Introduction

In view of the environmental problems of our own time, we are increasingly addressing the question of the historical roots and conditions of ecological crises. This leads us back far beyond the environmental history of the past fifty years, and addresses long-term developments of human history since the earliest times. It also includes a large number of scientific disciplines: prehistory, history, geography, geology, anthropology, medicine, biology, ethnology and others. Clearly, environmental historical work relying on a single discipline would be inadequate or too one-sided; it would need to be completed by results from other fields of study, and, ideally, meshed with them.

Ancient history as a discipline draws primarily on the literary sources, from Greece of the archaic era through to late antiquity. It thus addresses primarily ancient perceptions, descriptions and interpretations, which risks a one-dimensional perspective. For a more adequate reconstruction of ancient environmental conditions, this volume will attempt to at least begin to include research from other disciplines, even if no comprehensive interdisciplinary approach can as yet be realised.

The primary goal of the study of antiquity must be the examination of the peculiarities of human behaviour under the specific conditions prevailing at the time in question. The assessment of ancient conceptions of the environment or ancient environmental behaviour in terms of modern standards is problematical from the outset. Broad-brush prejudices, which either paint a picture of an idyllic ancient world where humankind and nature were one, or else go to the other extreme to emphasise the scant respect for nature exhibited by the Greeks and Romans, are in fact not particularly helpful in this regard. The number and scope of impacts are generally of entirely different dimensions than is the case today, and are based on very different technological and societal foundations. A reconstruction of ancient conditions can therefore contribute only indirectly to enlarging our field of vision for an analysis of our own time.

The most conspicuous interventions of the Greeks in nature were first of all forest clearing and mining, as well as the common wartime tactic of devastating the enemy's farmland to rob him of his sustenance, at least temporarily. The realisation that forest clearing led to soil erosion, and hence to the loss of farm and pastureland, quickly gained acceptance, but this was apparently not accompanied by any fundamental critique of clear-cutting. Clearing the forest was seen first and foremost as part of the progress of civilisation – as it would be later, too, among the Romans. On the other hand, the damage to farmland was probably of limited scale, neither leading to immediate shortages nor providing any comprehensive picture of the finiteness of resources. The Greeks and Romans of course still lacked the technological wherewithal to inflict global damage upon the environment. They thus never faced the necessity of fundamentally reconsidering their behaviour towards nature.

The numerous foundations of cities in countries all around the Mediterranean, which began during the first millennium BC, constituted a fundamental intervention in the landscape. Even in archaic times (between the eighth century BC and 500 BC) considerable quantities of stone, wood and metal were needed for public and private buildings. The temples, theatres, columned halls and gymnasia – schools for both athletic and artistic education – of the classical era (500–336 BC) demanded still more materials, and were the cause of even greater degrees of overexploitation, yet they also led to various forms of reuse and recycling. Certainly, the splendour and pomposity of the Hellenistic royal courts demonstrates that the ancient Greeks did not always husband natural resources in a thrifty manner, nor did their impacts upon nature exclusively result from the purposes of satisfying basic needs. This does, however, appear to some extent as a contradiction to their fundamental religious beliefs, according to which they venerated 'Mother Earth' in the form of the goddess Demeter, and always appreciated the beauty of pleasant groves, bays and river landscapes.

The Romans were able to expand still further the range of impacts on nature, both in the countryside and in the towns, and even to extend it north of the Alps, to large areas of Europe. Even in pre-imperial times, Rome was already confronted with urban problems not unfamiliar to us today. Congested streets, traffic noise, the stench of waste, and plumes of smoke from charcoal heating and baths led to a deterioration in living conditions, particularly of the lower classes of society. Huge numbers of exotic wild animals died in bloodthirsty public spectacles in the arenas, on a scale which threatened a number of species, such as the hippopotamus in

Lower Egypt, with extinction in some areas. While there was sporadic criticism of damage to nature caused by rapacious mining or the popular practice of lining rivers and lake shores with villas, this criticism was aimed less at the destruction of the environment than at the material greed and addiction to splendour for which the upper classes were thus berated.

The carelessness of the ancients in their stewardship of nature and its raw materials has certainly had its effects. The impacts of the utilisation of nature and the landscape in ancient times were considerable in many areas. Both southern and northern Europe, which was then newly incorporated into the ancient civilisational realm, were transformed. Nevertheless, popular opinion, according to which the widespread karst formation in various areas of the Mediterranean is due to clear-cutting of forests in ancient times, turns out to be wrong. Caution is called for when interpreting ancient intervention in nature, for in many areas later natural or anthropogenic changes, such as the building of the Venetian fleet or clear-cutting during the nineteenth century, have contributed to today's appearance of the landscape.

