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Landscape Change and Greek Monastic Agriculture

With anthropogenic climate change becoming a more pressing subject in popular media, attention has turned to cases in which past humans also affected the environment in which they lived. Many people view humans' ability to shape their world as a relatively recent phenomenon, as they forget about the effects of deforestation and agriculturally-induced topsoil erosion; unsurprisingly, the two are often correlated, since the removal of vegetation for agricultural purposes leaves the land more vulnerable to erosion by wind and water. Studying the types of intensive agriculture used across the Earth therefore provides a valuable method for determining anthropogenic, pre-industrial environmental changes. This information about pre-industrial landscape change can then help us understand how to deal with climate change in the present. In the case of the monastery of Hagios Ioannis Prodromos, this relationship between humans and their environment becomes especially interesting, as the monastery is a site of human healing that also serves as an important agricultural site. The question then arises—have monasteries cared for the health of the land as they have for the health of the people?

More generally, it becomes important to consider how monasteries throughout Greece have contributed to landscape change. Although monastic agricultural practices did indeed play a role in eroding Greek topsoil, monasteries were simply one component in a long tradition of intensive agricultural systems, all of which contributed to anthropogenic landscape change. Thus, it is easy to overestimate the impact of monasteries on land degradation: their influence is far overshadowed by larger agricultural institutions that specialize in the cultivation of vines or exotic plants and by the larger climatic patterns that govern the Earth. Altogether, more research

is needed in order to determine a more conclusive link between the agricultural practices of monasteries and the erosion of topsoil. As a general note, please note that this paper strives to be understandable from the myriad viewpoints of the Seminar's participants; therefore, it presents scientific research in summary and avoids unnecessarily technical jargon.

Well before the dawn of monasticism, humans' agricultural practices had already begun to affect their environment. The Greek Mesolithic, which took place roughly between 10,000 BP and 8000 BP for Greece, often serves as a mere prelude to the more exciting Neolithic.[1] Nonetheless, the study of the Mesolithic is still important, as it depicts the region's vegetation before the advent of agriculture. Our evidence for the region around the monastery comes from Tenaghi Philippon, between Serres and Kavala. Palynology, the analysis of subfossil pollen grains, reveals that the conditions were even drier than in the present day and that the temperatures were quite low—steppe vegetation prevailed, especially deciduous oak. The Mesolithic was a time of arboreal expansion: before the dawn of agriculture, the landscape was primarily characterized by oak woodland and grasses.[2]

During the Neolithic era (between 8000 and 5000 BP in Greece), the vegetation began to change: the oak woodland was cleared for agricultural purposes and other species started to become more common, including hazel, fir, pine, hornbeam, beech, and fir. Contrary to popular expectation, however, anthropogenic changes to the environment were actually minor in nature, as early human settlements were small-scale and somewhat scarce; aside from deforestation, climatic and edaphic factors were the primary forces behind landscape change until about 4500 BP, during the Bronze Age. Eastern Macedonia in particular experienced remarkably stable

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[1] Sytze Bottema, "The Vegetation History of the Greek Mesolithic," in *The Greek Mesolithic: Problems and Perspectives* (London: The British School at Athens, 2003), 33.

[2] Ibid., 42.

vegetation throughout the early periods of human settlements, although its inhabitants grew many pulses and fruits and did not begin olive cultivation until circa 3900 BP. Around 4500 BP, palynological evidence indicates that cultivation began to make an impact on Greek vegetation.[3]

