



ORIGINAL RESEARCH PAPER

Forestry Science

THE CONTRIBUTION OF THE CADASTRE AND GIS TO THE SPATIAL RESTRUCTURING AND ENVIRONMENTAL PROTECTION OF HALKIDIKI GREECE

KEY WORDS: Forest Maps, Cadastre, Forestry, Geographical Information Systems, Land Uses

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ABSTRACT

Until 1976 there were no high-precision maps showing the boundary between forest lands and other land uses such as agricultural land, urban areas, agglomerations, industrial sites of other activities. Forest Land Training has as its object the delimitation and registration of forest land in an accurate, transparent and definitive manner. In particular, the Forest Maps training has as an objective the time and spatial identification and mapping of forests and woodland. Forest and forest land registration aims at environmental protection of forests, forests and grassland. It also promotes the rights of the Greek State on forests, forestry and grassland in the procedures of the National Cadastre and the complete investigation of their ownership status. The purpose of this study was to investigate the contribution of the cadastre to a representative area, such as Halkidiki, but also more generally for the Greek area, the spatial planning, development and extension of forest areas as well as to record the changes of land cover from 1945 to 2008, demonstrating how the landscape is shaped according to the circumstance.

INTRODUCTION

Forest map is the map of the registration of the form and character of forest vegetation, ie in the form of polygons, in an appropriate scale of orthophoto maps, which is filled with photo-interpretive elements of recent and historical aerial photographs, administrative acts and available data of the forest service and other services.

It is the evolution of the Forest Land Registry. The Forest Register is a Constitutional requirement and obligation of the State, it has as its object the categorization of the Forest, according to the morphological characteristics. The object of the preparation of the Forest Maps. To record and delimit forests, forest and grassland areas. Purpose of the preparation of Forest Maps diachronic and the spatial identification and mapping of forests and forest areas the objective of the task.

MATERIALS AND METHODS

Our research was based on the primary cartographic data of the forest management of Halkidiki as well as of EKHA SA and were the following:

- Orthophoto maps of 1945 and 2008
- Administrative acts concerning property schemes

Photo-interpretation, capture and design programs for 3D ground models such as:

- Autocad 2000
- ArcGIS 10.3.1
- Global Mapper 19
- Erdas Imagine 10.2

Case Study

Halkidiki is the region of Macedonia and geographically it is the end of Central Macedonia in the Aegean sea, which enters deep into it, forming three elongated peninsulas, which give the region its characteristic shape ("feet of Halkidiki"). To the northeast is the Marmari peninsula, between Akanthios and Strymonikos Gulfs. Halkidiki is a large peninsula, since it is included by the Aegean Sea and only N.NW. it is united with the trunk of Macedonia through the region of Thessaloniki. In the southern part of Halkidiki, three characteristic individual peninsulas are formed which are from west to east: the Kassandra Peninsula, Sithonia Peninsula and Athos Peninsula. Halkidiki was chosen as a study area because it is of great cadastral interest. The capital of the Prefecture of Halkidiki is Polygyros with 6,121 inhabitants. Lowland lands occupy 25%, semi-mountainous lands 51% and mountainous lands 24%. Its main mountains are: Holomontas (1,165 m.), Mount Stratoniko (823 m.) And Athos (2,033 m.)

RESULTS

From the comparison of the photo interpretation between the orthophoto map of 1945 and the recent one for the region of Halkidiki, Figures 1,2,3 emerged with the areas of land uses appearing in hectares and in percentages respectively.

Performance of land use areas in Ha from the orthophoto maps of 1945 for Halkidiki Where A = Other form of use, D = Forests and forest areas,



Figure 1: 1945 In Area

Performance of land use areas in Ha from the orthophoto maps of 1945 for Halkidiki Where A = Other type of use, D = Forests and woodlands, X = Grassland



Figure 2: Recent In Area

As can be seen from the photo interpretation of 1945 in the area of Halkidiki, the main form of land use was forest land occupying an area of 159,017.91 Ha, which corresponded to approximately 64% of the total surface. The other type of land (non-forest) corresponded to 90,449.57 Ha (36%).

From the photo-interpretation of the recent map, the forest

areas receded occupying an area of 125,686.3 Ha (56%). The area covered by other types of land and grassland was 99,371.06 Ha (44%) and 17.31 Ha (0%) respectively. A decrease of 8% of forested areas is observed, while we observe an increase of 8% (64-56%) of non-forested areas.