The discussion of humankind and the environment in antiquity necessarily makes use of modern terms for environmental phenomena, which are, however, associated with particular periods of history and hence require clarification as to their origins and meanings. This moreover includes the term 'environmental history' itself, the contents and approaches of which have to be placed in a history-of-science perspective; moreover, its relevance or applicability to antiquity must first be examined. In this context, reference must be made to the research both of modern and of ancient environmental history, so as to delimit the scope of the study.

TERMINOLOGY

Neither ancient Greek nor Latin had words for many of the concepts familiar to us today in connection with environmental issues – the word 'environment' itself heads the list. That does not necessarily mean that there was no such thing as environmental awareness in antiquity. It does, however, show that the Greeks and Romans had a different conception of quite a number of phenomena, and that this fact influenced their behaviour towards the environment, and towards nature – for which they did develop a specific term. Let us then examine the origins and the meaning of the particularly important terms *nature*, *the environment*, *climate*, *ecology*, *sustainability, disaster* and *waste*, and how the content of those

terms was described in the age of antiquity. That will itself reveal some characteristic basic attitudes of the Greeks and Romans in their dealing with their environment.

Nature actually means 'that which has come into being or has grown without outside assistance', and is derived from the Latin *natura*, which means 'bringing forth'. The term is a translation of the Greek word *physis*, which describes both the creative force of nature and the natural order, and the natural essence of an object or of a living being. Nature as a space in its own right is in fact a discovery of the Greeks, who, in the context of the emergence of politically autonomous communities (*poleis*; sing.: *polis*), defined it as that which excluded their own achievements, the sum of which constituted 'culture' (*nomos*); this emphasised the value of the latter. However, they also realised that a mere dichotomy of nature vs culture – or *physis* vs *nomos* – was a false assumption, since they were to an extent interdependent, and the human, as a component of transitory nature, affected its processes (Plat. *leg.* 890d, 903c: humankind is not made for its own sake, but for the natural whole). Despite the consciousness of human superiority and achievement which emerged in antiquity, there also existed the demand to allow the *physis* the freedom to run its course, and to follow nature and live in harmony with it (Diog. Laert. 7.87ff.; Stob. 2.75ff.; Sen. *epist.* 122.19).

From the sixth century BC the Greeks in various cities along the coast of Asia Minor began to investigate the basic materials and laws of nature. These elements, they believed, were in constant change, so that nature could be seen as undergoing a process. By contrast with our own times, science in antiquity by and large did without experimentation, and engaged instead in the observation (*theoria*) of the cosmos as an ideal, predestined order. However, despite this rationality with which nature's substances and processes were thus permeated, the need remained to venerate nature religiously. So, as we shall see, the relationship of the Greeks and Romans to nature presented no uniform overall picture; rather, it included elements both of the veneration and of the domination of nature. As the term 'nature' had no specific association with protecting the environment, humans had considerable freedom in how they acted.

The English word *environment* came into common use in the early nineteenth century as a translation of the German words *Umgebung* – today usually translated as 'surroundings' – and *Umwelt*, the modern word for 'environment'. The latter is attested since 1800, and means literally 'surrounding country' or 'surrounding world'. By the second half of the nineteenth century it had in Germany replaced the French word

milieu as the term for the realm in which life arises and carries on.[1] In the biological sense, *Umwelt* was first used by the Baltic German biologist Jacob von Uexküll in 1909 to mean the surroundings of a living being, which affect that being and influence its conditions of life.[2] Since that time, the concept of *Umwelt* or 'environment' has been further developed scientifically, and is today seen as 'the world surrounding humankind', as the sum of all phenomena which influence the life situation of a human community.[3] In that sense, it is an anthropocentric concept, according to which nature serves humankind. However, the word has since the late 1950s also acquired an ecological, scientific application with regard to environmental protection. Only since the 1970s has an inflationary use of the term been observable, so that '*Umwelt*/environment' has now degenerated to an empty phrase, a shell.

Thus, there was no distinct term for 'environment' in antiquity; it was incorporated in the concept of *physis*. Environment in the modern sense was only characterised at a general level, at which primarily such climatic factors as wind and water were taken into account. *To periechon* in ancient Greece generally meant 'that which surrounds' the earth, and which could also be seen as a mixture of celestial phenomena, in effect as the climate. *Klima*, in Greek and Latin, means the curvature of the earth and describes the celestial realm, as a geographical location and zone (Strab. 2.1.35, 5.34). In reference to climate, ancient texts generally speak about the 'air', which could have various temperatures and currents, and could also be considerably affected by waters, the rain and the condition of the ground, a prominent example being Hippocrates' *On Airs, Waters, and Places* (Hippocr. *aër.* 1). Here, he uses neither the term *periechon* nor *klima*; he does, however, distinguish between European and Asiatic climatic zones, to which he attributes a decisive influence on human physical – and political – constitutions. As this concept was more of general theoretical character, a term for the environment itself was not required.

