

WHAT KIND OF ENVIRONMENTAL HISTORY FOR ANTIQUITY?

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What sort of fresh potential does environmental history have for our understanding of the Greek and Roman world? (Others must answer the symmetrical question: what sort of fresh potential do Greek and Roman history have for our understanding of changes in our planet?). Environmental scientists, climatologists, and archaeologists, together with historians economic and otherwise, have recently been converging on a number of major issues in the environmental history of the late Holocene period, that is to say, roughly speaking, historical times. The Mediterranean area has rightly attracted especially intense attention, partly at least because, as far as ancient times are concerned, it uniquely combines extensive written records with an ocean of archaeological information, while also offering the results of numerous palynological and geological studies. This convergence seems to promise that before long we shall be able to construct an environmental history of the region that will be more satisfying to both scientists and historians.

One obstacle of course is, to put it bluntly, that no historian knows enough science and no scientist knows enough history. In both camps, however, there are outstanding individuals who have made vigorous efforts to cross the great divide; and there exist ambidextrous archaeologists who keep up with both fields as far as that is humanly possible.

Not that one should give way to optimism. The technical complexities of every field grow and grow, and collaboration between humanists and scientists, while it may be on the increase, faces all sorts of barriers. And it is by no means clear that when we are considering the late-Holocene environment we are usually pursuing the same questions. This book is somewhat experimental in combining historical and scientific approaches, and the experiment reveals disparities of aims and methods that will continue to require discussion. We need to clarify our agendas.

It is worth recalling here the distinction usefully stressed by Horden and Purcell between history *in* the Mediterranean and the history *of* the Mediterranean.¹ By the former Horden and Purcell meant the history of

¹ Clarified in Horden and Purcell 2005, 357.

politics, society, the economy, religion and warfare that takes up most of the space in Mediterranean histories. But the Mediterranean world has had its own physical history, it is not just a 'setting'.² By the history *of* the Mediterranean Horden and Purcell meant the history of interactions between man and the environment, hence a history of human use and misuse of natural resources, a history of cultivars and rivers, a history of landscapes, settlement patterns, demography and 'connectivity'. *The Corrupting Sea*, which was the first book to carry out a part of this agenda (but demography and climate were reserved for Part II), did not attempt to explain contingent events, indeed it largely ignored them.

Some of the contributors to this volume, by contrast—notably Malanima, Cook and McCormick—aim to fit together climatic change and historical events of various kinds.³ Malanima takes a Roman 'economic decline' to have resulted from population growth (which meant that inferior land had to be used) and the end of the so-called Roman Warm Period (a decline in temperatures shortened growing seasons).⁴ This is a coherent story, but the facts on which it is based are fragile, and there were other factors at work. If there was an empire-wide economic decline, it probably set in after the beginning of the Great Pestilence (the Antonine Plague), in other words in a period of (possibly sharp) population shrinkage, not growth. And the pestilence itself was probably a major factor in any economic decline that did occur.⁵

As for climate change, 'the scientific study of the ancient climate has barely begun' (McCormick, below, p. 63),⁶ which means that this is an inopportune time for anything like environmental determinism.⁷ There are now multiple sources of information about the ancient climate, and the strong

² Not that one should complain when historians use this term. What is a ground for complaint is the publication, even within the last decade, of general histories of classical antiquity that pay no attention to the natural world: see *Cambridge Ancient History* volume XII, for example (2005). When, on the other hand Chakrabarty 2009, 201, announces that 'anthropogenic explanations of climate change' are spelling 'the collapse of the distinction between natural history and human history', he seems to be catching up with Braudel.

³ Here I discuss approaches and methods and do not attempt to summarize any of the papers included here.

⁴ The warmth of the Roman Warm Period must have been quite relative, at least in some places: Pliny's description of his Tifernum villa argues strongly for a climate there colder than the present one (see *Letters* 5.6.4, with Grove and Rackham 2001, 142).

⁵ Harris 2012.

⁶ See also Ermolli et al., this volume p. 213.

