

Fields of wheat back to the land. A GIS environment for the study of medieval village history in central Greece

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In the archaeological discourse GIS is usually referred to as an environment within which to process information concerning environmental and physical factors, with the aim to study and analyse broader historical and cultural phenomena. In few cases though, historical data have been employed as meaningful variables in the creation of GIS-based geographical and historical models (see for instance Doorn 1993). The present paper aims to broaden the discussion about the integrated use of archaeology and computer applications, bringing into focus the potential of historical archive data processed and analysed within a GIS environment.

As a case study we examine the Ottoman Imperial Archives of the province of Boeotia in Central Greece, which were studied by Machiel Kiel for the Boeotia survey project (Kiel 1997 and 1999). Such *Tahrirs*, which registered for tax reasons the population and the agricultural production of the region, were made as a regular practice of the Ottomans both in synoptic and detailed forms after every accession of a new Sultan or, in the case of long reigns, every 20-30 years (Kiel 1992, 1997:319). They offer us information on the total tax revenue per village, the number of households and, in the case of the detailed registers, the tax share of each product. To these sources we should add travellers accounts of the late 17th and 18th centuries as well as proper census accounts of the newly founded Greek state in the 19th century.

In the present study these diverse data sets were structured in a relational database that contains information on the village names and their location, on the periods in which the villages are recorded, data from the synoptic and detailed Ottoman registers on the population and agricultural production, as well as information from travellers and modern census statistics. The economic data from the registers come in an indirect way, that is tax revenues. Therefore within the alphanumeric database they had to be converted applying specific algorithms in order to get data in a format suitable for processing within the system. The number of tax paying units, i.e. households, was corrected by a factor of five people per household to get an impression on the total population per village. The transformation of the tax share of each product into the metric system was facilitated by the description in the *Mufassal tahrir defters* of the local laws (*Kanunname*) and customs about taxation practices as well as the way in which the local measures are related to the standard measure of Istanbul (Alexander 1985, Kiel 1997:320-321). In the Kaza of Thebes the local 'load' for cereals was 6.5 Istanbul bushels (*keyl*) or 167 kgr, in the Kaza of Levadia it was 6 Istanbul bushels or 154 kgr. The *Medre*, the measure for wine, equals to 71 liters. Sheep were taxed 1 *akce* (small silver coin) for two sheep, and this allows to calculate from the total revenue derived from sheep the total number of sheep per village. On the basis of this information given for Boeotia by Kiel (1997:318) and furthermore converting the 13%, that was the tithe in the *Sandjak of Euripos*, to which Boeotia belonged, into 100 % we came to an average estimation of the production of each crop in the metric system (see also Balta 1989).

GIS gives us the opportunity to study these parameters in the landscape. As base-layers we used the 1:200,000 and 1:50,000 topographical and geological maps of Boeotia which were digitized according to different info-layers and put into the GIS system as part of the larger work of one of the authors on the ancient settlement patterns of Boeotia (Farinetti, forthcoming). Subsequently GIS layers were produced illustrating the virtual continuous representation of the surface morphology (a DEM), as a TIN and subsequently as a GRID to allow further analyses, the slope, and the geology and arable soils of the region. Next step was to give a spatial character to the information recorded in the registers and collected into the database and attach spatial features to them. At this stage we used the results of an ongoing research by Bintliff and Kiel (forthcoming) who managed to locate a large number of the villages appearing in the documents. A large percentage of them is identical with present day villages, whose name history and location change can be followed through oral history and existing sources, such as travel journals and maps of the 19th or earlier centuries. Problematic are villages that ceased to exist and for which there is no indication of their location. Problematic are also cases of locations bearing the same name or of present day villages for which there are more candidates of the same clan in the archives. In such cases indications can be obtained from the known location of the previous or subsequent village recorded in the defters and this proximity factor has been used to define the approximate broader geographical setting (see also Balta 1992:59-64). Additional information comes from the sites recorded by the Boeotia archaeological surface survey. The project recorded the abandonment of numerous Byzantine village sites as well as the foundation of new ones, connected with a new pottery style and marking the relocation of villages (Bintliff 1995:115).

