2002, our results show a slower

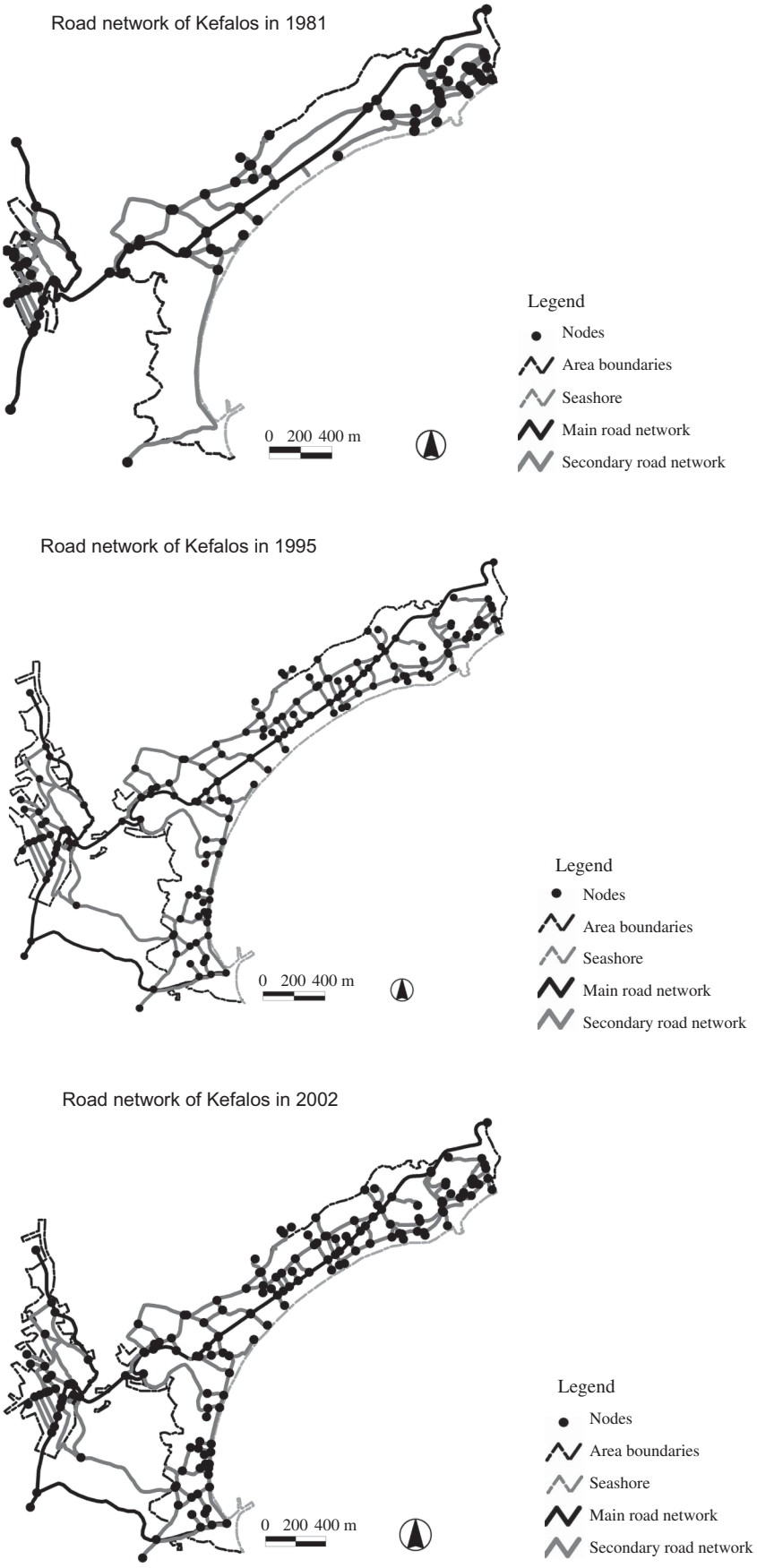

Figure 10. The development of Kefalos' road network from 1981 to 2002.

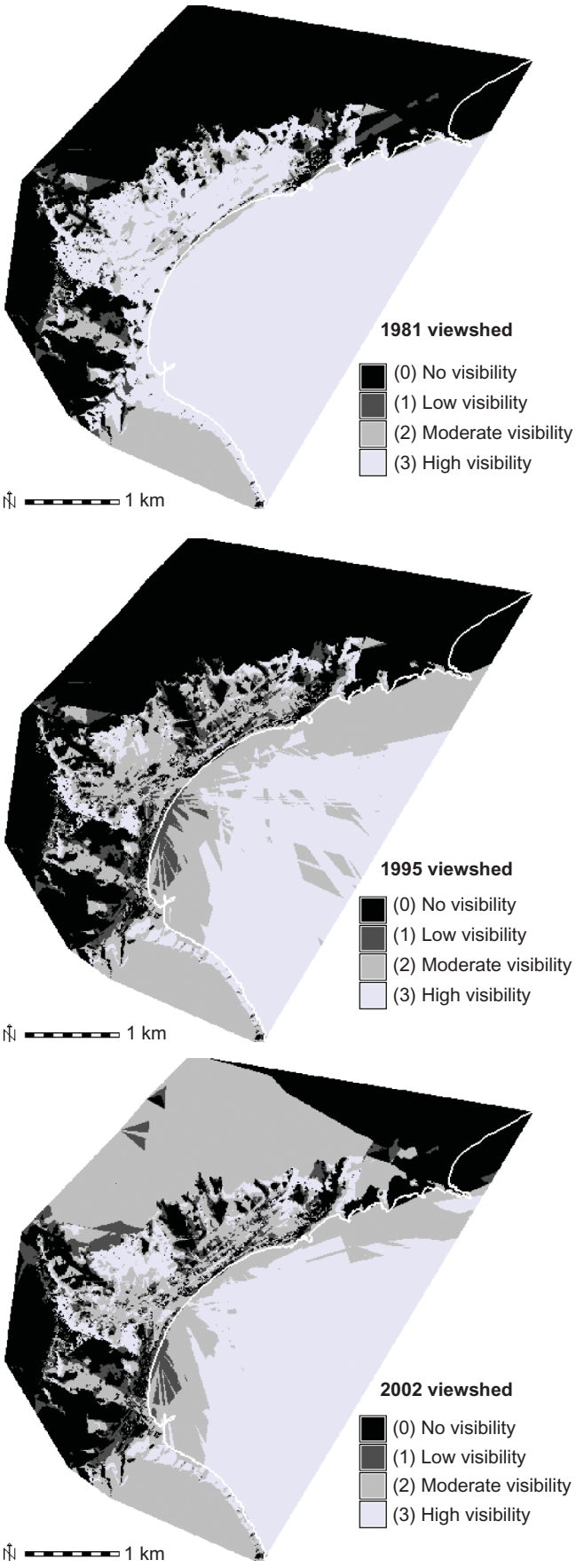

Figure 11. Viewsheds from the main network system in 1981, 1995 and 2002.

transformation of the landscape which entered a stabilization phase. Taking into account the potential for more development, we postulate that this tourist area's life cycle was at a middle stage (personal observation, 2012).

Land use composition (in percentages) as well as the number of patches (NP), showed an increased urbanization and abandonment of arable land until 1995 (Figure 5). From 1995 until 2002, only slight changes could be detected. Based on our results of limited land cover changes and network development (Tables 2–4), for the period 1995–2002, the landscape of Kefalos was showing a trend towards stabilization. This could be due to changes in tourists' preferences, to loss of aesthetic value because of the replacement of natural elements with built ones, and to the change or disappearance of the authentic natural and cultural poles of tourist interest, responsible for the area's attractiveness. Also, the causes of the above land use changes, may lie in external factors such as financial ones (e.g. cheaper tourist packages from tourist agents for the hotels on the Turkish coastline) or globalization trends, a new cultural economy of space (homogeneity in tourist services and infrastructures irrespective of their landscape settings) (Terkenli and d'Hauteserre 2006).

Changes in the mean values of Patton's shape index for all land uses were shown in Figure 6. This index may be used in order to quantify possible impacts in the environment of the study area. For the tourist uses, we detected a small decrease of the mean value from 1981 to 1995 and for the arable land an increase. This was because after the Med club, which was a large and complex establishment, urban development occurred in the form of small settlements of relatively similar complexity (Figure 6) and from the frequency distributions of shape index, not shown here due to space limitations. However, this happened to the expense of arable land and residual space, increasing the edge-to-edge contact of the two uses and thus the shape complexity of the remaining arable land and residual area. Therefore this index when interpreted through time, in parallel with the number of patches and land composition, gave us a very good quantitative description of the transformation of the tourist landscape.

The changes in density of built elements and in their spatial distribution are important indicators of the transformation of the tourist landscape towards urbanization. Density was estimated globally by PD (Figure 7) and locally by a kernel density estimator (Figure 8). The spatial distribution was measured by the nearest neighbour index (ENN) (Figure 9). These indices alone were another measurement of spatial heterogeneity of the tourist landscape.

The spatial distribution of land use patterns in the tourist coastal landscape of Kefalos, in combination with increased building density, contributed to a decreased visibility of the tourist attraction, and to the fragmentation of the initial landscape which was an early sign of loss of identity. In this particular case study, the spatial distribution of hotels and tourist accommodations seemed to affect organized (package) mass tourism development, since most of the latter appeared where the big concentration of hotel units were originally established (east side of the bay-Club Med). During our study time periods (1980–2002), land value did increase due to tourism development and increase of tourist uses (participant observation, 2004), a trend, however, that must be verified over a longer time period and a larger areal extent, in order to be fully substantiated.

Alpha (α) and gamma (γ) indices, helped us to understand the way that the transportation network system developed, which, in this case, the low values of alpha (α), with relatively high values of gamma (γ) pointed to a radial rather than a circular network development (Table 4). Following tourism evolutionary models such as Butler's (1980), Miossec's (1976), Oppermann's (1993) and Gromsen's (1981), during the first stages of the tourism development period for Kefalos, in 1981, small dispersed poles of tourist activity appeared along the seashore. As the tourism industry expanded, an increasingly complex hierarchical system of transport networks evolved. In 1995, two basic growth poles developed (the old port and Club Med) with secondary roads connecting them. During the period 1995–2002, the secondary roads became primary ones, and the road network expanded along the coastline and towards the hinterland (Figure 10).

Visibility analysis with the aid of a viewshed surface generation constituted an objective analytical method in lieu of conventional field survey affected by observer subjectivity bias. When the observer approached the sea the values of the index increased and as the distance from the seashore increased, the values of the index decreased. One of the advantages of using viewsheds was that they might substitute field survey in areas that were not accessible to the observer given that a high resolution DTM was available. The changes in visibility from 1981 to 1995 were another objective indicator of the degree of the landscape's transformation. In 1995 and 2002, visibility was strongly affected by building characteristics, density and position of all sorts of built elements along the coast (Figure 11). The linear en block development of tourist uses obstructed the views towards the sea and left very few open view-fields from particular viewpoints such as open spaces and streams. The application of the above set of indicators helped us understand the history of landscape transformation due to tourism development and, as a result to comprehend its current state. They represent a valuable instrument, in extracting, synthesizing and processing information, not readily obvious through map-reading and field surveys. In combination with the use of GIS, they may contribute towards landscape evaluation in Greek spatial planning, for purposes of tourism development and overall local community well-being. Tourist landscape assessment with the assistance of indicators, such as was attempted above, introduces objectivity, reliability and replicability to tourist landscape analysis. It offers better understanding of tourist behaviour, as well as supports local behaviour and political decisions, towards more balanced spatial tourist flows and equitable, well-balanced tourism growth, at the regional level.

For instance, our proposed methodology/indicators may be useful in the formulation of land use and environmental policy, with a bearing on the landscape, cultural and architectural heritage protection and enhancement, as well as in the drafting of design guidelines, towards the spatial organization of tourism development. One such case, currently under implementation is the Greek Special Framework for Spatial Planning and Sustainable Development for Tourism, which concerns the efficient protection of landscape, through an assessment of the value and protection potential of its character, its particular characteristics and of the diversity and quality of the Greek landscape from various human activities (Ministry of Environment Energy & Climate change 2007). In regional planning, this set of indicators may support research for the determination of effective investment, within the region of tourism development, for the exploration of the regional background for new resort planning and for the demonstration of the impact of a single establishment in the larger area, in view of local/regional resource protection and enhancement.

Nonetheless, the interrelationships of the above landscape structure indicators with socio-economic indicators merits further research, in the future, in order to decode and interpret the social, economic and cultural characteristics of a tourist landscape, as well as to compose an integrated system of both structural and socio-economic indicators, also encompassing indicators to assess the observer's feelings, perceptions and assigned values to the viewed and visited landscape (a holistic system of function, management and value indicators (Kadlecova et al. 2012)).

Conclusions

With the aid of the indicators presented in this paper, the location, composition, density, spatial heterogeneity (shape complexity and fragmentation of visible space) and spatial arrangement of tourism units and infrastructures were assessed, together with the degree of development of the road network and the degree of visibility towards the seashore, in our effort to evaluate landscape transformation and consequently the stage of tourist development in the particular landscape. As noted also by Pirselimoglu and Demirel (2012), in Trabzon Çalköy, high plateau settlement in Turkey, new infrastructure required for tourism will bring additional pressure to bear on the environment.

The innovative aspect of this research is that in the field of tourism and specifically in the assessment of tourism landscape, for the first time, lies in the proposed methodological framework and its corresponding set of landscape indicators. Furthermore, on the basis of all previously presented results, the described landscape indicators proved particularly valuable in understanding the spatial evolution of a tourist landscape, capturing its evolution at the exact time of the establishment of the evolving tourism life cycle of Kefalos. One area of such potential applicability of our methodological framework and related indicators therefore is its contribution to the analysis, interpretation and recording of such changes to the tourist landscape, significantly aided by evolutionary models such as Butler (1980), Miossec (1976), Opperman (1993) and Gromsen (1981). Further significant use of our methodology/indicators lies in the extension of its employment in monitoring the development of the tourist landscape, as a management tool, towards set goals and pre-determined purposes. At a third level of employment of our proposed set of methodology/indicators, the latter may prove to be a useful basis, upon which to construct top-down well-informed and place-specific tourism development policy, or sustainable bottom-up supply-side management of tourism growth.

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AN INTERDISCIPLINARY ANALYSIS OF TOURIST LANDSCAPE STRUCTURE

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This article presents a new methodological framework for assessing the structure of coastal tourist landscapes, bearing the potential for development, in order to adjust to all sorts of other tourist landscapes. Through a combined application of landscape indicators, remote sensing and landscape character assessment methods, the proposed framework aims at the measurement of attributes of the state of a landscape. The paper, accordingly, proceeds from a) an extensive literature review, based on the elements and aspects of tourism and landscape that comprise the tourist landscape and on qualitative and quantitative landscape assessment methods, to b) the presentation of the proposed methodological framework and set of indicators and c) ends with a series of conclusions on the applicability of the proposed methodological framework, in a tourist landscape context.

Keywords: *Tourism, tourist landscape, landscape indicators, landscape assessment, landscape structure.*

JEL Classification: *L83, M1, O1*

INTRODUCTION

In recent years, landscape is widely recognised as a major element of national and European heritage (Council of Europe, 2000). Appreciating the cultural, ecological, environmental and social values of landscape, the European Landscape Convention encourages Europeans people and governments in landscape identification, assessment, protection, management and planning. Many landscapes are prone to tourism

pressures and environmental, economic, social and aesthetic impacts (Coccossis & Tsartas, 2001). The analysis of tourism impacts upon the landscape, and, more specifically, the alterations of its structure, examined in this paper, lie in the context of an attempt to understand better the mechanisms and processes of tourism development that have informed and continue to drive landscape transformation, through time.

Literature review shows that there is a lack of research on the analysis and assessment of fundamental structural elements and their interrelationships, in a tourist landscape, especially as regards research conducted with the aid of quantitative methods and tools (Parker *et al.* in Herold *et al.,* 2005). Landscape character assessment methods have, so far, been widely used by landscape architects, in order to analyze the state of a landscape and any changes it may be going through (Lausch & Herzog, 2002). In the field of landscape ecology, several quantitative methodological tools--specifically under the name of *landscape metrics*--have been developed and applied (Forman and Godron, 1996), while no such set of research tools exists for the urban landscape. This absence of recent research on quantitative methods for the assessment of the state and change of the spatial structure of a tourist landscape, point to the need for such a methodological framework, holistically addressing and capturing landscape morphology, in general, and landscape structure, in specific (rather than relief, texture, color, etc)--since, according to Doukelis (1998), analyzing landscape structure, facilitates the study of tourist place history, and therefore tourist place development.

This paper, accordingly, purports to fill this gap, by undertaking research in this important, yet uncharted, area and to present a new methodological framework for analyzing and assessing the structure of tourist landscapes. Through a combined application of landscape indicators, remote sensing and landscape character assessment methods, the proposed framework aims at measuring attributes of the state of a landscape. More specifically, it assesses the composition and configuration of tourist landscape elements, in an attempt to analyze landscape organization and identify possibilities of development in the tourist landscape. This goal will be accomplished, through two specific objectives, as follows:

- To identify the main landscape *components,* commonly associated with tourist landscape structure (appearance) and
- To assess the *attributes* of these components, in an effort to evaluate the appearance of the tourist landscape as a whole.

The following literature review is intended to discuss and elaborate on the two principal dimensions of a tourist landscape and their

interrelationships. It is followed by an analysis of the tourist landscape and its shaping through time and ends with the presentation of the methodological framework accompanied by a set of landscape indicators and their applied metrics. The scientific contribution of this work is discussed in the last section of the article, which puts forth the ways in which this framework may be put to use by landscape and tourism development agents, planners or other landscape stakeholders; this latter part of the article also addresses the value and relevance of this work to landscape theory and methodologies.

LITERATURE REVIEW

At the outset of our research endeavor, it was considered important to identify the two main dimensions of a tourist landscape--namely a) landscape and b) tourism--their interrelationships and the ways in which these come together, in forming a tourist landscape, at the place of destination, before, after and during the visit (Hall and Page, 2006). We, therefore, begin with a brief literature review of the theoretical background of these terms, as they apply to our study, in order extract the main attributes that comprise the structure of a tourist landscape.

-*Landscape*: Landscape is the result of the ways, in which different components of our surrounding environment – physical, biological and social—interact and become perceived. Therefore, landscape is concerned with and manifests in the various forms of the complex interrelationships between people and place.

The significance of landscape in geography was introduced by the Berkeley School of Landscape, in the 1920's. Human/ cultural geographers, such as Cosgrove (1998), have since focused on the perceptual and symbolic dimensions of landscape, instead of its visual components: "landscape is the way we see it or perceive it rather than the image or the object" (Johnston et al., 2000: 429-431). According to Wascher (1995), landscapes are dynamic systems that develop on the basis of the variable nature of human and natural procedures. Therefore, landscape is considered as a system of forms, functions and values (Wascher, 2002; Terkenli & Kizos, 2003).