The environmental determinism established by the Greeks was also adopted by the Romans, albeit with Rome now replacing Athens as the centre of ideal environmental conditions (Vitr. 3.9–10). Pliny the Elder observed the effects of the soil and the climate in the form of the 'sky' (*caelus*) on the trees, which, he claimed, loved the north wind the most, as they grew thicker and stronger under its influence (*nat.* 17.9–10).

[1] Fuchsloch 1996, 4.
[2] Jacob von Uexküll, *Umwelt und Innenwelt der Tiere*, Berlin, 1909.
[3] Winiwarter 1994, 131, 154; cf. Merchant 1993, 1.

The environment was thus analysed pragmatically, with an eye to economic gain, and at the same time reduced to certain external phenomena, and used for political propaganda. No comprehensive, systematic discussion of environmental factors occurred, so that neither any real concept of the environment nor any profound ecological studies emerged.

The concept of *ecology* (German *Ökologie*) is of more recent vintage, and is the product of the scientific research of the nineteenth century. In 1866 the German natural scientist Ernst Haeckel described the *Umwelt* (environment) as the 'surrounding outside world', and defined the concept of ecology as 'the body of knowledge concerning the economy of nature – the total relations of the animal to both its inorganic and organic environment, including in the broader sense all "conditions of existence"'.[4] He saw ecology as a complete science which included all factors surrounding an organism, and interpreted it as part of the surrounding system. To this day, ecology is still the 'interdisciplinary scientific study of the interactions between organisms and their environment', but also 'of the distribution and abundance of organisms and the interactions that determine distribution and abundance'.[5] Ecology is also the study of ecosystems, which describe the web of relations among organisms at various scales of organisation.

While the term 'ecology' is derived from the Greek, it is notable that it did not exist in antiquity. *Oikos* means 'house' or 'the household', and by derivation, its budget, so that *oikonomia*/economy means the science and the laws of budget management, from which modern economics is derived. The word combination *oikologia* connects *oikos* with *logos*, rationality or intellect, and thus describes a kind of budget science of nature. In antiquity there were only modest initial approaches towards this concept.

The philosopher Theophrastus (*c.* 370–287 BC) for example determined the climatic zones in which certain plants were indigenous, and diagnosed climatic changes due to certain interventions in nature (*caus. plant.* 5.14.2–3). In Roman times Pausanias ascertained that the Meander (the Menderes in modern Turkey), which flowed through the cultivated country of the Phrygians and Carians, and therefore carried a large quantity of sediments, was silting up the bay between Priene and Miletus into which it emptied, while the Achelous, which flowed through the deserted country of the Aetolians, did not carry any comparable amount of silt (8.24.11; cf. 7.2.10–11). Nevertheless, the Echinades islands off its

[4] Ernst Haeckel, *Generelle Morphologie der Organismen*, Berlin, 1866, II.286, I.8.
[5] Begon et al. 2006, xi.

mouth were partially silted up (Hdt. 2.10; Thuc. 2.102), so neither was more reliable information available in this area, nor were more detailed investigations undertaken. Important observations of the human influence on habitat were widespread, yet more weight was given – not only terminologically – to economy than ecology, which was not yet established as a subject of research in its own right.

Only thanks to the knowledge of modern ecology did the demand for 'sustainability' or 'sustainable activity' emerge during the late twentieth century. *Sustainability* and *sustainable* as a concept are a creation of the 1970s, derived from the Latin *sustinere*, 'to uphold'. The English word includes two key concepts, that of being able to bear a load and that of being able to continue at a certain level over time; it is also used in the term 'sustainable growth'.[6] (The German word *Nachhaltigkeit* is derived from *Nachhalt*, which originally meant something to be stored for hard times. It is first attested in 1713, and was used in the area of forestry,[7] and came into general usage around 1800. The German word conveys only the second of the two meanings of its English equivalent, so that there are instances in which 'sustainable' is translated into German as *zukunftsfähig* – literally 'future-capable'.)

Strictly speaking, the concept of sustainability demands that only such a quantity of energy and raw materials be used as will be restored through natural processes during the same period. Moreover, only as many pollutants may be passed on to the environment as it can cope with during the same time period. The term 'sustainability' came into widespread use especially as a result of the UN's Brundtland Commission Report of 1987, the *Report of the World Commission on Environment and Development: Our Common Future*, which contained the following definition: 'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.' Unlike traditional concepts of environmental protection, sustainable development tries to incorporate existing social needs adequately. However, this also risks diminishing or neglecting negative impacts upon nature. In today's parlance, moreover, 'sustainable' often loses any direct reference to environmental issues, and is used in all kinds of contexts to simply mean 'effective in the longer term' or 'long-lasting', and hence 'high quality'.

[6] *Online Etymology Dictionary*, s.v. 'sustainable', http://www.etymonline.com/index.php?search=sustainable&searchmode=none.