Generally, agriculture tends to lead to topsoil erosion. This effect is well-studied within the geological community and has even reached wider audiences as a result of such dramatic events as the Dust Bowl of the 1930s. Nonetheless, the relationship between agriculture and erosion might not be quite as simplistic as the popular imagination would believe; in fact, the relationship depends on the types of crops planted and the techniques used in growing them. As indicated by a 1997 study on the effects of plant coverage on Mediterranean soil erosion, vines result in the highest level of agriculturally-induced erosion, followed by eucalyptus and other exotic plants. Cereals such as winter wheat (common in the lands surrounding Thessaloniki) tend to result in the lowest rates of erosion out of the main Mediterranean crops. For shrublands, the erosional rate depends on the precipitation amount: higher sediment loss occurs in areas of low precipitation. In the more general case, more rainfall leads to more erosion, as it facilitates the transport of sediment. In the area around Petralona, not far from Serres, the annual rainfall averages 464 millimeters per year, which is quite dry compared to temperate New Jersey but about average for the Mediterranean. The main crops in this area are grains and cereals, although self-sustaining communities like the monastery of Hagios Ioannis Prodromos have a much broader agricultural focus.[4] The cultivation of crops on steep slopes leads to even further

[3] Soultana Maria Valamoti, *Plants and People in Late Neolithic and Early Bronze Age Northern Greece: An Archaeobotanical Investigation* (Oxford: Archaeopress, 2004), 9, 133.

[4] C. Kosmas et al., "The Effect of Land Use on Runoff and Soil Erosion Rates under Mediterranean Conditions," *Catena* 29 (1997): 46-58, doi:10.1016/s0341-8162(96)00062-8.

erosion.[5] In contrast to the expected effect of intensive agriculture, however, olive trees seem to prevent erosion: in fact, many olive groves have survived on hilltops for centuries, protecting the sediment underneath them from runoff.[6]

The Larissa Plain in Thessaly has been the subject of several other important geoarchaeological investigations, as the Neolithic settlements there were densely settled and thus provide a magnified view of the relationship between land usage and erosion. Although the Larissa Plain is far removed from Serres, it provides an acceptable point of reference for the monastery; furthermore, the relationship between Greek agricultural systems and landscape change remains regardless of precise physical location. One 1990 examination of the basin yielded particularly interesting results: based on the alluviational patterns, it appears that major slope destabilization occurred about 1000 years after the dawn of agriculture in the region. This erosional pattern, however, did not seem to affect the density of settlements and likely did not pose a major issue until the first millennium BCE. The researchers considered but ultimately dismissed climatic and sea level change as the drivers of the observed trends: there is no evidence for local climatic changes during the era in question (only in northwest Europe), and sea level change (a few meters) would not have been large enough to explain the widespread erosion. While the forces driving landscape change are clearly complex and multifaceted, humans have probably had a measurable impact on the Greek landscape.[7]

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[5] Karl W. Butzer, "Environmental History in the Mediterranean World: Cross-disciplinary Investigation of Cause-and-effect for Degradation and Soil Erosion," *Journal of Archaeological Science* 32, no. 12 (December 2005): 1785, doi:10.1016/j.jas.2005.06.001.

[6] Kosmas et al., "The Effect of Land Use," 55.

[7] Tjeerd H. Van Andel, Eberhard Zangger, and Anne Demitrack, "Land Use and Soil Erosion in Prehistoric and Historical Greece," *Journal of Field Archaeology* 17, no. 4 (1990): 390-391, doi:10.2307/530002.

Based on this apparent correlation between human settlement and soil degradation, it might be tempting to suppose that any type of occupation would necessarily result in noticeable changes to the land; however, it is important to note that monasteries did not dominate the agricultural sphere. Indeed, secular systems of agriculture remained prevalent throughout the Middle Ages, when monastic agriculture was also at its prime. Monasteries have practiced agriculture since the beginning of the monastic movement: many early abbots and abbesses saw themselves as a religious type of *paterfamilias* and sought to live on an agricultural estate. As monasteries became ever more profitable, however, a tension arose between the monasteries' spiritual and economic attributes. Greek monasteries were dwarfed by the system of secular agriculture, which was often more intensive and extensive.[8] Under Ottoman occupation, monasteries' land was their most important feature; as a result, most monasteries began to increase their land holdings during the 16th century. Nevertheless, Eastern monasteries still did not practice profitable agriculture. Cistercian monasteries were the most widespread form of monastic agriculture during the Middle Ages: others were mainly designed for subsistence.[9] Frequently, the land that monks and nuns could not tend themselves was rented out to villagers or used by tenant farmers, with any extra produce being donated to the poor.[10]

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[8] William M. Johnston, *Encyclopedia of Monasticism* (London: Fitzroy Dearborn, 2000), s.v. "Agriculture, Western Christian."