On the other hand, landscape architects base their analytical perspectives on the *ways* that landscapes are structured by humans (Fry *et al.*, 2004). For landscape architecture, and specifically in landscape assessment methodologies, the term landscape refers to its visual appearance, reflecting the way certain attributes--such as scale, form and

enclosure--are combined, in order to create various landscape patterns, perceptible by the visitors (Warnock & Brown, 1998: 44-46).

Landscape ecology recognizes three basic features to a landscape, as follows (Forman and Gordon, 1996):

"1. Structure, which refers to the spatially related properties of elements of the ecosystem and their spatial interrelationship within the landscape,

2. Function, which describes the existing interaction between the spatial elements of the ecosystem, which is expressed in exchange processes of energy, material and substances, and

3. Dynamics, exhibited by the change to structures, to functions of the landscape structure and to the landscape mosaic over time" (Kronert *et al*., 2001: 114).

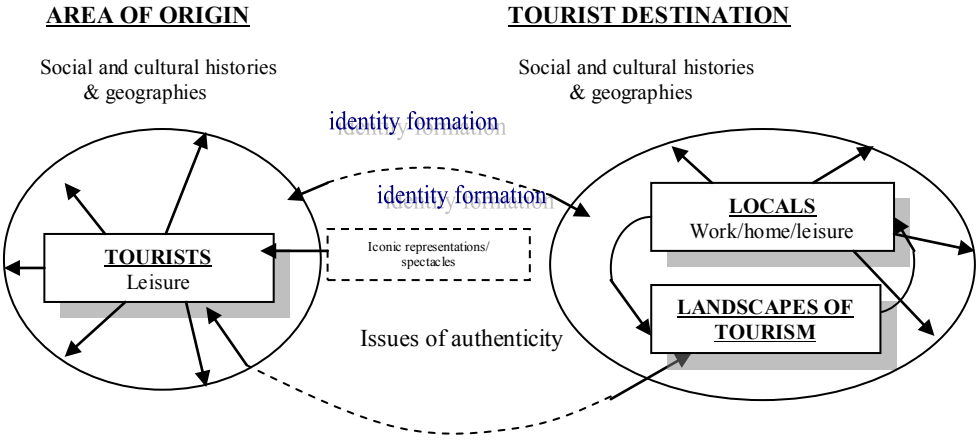
Tourism: The definition of tourism by Jafar Jafari (2003) focuses on "the study of humans away from their usual habitat, of the industry which responds to [their] needs, and of the impacts that both tourism and industry have on the host's socio-cultural, economic, and physical environments". The emphasis lies on tourism, as a compound activity, which includes travel towards, within and around a destination, for purposes of consumption, accommodation, recreation, as well as all relevant specific and general services (Inskeep, 1991; Pearce, 1989, in Briassoulis, 2002). "Mill and Morisson identify the four major parts of the tourism system, as being: 1) the market (tourists), 2) travel (transportation), 3) destination (attractions, facilities, and services), and 4) marketing (information and promotion), with each part closely linked in sequence with the other" (Inskeep, 1991:22).

On the other hand, the spatio-temporal development of seaside tourist destinations, as elucidated by the evolutionary models of Butler's tourist area life-cycle model (1980), Miossec's model of tourist development (1976), Opperman's model of tourist space in developing countries (1993) and Gormsen's (1981) model of spatio-temporal development of international seaside tourism, is deemed particularly valuable in the analysis of the tourist landscape. These models, thus, constitute an effective assessment guide, useful in the establishment of the degree, manner and direction of tourist development, at a tourist destination.

Tourist landscape: This article focuses on the tourist landscape, as the destination setting of the tourism system, and as the first axis in the construction of our proposed framework (Gunn, 1979; Mill and Morrison, 1985). Clare Gunn (1979:409) defines a landscape of tourism, as the total physical and visual environment utilized by all tourism activities, including the whole context and infrastructure of tourism development,

such as transportation, services, information, direction and, generally speaking, all such developments that attract people to a destination. Therefore, the tourist landscape incorporates the following tourist landscape elements and their interrelationships: 1) tourist attractions and activities (Inskeep, 1991; Pearce, 1995) including all natural and human-made features of destination (Jafari, 1982), 2) infrastructures, specifically developed for tourism (accommodations, food establishments, etc.), 3) environmental elements of the tourist destination (air, water, soil), 4) basic infrastructures of the tourist place, such as transportation networks , water supply, sewage, solid waste disposal systems etc, and, finally, 5) the landscape as a whole (Briassoulis, 2002).

Figure 1 The formation of tourist landscape



Source: Terkenli, 2002

On the basis of the definitions provided above, the tourist landscape emerges as the product of tourism activities, which tend to dominate an area and "infect" its appearance. In light of its easy and ready

accessibility, as well as its representational and relational properties, landscape constitutes a most significant geographical medium in the analysis of relationships that develop between tourist and visited location (Terkenli, 2002). The readiness and amenability of landscape to variable human intervention transform it into a veritable stage for consumption, play and recreation. The tourist landscape, consequently, becomes a social interface where local and global perspectives, the sides of supply and demand, production and consumption etc. come together in the ready construction and consumption of place identity (Terkenli, 2000: 185-6) (figure 1).

According to Wall (in Jafari, 1982), *tourist landscapes* are both natural and human-made, designed to serve—or products that emerge from—the accommodation of *all* needs of tourism development. The term *tourist landscape* will be adopted throughout this work, as the most appropriate and widely used medium of referring to landscapes, organized or transformed mainly through and for purposes of tourism development. More often than not, tourist landscapes are characterised by an insensitive use of space and land, closely related to tourism development; extensive rebuilding and expansion of tourist infrastructures along the seashore; uncontrolled urbanisation and multifunctional land uses; excessive road network extension; spatial fragmentation; as well as the homogenisation of landscape elements, resulting in the loss of place identity (Green & Hunter in Johnston and Thomas, 1995; Antrop, 1998; Terkenli, 2002). Due to the complexity of the tourist landscape, and particularly that of the urban tourist landscape, most research on tourism structures in the landscape has so far focused on the spatial arrangement of tourist infrastructures—the most visually apparent formal aspect of tourism development, in the landscape.

Methods and tools of analysis: Landscape assessment methods and methodological tools represent our second basic axis, in the construction of the proposed framework. In specific, our methodological framework will be developed on the basis of existing methodologies and tools and the ways in which these may be employed, for our purposes, in order to support our landscape assessment frame. Three of the most widely applied methods for analyzing visual qualities, in this broader area of research, are Landscape Character Assessment (LCA) (e.g. Swanwick, 2002), the Scenic Beauty Estimation (SBE) Method (e.g. Daniel & Boster, 1976) and the Visual Resource Management (VRM) system (e.g. Bureau of Land Management, 1980).

Among methodological tools used in quantitative landscape research, indicators present the final level of interpretation in landscape analysis

(Bartel, 2000). In the field of landscape ecology, several quantitative methodological tools--specifically under the name of *landscape metrics*--have been developed and applied (O'Neil *et al*., 1988; Turner, 1991; Mc Garigal and Marks, 1995; Mc Garigal *et al*., 2002). In research fields outside landscape ecology and across various types of environments (in particular, urban areas), under the name of landscape metrics, spatial metrics have been used to quantify the shape and pattern of vegetation in natural landscapes (Gustafson, 1998; Hargis Bissonette & David, 1998; McGarigal, Cushman, & Neel, 2002; O'Neill *et al*., 1988). At the same time, other attempts to create landscape indicators of visual qualities (Tveit *et al*., 2006; Ode *et al*., 2008) have been based on frameworks stemming from aesthetic theory, for purposes of visual landscape quality and character (Lothian, 1999; Zube *et al.,* 1975). One such significant attempt towards landscape indicator classification was undertaken, in 1993, by the Organization for Economic Cooperation and Development (OECD), in order to model cause and effect relationships between humans and the environment, employing the ''Pressure–State–Response'' model.

METHODOLOGY

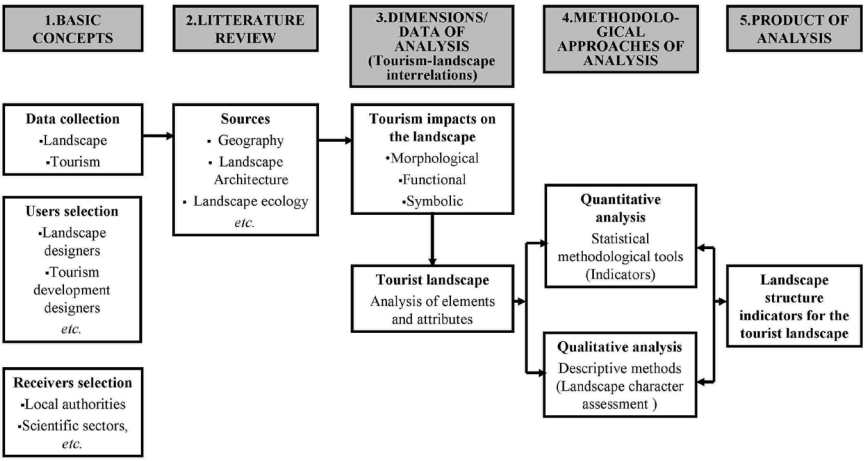
Landscape is widely viewed as constituted as a cultural system of three basic interlocking sets of aspects: visual, cognitive and experiential, alternatively theorized as form (the visual), meaning (the cognitive and the symbolic) and function (invested and articulated experience and cultural or biophysical processes) (Terkenli, 2000). This research is limited to formal landscape attributes, rather than attributes pertaining to landscape functions or values/ meanings/ symbolisms. It is also independent of attributes imbued on the landscape, by the observing side, following the subjectivist approach of landscape analysis (Lothian, 1999).

Our study, thus, focused on the morphological visual dimension of landscape, leaving out purely aesthetic attributes, such as color, texture and relief---following Swanwick *et al.'s* schematic presentation of landscape etymology (2002).

Accordingly, the construction of our methodological framework for the analysis and assessment of the tourist landscape is based on elements and aspects of both tourism and landscape comprising the tourist landscape, and on both qualitative and quantitative methods of landscape analysis. Therefore, the proposed model is constituted on two main axes, the interrelationship of tourism and landscape on the one hand and

landscape methods and techniques of analysis on the other; the final product is a system of tourist landscape indicators. Since landscape is defined and assessed here on the basis of a combination of geographical and landscape-architectural methodological approaches, the development of the proposed framework also draws upon landscape character assessment methods, which actually provide the basic theoretical frame of landscape analysis. The model's formulation follows a hierarchical structure of five basic levels: *conceptual definitions; literature review; analysis of the interrelationship of tourism and landscape; methods and techniques of analysis; and production of analysis results.* A schematic representation of the proposed methodological framework appears in figure 2.

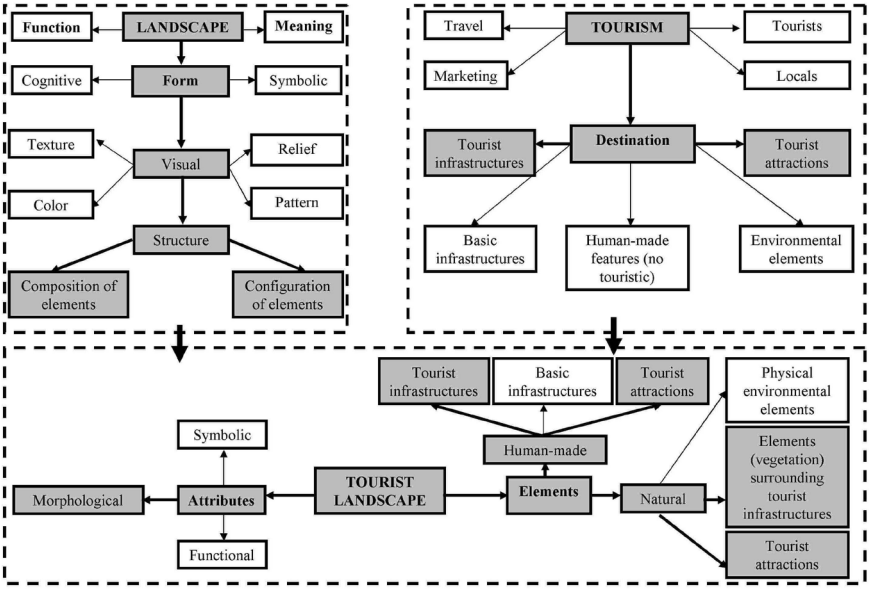
Figure 2 Organizational steps in the construction of the methodological framework



As the conceptualization and analysis of the tourist landscape have been based on the synthesis of its theoretical backgrounds, namely in the fields of landscape and tourism (figure 3), elements of tourist landscapes under assessment have been organized in two basic classes: a) human-made and b) natural. Built or human-made elements include: a) those targeted towards or specified for touristic use (i.e. hotels, B&B), b) those concerning tourist attractions and c) those forming the basic

infrastructures of a tourist destination area (road networks, electricity and water systems, etc.). Natural elements comprise of: a) purely environmental elements of the physical geographical context, such as water, air, soil, vegetation, b)on-site vegetation species (indigenous or not) and c) tourist attractions.

Figure 3 Conceptual diagrammatic analysis of the elements and attributes of a tourist landscape. *(Areas of the main focus of this study appear in grey)*.



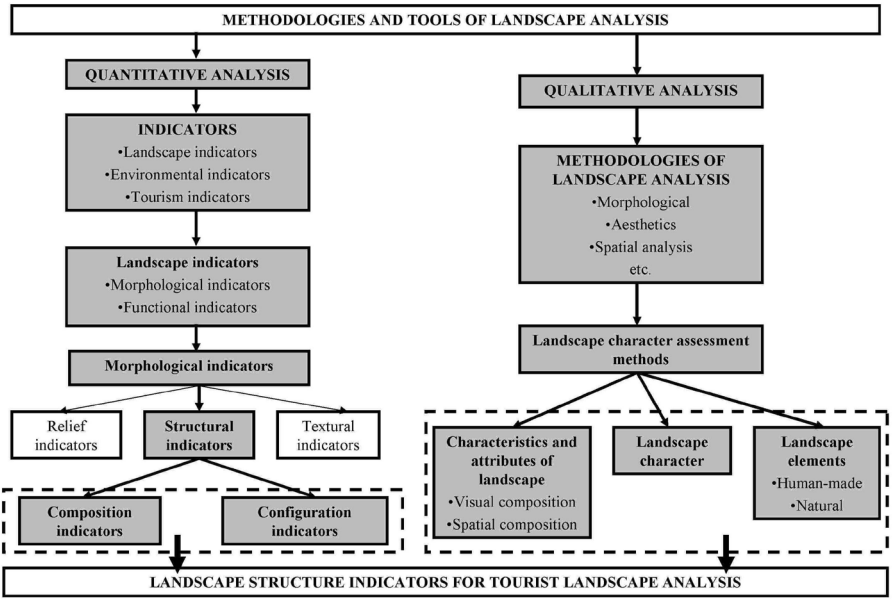
Our proposed methodological framework is developed on the basis of a review of methodologies, systematically categorized in terms of the three landscape aspects of form, function and meaning/ values, with an emphasis on the morphological aspects of the tourist landscape.

Among methods of landscape analysis, Landscape Character Assessment (LCA) (Shanwick, 2002) provides a more suitable understanding and evaluation of landscape as a resource, for purposes of enabling landscape enhancement, planning, conservation, restoration and, more generally, management. For this reason, its employment has been selected as the most appropriate tool towards the achievement of our

research goals. This method aims at assessing landscape elements (both natural and human-made), land uses, landscape attributes of visual and spatial composition (such as complexity, continuity, coherence, naturalness, visual scale, etc), visualization, as well as their interrelationships and, finally, the character of the landscape as a whole.

The Pressure-State-Response approach was another useful tool in our research (Spilanis & Karayiannis, 2009), since it brought out? our basic focus on state indicators, while describing the condition of the tourist landscape, as well as observable changes and processes, undertaken towards the goal of sustainable development, in any specific landscape under study. Significantly, a brief literature review on existing tourism indicators (Komilis and Vagionis, 1995; White *et al*., 2006), conducted in this research, revealed the absence of adequate tourist landscape indicators, a gap that this study purports to fill. A conceptual diagrammatic presentation of the methodologies and tools that emerged from the literature review, and where then applied to our landscape analysis, is presented as follows (figure 4).

Figure 4 Conceptual diagrammatic presentation of methodologies and tools of landscape analysis.



Such a review revealed that landscape indicators, as they appear in scientific literature so far, tend to be grouped into two categories: morphological and functional (Turner & Gardner, 1991). Since our framework focuses on the morphological aspects of the tourist landscape, we, then, turned to morphological indicators, and, more specifically, to the development of landscape structure indicators and their adjusted metrics. Two main categories of metrics were singled out, for the purposes of our study: composition metrics (concerning the proportion of the landscape taken up by each patch type, patch richness, patch evenness and patch diversity), and configuration metrics (concerning mean patch-shape, fractal dimension, contagion, interspersion and juxtaposition) (McGarigal and Marks, 1995).

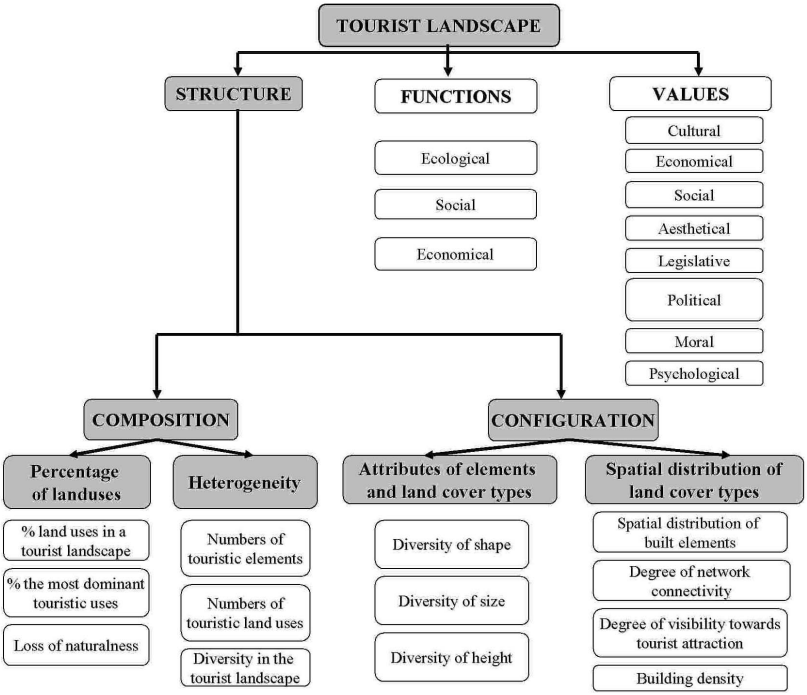
The selection of indicators proposed by this research project rested on the groupings presented above, as well as on the following assumptions: a) the complexity of landscape elements, shapes and sizes is indicative of the degree of human intervention in the physical environment, b) the more developed an area for tourism purposes, the higher the degree of its network connectivity the more pronounced the presence of tourism infrastructures (Zografos & Deffner,2009), and c) the spatial configuration of landscape elements and land cover types expresses landscape evolution and transformation, at a specific place, during a specific time period.