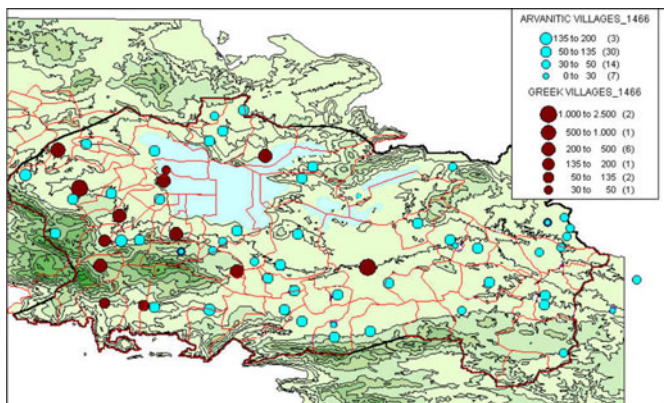


figure1 - Villages of Boeotia in 1466 according to population and ethnicity.

Our aim in this occasion is to present a preliminary discussion of the village history of the late 15th and mainly 16th century, giving emphasis to the spatial component that GIS allows us to include in our study. The oldest registration for Boeotia is a synoptic one and comes from the year 1466/67, few years after the annexation of Boeotia by the Ottomans (Figure 1). The archives make a distinction between *arvanitic* (*ARNAUDHAN*) villages, i.e. is albanian speaking, and greek speaking (*RUM*) villages, recording in that way the discontinuity in settlement and new population influx which took place in the Late Frankish period (Bintliff 1995). In 1466 the greek villages were large stable villages of 200-500 people clustering on or beside ancient foci (such as *Chaironeia*, *Chostiai*, *Thisbe*, *Koroneia*, *Copai*, *Haliartos*, *Askra*) and were concentrated mainly in western Boeotia. To these we should add the two almost entirely Greek towns of the region: Levadia, which was rather a large village of 1,000 people and the town of Thebes with 2,400 inhabitants. On the other hand, the arvanitic villages were tiny hamlets of 30 to 130 people, mobile around several village locations.

Figure 1, which also displays the distribution of modern village boundaries, shows that most of the medieval villages stand in the middle of present village territories. In some cases several small arvanitic hamlets exist within a present village community area, the large territory of modern Thebes corresponds to that of the medieval town, medieval Levadia has a smaller hinterland and is surrounded by several other villages, whilst the blank areas are occupied by the sites in the next census of 1506 as a result of population growth and gradual infilling of the landscape. The majority of the divisions displays a comparable territory for both Greek and Arvanitic villages, which does not take into account the different size of the villages, creating therefore an even distribution in the landscape, which reflects probably the organized character of the colonization that filled the deserted settlement niches of the region. Yet the small village size and lower population of the arvanitic Eastern Boeotia created more favourable conditions in comparison to the crowded and confined greek villages. The implications of these differences for the economic and demographic development become visible in the registers of 1506 and especially of 1570, for which also detailed economic data are preserved.

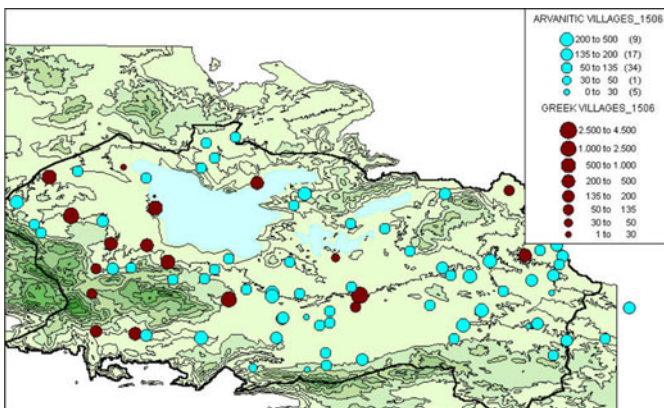


figure2 Villages of Boeotia in 1506 according to population and ethnicity.

In 1506 a general demographic growth can be noticed in both Greek and Arvanitic settlements (Figure 2). In the lowlands the arvanitic hamlets multiplied sharing the existing communities areas, a phenomenon related probably to their smaller size as well as to the fertility of these lowland areas. Their size remained small as most of them continued to fall in the range of 30 to 135 people. Yet already in 1506 many of the arvanitic hamlets were developing into substantial villages as a large number of them falls in the range of 135-200 people and a few reached the 300 inhabitants. Despite that, in this period the main distinction between smaller arvanitic hamlets and large greek villages remained (five of the latter were in range of 200-500, other five had 500-1,000 people, Levadia doubled its population coming up to 2,000 and Thebes the same reaching 4,500 inhabitants).