⁷ As is unwittingly demonstrated by the self-described neo-determinists Issar and Zohar 2007.

impression I receive from this literature (see especially Finné et al. 2011, Manning, this volume) is that the Roman Empire was full of micro-climates, and that no narrow date can be assigned to the end of the Roman Warm Period. If, as some suppose, that occurred much later than 150 AD,⁸ it has to compete with other possible causes of economic deterioration such as repeated civil war and a severe currency crisis in the 270s. Nonetheless Malanima's paper implicitly calls into question the viability of the 'history *in*'/'history *of*' distinction, or rather it firmly places the economic history of an agrarian society in the 'history *of*' category. Bresson, similarly, found it impossible to separate off the exchange of commodities in antiquity from the history *of*.⁹

Malanima's paper sets out without unprecedented clarity the likely energy needs of the Roman world, and might lead in any of several interesting directions, such as an attempt to calculate the carrying capacities of a variety of regions.

The fuel history of the Roman world certainly counts as 'history *of*' too. One of the material bases of the whole culture was charcoal, which was the essential means for producing the high temperatures needed for iron- and copper-working. This topic is not of course new,¹⁰ but it is now receiving more attention from archaeologists, thanks in good part to the enthusiasm of Robyn Veal. Her paper in this volume raises the question how much charcoal was employed in other processes and practices. If there is to be a clear answer, it will presumably come from further excavation reports and the new methods of analysing charcoal that she outlines. The most intriguing result she reports, from Pompeii, is the predominance of beech-wood (*fagus sylvatica*) charcoal from the third century BC to the date of the eruption, with other taxa, including fruit and nut woods 'in small, but then increasing amounts', becoming commoner in the first centuries BC and AD. Was this change simply a matter of preference, or were the beech woods thinning out?¹¹

⁸ As late as 400 perhaps: see the bibliography in Manning, this volume, p. 135. Manning's conclusion leaves a supposed end of the Roman Warm Period c. 150 in limbo, dating the change to some time in the third century. It is not clear whether the third century was drier or wetter in central-Mediterranean lands: see on the one hand McCormick (p. 70) and Manning (p. 163), and on the other Keenan-Jones (p. 234).

⁹ Bresson 2005, 99–100. See further Horden and Purcell 2005, 357.

¹⁰ The book edited by Fiorentino and Magri 2008 gives an idea of the state of this field.

¹¹ Incidentally I note that beeches, which do not now grow below 800 metres in Italy, sometimes grew at notably lower altitudes in the past (Theophrastus, *Hist.Plant.* 5.8.3, with Grove and Rackham 2001, 142; Ferrari Fontana et al. 2008), which makes it less likely that Pompeii was running out of them. Beeches can be coppiced.

McCormick's paper complements Malanima's. Having amusingly settled the question of the exact year in the 370s when Ausonius wrote his poem *Mosella*,¹² he generously presents the results of his Dumbarton Oaks research group's work on the Mediterranean climate, 100 BC to 600 AD. This leads primarily to some specific questions about agricultural production, though McCormick's scholarly caution and rigor sometimes give way to the more general hope that climate change can be correlated with 'imperial fortunes'. The results proposed so far are regional but intriguing: one is a refinement of data collected forty years ago by Danielle Bonneau about the annual flooding of the Nile, which appear to show that (evidently because of lower precipitation in the river's headwater region) the Nile flooded less well in the period 155 to 299 AD than it had in previous centuries, with the overall effect of lowering agricultural production. Whether this had any impact on the grain supply of the city of Rome is unknown, but it must certainly have made life more difficult for the Egyptian poor.

Another possibility canvassed by McCormick is that the cultivation of rye (*secale cereale*) in central Europe, inside and outside the Roman Empire, was a response to climatic change, either to lower temperatures, as previously proposed, or to lessened precipitation, as proposed by McCormick himself. Like the spread of other cultivars, the spread of rye, a grain known to but looked down on by classical Mediterranean writers, is a matter of controversy; the very concept of domestication is a complex one.¹³ We seem to lack an up-to-date account of the diffusion of rye in Europe, but K.-E. Behre's impressively detailed study of 1992 appears to show that it was cultivated in free Germany as early as the second century AD. 'The decisive reason for rye becoming a crop has to be seen in the change of the harvesting method and not in climatic deterioration', he claimed.¹⁴ But it would certainly be tempting to associate the spread of rye cultivation in central and northern Europe with a colder climate if a close chronological fit could be established.