PRODUCTION OF ANALYSIS RESULTS

Our preceding literature review on landscape indicators, metrics and landscape character assessment methods concluded with the following proposed set of indicators, formulated on the basis of two structural landscape aspects, borrowed from landscape ecology: landscape composition and landscape configuration (figure 5). Taken together, these landscape indicators comprise our proposed landscape indicator model.

The landscape indicator model, as shown above, has been conceived in this more general form, aimed at an application to conventional 3S's tourist landscapes, but may be further developed or tailored to the particularities of various other types of tourist landscapes, such as winter tourism, agrotourism, e.t.c. The proposed specific tourist landscape indicators are presented, together with their applied metrics, in the following table (table 1).

Figure 5 Conceptual diagram grouping tourist landscape indicators.



With regard to the scale level, at which this set of landscape indicators are proposed to be employed, in this study, class (land use) level and landscape level metrics are considered as the most appropriate ones for tourist landscape analysis. "Class metrics represent the spatial distribution and pattern within a landscape of a single patch type; whereas landscape metrics represent the spatial pattern of the entire landscape mosaic, considering all patch types simultaneously" (McGarigal et al., 2002). Although many of these indices may be identical at the class and landscape levels, their interpretations may be somewhat different, at different scales of measurement. Obviously, it is up to the researcher to select the appropriate geographical scale, for any particular analysis of tourist landscape structure.

Table 1 Proposed landscape structure indicators for tourist landscape analysis

TOURIST LANDSCAPE STRUCTURE INDICATORS	APPLIED LANDSCAPE METRICS
A. Composition indicators	
1. Percentage of land uses	
1^a. Percentage of tourist and non-tourist land uses.	*% from thematic maps*
1^b. Percentage of the most dominant tourist uses.	*% from thematic maps*
1^c. Loss of naturalness	*% of unbuilt natural areas*
2. Heterogeneity indicators	
2^a. Number of selected elements of tourist interest (landmarks)	*Number derived from thematic maps*
2^b. Number of various types of land uses in a tourist landscape	*-Number of Patches (NP)* *-Patch Richness (PR)*
2^c. Diversity in a tourist landscape	*Shannon's Diversity Index (SHDI)*
B. Configuration indicators	
3. Attributes of built elements and land cover types.	
3^a. Diversity of shapes of land cover types	*Patton's Diversity Index (DI)*
3^b. Diversity of sizes of land cover types	*Patch size standard deviation index*
3^c. Diversity of heights of built elements.	*Shannon's Diversity Index (SHDI)*
4. Spatial distribution of land cover types	
4^a. Building density	*Patch Density*
4^b.Spatial distribution of built elements in tourist landscape	*Nearest Neighbor Distance index*
4^c. Degree of network connectivity	*Indices α, γ*
4^d. Degree of visibility towards tourist landscape of interest	*Visibility index*

DISCUSSION

Among composition indicators, those referring to an attribute of the tourist landscape itself--such as richness and diversity—through the estimation of the number and percentage of land uses, provide a general

idea of tourism development in the area. Thus, they also indirectly refer to the degree of land cover (urbanisation of rural landscape), to change in pre-existing land uses and, by extension, to the dynamics of the whole local socio-economic context. On the other hand, loss of naturalness, through over-construction, in combination with the increase in the diversity of elements or land uses in a tourist landscape, which often comes with tourism or other development, creates optical disharmony and spatial confusion to the visitor. As a consequence, not only functional, but also symbolic landscape dimensions are affected or disturbed, as much for the locals as for the tourists.

Among configuration indicators, those referring to formal attributes of tourist landscape elements (shape, size and height) are particularly important for the extraction of information on the planning and building status of the area under study and for the elucidation of landscape functions of the past, present and future. These landscape elements are precisely those that come readily under the perception of the visitor of a tourist landscape. With the aid of the above indicators, presence, scale and spatial arrangement of tourism units and infrastructures are assessed, as are also the fragmentation of space, the degree of the road network development and the potential for visual and functional accessibility to and from poles of tourist attraction. Indicators of spatial distribution of various land cover types are equally useful, as structural and functional indicators. They are considered valuable in understanding tourist landscape formation, land-ownership arrangements of a tourist region and future trends in tourism development. These indicators may also prove informative about the historical evolution of the tourist landscape, that is the stages of tourism development, as inscribed in the landscape, in accordance to various models of tourism geography—such as Butler's tourist area life-cycle concept model (1980), Miossec's model of tourist development (1976), Opperman's model of tourist space evolution in developing countries (1993) and Gormsen's (1981) model of spatio-temporal development of international seaside tourism. Their contribution lies in their ability to assess the spatial concentration of tourist activities, which is also directly connected to their ability to evaluate purchasing land values in the region, and hence its potential for further tourism development.

The application of the proposed methodological framework, combining landscape metrics, remote sensing and landscape character assessment methods, may support the analysis of tourism growth and land use change in a variety of different tourism settings. Spatial assessment, on the basis of the proposed set of indicators, may contribute to a better

understanding of the behavior of both tourists and locals and lead to more grounded political decisions, ensuring a more balanced flow and concentration of tourists towards and through poles of landscape attraction. Landscape indicators deserve a central place in the tourism research and planning agenda, since they may be employed for various purposes, from the detailed mapping of tourist land use changes, at various geographical scales, to helping deduce a number of socioeconomic characteristics from remote sensing data. Such analysis of temporal change in tourist landscape structure, based on remote sensing and spatial metrics, may also encourage the development of new methodological perspectives in landscape and tourism sciences.

Moreover, most significantly, the proposed set of landscape indicators, stemming from our methodological framework for tourism landscape assessment, must be viewed as constituting only a subset of a larger and more well-rounded set of indicators, analysing structural and functional changes in tourist landscapes, in conjunction with indicators assessing state and change in the cognitive/ symbolic, qualitative aspects of the tourist landscape.

CONCLUSIONS

The methodological framework introduced above, purports to be an efficient instrument in the evaluation of fundamental structural elements and traits of a tourist landscape. It is hoped that it constitutes a valuable tool for any landscape or tourism development agent, planner or other stakeholder in the broader interdisciplinary research area of urban planning, environment, landscape and/or tourism planning, in the context of any systematic, sustainable and comprehensive spatial intervention in a tourist region or specific destination. It may also prove to be a useful tool for local authorities, providing important quantitative information on tourism impacts on the landscape, thus helping reinforce tourism development geographically remote areas. From the information thus deduced, useful conclusions on social economic, political and cultural processes that created and continue to create a landscape may be additionally derived. The proposed framework may thus constitute a valuable tool in future planning efforts towards description, appraisal and assessment of the state of coastal tourist landscapes and of potential impacts of the tourism industry on them.

However, landscape indicators are not a panacea in tourist landscape assessment. Rather in combination with other data concerning both the

natural and the socio-cultural aspects of the landscape, they may prove to be a crucial tool for constructing a realistic simulation of future local-level tourism development. This research is still at an early stage and relies heavily on metrics and assumptions originating in landscape ecology, GIS science and spatial analysis. Tourist landscape metrics tailored to the needs of tourism analysis at different scales, as well as further improved remote sensing and mapping products, remain issues and areas of further research. The successful application of such a tool may potentially also serve in the improvement of infrastructures, as well as techniques and strategies, the protection of the natural and cultural environment, tourist landscape, upgrading social prosperity and economic blossoming, but also move generally speaking, to future local tourism development on a more sustainable and landscape-sensitive basis. Finally, landscape planning and tourism management may profit greatly from linking landscape structure to landscape preferences and other such methods and models (Dodds &Butler, 2010) currently used in tourism geography and other fields of tourism study.

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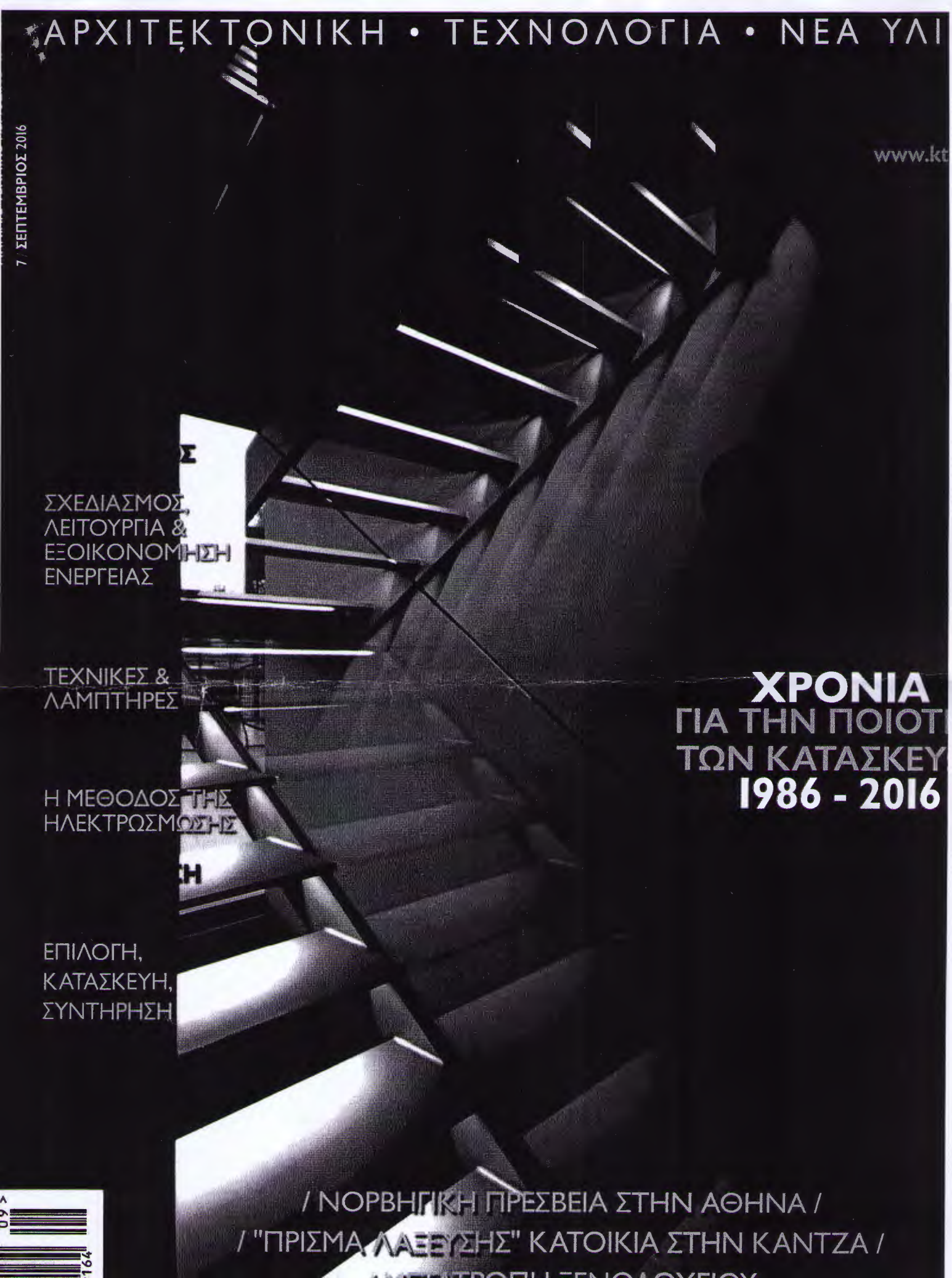


ΣΧΕΔΙΑΣΜΟΣ, ΛΕΙΤΟΥΡΓΙΑ & ΕΞΟΙΚΟΝΟΜΗΣΗ ΕΝΕΡΓΕΙΑΣ

ΤΕΧΝΙΚΕΣ & ΛΑΜΠΤΗΡΕΣ

Η ΜΕΘΟΔΟΣ ΤΗΣ ΗΛΕΚΤΡΩΣΜΩΣΗΣ

ΕΠΙΛΟΓΗ, ΚΑΤΑΣΚΕΥΗ, ΣΥΝΤΗΡΗΣΗ

ΧΡΟΝΙΑ
ΓΙΑ ΤΗΝ ΠΟΙΟΤ
ΤΩΝ ΚΑΤΑΣΚΕΥ
1986 - 2016

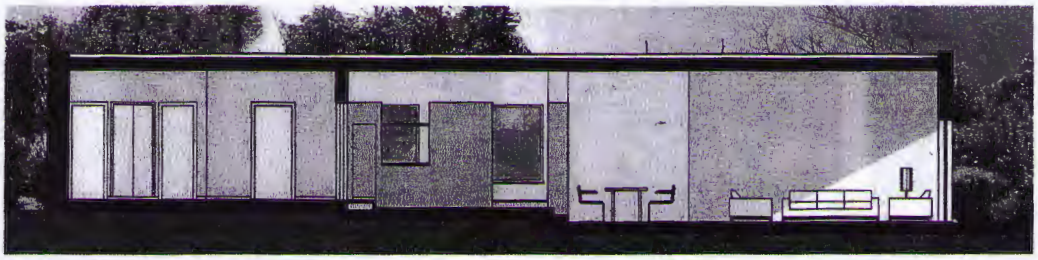
/ ΝΟΡΒΗΓΙΚΗ ΠΡΕΣΒΕΙΑ ΣΤΗΝ ΑΘΗΝΑ /

/ "ΠΡΙΣΜΑ ΛΑΞΕΥΣΗΣ" ΚΑΤΟΙΚΙΑ ΣΤΗΝ ΚΑΝΤΖΑ /

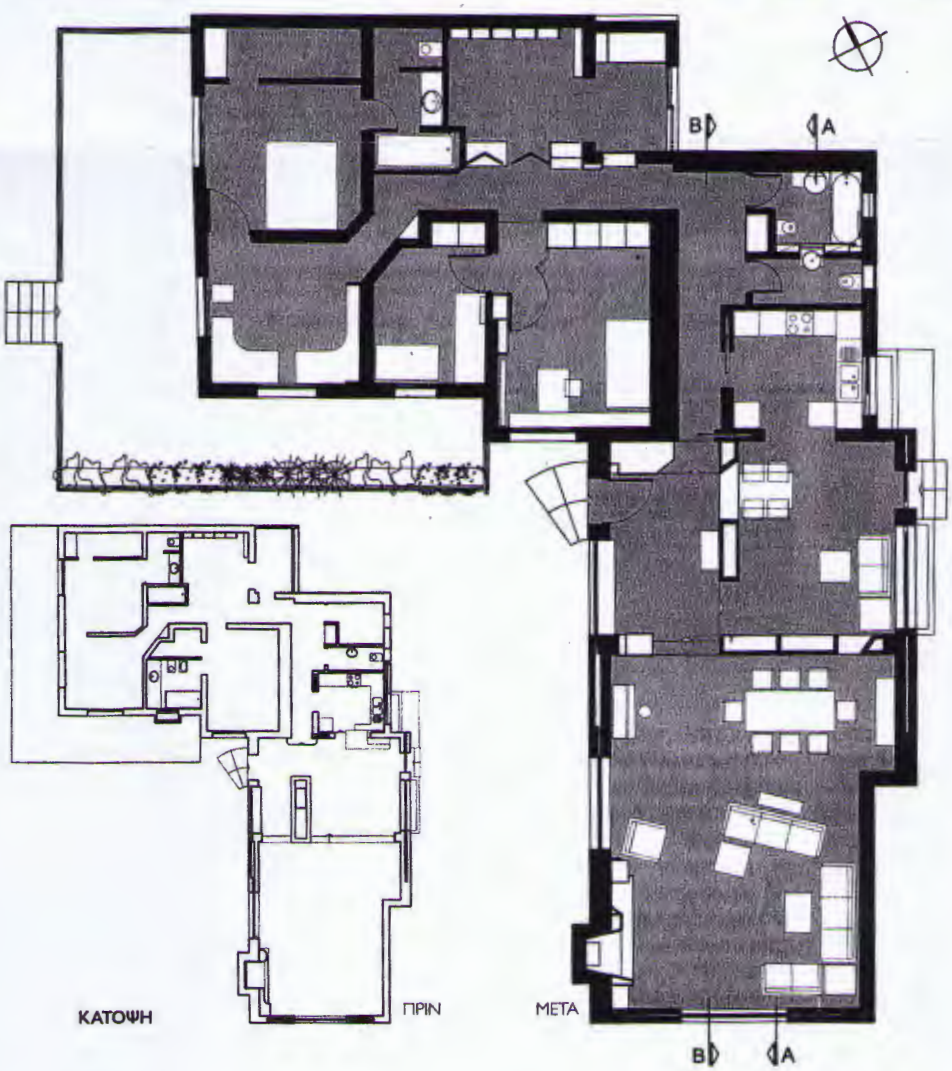
Ανακατασκευή μονοκατοικίας
στο Χαλάνδρι

ΤΟΜΗ Α - Α

ΤΟΜΗ Β – Β



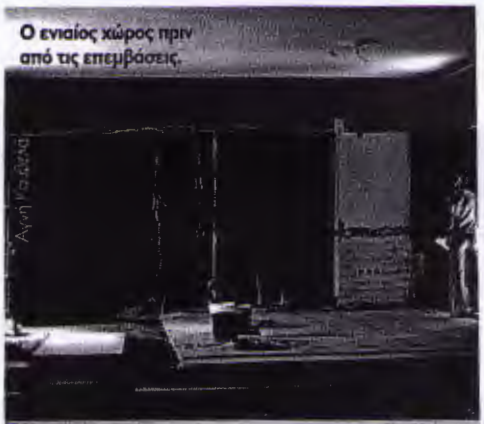
Η πρόσβαση προς την κατοικία γίνεται μέσω του εκ νέου διαμορφωμένου κήπου, που διαθέτει πλούσια βλάστηση, πορείες και στάσεις.



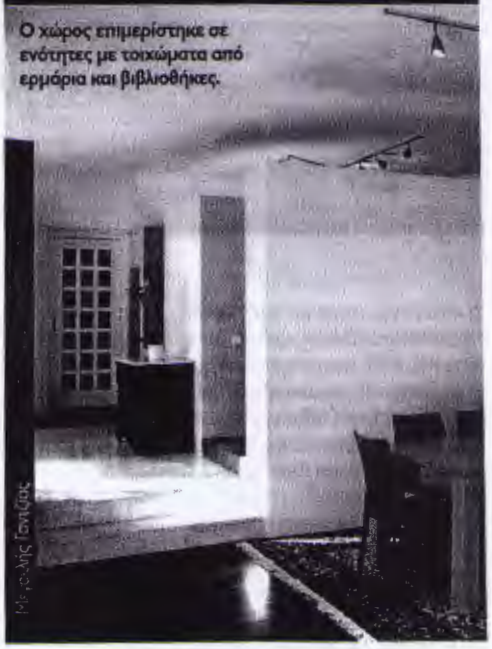
ΚΑΤΟΨΗ

ΠΡΙΝ

ΜΕΤΑ



Ο ενιαίος χώρος πριν από τις επεμβάσεις.



Ο χώρος επιμερίστηκε σε ενότητες με τοιχώματα από ερμάρια και βιβλιοθήκες.


Μιχαλής Γαντζίας


Μιχαλής Γαντζίας

Ο χώρος εισόδου της κατοικίας.