Differences can be observed also in the economic structure of the villages, which presumably go back to the C15th and are related to the different ethnicity of the villages. In Figure 3, which illustrates sheep rasing in the Kaza of Thebes, we observe that all the arvanitic settlements had a strong pastoralist component and were evenly distributed having comparable size of flocks. Their economy was supplemented by cereal and cotton production. On the contrary the Greek villages were not involved in stockraising but were practicing mediterranean polyculture.

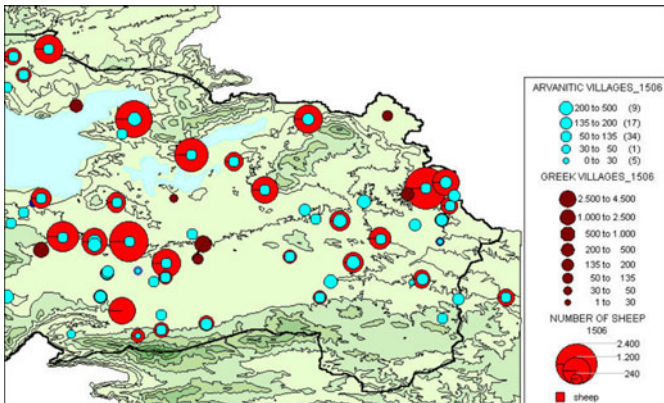


figure3 Sheep raising in the district of Thebes in 1506

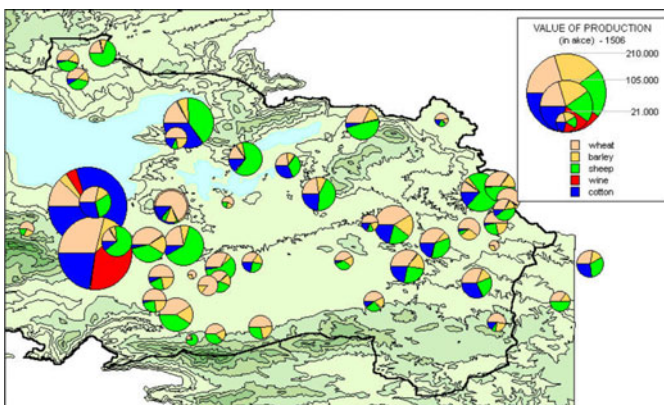


figure4 Monetary value of the agricultural activity in 1506

Figure 4 which shows the monetary value in *akce* of the different types of agricultural activity, calculated on the basis of the official price (not the fluctuating market price) of each article mentioned in the registers (Kiel 1997:321), lets us evaluate the importance of the different crops for the economy of the villages. The Greek villages, which are very few in the Kaza of Thebes, had an economy based on a considerable grain production for subsistence and in the meanwhile they were orientated towards labour intensive activities. Panagia (the successor of ancient *Askra*) was specializing in viniculture, while Harmena (the successor of ancient *Haliartos*) in cotton and the textile industry. We should notice the total absence of olives, a crop that was introduced in other parts of the Aegean area during the 17th century, in connection with an export oriented economy. The inhabitants of the arvanitic villages, alongside the systematic sheep raising, were devoted to supplementary activities such as cereal and cotton production. We notice also differences among them, as some had a higher income from the exploitation of grazing land while others near the plain from the grain production. Therefore in 1506 they were moving already away from a subsistence model based on tiny pastoral hamlets, which might have been the case immediately after the colonization.

In Figure 5 we attempted to assess the production recorded in the registers in terms of the territories of the different villages, calculating the area devoted to grain cultivation and viniculture. We used here the figures that Allbough (1953) gives as the yield of 1 ha of land for different kinds of crops and we took also into account the fallow areas, which practically double the area devoted to cereals. As we should expect, the smaller Arvanitic villages had plenty arable land available, which together with the exploitation of the grazing land created more favourable circumstances. Panaya on the other hand, the largest Greek village after Thebes, with a considerable rise in population seems to have exceeded the potential of its territory.