McCormick briefly floats the idea, and Edward Cook develops it in full, that the Hunnic and Avar invasions of Europe in late antiquity were 'probably encouraged' (McCormick) by aridification in central Asia. Or that aridification 'may have contributed to' the impulse to move westwards (Cook). What Cook contributes to strengthening this old theory is recent dendro-chronological information that indicates a 'megadrought' in central China

¹² Unless, that is to say, Ausonius' description of the physical conditions of the Moselle valley was—as seems to me quite likely—largely unlocated in time.

¹³ Cf. Weiss et al. 2006.

¹⁴ Behre 1992, 142, q.v.

(present Qinghai province) about 360AD. With his wide knowledge of climate systems, he is able to delineate the climate change in question with a new level of detail. One obvious difficulty is that the Qinghai sites are a good 4,000 kilometres from the earliest known home of the Huns, to the east of the lower reaches of the Volga. Furthermore, Huns are reasonably well attested further west, to the north and west of the Black Sea, as early as the 370s.¹⁵

These two papers raise the wider question whether climatic variation has ever been a detectable major cause of social or political events. It is probably fair to say that most historians are congenitally disinclined to accept such ideas, fond as they are of human agency and specific cases. Some recent work may make this scepticism harder to defend. In particular, it has been argued that ENSO (El Niño/Southern Oscillation) (see Cook, p. 92, for an explanation of this concept) has been one of the causes of civil conflicts in tropical countries since 1950.¹⁶ The very modesty of the claim in question ('ENSO may have had a role in 21 % of all civil conflicts since 1950') is appealing.

The paper contributed by Sturt Manning, which amounts to a comprehensive review of the current state of knowledge concerning the ancient Mediterranean climate, points out some of the reasons why such are hypotheses may be problematic:¹⁷ on the one hand, obviously, lie the complexities of historical causation,¹⁸ on the other the present uncertainties of climate history.

When we talk about the historical effects of climate change, it is essential that we consider both alternative explanations and the likely effects on human beings—and these particular human beings—of climate instability, aridification, and changes such as short and long periods of decreased or increased temperatures, and of decreased or increased precipitation. Should we think of 'the Huns' leaving central Asia in desperate economic straits and arriving in Europe as, fairly briefly, a highly formidable force? Think of other large-scale migrations, such as the Arab expansion of the seventh century

¹⁵ Orosius 7.33.10. But where exactly Huns were to be found in the 370s and 380s continues to be debated.

¹⁶ Hsiang et al. 2011.

¹⁷ Manning, this volume pp. 114–115.

¹⁸ Manning 2010 associates the large ¹⁴C production peak centered on 765 BC with population growth in Greece and all the complex cultural changes that began in that period. Such a climate would have resulted in longer and more reliable growing seasons. While well aware of the difficulties of establishing any causal relationship (42), he concludes that climate change 'may have created conditions that actively promoted development and change in human societies' (44). See Danti in the same volume, esp. 140, for a properly sceptical approach.

or the European occupation of the Americas: when we know about their underlying motives in detail, they concern the obvious material advantages of conquering your weaker neighbours, together with religious considerations of various kinds. Which is not to exclude the possibility that traditional historical methods have under-estimated the influence of climatic change.

It can be hypothesized that climatic events have much more potential for explaining economic and other consequent *difficulties* in past societies than for explaining economic, cultural or any other kind of *success*—or migrations. Thus it has been plausibly argued—though the argument is far from closed—that a basic cause of the collapse of Classic Mayan civilization was a period of recurrent major droughts.¹⁹ And it may not, on the other hand, be in any way an anomaly when Paula Kouki discovers that in southern Jordan, in the region of Petra, ‘the intensification of settlement and agriculture lagged behind ... improved climatic conditions by at least two centuries’.²⁰

Manning mentions several examples of proposed correlations between climate change and large-scale successes or advances, none of which has been adequately demonstrated.²¹ He seems willing to attribute the so-called Greek Renaissance that began in the eighth century BC to a climatic change favourable to agriculture; the point, he says, is ‘not who is right or wrong—rather how the same case can be and is differently interpreted’. I entirely disagree with this last claim, because I want to save climate scientists from chasing historical mirages: we could possibly say that a climate reasonably favourable to agriculture was a *necessary* condition for the ‘Greek Renaissance’, but it has zero explanatory power.²² ‘Axial age’ or not, this was a unique succession of events, which can to a considerable extent be explained—although some would say that the great fascination of classical Greek history is that its successes remain to a considerable extent unexplained.