Οι διαχωριστικά διασφαλίζουν την οπτική διαπερατότητα των επί μέρους χώρων.


Το τζάκι στη γωνία του καθιστικού.

Μιχαλής Γαντζίας

ΑΡΧΙΤΕΚΤΟΝΙΚΗ ΜΕΛΕΤΗ:
Αγνή Κουβελά
ΔΥΝΑΤΟΤΕΧΝΙΚΗ ΜΕΛΕΤΗ:
Χαρούλα Γκόλτσιου
ΗΛΜ ΜΕΛΕΤΗ:
Αντώνης Κουβελάς
ΕΠΙΒΛΕΨΗ:
Αγνή Κουβελά
ΤΟΠΟΘΕΣΙΑ: Χαλάνδρι, Αττική
ΣΥΝΟΛΙΚΟ ΕΜΒΑΔΟ ΚΤΙΡΙΟΥ: 215 m²
ΕΜΒΑΔΟ ΚΗΠΟΥ: 725 m²
ΟΛΟΚΛΗΡΩΣΗ ΚΑΤΑΣΚΕΥΗΣ:
2015
ΠΑΡΟΥΣΙΑΣΗ: Αγνή Κουβελά
ΦΩΤΟΓΡΑΦΙΕΣ:

Μια ισόγεια μονοκατοικία του '50, που είχε υποστεί ενδιάμεσες προσθήκες και βελτιώσεις, ανακαινίσθηκε πρόσφατα για να στεγάσει νέα μέλη, μια τετραμελή οικογένεια.
Οι επεμβάσεις στόχευσαν στον αισθητικό εκσυγχρονισμό της οικίας και την απόδοση ενιαίου ύφους μέσα από μια μαξιμαλιστική προσέγγιση λειτουργικότητας.
Το ακανές και άμορφο καθιστικό, επιμερίστηκε σε ενότητες με τοιχώματα από ερμάρια και βιβλιοθήκες. Η μορφές τους διασφαλίζουν την οπτική διαπερατότητα, ενώ το πεάμεσα χρηστικά, αφήνοντας την οροφή αδιάσπαστη να διατρέχει τους χώρους.
Πλωτό ξύλινο δάπεδο υπερύψωσε το καθημερινό κατά μια βαθμίδα, ώστε να γίνει συνεπίπεδο με την κουζίνα που επανασχεδιάστηκε. Το μεγάλο λουτρό με τη γειτονική αποθήκη μετατράπηκαν σε παιδικό υπνοδωμάτιο, ενώ νέο κοινόχρηστο λουτρό διαμορφώθηκε στη θέση του λεβητοστασίου που καταργήθηκε.
Η θέρμανση του κτιρίου με καυστήρα πετρελαίου αντικαταστάθηκε με αντλία θερμότητας εναλλάκτη αέρα - αντικαταστάθηκαν με νέα καταλληλότερα, ενώ στους τοίχους συμπαγούς οπτοπλινθοδομής του παλαιότερου τμήματος προστέθηκε σύστημα εξωτερικής θερμομόνωσης.
Στον κήπο, που βρισκόταν σε εγκατάλειψη, διαμορφώθηκαν πορείες και στάσεις με κυβόλιθους, ενώ ο παιδικός ποδηλατόδρομος και η θέση για κούνιες στρώθηκαν με πατημένο χώμα. Το υπόλοιπο τμήμα οργανώθηκε σε περιοχές με οπωροφόρα δένδρα, λαχανόκηπο, αρωματικές πόες, ξηρόφυτα και άλλα καλλωπιστικά φυτά. Το κτίριο είναι σήμερα

ΑΝΘΡΩΠΟΓΕΩΓΡΑΦΙΑ

ΑΝΘΡΩΠΟΣ, ΚΟΙΝΩΝΙΑ ΚΑΙ ΧΩΡΟΣ

ΘΕΑΝΩ Σ. ΤΕΡΚΕΝΛΗ • ΘΕΟΔΩΡΟΣ ΙΩΣΗΦΙΔΗΣ • ΙΩΑΝΝΗΣ ΧΩΡΙΑΝΟΠΟΥΛΟΣ

ΕΠΙΜΕΛΕΙΑ

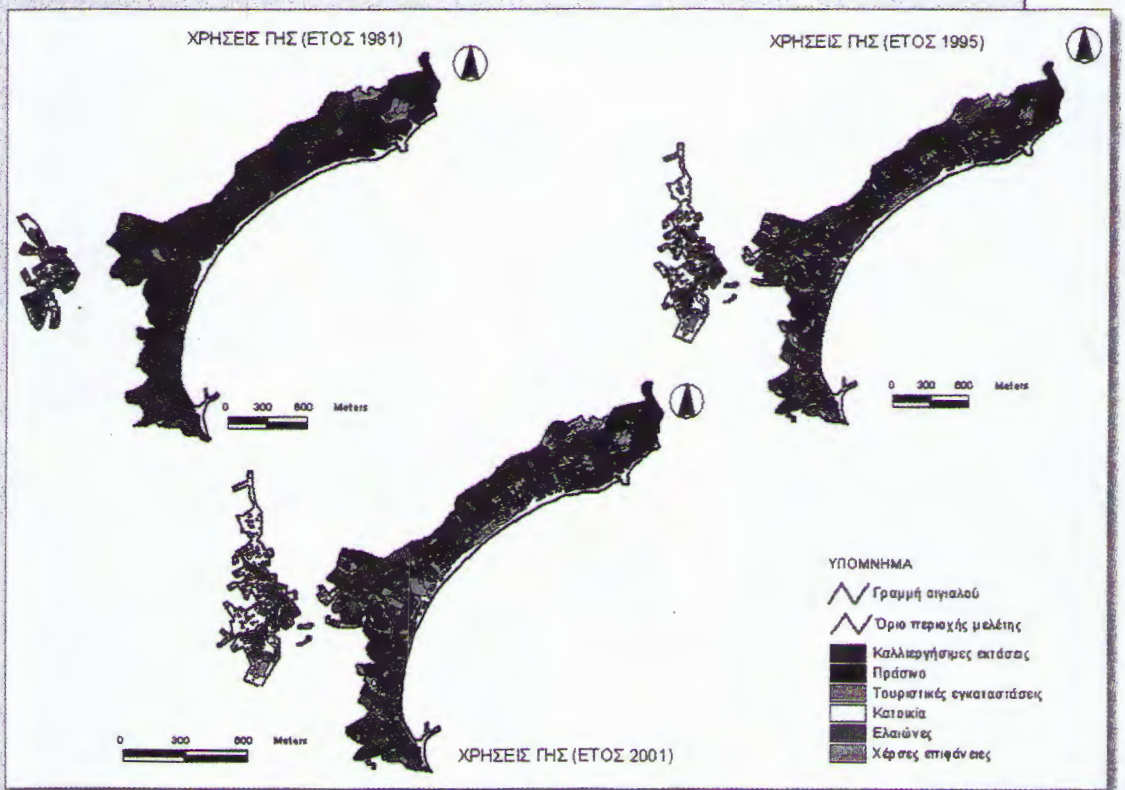
ΕΚΔΟΣΕΙΣ ΚΡΙΤΙΚΗ

ΕΠΙΣΤΗΜΟΝΙΚΗ ΒΙΒΛΙΟΘΗΚΗ

ΕΝΘΕΜΑ 1 **Το τουριστικό τοπίο της Κεφάλου, Κω: μια σύντομη ανάλυση**

Αικατερίνη Γκόλτσιου

Η Κέφαλος αποτελεί το ορεινό ΝΔ άκρο του νησιού της Κω. Διοικητικά ανήκει στο Δήμο Ηρακλειδών με έδρα την Αντιμάχια, ενώ το Δ.Δ. της Κεφάλου αποτελείται από τις περιοχές Κέφαλος, Καμάρι, Κάμπος και Όνια (Μάρκογλου, 2004). Το τοπίο της Κεφάλου ποικίλλει, από δασώδεις βουνοπλαγιές μέχρι γυμνούς λόφους. Το μεγαλύτερο μέρος όμως της παραλιακής ζώνης είναι ομαλό, κατεξοχήν πεδινό και οροθετείται από λοφώδεις εξάρσεις. Το σχήμα, η μορφή των αγροτεμαχίων, των δρόμων, των μονοπατιών που συνδέονται με την αγροτική εκμετάλλευση, η διάταξη των χωραφιών, δασών, λιβαδιών κτλ. παραπέμπουν στην κοινωνική ιστορία της περιοχής. Η περιοχή χαρακτηρίζεται από πλούσια ιστορία, καθώς η πρώτη ύπαρξη ζωής στην Κέφαλο χρονολογείται στη Νεολιθική Εποχή, ενώ κατά το 12 αι. π.Χ. αποτελεί την πρωτεύουσα της Νήσου Κω, γνωστή ως Αστυπάλαια. Κατά την Περίοδο των Ιπποτών ιδρύεται το Κάστρο στο ψηλότερο σημείο του χωριού της Κεφάλου, με πανοραμική θέα όλης της περιοχής του Καμαρίου. Όπως όλα τα Δωδεκάνησα, περνά υπό την κατοχή των Ιταλών, των Γερμανών και των Άγγλων μέχρι την απελευθέρωσή της (Μάρκογλου, 2004).



Χάρτης 3. Χρήσεις γης της Κεφάλου (έτη: 1981, 1995, 2002) (βλ. και Παράρτημα)

ΕΝΘΕΜΑ 1

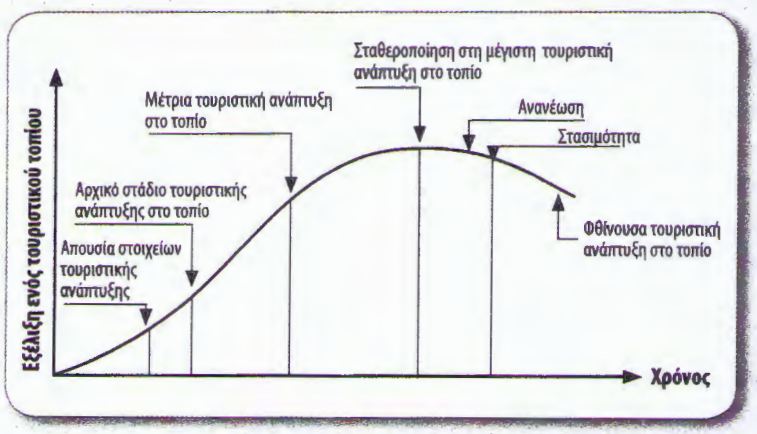
Φωτογραφία 1. Άποψη του Club Med και του νησιού Καστρί από

Σήμερα ο τουρισμός αποτελεί την κύρια πλουτοπαραγωγική πηγή της Κεφάλου. Η περιοχή ήταν αρχικά αγροτική, με διάσπαρτα κτίσματα που λειτουργούσαν ως εξοχικά για τους Κεφαλιανούς· κατά την περίοδο 1970-1980, με την άνθηση της εμπορικής ναυτιλίας και την αύξηση του οικογενειακού εισοδήματος, μετασχηματίστηκε σε τουριστική (Παπαντωνίου, Γ., Παπαντωνίου, Δ. 1998). Το 1981, με την εμφάνιση του ξενοδοχείου Σύδνεϊ στη Σκάλα (παλιό λιμάνι) και του Club Med πλησίον της Βασιλικής του Αγίου Στεφάνου, εισάγεται στην περιοχή ο μαζικός τουρισμός, και τα πρώτα μπαγκαλόου, ταβέρνες και καφετέριες κάνουν την εμφάνισή τους (Χάρτης 3). Το 1995, παρουσιάζεται εγκατάλειψη των αγροτικών γαιών και έντονη οικιστική ανάπτυξη κατά μήκος του κεντρικού παραλιακού δρόμου, με πύκνωση των τουριστικών χρήσεων (Χάρτης 3). Η αύξηση των τουριστικών εγκαταστάσεων πραγματοποιείται εις βάρος του πρασίνου και των καλλιεργήσιμων εκτάσεων.

Παρατηρείται άναρχη τουριστική ανάπτυξη από μικρές οικογενειακές τουριστικές μονάδες, σε αντίθεση με άλλα μέρη της Κω όπου κυριαρχούν οι μεγάλες τουριστικές μονάδες. Η παραλία προς το παλιό λιμάνι καλύπτεται κατά κανόνα από χώρους διατροφής και ψυχαγωγίας. Το πρωτεύον οδικό δίκτυο αναπτύσσεται και συμπληρώνεται με ένα ανεπτυγμένο δεύτερον οδικό δίκτυο.

Από το 2002 έως σήμερα παρατηρείται αύξηση των τουριστικών εγκαταστάσεων και πύκνωση αυτών, όχι μόνο κατά μήκος του κεντρικού παραλιακού δρόμου αλλά και στο εσωτερικό της περιοχής (Χάρτης 3).

Αναλύοντας το τοπίο αυτό ως τουριστικό προορισμό με τη βοήθεια του υποθετικού υποδείγματος του Κύκλου Ζωής Ενός Παραθεριστικού Κέντρου (Butler, 2004), διαπιστώνεται η δυναμικότητα του παράκτιου τουριστικού τοπίου της Κεφάλου. Το 1981 το τοπίο διατηρεί τα στοιχεία που συνθέτουν τον αγροτικό



Διάγραμμα 4. Προσαρμογή του διαγράμματος του

ΕΝΘΕΜΑ 1

του χαρακτήρα και παρατηρείται μια μικρή τουριστική ανάπτυξη (αρχικό στάδιο τουριστικής ανάπτυξης, βλ. διάγραμμα 2). Το 1995 γίνεται η μεταπήδηση σε τουριστικό τοπίο (στάδιο μέτριας τουριστικής ανάπτυξης, βλ. διάγραμμα 1). Κατά το χρονικό διάστημα 1995-2002, το τοπίο διανύει το στάδιο της μικρής σταθεροποίησης στη μέγιστη τουριστική ανάπτυξη στο τοπίο (βλ. Διάγραμμα 4).

Σύμφωνα με το υποθετικό υπόδειγμα του Κύκλου Ζωής Ενός Παραθεριστικού Κέντρου του Butler (1980:5) πολλοί παράγοντες υπεισέρχονται στην εξέλιξη του συγκεκριμένου τουριστικού τοπίου, αλλά και γενικότερα της τουριστικής ανάπτυξης σε ένα τοπίο, όπως είναι η αλλαγή στις προτιμήσεις των τουριστών, η βαθμιαία απώλεια ποικιλότητας του τοπίου, η πιθανή αντικατάσταση των φυσικών στοιχείων από τουριστικά και, τέλος, η αλλοίωση και ίσως καταστροφή των τοπικών/γηγενών φυσικών και πολιτισμικών πόλων έλξης που είναι υπεύθυνοι για την ελκυστικότητα της περιοχής (Pearce, 1995).

έναν τόπο, την τουριστική απασχόληση και υπηρεσίες και για τις σχέσεις τουριστών και ντόπιων. Πολλοί είναι και πάλι οι παράγοντες που υπεισέρχονται και στη χωρική οργάνωση της πλευράς της τουριστικής προσφοράς – παρότι η σχετική θεωρία υστερεί σε σχέση με αυτήν που αφορά την πλευρά της ζήτησης του τουρισμού.

Πρόκειται για μια αγοραία σχέση μεταξύ των δύο πλευρών, σχέση η οποία διέπεται από τους νόμους της αμοιβαίας απολαβής, ενώ οι τόποι προορισμού αποτελούν κέντρα κατανάλωσης παντός τύπου αγαθών (σουβενίρ, τοπική γαστρονομία), υπηρεσιών (νυχτερινή διασκέδαση, ασφάλεια), πόρων (τοπία, τροπικό κλίμα), υποδομών (ταχυδρομεία, αεροδρόμια), εμπειριών (χορός, θρησκευτική λατρεία), ακόμη και ανθρώπων («καμάκι», πορνεία) κτλ. Πολύ σημαντικό ρόλο για την τουριστική ανάπτυξη παίζουν η γεωγραφική θέση και τα χαρακτηριστικά της, όπως οι προσβάσιμες παραλίες ή τα μνημεία, τα οποία σε ένα βαθμό είναι ανθρωπογενή και επείσακτα. Δεν ενδιαφέρει, άρα, μόνον πού βρίσκονται οι τουριστικοί πόροι, ποιες δραστηριότητες ευνοούνται, ποιοι τις χρησιμοποιούν, ποιοι τις διαχειρίζονται και επωφελούνται από αυτές, ποιες οι σχέσεις τουριστών και ντόπιων, πώς συνδέονται οι τουριστικές με τις υπόλοιπες χρήσεις γης και ποιες οι ευρύτερες επιπτώσεις τους στην τοπική ανάπτυξη· εξίσου ενδιαφέρουν και οι τρόποι και οι στρατηγικές με τις οποίες σχεδιάζονται, διαμορφώνονται και γίνονται αντικείμενα διαχείρισης γεωγραφικοί τόποι, θέσεις, τοπία, νησιά, πόλεις διαφόρων τάξεων και ολόκληρες περιφέρειες, χάριν ακριβώς της τουριστικής ανάπτυξης (μαρίνες, γήπεδα γκολφ, καζίνα, ποδηλατόδρομοι, πεζόδρομοι, αναπλάσεις συνοικιών και λιμανιών, αισθητικά δάση κ.ά.). Τέλος, συχνά παρατηρούνται και οι αντίθετες τάσεις: η μεταφορά στοιχείων από τον τόπο προορισμού (διακοπών) στον τόπο προέλευσης (κατοικίας) (αντίστροφη διακίνηση) και ο πολιτισμικός εμπλουτισμός της εκεί οργάνωσης της ζωής και διευθέτησης του χώρου με το νέο και διαφορετικό που

Κύρια ταυτότητα

Από: "Σύλλογος Αρχιτεκτόνων Κορινθίας" <sakorinthias@gmail.com>
Προς: <agkolj@otenet.gr>
Αποστολή: Τετάρτη, 2 Δεκεμβρίου 2009 9:18 μμ
Θέμα: FW: Ευχαριστήρια Επιστολή

Αγαπητή κυρία Γκόλτσιου,

Θα θέλαμε να σας ευχαριστήσουμε για την συμμετοχή με την εισήγησή σας στην ημερίδα του συλλόγου μας την Παρασκευή 13 Νοεμβρίου 2009 με θέμα «ΚΑΤΑΣΚΕΥΕΣ ΤΟΥ ΜΕΛΛΟΝΤΟΣ «(Προς μία βιοκλιματική αρχιτεκτονική)», η οποία έγινε στα πλαίσια της συνεδρίασης του Συντονιστικού του ΣΑΔΑΣ-ΠΕΑ στο Λουτράκι με την συμμετοχή αρχιτεκτόνων από όλη την Επικράτεια.

Σας ενημερώνουμε ότι πρόκειται να γίνει ένα αφιέρωμα στο περιοδικό « Ο ΜΗΧΑΝΙΚΟΣ» (έκδοση του ΠΕΡΙΦΕΡΕΙΑΚΟΥ ΤΜΗΜΑΤΟΣ ΤΟΥ Τ.Ε.Ε. ΠΕΛΟΠΟΝΝΗΣΟΥ) στην ημερίδα. Θα θέλαμε να μας στείλετε μέχρι την Δευτέρα 7 Δεκεμβρίου 2009 μία περίληψη της εισήγηση σας (μέχρι μία σελίδα) για να συμπεριληφθεί στο αφιέρωμα στο περιοδικό.