[9] Victor Roudometof and Michalis N. Michael, "Economic Functions of Monasticism in Cyprus: The Case of the Kykkos Monastery," *Religions* 1, no. 1 (December 2010): 61-62, doi:10.3390/rel1010054; Constance Hoffman Berman, "The Profits of Grange Agriculture," in *Medieval Agriculture, the Southern French Countryside, and the Early Cistercians: A Study of Forty-three Monasteries* (Philadelphia: The American Philosophical Society, 1986), 62.

[10] Roudometof and Michael, "Economic Functions of Monasticism in Cyprus," 64-65.

Moreover, in dealing with long-term trends of agricultural activity in a region, it is difficult to determine how much of the observed changes over time are due to human occupation and which are part of the larger trends of plate tectonics and naturally induced climate change. Recent research in Cyprus has even indicated that the land may be more resilient than previously anticipated. While Cyprus is geologically distinct from mainland Greece, much of the island's agriculture is dominated by monasteries' holdings. Like much of the Mediterranean, Cyprus has frequently been regarded as degraded due to centuries of unsustainable land usage; however, this assessment is based primarily upon the subjective judgment of summertime visitors who witness only the arid months.[11] In actual fact, a 2007 study suggests that the land actually followed a cyclical pattern of regeneration, undergoing periods of degradation due to intensive land usage, followed by periods of ecological recovery due to the vegetation's resilience. This study is particularly important for its emphasis on the multidisciplinary role of geoarchaeology in determining the true impact of anthropogenic landscape change. By combining multiple different perspectives into one investigation, the researchers claim to provide a more accurate view of the issue.[12]

One of the researchers involved in the geoarchaeological investigations on Cyprus, Karl W. Butzer, is also skeptical about the terms used and the assumptions other scientists have brought to the table. First off, he questions whether the changes observed in the archaeological record are necessarily signs of degradation: he opts for the more value-neutral term "transformation." He also doubts the instinctive fear inherent in observations of erosion: after all,

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[11] Karl W. Butzer and Sarah E. Harris, "Geoarchaeological Approaches to the Environmental History of Cyprus: Explication and Critical Evaluation," *Journal of Archaeological Science* 34, no. 11 (November 2007): 1932-1933, doi:10.1016/j.jas.2007.01.013.

[12] Ibid., 1950.

soil will (in theory) work its way downstream eventually and benefit sediments elsewhere. While he ultimately affirms the detrimental role of erosion in landscape change, he also argues that the Mediterranean landscape has sustained human agriculture for eight millennia and cannot possibly be as poor of soil as some researchers have suggested.[13] Most importantly, Butzer casts doubt into the issue of causation. Since it is very difficult to distinguish between human and climatic forcing, it becomes more important than ever to combine the humanistic and scientific studies of the agricultural past.

The observed changes in landscape over the past 8000 years have been moderate in scale, but we cannot ascertain the true role of anthropogenic features without further study. Even so, monasteries contribute only minimally to the overall impact of human agriculture. For both of these reasons, it is easy to exaggerate the role played by monasteries in the "degradation" of the Mediterranean landscape. Further research on the past and present agricultural practices of monasteries is necessary to determine how these practices affect the landscape. In all future research, the emphasis should be on an interdisciplinary approach. By looking at the land usage and speaking with the sisters at the monastery of Hagios Ioannis Prodromos, it might be possible to gain a better understanding of how monks and nuns view the relationship between their spiritual health, the physical health of their community, and the health of the land. The scientific knowledge gained in pursuit of this topic might even help to fine-tune the climate models used to predict the effects of anthropogenic climate change today.

[13] Butzer, "Environmental History in the Mediterranean World," 1786-1787.

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