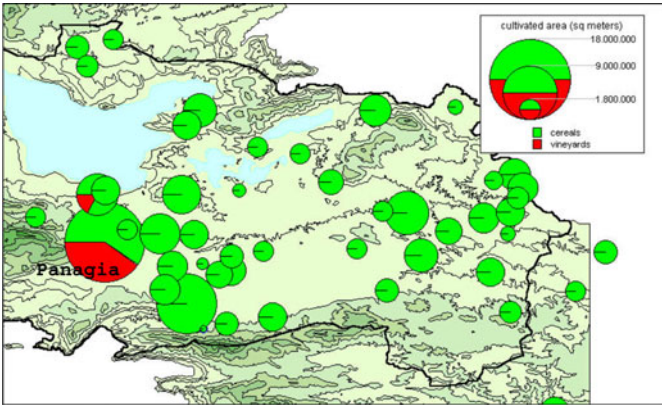


figure5 Calculated area devoted to grain cultivation and viniculture in 1506

What these different economic strategies meant for the peasant can be seen in Figure 6 which estimates the average income per household generated by the agricultural production. Small population numbers and larger territories created the circumstances for intensified production, higher surpluses and a better income per household. Striking, on the other hand, is the case of Panagia which in our previous figures appears always as a large village with large production and high population number. Yet these were not a sign of prosperity as the very low average income per household illustrates, indicating the crisis that was facing this village economy. Better was doing Harmena which was specializing in cotton production.

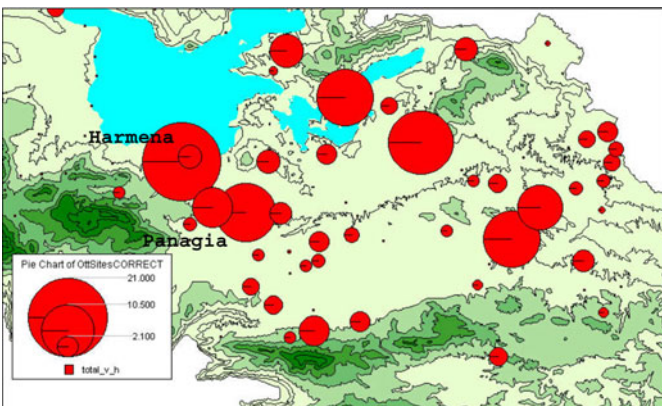


figure6 Average income per household in 1506

As a result of this deficit but also because of the continuing population growth in both Greek and Arvanitic villages in the course of the C16th an essential transformation, which is reflected in the 1570 register, took place in the Boeotian landscape. First of all a transformation of scale is observed in the Arvanitic villages, which doubled their population and fell in the range of 200-500 people, a size similar to the majority of the Greek villages. In terms of village size there is therefore a growing homogeneity in the rural landscape. On the other hand certain Greek villages and towns grew further and kept dominating the urban landscape: three villages were in the range of 600-1,000 people, another two in the range of 1,000-2,500 and the two towns of Levadia and Thebes had 1,500 and 7,500 people respectively.

The observed homogeneity becomes more evident when we move to the economic structure of the villages (Figure 7). With demographic increase the arvanitic villages turned to supplementary activities and viniculture appears along with cultivation of cereals, cotton and stock raising. They resemble therefore from now on to a typical Greek village in respect to economy and village size. Yet this transformation was not one sided. The Greek villages pressed by their large population and limited availability of land were forced to embark to

other activities. In Panagia for example viniculture was decreased drastically and cereal production was increased to feed the growing population. The higher income though derived by the introduction of stock raising, which changed essentially the character of this village economy. This reorientation should be seen as an answer to the crisis of the previous 70 years and not as an investment of surplus money from wine or the textiles into sheep breeding as it has been argued (Kiel 1997).