Ευχαριστούμε και πάλι για την συμμετοχή σας και περιμένουμε την αποστολή του κειμένου σας στην ηλεκτρονική διεύθυνση του Συλλόγου Αρχιτεκτόνων Κορινθίας (sakorinthias@gmail.com). (Υπεύθυνος Επικοινωνίας : Κωνσταντίνος Σταυρόπουλος : 27440.67704 ή 6944.320.322).

ΦΙΛΙΚΟΤΑΤΑ ΓΙΑ ΤΟ Σ.Α.Κ.

Ο ΠΡΟΕΔΡΟΣ

ΚΩΝΣΤΑΝΤΙΝΟΣ ΣΤΑΥΡΟΠΟΥΛΟΣ

πρόγραμμα ημερίδας

18.00-18.30 ΠΡΟΣΕΛΕΥΣΗ
18.30-19.00 ΧΑΙΡΕΤΙΣΜΟΙ
19.00-21.00 ΟΜΙΛΙΕΣ

ΚΟΣΜΟΓΛΟΥ ΦΟΥΛΗ:
Αρχιτέκτονας Μηχανικός- Πολεοδόμος. Τμηματάρχης της Διεύθυνσης Οικιστικής, Πολιτικής και Κατοικίας του Υπουργείου Περιβάλλοντος Ενέργειας & Κλιματικής Αλλαγής

ΜΙΤΜΑΝ ΣΤΕΦΑΝΟΣ:
Δ/νων Σύμβουλος της εταιρείας HELIOINDEX ΑΕ (Φωτοβολταϊκά Συστήματα). Μέλος Δ.Σ. ΣΕΦ (Συνδέσμου Εταιρειών Φωτοβολταϊκών)

ΜΥΛΩΝΑΚΗΣ ΓΙΩΡΓΟΣ:
Φυσικός M.Sc Αντιπρόεδρος Ευρωπαϊκής Ομοσπονδίας Κατασκευαστών Αλουμινίου (FAECF).

ΓΚΟΛΤΣΙΟΥ ΑΙΚΑΤΕΡΙΝΗ:
Δρ. Γεωγραφίας (Πανεπιστήμιο Αιγαίου), Αρχιτέκτων τοπίου (M.L.A., University of Edinburgh), Γεωπόνος (Γ.Π.Α.)

ΤΡΙΑΝΤΗ ΕΥΦΡΟΣΥΝΗ:
Dr.Αρχιτέκτων Μηχανικός – Περιβαλλοντολόγος

ΛΑΜΠΡΟΠΟΥΛΟΥ ΛΕΝΑ:
Αρχιτέκτων Μηχανικός MSc Υπεύθυνη Τμήματος Κτιρίων.
Διεύθυνση Ενεργειακής Αποδοτικότητας, ΚΑΠΕ – Κέντρο Ανανεώσιμων Πηγών και Εξοικονόμησης Ενέργειας

ΛΥΡΟΥΔΙΑΣ ΕΥΑΓΓΕΛΟΣ:
Dr. Αρχιτέκτων Μηχανικός, Πρόεδρος ΣΑΔΑΣ - ΠΕΑ

21.00-21.30 ΣΥΖΗΤΗΣΗ - ΕΡΩΤΗΣΕΙΣ

πρόσκληση

Ο Σύλλογος Αρχιτεκτόνων Κορινθίας

και το Τ.Ε.Ε. Περιφερειακό Τμήμα

Πελοποννήσου σας προσκαλούν στην

ημερίδα με θέμα

"Κατασκευές του μέλλοντος"

(προς μια βιοκλιματική αρχιτεκτονική)

την Παρασκευή 13 Νοεμβρίου 2009

και ώρα 18.00

στο Hotel "Poseidon Resort"

στο Λουτράκι

Ο Πρόεδρος του Συλλόγου Αρχιτεκτόνων Κορινθίας Κων/νος Σταυρόπουλος

Η Πρόεδρος του Τ.Ε.Ε. Περιφερειακού Τμήματος Πελοποννήσου Χαρίκλεια Δ. Τσιώλη

Για ΡΙΤΣΟ

ΠΑΡΑΣΚΕΥΗ 13 ΝΟΕΜΒΡΙΟΥ 2009

Ημερίδα με θέμα: **«ΚΑΤΑΣΚΕΥΕΣ ΤΟΥ ΜΕΛΛΟΝΤΟΣ»**
(ΠΡΟΣ ΜΙΑ ΒΙΟΚΛΙΜΑΤΙΚΗ ΑΡΧΙΤΕΚΤΟΝΙΚΗ)
στο **HOTEL "POSEIDON RESORT"**

ΠΡΟΓΡΑΜΜΑ ΗΜΕΡΙΔΑΣ

- **18.00-18.30 ΠΡΟΣΕΛΕΥΣΗ**

- **18.30-19.00 ΧΑΙΡΕΤΙΣΜΟΙ**

- **19.00-19.15 ΚΟΣΜΟΓΛΟΥ ΦΟΥΛΗ** :
  Αρχιτέκτονας Μηχανικός- Πολεοδόμος. Τμηματάρχης της Διεύθυνσης Οικιστικής, Πολιτικής και Κατοικίας του Υπουργείου Περιβάλλοντος Ενέργειας & Κλιματικής Αλλαγής
  Αναγκαιότητα για «Βιοκλιματικό Σχεδιασμό». Από την Κοινοτική Οδηγία SAVE στο Νόμο 3661/2008 – Τεχνικός Κανονισμός (ΚΕΝΑΚ) – Πιστοποιητικό Ενεργειακής Απόδοσης Κτιρίων.

- **19.15-19.30 ΜΙΤΜΑΝ ΣΤΕΦΑΝΟΣ:**
  Δ/νων Σύμβουλος της εταιρείας HELIOINDEX ΑΕ (Φωτοβολταϊκά Συστήματα)
  Μέλος Δ.Σ. ΣΕΦ (Συνδέσμου Εταιρειών Φωτοβολταϊκών)
  «Φωτοβολταϊκά συστήματα: Ενέργεια σε ανθρώπινη κλίμακα».

- **19.30-19.45 ΜΥΛΩΝΑΚΗΣ ΓΙΩΡΓΟΣ:**
  Φυσικός M.Sc Αντιπρόεδρος Ευρωπαϊκής Ομοσπονδίας Κατασκευαστών Αλουμινίου (FAECF).
  ΤΟ ΣΗΜΑ ΠΟΙΟΤΗΤΑΣ ΣΕΚΑ – Q.SYSTEM 2
  ΩΣ ΕΡΓΑΛΕΙΟ ΑΝΑΓΝΩΡΙΣΗΣ ΤΩΝ ΠΟΙΟΤΙΚΩΝ ΚΑΤΑΣΚΕΥΩΝ ΑΛΟΥΜΙΝΙΟΥ.

- **19.45-20.05 ΓΚΟΛΤΣΙΟΥ ΑΙΚΑΤΕΡΙΝΗ:**
  Δρ. Γεωγραφίας (Πανεπιστήμιο Αιγαίου),
  Αρχιτέκτων οπίου (M.L.A., University of Edinburgh)
  Γεωπόνος (Γ.Π.Α.)
  ΣΥΓΧΡΟΝΟΙ ΜΕΣΟΓΕΙΑΚΟΙ ΚΗΠΟΙ: Η επαναφορά της χαμένης φύσης.

- **20.05-20.25 ΤΡΙΑΝΤΗ ΕΥΦΡΟΣΥΝΗ :**
  Dr.Αρχιτέκτων Μηχανικός – Περιβαλλοντολόγος
  «Περιβαλλοντικός Σχεδιασμός Κτιρίων και Ανοικτών Χώρων.

ΕΓΝΑΤΙΑ ΟΔΟΣ ΑΕ.

ΟΔΗΓΟΣ ΑΠΟΚΑΤΑΣΤΑΣΗΣ ΤΟΠΙΟΥ

(ΟΣΑΤ)
ΓΙΑ ΤΗΝ ΕΓΝΑΤΙΑ ΟΔΟ

Ιούνιος 1997

Land Use Consultants

ΔΙΕΥΘΥΝΣΗ ΕΡΓΩΝ

Brown & Root

27. Ν.Φουτσιτζόγλου
28. Β.Εβρένογλου

Διεύθυνση Αναδασώσεων Θεσ/νίκης

29. Γ.Γραμματικόπουλος
30. Χ. Τουρλακίδης

Ινστιτιούτο Κτηνοτροφικών Φυτών Λάρισας (ΕΘΙΑΓΕ)

31. Κ.Ηλιάδης

Ινστιτούτο Δασικών Ερευνών Αθήνας (ΕΘΙΑΓΕ)

32. Γ. Μπρόφας

Ε Ο Α Ε

33. Ι.Ure
34. Ε. Βαλιάντζα
35. Σ. Καραμάνος
36. Σ. Θωμά

- **ΚΑΤΑΛΟΓΟΣ ΕΜΠΕΙΡΟΓΝΩΜΟΝΩΝ ΠΣΑΤ**

1. Γ. Αναγνωστόπουλος Πρόεδρος
2. Ι.Τσαλικίδης Αντιπρόεδρος
3. Ν.Τζώρτζη
4. Α.Βισίλια
5. Κ.Γκόλτσιου
6. Β.Λάσκαρη-Κρασοπούλου
7. Θ.Σκλαβενίτη
8. Κ.Ταμουσέλη

- **ΚΑΤΑΛΟΓΟΣ ΕΜΠΕΙΡΟΓΝΩΜΟΝΩΝ ΕΙΔΙΚΩΝ ΕΡΓΑΣΙΩΝ**

Θέμα : Επιλογή κατάλληλων ειδών αυτοφυούς τοπικής χλωρίδας για την αποκατάσταση τοπίου της Εγνατίας Οδού.

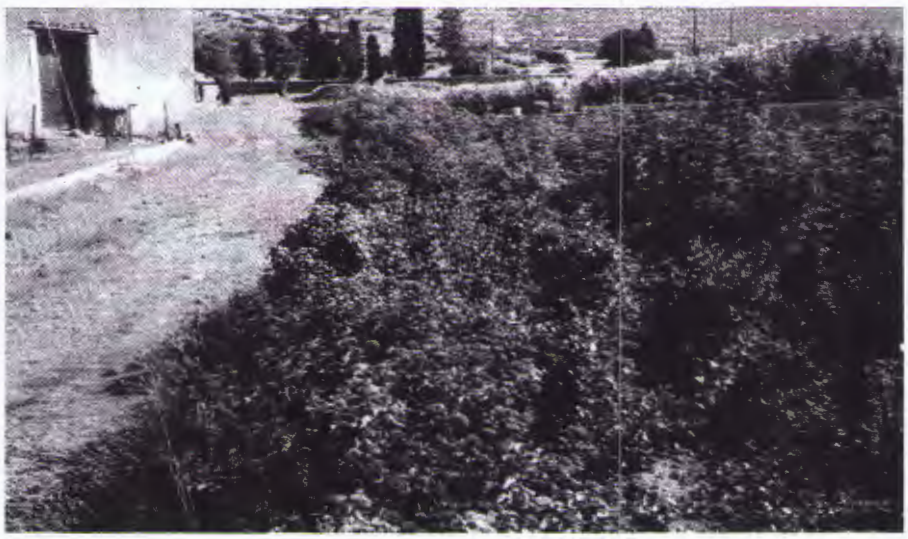
1. Σ.Ντάφης
   Ομότ. Καθηγητής Δασολογίας Α.Π.Θ.

2. Π.Γκανάτσας
   Δρ. Δασολόγος - Οικολόγος Ειδ. Φυσ. Αναγέννησης.

ΜΙΚΡΟ ΑΓΡΟΚΤΗΜΑ ΣΤΗΝ ΑΤΤΙΚΗ

Χαμηλά ποώδη φυτά με θυσανωτή και αέρινη εμφάνιση προσδίδουν την εικόνα των αμμοθινών

Ο κήπος που σχεδιάστηκε από την αρχιτέκτονα τοπίου ΚΑΤΕΡΙΝΑ ΓΚΟΛΤΣΙΟΥ αποτελεί ένα παράδειγμα σωστού σχεδιασμού που βελτιώνει τις συνθήκες της ανθρώπινης ζωής, βοηθά στην προστασία και ανάδειξη του τοπίου και συντείνει στην ενδυνάμωση της σχέσης ανάμεσα στον άνθρωπο και τη φύση.



ΜΕΛΕΤΗ: ΚΑΤΕΡΙΝΑ ΓΚΟΛΤΣΙΟΥ, ΑΡΧΙΤΕΚΤΩΝ ΤΟΠΙΟΥ
ΕΠΙΜΕΛΕΙΑ-ΠΑΡΟΥΣΙΑΣΗ: ΚΥΡΙΑΚΟΣ ΚΟΣΜΑΣ

Φυτικά είδη όπως, λαντάνα, δεύτσια, εσκαλόνια, λυγαριά, φύονται κατά μήκος των διαδρομών

ational federation of landscape architects

abstract submission form

Themes (*please underline one theme)*: Urban Growth and Decline; Safer Cities and Towns; Rural Growth and Decline; Quality, Aesthetics and Economics; The Edinburgh Fringe

Title of paper IDENTIFYING CHANGES IN TOURIST COASTAL LANDSCAPES USING LANDSCAPE METRICS

Author K.Gkoltsiou,T.Terkenli,S. Koukoulas E-mail gkolt@geo.aegean.gr

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Affiliation (enclose a brief CV) Enclosed

Keywords Rural landscapes, tourist landscapes, coastal landscapes, landscape metrics,GIS,Gre

Abstract (maximum 300 words)

IDENTIFYING CHANGES IN TOURIST COASTAL LANDSCAPES USING LANDSCAPE METRICS

Katerina Gkoltsiou, Phd Student
Dr. Theano Terkenli,Tenured Assistant Professor
Dr Sotirios Koukoulas, Lecturer
Department of Geography, University of the Aegean, University Hill, Mytilene 81100 Greece,
E-mail: gkolt@geo.aegean.gr

The coastal landscape of the Aegean islands has long been established as one of the most famous tourist attractions of the Mediterranean for its multivariate natural and cultural profile. The uncontrolled growth of the tourism industry in the form of large hotel units, in many Greek tourist destinations, has caused enormous pressures and significant alterations to the natural and cultural landscape of Greek coasts. Many rural landscapes on the islands of the Aegean are in the process of decline and are slowly transformed to tourist attractions.

This paper examines landscape change and evolution from a rural coastal landscape to a tourist one. The study focuses on the area of Kefalos at the south part of the island of Kos and presents the chronological changes upon the morphological and functional elements of the tourist landscape with the aid of Remote Sensing and GIS techniques.

The methodology is based on a system of landscape metrics developed within a GIS framework, in order to simplify and quantify current ongoing change and to provide simple measures standardized for time and place. Landscape metrics were used on orthorectified aerial photographs to quantify changes of patch characteristics, such as size, shape and edges and of spatial arrangement of patches (such as fragmentation, connectivity, diversity, density metrics, isolation /proximity and contrast metrics) over time and space. The application of such analytical tools represents a novel methodological approach to the landscapes of tourism, by demonstrating the value of landscape metrics in a quantitative landscape assessment for the Greek tourist landscapes.

Keywords: rural landscape, tourist landscape, coastal landscape, landscape metrics, geographic information system (GIS), Greece.

Submission Deadlines

Abstract and CVs of authors: March 7th 2005
Notification of acceptance of full papers will be made by March 18th 2005
Full papers must be submitted electronically by May 30th 2005
Presentations will be 18 minutes long including all illustrations (papers in the Edinburgh Fringe experimental sector will be 14 minutes). Papers are invited on the theme and sub-themes outlined. Abstracts may be for project orientated papers or the results of research.

IEEE Transactions on Geoscience and Remote Sensing

Assessing land-use transition potential with the use of neural networks and GIS

Journal:	*Transactions on Geoscience and Remote Sensing*
Manuscript ID:	draft
Manuscript Type:	IGARSS 2007 Special Issue paper
Date Submitted by the Author:	n/a
Complete List of Authors:	Vafeidis, Athanasios; University of the Aegean, Geography Koukoulas, Sotirios; University of the Aegean, Geography Vafeidis, Georgios; University of the Aegean, Geography Gatsis, Ioannis; University of the Aegean, Geography Gkoltsiou, Katerina; University of the Aegean, Geography
Keywords:	Neural networks

Assessing land-use transition potential with the use of neural networks and GIS

Athanasios T. Vafeidis[1], Sotirios Koukoulas[1], G. Vafeidis[1,2], Ioannis Gatsis[1], Katerina Gkoltsiou[1]

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Submitted to IEEE Transactions on Geoscience and Remote Sensing for the IGARSS 2007 Special Issue

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Abstract

In the present study a spatial model, which couples GIS with artificial neural networks has been developed for forecasting changes in land use. The model was parameterized for the island of Lesvos (NE Greece) for the time period between 1975 and 1999. It employs an artificial neural network for predicting the patterns of development of the island's urban areas and olive groves, based on a series of input parameters such as population density, transportation network, location of urban areas, proximity to the coastline and elevation. Data from 1975 and 1990 were used for the training of the neural network and the model was run to project (i) urban land development and (ii) patterns of olive grove cultivations, for 1999. The model outputs were validated using a land-cover map of 1999 derived from satellite imagery and were also compared to a null model. Furthermore, the effect of the individual input variables on the model outputs was evaluated. Results demonstrate that the model can predict reasonably well the patterns of change of the island's urban centers, however its predictive ability regarding the changes in the extent and location of olive groves is considerably lower. In conclusion, the overall performance of the model and its advantages and limitations are critically assessed and future improvements are suggested.

Keywords: neural networks; GIS; land-use change; spatial modeling;

ΝΑ ΔΙΑΤΗΡΗΘΕΙ ΜΕΧΡΙ.....
Βαθμός Ασφαλείας

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΥΠΟΥΡΓΕΙΟ ΕΘΝ. ΠΑΙΔΕΙΑΣ ΚΑΙ ΘΡΗΣΚΕΥΜΑΤΩΝ
ΔΙΟΙΚΗΤΙΚΟΣ ΤΟΜΕΑΣ ΣΠΟΥΔΩΝ
ΕΠΙΜΟΡΦΩΣΗΣ ΚΑΙ ΚΑΙΝΟΤΟΜΙΩΝ
ΔΙΕΥΘΥΝΣΗ ΣΠΟΥΔΩΝ ΔΕΥΤΕΡΟΒΑΘΜΙΑΣ ΕΚΠΑΙΔΕΥΣΗΣ

Αθήνα, 27 ΑΥΓ. 1999
Αριθ. Πρωτ. Γ2/3991
Βαθμός Προτεραιότητας ΕΞ. ΕΠΕΙΓΟΝ

Ταχ. Δ/νση : Ερμού 15
101 85 ΑΘΗΝΑ
Τηλέφωνο :
Fax :
TELEX :

ΑΠΟΦΑΣΗ

Κοιν.: 1. Παιδαγωγικό Ινστιτούτο
Μεσογείων 396
153 41 Αγία Παρασκευή
2. Όλους όσους αναφέρει η απόφαση με τη φροντίδα του Π.Ι.