Manning is, however, generally cautious about climatic causes that have been attributed to historical events and processes. As he notes, several scholars have argued that climate change was ‘a factor, even a significant

¹⁹ Hammond 2010.

²⁰ Kouki, this volume pp. 205–206.

²¹ Compare the argument of Sallares 2007, 19, based on Speranza et al. 2002, that ‘a decline in solar activity leading to colder and more humid conditions c. 850 BC may well have been the critical factor underlying the simultaneous development of Iron Age cultures around the Mediterranean, which is otherwise difficult to explain’, an assertion, this last, which seems crucially to under-estimate Mediterranean connectivity.

²² A historian is not allowed to say that a climatic event ‘marks the beginning of’ the Greek Renaissance (Manning, this volume, p. 132).

factor, in the decline and re-organization of the later Roman world,²³ but the nature, scale and chronology of the climate changes themselves are still most unclear. What difference does it make if average temperatures change by one degree or by several? How much less precipitation means difficulties—or disaster? We need more data, obviously, but, more importantly still, we need better thinking about the possible range of differences between local climates within the same region and within the Roman Empire (Mediterranean and otherwise) as a whole; and we also need better thinking about the likely effects of climatic change on human, or rather Roman, behaviour.

Many questions about the environmental history of antiquity seem ripe for scientist-humanist collaboration.²⁴ Scientists sometimes frame the subject simply as the effect of mankind and climate on landscapes,²⁵ but it is the vital interactions that demand attention. What would grow where? Grains (not only rye) and olive trees may raise the largest problems here, but there is also much to say about other fruits and vegetables,²⁶ and about the timber-productivity of various areas from Spain to Egypt. What levels of population, urban and rural, could the resources of various areas support? The Mediterranean has many desert areas and marshes and mountains—how many of them were productive? And the sea itself has a multifaceted history. One scholar has it the Mediterranean ‘is relatively poor in fish’²⁷—should we think that this was so in antiquity, or should we allow that many coastal populations depended heavily on harvesting the sea?²⁸ Then there is the vast array of the mineral resources, widely studied in the last half-century in particular, but in the case of metals at least still needing Mediterranean-wide studies.

What effects, direct and indirect, did humans in turn have on natural resources, in particular on woodlands, soil, fresh water and wild life? Sub-topics here include wood fuel, deforestation and erosion, fallow fields, drainage and irrigation projects, hunting, and the consequences of tax

²³ Below p. 158.

²⁴ See also the list of questions in Harris 2005b, 12–20, and the bibliography mentioned there, which I do not attempt to bring up to date in this introduction.

²⁵ E.g. Sadori and Giardini 2008, 229. An obvious difference is that scientists generally want to deal with longer periods, in this case since the mid-Holocene, i.e. the last 4500 years, whereas few Mediterranean (as distinct from Ancient Near Eastern) historians want to look back much beyond 1000 BC.

²⁶ See Sallares 2007, 29, for some brief remarks about the diffusion of fruit trees.

²⁷ Sallares 15.

²⁸ Cf. Horden and Purcell 2000, 576–577. See now Boardman 2011.

regimes.²⁹ How large a share of ancient economies was pastoral, and how did pastoralism affect landscapes? The list can go on: one of the most contested topics in ancient history at present is osteological: the relationship between surviving human bones and stature, and more generally well-being.³⁰ This issue leads to the wider question of disease patterns. Hence we need, among others, agronomists, food scientists, geologists, botanists, metallurgists, hydraulic engineers, and physiologists.

Arching over all these questions is the perennial problem of generalization, already mentioned in the context of climate. Horden and Purcell attempted to circumvent this problem by concentrating on four micro-regions. In retrospect, I believe that this was in essence a good idea but that we need two or three times as many micro-regions, at least. Many scholars have devoted themselves to studying Greek regions and Roman provinces over the last forty years, but unfortunately few of them have pursued environmental questions in detail if at all (there have been some splendid exceptions).