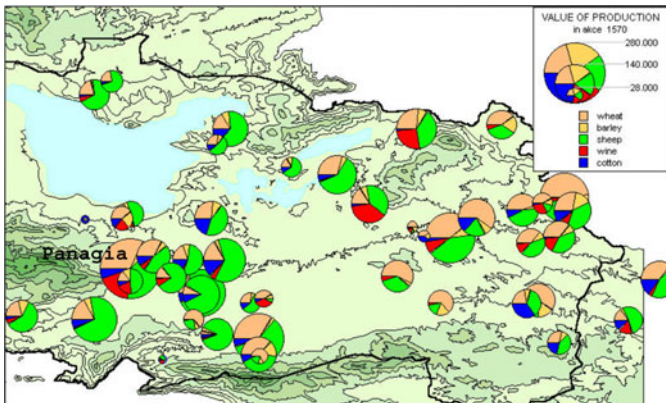


figure7 Monetary value of the agricultural activity in 1570

Our point is illustrated better in figure 8, where we can see the area devoted to cereal cultivation and viniculture in two up today surviving villages, Panagia and Mavromati. Displayed are also the boundaries of the present day villages and a classification of the soils of the region in a scale from 1 (bare rock) through 2 (grazing land) up to 5 (best arable soil). In the case of Panagia we can notice the limited area for cultivation which had been surpassed by the agricultural production as well as the existence of plenty grazing land in the interior mountainous area. The embarkation upon pastoralism was exactly what this community did to ensure its viability and carry on its demographic expansion.

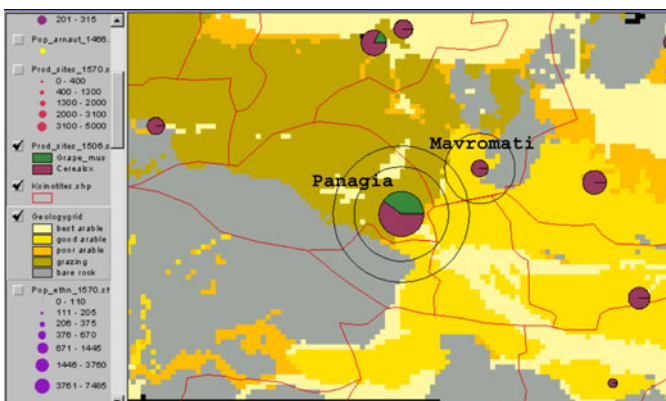


figure8 Calculated area devoted to grain cultivation and viniculture in the villages of Panagia and Mavromati

Furthermore, looking at the size of flocks and their distribution in Figure 9, we can notice clusters of sites with systematic sheep raising indicating a more specialized landscape (in comparison to 1506 in figure 3), which was determined by topography (lowland-upland) and soil potential rather than by ethnicity. Finally, the value of production per household and therefore the procapita income shows, as was the case also in the 1506 register, an inverse proportion of the highest income to the village size. This affects mainly the Greek villages, which were larger in size. As a working hypothesis we could connect this deficit with migratory patterns and the population influx which is observed in certain Greek towns such as Thebes, and which can

not be explained with natural demographic growth (see also discussion in Balta 1992:97-98 for similar trends in Euboea).

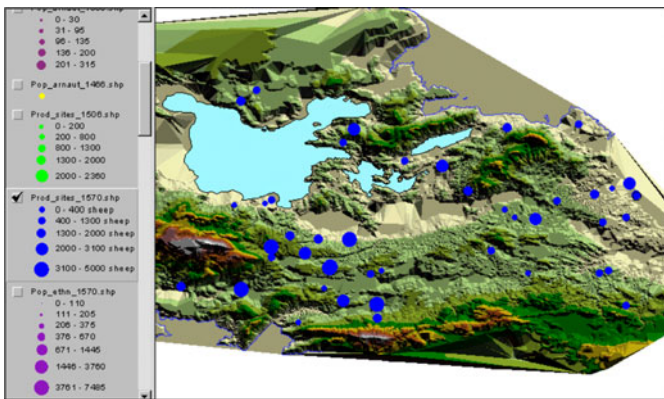


figure9 Sheep razing in the district of Thebes in 1570

To sum up, with this paper, as part of a research which is just at the beginning, we made an attempt to make a meaningful use of an historical source, the Ottoman registers, combining them with the potentials for spatial analysis that Geographical Information Systems offer. We considered the territories of the villages and the agricultural potential of their hinterlands, the economic structure and importance of the different products for the village economy, as well as the demographic development and changes that took place in time, trying to illustrate the transformation of the Boeotian landscape during the 16th century.

Acknowledgments

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