Θέμα: Ανάθεση συγγραφής διδακτικών βιβλίων ΤΕΕ, ορισμός μελών που μετέχουν στη διαδικασία κρίσης και λοιπών εμπλεκομένων στην παραγωγή των εν λόγω βιβλίων.

Έχοντας υπόψη:

1. Τις διατάξεις των άρθρων 9 και 60 του Ν. 1566/85 (ΦΕΚ 167 τ. Α΄), όπως τροποποιήθηκαν με τις διατάξεις των παρ. 2 και 3 του άρθρου 7 αντίστοιχα του Ν. 2525/97 «Ενιαίο Λύκειο. πρόσβαση των αποφοίτων του στην Τριτοβάθμια Εκπαίδευση, αξιολόγηση του εκπαιδευτικού έργου και άλλες διατάξεις» (ΦΕΚ 188-Α/23-9-1997), σε συνδυασμό με τις διατάξεις: α) του άρθρου 88 του νόμου 1566/85 και τις διατάξεις του Ν.Δ. 749/70 (ΦΕΚ 277-Α), β) του άρθρου 30 του Ν.1304/82 (ΦΕΚ 144-Α), γ) του άρθρου 33 του Ν. 1143/81 (ΦΕΚ 80), οι οποίες εξακολουθούν να ισχύουν, επειδή δεν έχουν εκδοθεί τα υπό του άρθρου 88 του ν. 1566/85 Προεδρικά Διατάγματα ή Κανονιστικές Αποφάσεις, όπως προβλέπεται και από τις διατάξεις της παρ. 2 του άρθρου 7 του Ν. 2525/97.
2. Τις διατάξεις του άρθρου 27 του Ν. 1824/88, το οποίο προστέθηκε ως παράγραφος 12 στο άρθρο 60 του Ν. 1566/85.
3. Τις διατάξεις του Ν.2640/98 (ΦΕΚ 206 τ. Α΄) «Δευτεροβάθμια Τεχνική – Επαγγελματική Εκπαίδευση και άλλες διατάξεις»

4. Τις υπ' αριθ. πρωτ. 1828/6.4.99, 2021/21.4.99, 2674/7.5.99 3525/27.5.1999, 3535/28.5.1999, 4093/17.6.99 προσκλήσεις Εκδήλωσης Ενδιαφέροντος συγγραφής σχολικών βιβλίων των ΤΕΕ
5. Τη γνώμη του Π.Ι. όπως αυτή έχει διατυπωθεί στις αριθ. 11, 12, 13, 14, 16 και 19 του 1999 πράξεις του Τμήματος Δευτεροβάθμιας Τεχνικής Επαγγελματικής Εκπαίδευσης του Παιδαγωγικού Ινστιτούτου
6. Το αριθ. 042060/11-10-1996 έγγραφο της Γενικής Διεύθυνσης V της Ευρωπαϊκής Επιτροπής, σύμφωνα με το οποίο εγκρίθηκε με τη γραπτή διαδικασία το Τεχνικό Δελτίο της Ενέργειας 1.1.α «Προγράμματα – Βιβλία» του ΕΠΕΑΕΚ.
7. Την υπ αριθ. ΚΑ/1502/14-5-1999 Κοινή Υπουργική Απόφαση «Ανάθεση και χρηματοδότηση του Παιδαγωγικού Ινστιτούτου για την εκτέλεση του έργου «Τεχνικά Επαγγελματικά Εκπαιδευτήρια» της Ενέργειας 1.1.α «Προγράμματα – Βιβλία» που χρηματοδοτείται από το Β' ΚΠΣ.
8. Τις ανάγκες των μαθητών Α', Β' τάξεων του 1ου κύκλου και του 2ου κύκλου των ΤΕΕ.

α π ο φ α σ ί ζ ο υ μ ε

Ι. τη συγκρότηση ομάδων στις οποίες ανατίθεται η συγγραφή νέων διδακτικών βιβλίων των ΤΕΕ και η πάσης φύσεως υποστήριξή της, καθώς και τον ορισμό ειδικών επιστημόνων που μετέχουν στη διαδικασία κρίσης των βιβλίων, ως κατωτέρω:

1. "Νέα Ελληνικά"

Τάξη Α' του 1ου κύκλου του τομέα των Γενικών Μαθημάτων

α) Η συγγραφή ανατίθεται στους:
1. Αγγελάκο Κων/νο, Εκπ/κό Β/θμιας ΠΕ2
2. Αργυροπούλου Χριστίνα. Εκπ/κό Β/θμιας ΠΕ2
3. Καραβέλη Άννα, Εκπ/κό Β/θμιας ΠΕ2
4. Ραυτοπούλου Μαρία. Εκπ/κό Β/θμιας ΠΕ2

β) Κριτές του βιβλίου ορίζονται οι:
1. Αντωνίου Χρήστος, Σχολικός Σύμβουλος
2. Δανιήλ Ανθούλα, Εκπ/κός Β/θμιας ΠΕ2
3. Μπεχλικούδη Δήμητρα. Εκπ/κός Β/θμιας ΠΕ2

γ) Η ηλεκτρονική επεξεργασία του κειμένου ανατίθεται στην Αλεξοπούλου Αικατερίνη

δ) Η γλωσσική επιμέλεια ανατίθεται στη Ραυτοπούλου Μαρία, Εκπ/κό Β/θμιας ΠΕ2

ε) Τυπικοί όροι:

Ως συντονιστής της συγγραφικής ομάδας ορίζεται ο Μπαμπίλης Δημήτρης, εκπ/κος Β/θμιας εκπ/σης ΠΕ 14, Γεωπόνος

21. *«Σχεδιασμός φυτοτεχνικών έργων»*

2ος κύκλος του Τομέα Γεωργικής Παραγωγής και Φυσικών Πόρων

α) Η συγγραφή ανατίθεται στους:

1. Λάσκαρη Βασιλική, Γεωπόνο MSc – Αρχιτέκτονα τοπίου
2. Γκόλτσιου Αικατερίνη. Γεωπόνο MSc – Αρχιτέκτονα τοπίου
3. Σαρακινιώτη Δέσποινα. Γεωπόνο, Δ/νση Πρασίνου και Κηποτεχνίας Δήμου Αθηναίων

β) Κριτές του βιβλίου ορίζονται οι:
1. Ροίδης Χάρης, Γεωπόνος MSc
2. Βυθοπούλου Ελένη, εκπ/κος Β/Θμιας εκπ/σης ΠΕ14, Γεωπόνος
3. Κασβακίδου Μαρία, εκπ/κος Β/Θμιας εκπ/σης ΠΕ14, Γεωπόνος

γ) Τυπικοί όροι:
Η έκταση του βιβλίου θα είναι 170 σελίδες καθαρού κειμένου και 60 σελίδες φωτογραφικού υλικού. συνολικά 230 σελίδες, αριθμός ο οποίος μπορεί να αυξηθεί ή να ελαττωθεί κατά την κρίση των συγγραφέων. Πρέπει να ακολουθείται το πρόγραμμα σπουδών του μαθήματος.

Ως συντονιστής της συγγραφικής ομάδας ορίζεται η Μανιατέα Αριστέα. εκπ/κος Β θμιας εκπ/σης ΠΕ 14, Γεωπόνος

22. *«Εφαρμογές ασύρματων δικτύων στην κηποτεχνία»*

2ος κύκλος του Τομέα Γεωργικής Παραγωγής και Φυσικών Πόρων

α) Η συγγραφή ανατίθεται στους:
1. Μπαμπίλη Δημήτριο. εκπ κο Β/Θμιας εκπ/σης ΠΕ14, Γεωπόνο
2. Σπαθαριώτη Μανώλη. εκπ κο Β/Θμιας εκπ/σης ΠΕ14, Γεωπόνο
3. Καλατζόπουλο Γεώργιο. Γεωπόνος
4. Βαλιώτη Χρήστο. Γεωπόνο

β) Κριτές του βιβλίου ορίζονται οι:
1. Αγγελίδης Σωτήρης. Καθηγητής ΓΠΑ
2. Χριστοδουλίδης Κων/νος. εκπ κος Β/Θμιας εκπ/σης ΠΕ14, Γεωπόνος
3. Πανούσης Φώτης. εκπ κος Β Θμιας εκπ/σης ΠΕ14 Γεωπόνος

Στρατίκη Στέφανο
Τζουανοπούλου Πολυξένη
Τσαματροπούλου Αργυρώ
Τσάφο Βασίλειο
Τσικλείδη Ελπινίκη
Φορτούνη Κωστούλα
Φραγκιαδάκη Ελένη
Χαλουμπάκη Χριστίνα
Χαριτίδου Γεωργία
Χορμόβα Μαρία

V. Γλώσσα των σχολικών βιβλίων είναι η Νεοελληνική, η προβλεπόμενη από το Ν.1566/85 (ΦΕΚ 167 τ. Α΄), όπως περιγράφεται στη σχολική γραμματική γραμμένη στο μονοτονικό σύστημα, σύμφωνα με τις διατάξεις του Π.Δ. 297/82 (ΦΕΚ 52 τ.Α΄).

VI. Με νεότερη απόφασή μας θα προβλεφθεί, όπου κριθεί απαραίτητο, και η συγγραφή από τους ίδιους συντελεστές βοηθητικού υλικού, όπως βιβλίου καθηγητή, λύσεων ασκήσεων, τετραδίου εργασιών, για συγκεκριμένα από τα περιλαμβανόμενα στην απόφαση αυτή βιβλία που προορίζονται για χρήση από τους μαθητές.

VII. Για την ολοκλήρωση της παραγωγής των ανωτέρω διδακτικών βιβλίων προβλέπεται, όπου απαιτείται, η χρησιμοποίηση ζωγράφων, σκιτσογράφων κ.ά. Επίσης προβλέπεται η χρήση και αγορά φωτογραφικού υλικού και η επεξεργασία από ατελιέ για το μοντάζ, τη στοιχειοθεσία και την παραγωγή των φίλμς.

VIII. Η αποζημίωση όλων των εμπλεκομένων στη συγγραφή και τη διαμόρφωση των βιβλίων μέχρι και την τελική παραγωγή των φίλμς θα γίνει σύμφωνα με τις αποφάσεις του Συντονιστικού Συμβουλίου του Π.Ι.

Ο ΥΠΟΥΡΓΟΣ

ΓΕΡΑΣΙΜΟΣ ΑΡΣΕΝΗΣ

Εσωτερική διανομή:
1. Γραφείο Υπουργού κ. Γερ. Αρσένη
2. Γραφείο Υφυπουργού, κ.Ι. Ανθόπουλου
1. Γραφείο Γεν. Γραμματέα, κ. Αγ. Ζησιμόπουλου
2. Γραφείο Ειδικού Γραμματέα, κ. Δ. Παπαϊωάννου
3. Δ/νση Σπουδών Β/θμιας Εκπ/σης τμήμα Α΄(3)
4. Πρόεδρο Π.Ι., κ. Θ. Εξαρχάκο

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ

Πιστό Αντίγραφο
ο προϊστάμενος Τμήματος
Διεκπ/σης Δ Πρωτοκόλλου

ΓΙΑΝΝΗΣ ΚΑΡΑΘΑΝΟΣ

Η συμβολή της αρχιτεκτονικής τοπίου στην αρμονική σύνδεση κτιρίου - κήπου

Προκειμένου ο εξωτερικός χώρος να αποκτήσει ενδιαφέρον και να μην αποτελεί απλά ένα στολίδι του κτιρίου χωρίς καμιά απολύτως λειτουργική αξία, ο Αρχιτέκτονας τοπίου αποσκοπεί στην αποφυγή κοινότοπων πλέον ιδεών και εισάγει νέες ιδέες που πηγάζουν από τη φαντασία του, τα όνειρα, τις προσδοκίες του πελάτη και την υφιστάμενη κοινωνική κατάσταση.

ΚΑΤΕΡΙΝΑ ΓΚΟΛΤΣΙΟΥ
Αρχιτέκτονας Τοπίου - Γεωπόνος

Σχεδόν εξ ορισμού τα κτίρια είναι συνδεδεμένα με τον εξωτερικό χώρο. Ο 20ός αι. έρχεται να τοποθετήσει τα κτίρια αιωρούμενα πάνω από ένα «εχθρικό» τοπίο, ενώ συγχρόνως αυτά προσπαθούν να φτάσουν τον ουρανό. Άραγε, ποια η σχέση του κτιρίου με το φυσικό περιβάλλον, ποια η θέση του στο τοπίο και ποια η δική μας άποψη για το είδος του διαλόγου μεταξύ κτιρίου και τοπίου;

Η δημιουργία σχετικής ισορροπίας μεταξύ ανοιχτού χώρου και αστικοποίησης, η αρμονική σχέση μέσα σε ένα αστικό τοπίο όλων εκείνων των παραμέτρων που το συνθέτουν (κτίρια, δέντρα, νερό, κυκλοφορία κ.λπ.), η σύνδεση του εσωτερικού με το εξωτερικό, η συνέχεια μεταξύ των στοιχείων του εξωτερικού χώρου και του εσωτερικού ενός κτιρίου, η δημιουργία κίνησης και τέλος η αντίληψη του χώρου (sense of place) από τον επισκέπτη, είναι μερικές από τις βασικές παραμέτρους σχεδιασμού ενός εξωτερικού χώρου.

Ο Αρχιτέκτονας Τοπίου προσπαθώντας να σχεδιάσει ένα χώρο απλό και βιώσιμο λιτό μα συνάμα ιδιαίτερο, που να διαθέτει τη σωστή κλίμακα μεταξύ του κτιρίου, του ανθρώπου και του υπαίθριου χώρου και να είναι εύκολα συντηρήσιμος λαμβάνει υπόψη του τις ακόλουθες παραμέτρους: 1) το χώρο και τη μελλοντική του εξέλιξη, 2) τις προσδοκίες του πελάτη, 3) τα υλικά και τις κατασκευαστικές λεπτομέρειες, 4) τις μεθόδους συντήρησης, 5) το κόστος. Στόχος πάντοτε η κατάληξη σε μια διαχρονική και λειτουργική λύση, όπου θα επιτυγχάνεται η οργανική σχέση μεταξύ κτιρίου και κήπου. Ο Garret Eckbo, ένας από τους πρωτοπόρους του Μοντέρνου Κινήματος της Αρχιτεκτονικής Τοπίου στην Αμερική υποστήριζε πως τέσσερα είναι τα βασικά στοιχεία σχεδιασμού του περιβάλλοντος χώρου ενός κτιρίου: ο τρισδιάστατος χώρος, ο σεβασμός προς τα υλικά που πρόκειται να χρησιμοποιήσουμε, η αναγνώριση των ανθρώπινων αναγκών και η προτίμηση προς

τα ιθαγενή φυτά.

Προκειμένου ο εξωτερικός χώρος να αποκτήσει ενδιαφέρον και να μην αποτελεί απλά ένα στολίδι του κτιρίου χωρίς καμιά απολύτως λειτουργική αξία, ο Αρχιτέκτονας τοπίου αποσκοπεί στην αποφυγή κοινότοπων πλέον ιδεών, π.χ. των παρτεριών, του βραχόκηπου ή τού τριανταφυλλεώνα και εισάγει νέες ιδέες που πηγάζουν από την φαντασία του, τα όνειρα, τις προσδοκίες του πελάτη και την υφιστάμενη κοινωνική κατάσταση. Προβαίνοντας σε κάτι δυναμικό προσπαθεί, σε συνεργασία με άλλους επιστήμονες, να επιτύχει μια ισορροπία μεταξύ των τεχνητών, ανθρωπογενών και των φυσικών στοιχείων του τοπίου.

Η άμεση σχέση κτιρίου, εξωτερικού χώρου και πελάτη μπορεί να λάβει διάφορες μορφές. Ορισμένες από αυτές είναι η σχέση της κατοικίας με τον κήπο της, ο χώρος ενός εμπορικού κέντρου με το αίθριό του, τον κήπο του ή με το χώρο του «roof garden».

Αναλυτικότερα αναφέρουμε πως προτού ξεκινήσει ο σχεδιασμός ενός κήπου ή εξωτερικού χώρου εξετάζονται οι εδαφοκλιματικοί παράγοντες (κλίμα, μικροκλίμα, κλίσεις, υφή, δομή του εδάφους και η περιεκτικότητά του σε θρεπτικά στοιχεία), οι οποίοι είναι άρρηκτα συνδεδεμένοι με τη βλάστηση. Η τοποθεσία, το σχήμα και ο προσανατολισμός του σπιτιού και του οικοπέδου καθορίζουν επίσης τη σχέση κτιρίου και κήπου. Το είδος του κοινού που πρόκειται να φιλοξενήσει ο συγκεκριμένος χώρος καθορίζουν το στυλ, το μελλοντικό χαρακτήρα και τις χρήσεις του χώρου. Άλλοτε πάλι το κόστος καθοδηγεί το σχεδιασμό πιο πολύ από την τέχνη, π.χ. στα εμπορικά κέντρα, όπου ο σχεδιασμός του τοπίου πρέπει να βοηθά στην πώληση των διαφόρων χώρων και στο να είναι περισσότερο λειτουργικό και ασφαλές. Η ισορροπία, αρμονία ή αντίθεση μεταξύ των διαφόρων στοιχείων του κήπου είναι επίσης βασικά συστατικά της επιτυχίας, η οποία μπορεί να βασιστεί σε ανάλογα σχήματα, γραμμές ή καμπύλες, αρμονικά συνδυασμένα, σωστή επιλογή των χρωμάτων σε σχέση με τα χρώματα του κτιρίου, κ.ο.κ.