My contribution to the body of this book is an account of deforestation that attempts to combine historical and scientific information and comes to a mixed conclusion—quite a bit of deforestation, but not a Mediterranean-wide crisis.

We then proceed to local studies, that is in a sense to micro-regions. Paula Kouki's study takes us to Petra. Her highly suggestive conclusion is, in brief, that the patterns of settlement there do not conform to what the climate data might lead one to expect. When precipitation somewhat increased in the second and third centuries AD, rural settlement thinned out; a drying climate in the sixth century was accompanied by the enlargement of settlements. She considers various possible explanations, concluding that the notion of a 'favourable climate' is simplistic even in a region that was so heavily influenced by a single climatic variable, rainfall. In particular, much will always depend on the plants and technologies available, and indeed on local traditions of land use.

Our last two studies take us to Italy. The approach of Elda Russo Ermolli and her collaborators is geoarchaeological. They found that both at Neapolis and Velia it was probably a combination of climatic events and human neglect that led to sedimentation and urban degradation in and after the third century AD. In both places the coastline moved forward more quickly

²⁹ On the latter see especially Purcell 2005.

³⁰ See among others Steckel 2009, Wheeler 2012, Pitts and Griffin 2012.

in the third century. The old port of Neapolis ceased to function, and flooding rendered part of the site of Velia uninhabitable. Our authors conclude that ‘the effects of particular land use conditions were enhanced by extreme climatic events’, creating ‘episodes of severe erosion’.³¹

Roman officials intervened from early times to influence land-use (by taking control of all coastal woodlands: Cicero, *De Republica* 2.58), and perhaps even earlier to exercise some control over water resources. Keenan-Jones’ paper considers their ambitions and achievements in the latter department, concentrating on central and south-central Italy in early imperial times. His first case is the Aqua Augusta in Campania, a longer construction, taken as a whole, than any of the aqueducts of the capital itself. Whoever diverted the water from the springs at the head of the River Sabato (see the map on p. 241) to the towns to the north and west of Naples as far as Misenum—it was probably Augustus who was responsible for most of it—did a great favour for their permanent and temporary residents, including of course members of the imperial household and of the senatorial-equestrian elite. In so doing, the person or persons responsible also did a disservice to the inhabitants of the basin of the Sabato itself. It would be worth speculating further how grave this damage is likely to have been, and whether the decision is likely to have been an entirely political and social one. For Frederiksen, ‘the feeling behind [Augustus’] massive corrections of nature in Campania is not in the least utilitarian’; rather it was a matter of ‘spectacular ostentation’.³² Since the aqueduct served the interests of productive towns such as Puteoli, however, its net economic effect may well have been positive. And we have been reminded by the Hadrianic ‘Bronze of Agón’ that Roman authorities often took thought for utilitarian irrigation schemes as well as spectacular aqueducts.³³

Keenan-Jones’s second case concerns the aborted project of 15 AD to make the waters of the River Clanis flow northwards into the Arno instead of southwards into the Tiber, to prevent the Tiber from flooding again. It could probably have been done (since it was in fact done by 1700), but as why it was not, we are at the mercy of Tacitus. The most interesting aspect of the matter, it seems to me, is the inability of Rome’s famed hydraulic engineers to find a solution that would have prevented serious floods in the capital.

³¹ It might be tempting to associate this erosion with local deforestation, but the pollen data from the port sediments at Naples, which show an increase in cabbage cultivation during the third century (Ermolli et al., this volume, fig. 4) and the spread of wild vegetation, seem to exclude this.

³² Frederiksen 1984, 334.

³³ Beltrán Lloris 2006, with bibliography on other cases (166–167, 192–193).

These case studies, together with those incorporated in the papers by McCormick and Veal, have shown how much hard work is necessary to produce results in this field. All the more reason for scholars in diverse fields to attempt to collaborate. But an even more pressing conclusion is that all of us who are concerned with such questions about the past as these need to debate our objectives and consider carefully which questions most need answering.