Figure 3 and Table 1 show the composition of the two orthophoto maps (1945 and recent) for the region of Halkidiki with land uses presented as a percentage (%) and in Ha of the total area. From the processing of the data, it appears that most of the area (142,070.62Ha), which corresponds to a percentage of about 50%, is covered by forests and woodlands that have preserved their character throughout time (DD). In a percentage of the order of 30%, it is of the other form (AA) and with an area of 85,799.03 Ha.

On the contrary, the areas that showed a change correspond to an area of 8,394.5 Ha and to a percentage of 3% in forested fields (AD), 6% in cleared forest areas (DA) and with an area of 15,918.83 Ha. As far as the administrative PAs are concerned present 4%, PΔ 2%, PX 0% and finally AN 5%.

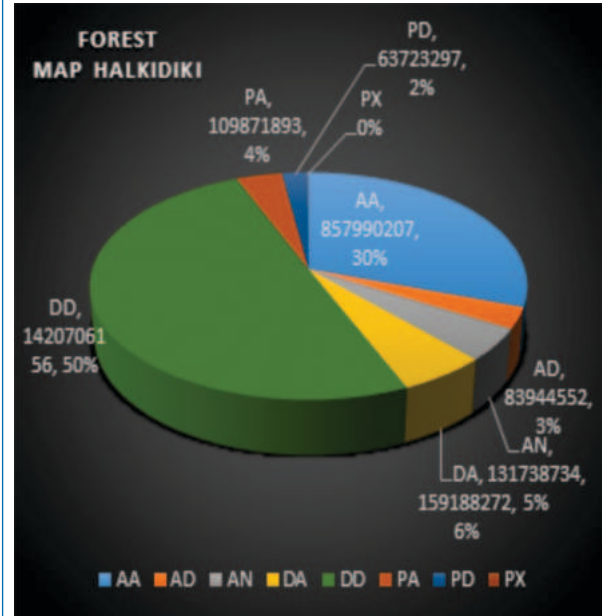


Figure 3: Forest Map Of Halkidiki In Area And Percentage.

Table 1: Forms Of Land Cover Expressed In Polygons (number And Percentage %) And In Area (ha And Percentage %) Resulting From The Synthesis Of The Historical (1945) And Recent Orthophotomap For The Region Of Halkidiki

CHARAC-TER	POLYGONS		AREA		
	HOST	RATE	Ha	RATE	
AA	34944	28%	85.799,03	30%	Same form of land cover in the historian(1945) and recent map
DD	10714	8%	142.070,62	50%	
TOTAL (A)	45658	36%	227.869,65	80%	Change in land cover form
AD	30473	24%	8.394,5	3%	
DA	30583	24%	15.918,83	6%	
TOTAL (B)	61056	48%	24.312,88	9%	
PA	14010	11%	10.987,19	4%	
PD	3706	3%	6.372,33	2%	Administrati ve acts
PX	6	0%	118,96	0%	
AN	2475	2%	13.173,88	5%	
TOTAL (C)	20197	16%	30.652,36	11%	
TOTAL (A+B+C)	126911	100%	282.831,89	100%	

Where A = Other form of use, D = Forests and woodlands, X = Grassland or rocky and Of the two characters in the composition, the left one refers to the orthophoto map of 1945 and the right one to the recent one.

In the region, the largest area is occupied by forest lands and forests (DD), while the always non-forest lands (AA) appear in a relatively small area. The large altitude range of the area (Figure 1) contributed to this, as it is a lowland settlement, where cultivated lands dominate. In the region, the largest area, as mentioned above, is occupied by the always forested areas (DD). In fact, as expected, both the intense touristic and holiday nature of the area has led to the development and construction of large areas of agricultural land. On the other hand, the always forested areas and forests (DD) also occupy a significant area in the study area, and appeared to extend inland.



Figure 4: Halkidiki Altitude Map

Finally, the forest map of Halkidiki with the forms of coverage was prepared through the GIS software. (Figure 2)

Figure 5 : Forest Map Of Halkidiki With The Forms Of Coverage

CONCLUSIONS

The contribution of the Land Registry to the spatial restructuring of Greece, to the formation, development and expansion of forests and woodlands is shown through the research we have done to be very substantial. The digital recording of properties throughout the territory of Greece and their registration by land use is the first step for the overall recording of the existing situation in current time and thus creates the possibility for specialists to plan a spatial restructuring based on the needs of seasonal.

It permanently and effectively protects the environment and is a key planning and EIA (Environment Impact Assessment) tool. The irrevocable demarcation of the forests and the coast, combined with the registration of private and public property, will be the most serious barrier against encroachment and arbitrariness in our forests, beaches and protected areas and at the same time a positive field of investment.

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