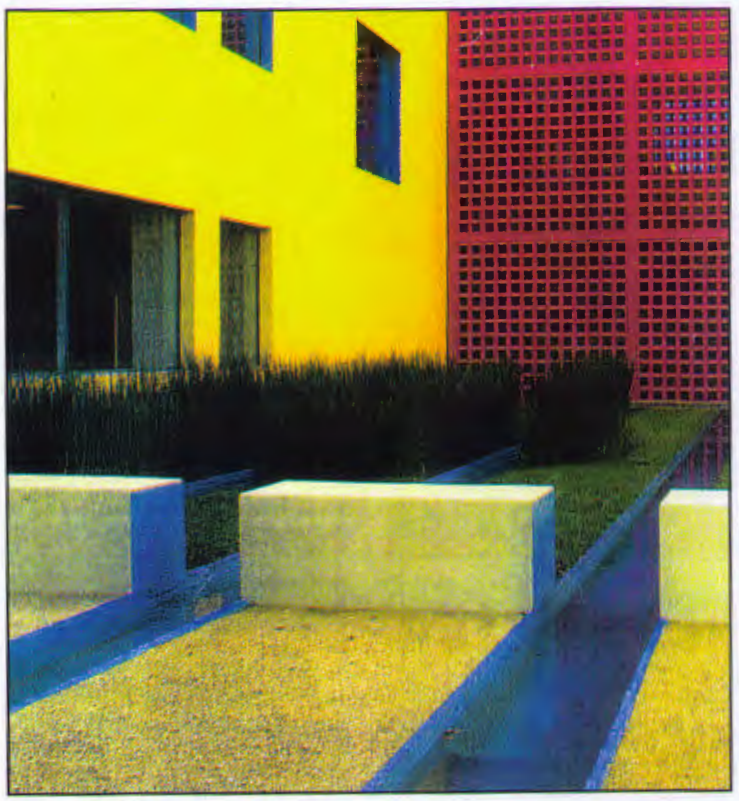
Οι παραπάνω βασικές αρχές της σύνθεσης ενός κήπου δεν καθορίζουν μόνο το είδος φύτευσης, των υλικών πλακόστρωσης, των διακοσμητικών στοιχείων (γλυπτικές συνθέσεις), τις διάφορες μορφές νερού, τα φωτιστικά, τα καθιστικά, τα στέγαστρα και οποιοδήποτε άλλο στοιχείο ανάδειξης ενός κήπου, αλλά κυρίως τον συνδυασμό μεταξύ τους και τη σχέση τους με το χώρο και τα γύρω. Άλλωστε, όπως υποστήριζε και ο F.L. Wright: «Είναι καλό να εργάζεσαι με περιορισμένη παλέτα και πολλή φαντασία παρά με λίγη φαντασία και εκτεταμένη παλέτα». Ενδεικτικά αναφέρουμε το χώρο ενός εμπορικού κέντρου, ο οποίος κατακλύζεται από διάφορους χρωματισμούς, φωτισμούς και πελάτες. Η χρήση πολλών χρωματισμών μορφών και υφών των διαφόρων υλικών και της φύτευσης πρέπει να αποφεύγεται για να μη δημιουργείται σύγχυση στον πελάτη και να τον δυσκολύνει στις αγορές του.

Χαρακτηριστικό παράδειγμα φαντασίας συνδυασμού υλικών είναι η λύση του βραζιλιάνου Αρχιτέκτονα Τοπίου Roberto Burle Marx για το roof garden της τράπεζας Safra Bank στο Sao Paolo προσαρμοσμένη στον τόπο και στο χρόνο. Οι οργανικές καμπύλες και γραμμές τονίζονται με βότσαλα διαφόρων μεγεθών σε συνδυασμό με τα φυτά σε γλάστρες. Ο ίδιος υποστήριζε πως ο κήπος είναι αποτέλεσμα κατάταξης φυσικών υλικών με βάση τους νόμους της αισθητικής.

Ο προσεχτικός και επιμελής σχεδιασμός του εξωτερικού χώρου δίνει άλλοτε έμφαση στο κτίριο ή μετριάζει κάποιες ατέλειές του. Ένας κήπος πρέπει να έχει ένα χαρακτήρα και να σχετίζεται άμεσα με το σπίτι, έτσι ώστε η πρόσβαση από και προς τα διάφορα μέρη του κήπου να είναι εύκολη, π.χ. το επίπεδο του σπιτιού να βρίσκεται στο ίδιο επίπεδο με τον κήπο ή τα παράθυρα και γενικότερα τα διάφορα ανοίγματα του σπιτιού να είναι ελεύθερα και να μην καλύπτονται από φυτά ή ακόμα να υπάρχει ένα σημείο αναφοράς, το οποίο να τραβά την προσοχή του επισκέπτη. Π.χ. ένα γλυπτό ή ένα στοιχείο νερού, μια σύνθεση φυτών πρέπει να είναι ορατά από κάποιο κεντρικό άνοιγμα του σπιτιού (παράθυρο ή πόρτα).

Τα γλυπτά, ως διακοσμητικά στοιχεία αλλά και τα φυσικά στοιχεία (πέτρα, σίδερο, ξύλο, φυτά) μπορούν να προσδώσουν μια ιδιαίτερη αισθητική και συμβολική χροιά κατευθύνοντας κάποιες φορές το σχεδιασμό του κήπου. Η τοποθέτησή τους όμως καλείται να είναι ανάλογη του χαρακτήρα, του μεγέθους, της κλίμακας, του χώρου.

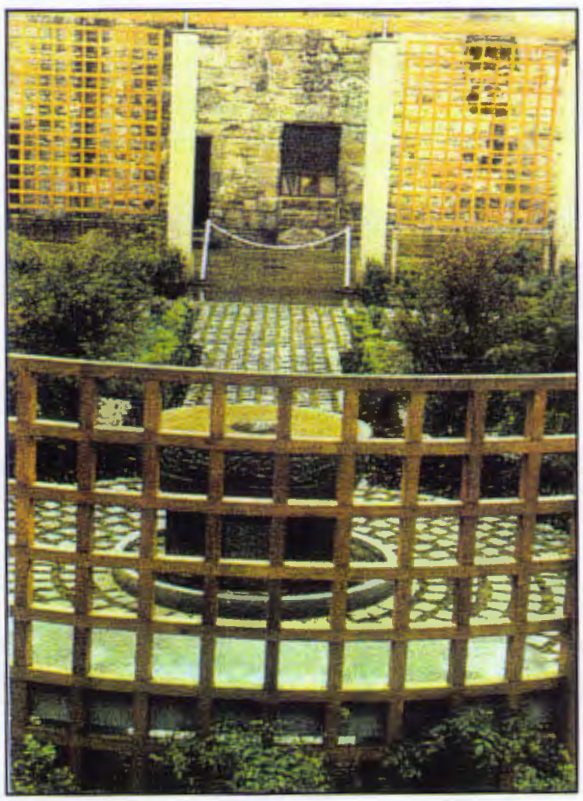
Για παράδειγμα, αναφέρουμε τον κήπο των γλυπτών, στο λόφο του Montjuic στη Βαρκελώνη. Ο κήπος σχεδιάστηκε από αρχιτέκτονες τοπίου σε συνεργασία με γλύπτες, έτσι ώστε ο αριθμός και το μέγε-



Συγκρότημα κτιρίων στο Dallas, Texas. Αρχιτέκτονας Τοπίου Peter Walker. Η συνύπαρξη της γεωμετρικής εικόνας με τις βιολογικές μορφές δημιουργεί ένα τοπίο ανάλογο των έργων του Kandisky και του Miro

θος των έργων τέχνης αλλά και ο γενικότερος σχεδιασμός του κήπου να επιτρέπουν στον επισκέπτη εθελοντικά και διακριτικά να εξερευνήσει τον κήπο αλλά και οι διάφορες γλυπτικές συνθέσεις να μην επηρεάζουν η μία την άλλη.

Ένα μέσο δημιουργίας συνέχειας μεταξύ κτιρίου και κήπου είναι επίσης τα φυτά. Μπορεί να τα συναντήσουμε σε μπαλκόνια ή στη στέγη ενός κτιρίου, σε ζαρντινιέρες, ως αναρριχώμενα πάνω στους τοίχους ε-



Κήπος στη Γλασκόβη. Αρχιτέκτονες Τοπίου James Cunning Young & Partners. Η συμβολή των κατασκευών στη σχέση κτιρίου και κήπου

νός κήπου ή με τις διάφορες γεωμετρικές μορφές τους ως δέντρα να αποτελούν αυτόνομα αρχιτεκτονικά στοιχεία δυναμικά και όχι στατικά. Αποτελεί τέχνη το να φέρουμε τα δέντρα με τα κτίρια σε αρμονία/ισορροπία, διότι βασίζεται στο ότι το δέντρο θα «πλουτίσει» το κτίριο και το κτίριο θα μεταδώσει τις αρχιτεκτονικές του ιδιότητες στο φυτό, έτσι ώστε και τα δύο μαζί να αποτελέσουν μια ενότητα. Τα δέντρα ορίζουν το χώρο μεταξύ των κτιρίων και τονίζουν τα κτίρια αυτά καθεαυτά. Τα καλύτερα αποτελέσματα επιτυγχάνονται με απλότητα, π.χ. μια ομάδα φυτών ενός είδους ή μερικά είδη με παρόμοια υφή, μορφή και χρώμα. Η σωστή επιλογή των φυτών - δέντρων ή θάμνων, ανάλογα με το σχήμα, το χρώμα (του άνθους, του κορμού, των φύλλων και των καρπών), την υφή του φυλλώματος και το μέγεθος αλλά και το φυσικό περιβάλλον όπου μπορούν να αναπτυχθούν (η θερμοκρασία, η υγρασία, το φως, ο άνεμος, η ρύπανση της ατμόσφαιρας και ο ανταγωνισμός μεταξύ των ειδών), δηλώνει την ορθή κατανόηση του χώρου από το σχεδιαστή. Επίσης, η επιλογή της σωστής απόστασης φύτευσης των δέντρων από το κτίριο είναι ένας σημαντικός παράγοντας στην κατασκευή ενός κήπου, καθώς οι ρίζες και τα κλαδιά των δέντρων μπορεί να προκαλέσουν ζημιές στα γειτονικά κτίρια αλλά και με το πυκνό φύλλωμά τους να κρύψουν το φως του κτιρίου.

Ένα άλλο στοιχείο, το οποίο δεν πρέπει να απουσιάζει από έναν κήπο, εφόσον βέβαια εντάσσεται στο γενικότερο σχεδιασμό, είναι το νερό σε διάφορες μορφές (λίμνη, πισίνα, σιντριβάνι, κ.λπ.). Το νερό προσδίδει κίνηση, ευχαρίστηση, ηρεμία, ποικιλία στο τοπίο, δημιουργεί το αίσθημα της δροσιάς και λόγω της διαφάνειάς του είναι το κατάλληλο μέσο για την αντανάκλαση εικόνων.

Χαρακτηριστικό παράδειγμα πρωτότυπης χρήσης του νερού ως στοιχείο ελεύθερο αλλά και ελεγχόμενο και υπόδειγμα συνδυασμού Αρχιτεκτονικής και Τοπίου αποτελεί η σχεδιαστική λύση του Αμερικανού Αρχιτέκτονα Τοπίου Peter Walker, για ένα συγκρότημα κτιρίων στο Dallas, Texas. Στόχος του η σύνδεση της Αρχιτεκτονικής με το Τοπίο, ο μετριασμός της επίδρασης των εργασιών στο περιβάλλον και η προστασία του χαρακτήρα του τοπίου. Στο σχέδιό του επικρατεί η απόλυτη γεωμετρία. Η συνύπαρξη της γεωμετρικής τεχνητής εικόνας με τις βιολογικές μορφές δημιουργεί ένα τοπίο ανάλογο των έργων του Miro και του Kandisky.

Στις μέρες μας, όπου το «design» στα προαναφερόμενα μέσα διακόσμησης ενός κήπου έχει εξελιχτεί, έγκειται στον αρχιτέκτονα τοπίου να επιλέξει σωστά τα διάφορα υλικά πλακόστρωσης, καθιστικά, στέγαστρα, φωτιστικά, έτσι ώστε να μην ανταγωνίζονται το γενικότερο σχεδιασμό. Τοίχοι με φυσικά ή μη υλικά σε διάφορους χρωματισμούς, σκαλοπάτια θεατρικού χαρακτήρα, προκειμένου να σπάσουν τη μονότονη πολλές φορές επίπεδη διάσταση, φράχτες και άλλα διαχωριστικά από ποικίλα υλικά και φωτισμός διακριτικός, με ξεχωριστό διακοσμητικό χαρακτήρα συνθέτουν την εικόνα του σημερινού κήπου. Επειδή, συνήθως, αυτά τα κατασκευαστικά στοιχεία σηματοδοτούν κοινόχρηστους χώρους και εισόδους, αλλά και προϊδεάζουν τον επισκέπτη για το τι πρόκειται να ακολουθήσει εντός του κτιρίου, η επιλογή τους πρέπει να είναι πολύ προσεκτική, ώστε να μην αντανακλούν το εκτυφλωτικό φως του ηλίου, να μην απορροφούν τη θερμότητα, να είναι ιδιαίτερα ανθεκτικά στην ατμοσφαιρική ρύπανση και λιγότερο επιρρεπή στους βανδαλισμούς.

Αναφέρουμε ως παράδειγμα ένα μικρό κήπο στη Γλασκόβη της Σκοτίας ενός ιστορικού κτιρίου του 15ου αι. Ο κήπος σχεδιάστηκε από τους Αρχιτέκτονες Τοπίου James Cunning Young and Partners και σκοπός του σχεδίου ήταν να αποδώσει το πνεύμα της εποχής (15ος αι.) και να λειτουργήσει εισαγωγικά προς το κτίριο. Είναι εκπληκτικός ο συνδυασμός μοντέρνων και παραδοσιακών τεχνοτροπιών στη χρήση των διαφόρων υλικών. Ο κήπος δημιουργεί την αίσθηση της απομόνωσης, διεγείρει τις αισθήσεις, αποδίδει αυτήν την επικοινωνία με το κτίριο και τους γύρω δρόμους. Φωτισμός διακριτικός στην οροφή του στεγάστρου που συνορεύει με τον κήπο.

Γενικότερα ο φωτισμός ενός κήπου προσφέρει ένα διαφορετικό στυλ κατά τη διάρκεια της νύχτας, είτε με το παίξιμο της σκιάς ή του φωτός και του νερού, με την αντανάκλαση, με τον τονισμό της υφής των διαφόρων επιφανειών, με την κίνηση. Παρ' όλα αυτά, ο διακοσμητικός χαρακτήρας που μπορεί να λάβει ένας κήπος τονίζοντας κάποια ιδιαίτερα σημεία του κήπου ή στοιχεία, δεν πρέπει να ανταγωνίζεται ποτέ αυτόν του κτιρίου.

Ο σχεδιασμός του κήπου είναι από τους πιο ειδικούς, απαιτητικούς, υπεύθυνους τομείς της Αρχιτεκτονικής Τοπίου. Ο αρχιτέκτονας Τοπίου καλείται να μιλήσει τη διάλεκτο κάθε υλικού —φυσικού και μη— αλλά και το σημαντικότερο να βρει το μέσο επικοινωνίας μεταξύ αυτών, έτσι ώστε όλα να μιλούν την ίδια γλώσσα με το κτίριο.

A blessed land

panoramic view: the new town eath the castle of Palamidi (1) consists of blocks of flats with very few open ces; the Xenia Hotel breaks the line of the horizon causing serious intrusion in the dscape character (2); the visual intrusion of the Xenia Palace Hotel is minimised by use of several levels (3)

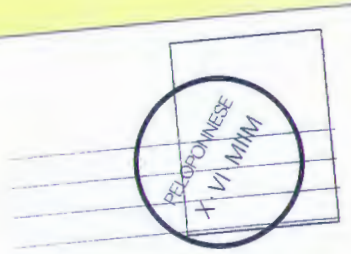
Since the time of Nafplios (the son of Poseidon) in the Hellenic period, through 'French, 'Venitian and 'Turkish domination, up until modern Greek times, man has both fortified and travelled the seas from the town of Nafplios — in the 'blessed land' of Peloponnese, the southern Greek peninsula.

Steep cliffs and colourful rocks run down to the sea, and every day hundreds of visitors climb the 999 steps to the castle of Palamidi and admire the excellent views of the Argolic bay and the 'lighthouse of the city' — the castle of 'Bourtzi.

'Even today, in the crevices of the steep cliffs along the beach you can find the prickly pear — the hallmark of Nafplios — milkweed, the famous orange trees and pines, all of which contribute to Greek fruit production.

'Furthermore, Greek, Italian and Turkish civilisations still flourish in the old city, where the archaeological museum, the Venitian school, the town hall, Syntagmatos Square, the church of St Spiridona and many other historic places are still places of reunion.

In contrast, the new town consists of blocks of flats with very few open spaces. New hotels and leisure developments threaten the landscape, with the exception of a few old houses which have been restored to small, romantic 'pensions'. There is an urgent need for a new design solution here, capable of cherishing the excellent combination of dynamic, natural and social systems in the Nafplion landscape.



The Editor,
Landscape Design,
13a West Street,
REIGATE,

◄▲ Syntagmatos Square is now mostly cafés and restaurants. The pink Turkish church (centre) is used

▼ Prickly pear, pine trees and wild flora form the carpet around the rock of Acronafplia

This month, our postcard comes from *Katerina Goltsiou*, a Greek landscape architect who studied landscape architecture at the University of Edinburgh.

Why not see your postcard in print? Don't be shy — just send us a few photographs or drawings of an interesting, bizarre or exciting development. Perhaps something you have seen where you live, or that you visited while travelling, studying or working.

Please include a text of around 200 words to accompany your illustrations, and don't forget to send a contact address and telephone number.

Μία πρωτοποριακή παρέμβαση: Παλαιό λατομείο που έγινε χώρος αναψυχής.

Η μεταμόρφωση των λατομείων

Η αρχιτεκτονική τοπίου οδηγεί σε τεχνικές αποκατάστασης υψηλών απαιτήσεων αισθητικής και οικολογίας

Κείμενο: Κατερίνα Γκόλτσιου*
**Αρχιτέκτων τοπίου (M.L.A. University of Edinburgh), γεωπόνος (Γεωπονικό Πανεπιστήμιο Αθηνών) και μέλος του Πανελλήνιου Συλλόγου Αρχιτεκτόνων Τοπίου.*

Είναι γνωστό πως η εξόρυξη μεταλλευμάτων και η δημιουργία λατομείων επιφέρει διαταραχές τόσο στη μορφολογία όσο και στη βλάστηση του τοπίου. Ο θόρυβος, η σκόνη, η διάβρωση, η καταστροφή της χλωρίδας και της πανίδας, η απώλεια του χαρακτήρα του τοπίου και γενικότερα οι αισθητικές-οπτικές επιπτώσεις, καθώς και η μόλυνση του υδροφόρου ορίζοντα, είναι μερικές από τις σπουδαιότερες διαταραχές των μεταλλευτικών δραστηριοτήτων. Τα κενά των εκσκαφών καθώς και οι όγκοι σκαμμένου υλικού (μπάζων) δημιουργούν και αυτά με τη σειρά τους περιβαλλοντικές οχλήσεις.

Η αποκατάσταση λατομείων είναι κάτι ιδιαίτερα σύνθετο, καθώς περιλαμβάνει την ανάπλαση αλλά και τη μέριμνα για παροχή χρήσεων συμβατών οικολογικά και αισθητικά με τις ανάγκες της περιοχής. Ο παραδοσιακός και επικρατέστερος τρόπος αποκατάστασης ενός λατομείου για τα ελληνικά δεδομένα αναφέρεται κυρίως στην φυτοκάλυψη των μετώπων εξόρυξης. Τα βασικότερα στάδια αυτού του τύπου αποκατάστασης είναι:

- Η ανάπλαση του χώρου της εκσκαφής και των αποθέσεων
- Η κάλυψη με γόνιμο χώμα
- Η σπορά
- Η φύτευση δένδρων και θάμνων
- Το πότισμα και η συντήρηση.

Σ' αυτή την προσπάθεια για επαναφορά του φυσικού τοπίου στην αρχική του κατάσταση ή σε μια νέα χρήση συμβατή με το χαρακτήρα του μακροτοπίου της περιοχής και με τις ανάγκες του κοινωνικού συνόλου, η συμβολή του αρχιτέκτονα τοπίου είναι ιδιαίτερα πολύτιμη.

Ο ρόλος του είναι να ενσωματώσει τις αντικρουόμενες απαιτήσεις των εταιριών εξόρυξης μεταλλευμάτων και του κοινωνικού συνόλου σε ένα σχέδιο, να προβλέψει τις καταλληλότερες μελλοντικές χρήσεις του χώρου και να είναι σε θέση να λάβει γρήγορες αποφάσεις στα αρχικά ακόμα στάδια της εκμετάλλευσης.

Έτσι, η αποκατάσταση του τοπίου από τις προαναφερόμενες μεταλλευτικές δραστηριότητες μπορεί να ειδωθεί από διάφορες οπτικές γωνίες. Σε αυτό το πλαίσιο αξίζει να αναφερθούν περιληπτικά μερικές από τις δυνατότητες διαμόρφωσης ενός διαταραγμένου λατομικού τοπίου.

1 Επαναφορά του δασικού χαρακτήρα. Συνήθως η χρήση αυτή επιλέγεται όταν η μεταλλευτική δραστηριότητα λαμβάνει χώρα μέσα σε δασική έκταση και θέλουμε να ενσωματωθεί το νέο τοπίο στο ήδη υπάρχον.

2 Δημιουργία δεξαμενής νερού ή λίμνης. Σε πολλά από τα λατομεία η γεωμορφολογία και γεωλογία τους επιτρέπει την πλήρωσή τους με νερό. Στην περίπτωση αυτή μπορεί να δημιουργηθεί λίμνη (στην οποία είναι δυνατό να εκτρέφονται και ψάρια για εμπορική εκμετάλλευση) ή να κατασκευαστούν αθλητικές εγκαταστάσεις που να φιλοξενούν δραστηριότητες όπως wind surfing, canoe κ.ο.κ.

3 Αναψυχή. Πολλοί από τους χώρους αυτούς θα μπορούσαν να αποτελέσουν χώρους συνάθροισης, οργάνωσης πολιτιστικών εκδηλώσεων, φεστιβάλ και αθλητικών δραστηριοτήτων. Αρκετά συχνή είναι η παρουσία αναρριχητών και ορειβατών στα μέρη αυτά. Σε πολλές χώρες του εξωτερικού οι χώροι αυτοί μετατρέπονται σε εκτάσεις γκολφ, τοξοβολίας κ.ο.κ. Αρκετά συχνή στη χώρα μας είναι η μετατροπή των χώρων αυτών σε υπαίθρια θέατρα, η οποία όμως πρέπει να γίνεται με ιδιαίτερη προσοχή έτσι ώστε οι χώροι αυτοί να αξιοποιούνται πλήρως από την κοινότητα της περιοχής.

Δείγμα αισθητικής ανάπλασης.

4 Κατασκηνωτικοί χώροι. Πολλά λατομεία μπορούν να φιλοξενήσουν τροχόσπιτα αλλά και κάθε μορφής κατασκήνωση, που σε άλλες περιπτώσεις θα δημιουργούσε άσχημη εικόνα σε ένα «επίπεδο» τοπίο.

5 Χώροι περιβαλλοντικής εκπαίδευσης. Αυτός ο τρόπος αποκατάστασης μπορεί να λάβει διάφορες μορφές. Μπορεί λ.χ. να δημιουργηθούν χώροι βοτανικής και περιβαλλοντικής εκπαίδευσης (τεχνητοί βιότοποι, βοτανικοί κήποι κλπ.) για την παρουσίαση γεωλογικών σχηματισμών ιδιαίτερου ενδιαφέροντος, ιστορικών - αρχαιολογικών στοιχείων και σπανίων φυτών.

6 Χώροι υπαίθριων μουσείων τέχνης (land art). Πολλές από τις εξορύξεις μπορούν να γεννήσουν πρωτοποριακές ιδέες για γλύπτες και καλλιτέχνες. Το ανάγλυφο των λατομείων μπορεί να χρησιμοποιηθεί με εικαστικό τρόπο, και από τα άχρηστα υλικά λατόμευσης να κατασκευατούν γλυπτά εντός αυτών των χώρων. ■

A RULE-BASED APPROACH FOR MAPPING AND MONITORING OF LAND COVER CHANGES IN LESVOS (E. GREECE), WITH EMPHASIS IN DEFORESTATION AND OLIVE GROVES ABANDONMENT

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EXTENDED ABSTRACT

This research focuses on the assessment of land cover changes that have taken place in Lesvos island during a 25-years span (1975-1999), using a rule-based approach combined with Remote Sensing and Geographical Information Systems (GIS) techniques. The detection of multitemporal land cover changes is significant, as these changes may trigger or indicate the cause of many environmental problems.
Three satellite images, a Landsat MSS scene (1975), a Landsat 5 TM scene (1990) and a Landsat 5 TM scene (1999), were employed for identifying land cover changes. The study area was initially divided into five relatively homogeneous zones, depending on surficial and geomorphological characteristics, and the type of vegetation/land cover that dominated each area. Each zone was individually classified with the maximum likelihood classifier using *a priori* class probabilities, in order to achieve better classification results and higher accuracies. Additional data were derived from aerial photographs (1960 and 1995) and Quickbird data (2001). Detailed photo-interpretation (on the above-mentioned data) aided by a Digital Elevation Model (DEM), and the three classified images within each zone, led to the generation of a subset of rules for the post-processing of the classified images and the detection and correction of erroneously classified pixels of specific land cover classes.
The application presented here has focused on:
a) The mapping of land cover using Landsat images and the analysis of the information regarding change detection during the 25 years span (1975-1999).
b) The integration of Remote Sensing imagery with other ancillary GIS data such as a DEM, other land cover maps and field measurements, using a rule-based approach, which led to a more accurate identification, assessment and mapping of land cover changes.
The land cover changes observed during the last three decades are considerable, even though the island is far from the mainland and without any intense tourist growth. The human pressure to the natural environment is manifested through the rapid expansion of the urban areas, fires, deforestation of pine forests, the expansion of cultivations into natural vegetation zones and overgrazing mostly in semi-mountainous or mountainous areas. On the other hand, the abandonment of the olive groves and other crops in inaccessible or mountainous areas has been observed.
The above framework has proved to be a promising and practical approach in order to quantify, understand, conceptualize and better present the dynamics of land cover changes and their implications to local environments and sustainable development.

Keywords: rule-based approach, land cover changes, remote sensing, GIS, Lesvos.

Forecasting land-use changes with the use of neural networks and GIS

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***Abstract*— In the present study a spatial model, which combines GIS with artificial neural networks has been developed for forecasting changes in land use. The model has been parameterized for the island of Lesvos (NE Greece) for the time period between 1975 and 1999 and employs an artificial neural network for predicting the patterns of development of the island's urban centres and extensive olive groves, based on a series of input parameters such as population density, transportation network, location of urban centres, distance from the coastline and elevation. In this context, data from 1975 and 1990 have been used as input and the model has been run to project (i) urban land development and (ii) patterns of olive grove cultivations, for the year 1999. Results demonstrate that the model can predict reasonably well the patterns of change of the island's large urban centres, however its predictive ability regarding the changes in the extent and location of the fields of olive-groves is considerably lower. The overall performance of the model and its advantages and limitations are critically assessed and future improvements are suggested. Finally a number of recommendations for the successful application of the model are made and its applicability in the wider Mediterranean region is discussed.**

Keywords- neural networks; GIS; land-use change; modelling;

I. INTRODUCTION

The need to forecast land use change stems from the wide range of its impacts on the social and physical environment. Land use change is considered an important driver of global change [1] and has significant effects on ecosystems [2]. In order to anticipate future climate change an understanding of how land use will evolve is necessary [3] while, according to [4] the need for predicting land use change is a direct consequence of the effects that human activities have in environmental quality. Land use and land cover change models constitute valuable tools in the process of understanding the changes that occur on the Earth's surface [5] as well as in evaluating the potential for future modifications. The complexity of processes involved with LUCC and its temporal and spatial variation [6] combined with the difficulties of case studies with controlled conditions under which to test the impacts of individual forcing factors in the behavior of the system, render modeling an essential tool for exploring the mechanisms and driving forces of the processes involved. Models of land-use change are useful for exploring the various mechanisms by which land use change occurs and the forces that drive it, project potential future environmental and socio-economic impacts of land use change, evaluate the influence of alternative policies and management regimes on LU and development patterns [7].

The use of models has significantly contributed in identifying mechanisms, patterns and the role of different drivers of land use change. Consequently, there now exists a very large diversity in modelling approaches, concepts and models striving to describe the mechanisms of land use and land cover change (see [8]). Artificial Neural Networks is one of the modeling tools that has recently been used in the attempt to explore the complexity of interactions between the parameters that govern the patterns in which land use and land cover change and evolve. They have been employed for modeling land use change due to their ability to model and quantify complex behaviour and patterns [7] by taking into account nonlinear relationships between driving variables and the changes in land use [9].

In the present study, a spatial model has been developed, which couples an artificial neural network with a GIS to forecast land use changes. The model has been parameterized for the island of Lesvos (NE Greece) for the time period between 1975 and 1999 and employs an artificial neural network for learning the patterns of change of the island's urban centres and extensive olive groves, based on a series of input parameters such as population density, transportation network, location of urban centres, distance from the coastline and elevation. Further to the application of the model, its overall performance is assessed and the contribution of the individual parameters to the results is evaluated.

II. METHODS

A. *The Study Area*

The study area is the island of Lesvos (North Aegean - Eastern Greece) (Figure 1). The island is sustaining intense pressure on its land due to its ecosystems facing disturbance as a result of the limited available natural resources, insularity, and the development of monocultures in the agricultural sector [10]. At the same time, Lesvos has limited prospects for development other than that of tourism. Extensive fields of olive groves and variable natural and agricultural landscapes

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Σχεδιασμός του τοπίου της περιφερειακής ζώνης του παρθένου δάσους Φρακτού (Δράμα)

16.30 – 18.00 **ΣΥΝΕΔΡΙΑ V** Αίθουσα Α

Αρχιτεκτονική Τοπίου

Π ρ ό ε δ ρ ο ς : Eliseo ARREDONDO, Μεξικό

Martine GUITON, Γαλλία
Ανάλυση μιας γαλλικής κοιλάδας στο Oppède-le-Vieux, Vaucluse, Γαλλία. Ένα επιβλητικό ιστορικό τοπίο

Lucia Maria COSTA, Βραζιλία
Τα έργα τέχνης στον σχεδιασμό αστικών ανοικτών χώρων

Helena NAPOLEON DEGREAS, Βραζιλία
Το ετερο-τοπίο του Σάο Πάολο: η οικοδόμηση και η καταστροφή ενός αστικού πλαισίου

Αντωνία ΝΟΥΣΙΑ, Ηνωμένο Βασίλειο
Ο πολλαπλός ρόλος του τοπίου κατά την αναπαράστασή του στα υπαίθρια μουσεία

Daphne GREENSTEIN, Gil HAR-GIL, Ισραήλ
Η τέχνη ένταξης της αρχαιολογίας, της θρησκείας και της φύσης στην αρχιτεκτονική του τοπίου

19.30 – 21.30 **Δεξίωση Υποδοχής** Αίθουσα Δεξιώσεων

Τετάρτη 9 Σεπτεμβρίου

09.15 – 11.00 **ΣΥΝΕΔΡΙΑ VI** Αμφιθέατρο

Ιστορικά Τοπία και Κήποι

Π ρ ό ε δ ρ ο ς : Hans DORN, Γερμανία

Κατερίνα ΓΚΟΛΤΣΙΟΥ, Έλλη ΠΑΓΚΑΛΟΥ, Ελλάς
Αρχαιολογικοί χώροι και δημιουργικός σχεδιασμός τοπίου. Ασύμπτωτες έννοιες;

Κύρια ταυτότητα

Από: <earth_conference2008@aegean.gr>
Προς: <gkolt@geo.aegean.gr>
Κοιν.: <earth_conference2008@aegean.gr>
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ABSTRACT SUBMISSION NOTICE

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Landscape indicators: a promising tool for the analysis of spatial distribution of tourist elements.

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ABSTRACT

The coastal landscape of the Aegean islands has long been established as one of the most famous tourist attractions of the Mediterranean for its multivariate natural and cultural profile. The uncontrolled growth of the tourism industry in many Greek coastal destinations has caused enormous pressures and significant alterations to their natural and cultural landscape.

This paper analyzes the spatial distribution of tourist elements in a coastal landscape, with the aid of a set of landscape indicators, the result of a methodological framework for the description, appraisal and assessment of coastal tourist landscapes and future impacts from tourism industry.

The case study of Kefalos, Kos examines chronological changes upon the density of human-made or built elements, the degree of network connectivity, the spatial organization of tourist land uses and alterations upon the views towards the tourist attraction, with the aid of Remote Sensing and GIS techniques. The methodology is based on a system of landscape metrics developed within a GIS framework, in order to simplify and quantify current ongoing change and to provide simple measures standardized for time and place. Landscape metrics were used on orthorectified aerial photographs to quantify changes on spatial arrangement of patches (such as density, connectivity, distribution, etc.).

The application of such analytical tools represents a novel methodological approach to the Greek landscapes of tourism. It demonstrates the value of landscape indicators in a quantitative landscape assessment for the understanding of Greek tourist landscape formation and future trends of tourism development.

Keywords: *tourist landscape, coastal landscape, landscape indicators, landscape metrics, geographic information system (GIS), Greece*
Stream: Landscape Geography
Topic (*): Natural resources: management, tourism, and local development, OR Spatial identities and social movements.

(*) Please indicate "Other" if the topic of your paper does not fit any of the conference themes

Analysing spatial patterns of land cover/use change derived from satellite remote sensing and knowledge-based contextual information

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Abstract – This paper describes a methodological framework for assessing land cover/use changes that have taken place in Lesvos (Greece) since 1975, using landscape metrics and spatial statistics combined with Remote Sensing and Geographical Information Systems (GIS) techniques. Remote sensing techniques were employed in order to map land cover changes that have taken place in the last 25 years. The latter was achieved by devising a simple and operational rule-based approach to map land cover changes, based on the classification of Landsat imagery and the conceptual analysis of the information regarding change detection. The use of ancillary GIS data such as a Digital Elevation Model, existing thematic maps and the knowledge of the island's vegetation dynamics, formed the basis for setting the rules for the post-processing of the classified images that led to a more accurate assessment and mapping of land cover changes. Landscape metrics and spatial statistics were derived from the land cover change map of the classified Landsat MSS and TM5 images, in order to quantify the characteristics of patches, such as size, shape and edges and their spatial arrangement (spatial autocorrelation, fragmentation, connectivity, diversity, density metrics, isolation / proximity and contrast metrics).
The above framework proved to be a promising and practical approach in order to quantify, understand, conceptualize and better present the dynamics of land cover/use changes in Lesvos.

Keywords: spatial patterns, autocorrelation, landscape metrics, land cover/use change, Lesvos-Greece.

1. INTRODUCTION

Remote Sensing and GIS (Geographic Information Systems) play an important role in our quest to understand land cover/use changes in the environment that we live in. Satellite imagery and aerial photographs are used to map land cover for several time periods and quantify land cover changes. Despite their significance for scientists and for policy makers, detection and monitoring of land cover/use changes, their size and dynamics as well as the identification of the causal factors are not yet fully understood. The quantification of uncertainty in the estimations and the correct interpretation of the findings still rank high in the research priorities.

Change detection studies have widely focused on post-classification comparison and image differencing (Coppin *et al.*, 2004; Carlson and Sanchez-Azofeifa, 1999; Symeonakis *et al.*, 2006). Only recently it has been suggested that the use of landscape metrics can aid the study of land cover/use change and help in understanding and inferring the processes involved in the spatial distribution of land uses and the patterns created (Herzog and Lausch, 2001; Narumalani *et al.*, 2004; Herold *et al.*,2005). These studies have focused on the application of landscape metrics to each classified image and the comparison of the indices derived. This is an important step towards the correct interpretation of change patterns as it provides additional information about the structure of changes (e.g. changes in patch size, fragmentation of the landscape etc) but it is still difficult to infer on the causal factors of these changes and proceed with the modeling of land cover/use change dynamics. Are changes randomly distributed? Are they aggregated? Do they follow the same pattern everywhere in the study area? These are some questions that we can not answer by simply calculating landscape metrics from land cover maps and comparing them for different time periods.

A new path is proposed in this research with regard to the meta-analysis of classified satellite images. Our approach focuses on: 1) Using common GIS overlay techniques (e.g. buffers, cost distance, spatial queries) to find where the changes occur in relation to physiographical characteristics and the structured environment of the study area; 2) Using Landscape metrics on the change map to characterize the geometrical properties of the "changed" patches; and 3) Using spatial statistics to study the spatial distribution of patches and reveal the "hot spots" of changes.

It is demonstrated that by using a combination of spatial exploratory data analysis, within a GIS framework where other physiographical and socioeconomic data are stored, it is possible to enhance the interpretation of the patterns of change, reach more reliable conclusions, reveal the main causal factors and/or prove hypotheses made *a priori*.

2. METHODOLOGY

2.1 The study area

The study area is the island of Lesvos (North Aegean - Eastern Greece) (Figure 1). It was selected due to the fact that the island's ecosystems are faced with disturbance as a result of limited available natural resources, insularity, and the development of monocultures in the agricultural sector (Giourga *et al.*, 1994). At the same time, Lesvos has limited prospects for development other than that of tourism.

Extensive fields of olive groves and variable natural and agricultural landscapes characterize the island, while the main income of the local population comes from the agricultural and stock-farmer activities. The size of farm holdings in the island is very small with the average area of a farm being approximately 2.3 ha, of which 2 ha are olive groves. Olive cultivation in Lesvos had been in the past a monoculture that virtually sustained the island's economy. However, the agricultural sector currently suffers from significant underemployment as employment in olive groves is

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
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ο Δήμαρχος Ηλιούπολης

Απονέμει

ΤΟ ΔΕΥΤΕΡΟ ΒΡΑΒΕΙΟ

του Πανελληνίου Αρχιτεκτονικού Διαγωνισμού Ιδεών

με θέμα:

«ΔΙΑΜΟΡΦΩΣΗ ΠΛΑΤΕΙΑΣ ΕΘΝΙΚΗΣ ΑΝΤΙΣΤΑΣΗΣ»

στη Μελέτη Νο 10873

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Ο ΔΗΜΑΡΧΟΣ

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The Westonbirt International Festival of Gardens 2004

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Personal Details

Contact Name: Katerina Goltsi, Panita Karamanea, Loulia Dreiga, Mary Tsagari

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Postcode: 15127

Tel: 0030-2106136246 Fax: 0030-210 6136 246

Email: gkoli@geo.uoa.gr

Website (if applicable):
(If you do not have your own website and wish to include visuals of your past work with this application, please feel free to do so. However, we regret we are unable to return them to you).

Please describe the creative field you represent (e.g. garden design, architecture, sculpture, interior design, stage-set design etc.) and details of your most recent design projects.

Katerina Goltsi : garden design, landscape design
Panita Karamanea : architecture, landscape design
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