[7] Hanns Carl von Carlowitz, *Sylvicultura Oeconomica (Anweisung zur wilden Baum-Zucht)*, Leipzig, 1713.

The demand that raw material extraction be restricted to the renewable products of the earth's surface was already formulated by Pliny the Elder in the first century AD, albeit more as a moral appeal than as a conservationist demand (*nat.* 33.1ff.). Faith in the infinity of resources, or the regenerability both of surface and subsurface materials, was dominant (Xen. *vect.* 1.4, 4.2ff.; Strab. 3.2.8–10). The ancients had not yet addressed the issue of the planned management and distribution of resources, and thus could develop no real concept of sustainability. The question, too, of equal access to goods and social justice was completely beyond the pale.

Disaster comes from the Italian *disastro*, 'ill-starred', a calamity due to an unfavourable planetary position. 'Hazard' means a threatening calamity stemming from nature, while 'disaster' describes natural phenomena which become a catastrophe only owing to the vulnerability of society; A. Oliver-Smith speaks of 'failures of human systems'.[8] 'A disaster is the tragedy of a natural or human-made hazard (a hazard is a situation which poses a level of threat to life, health, property, or environment) that negatively affects society or environment ... disasters are seen as the consequence of inappropriately managed risk.'[9] In German, *Katastrophe* simply means a serious accident, generally sudden and unexpected, which causes major damage and requires outside help. The problem there is the question of predictability, as well as the subjective and objective effects of the event on people and/or the environment, and the question of dealing with the event. Modern catastrophe research therefore addresses the natural and social conditions existing prior to extreme events, while also analysing the actual process and the consequences, according to certain patterns. People in antiquity were still a long way from any such considerations, inasmuch as divination (fortune-telling) was the principle strategy and form of communication with the environment, and allowed no effective access to catastrophic contingencies.

Catastrophe in Greek and Latin means a reversal, an unexpected change, but did not refer explicitly to nature. Natural devastation was seen as misfortunate and ruinous – *kakon* (Dio 77.2), *pestis* (Tac. *ann.* 2.47), *clades* (Sen. *nat.* 6.2.9) – and a divine punishment for bad moral behaviour (Cic. *nat. deor.* 2.14; Plin. *nat.* 33.1–2). In Seneca's view, natural events such as catastrophic floods occurred according to a predefined plan which humans could hardly counteract (*nat.* 3.27.1ff.). Scientific

[8] Oliver-Smith and Hoffman 1999, 28.
[9] Popular definition in *Wikipedia*, s.v. 'disaster', http://en.wikipedia.org/wiki/Disaster (16 January 2006).

investigations into the natural causes of such events, modest as they were, concentrated on supposed underground winds, fires and waters. Both precautionary measures and rescue strategies were conceived only rudimentarily. In classical times Greek cities helped each other out during catastrophes; in the Hellenistic period the kings emerged as the major donors at such times, and such activity then became a regular task of the Roman emperors.[10] Nevertheless, a largely fatalistic attitude prevailed in this area throughout antiquity. There was a readiness to suffer the vagaries of nature and its hazards, since they were seen as possessing an overarching significance.

Waste is from the Latin *vastus* (bleak, barren, void) and refers to unusable or unwanted material. This has become a growing problem only with the age of industrialisation, since the nineteenth century. Since the 1950s the rubbish of consumer society has been added to the problem, giving rise to the recycling of materials and the energy contained in them. In antiquity certain craft products were indeed already manufactured serially in industrial production; nonetheless, waste in the modern sense was still unknown. Accordingly, only early forms of recycling emerged, primarily the reuse of materials which were either valuable or of limited availability, such as metals, stone blocks and timber. Even in classical Greece such non-degradable substances as ceramic fragments ended up in rubbish pits and landfill deposits.

The Greek word for waste is *apostasis*, meaning abandonment of a political faction or regime. Otherwise, waste products are known only from handicrafts, under product-specific names – such as the waste products of sawing, wood-carving or planing. There were, however, several terms for trash (*skybala*, *skoria*, *pelos*). *Kopros* describes dung and fertiliser, and faeces and dirt. For the Romans the only term other than those for the waste products of crafts was *stercus*, which can be translated as 'dirt', and also includes faeces in the form of dung and fertiliser. Urine was collected in the city of Rome and used by fullers for leather processing, while animal dung was used in the countryside as fertiliser. In addition, efforts were undertaken at various places to remove filth from residential settlement areas under the supervision of officials. Much waste was nevertheless left lying around in ancient cities, often resulting in their contamination and pollution on a scale which no modern concept of hygiene would tolerate.

[10] Meißner 2008.

MODERN ENVIRONMENTAL HISTORY: THEORETICAL APPROACHES AND PERIODISATION

Environmental research is altogether a relatively young field of science which emerged as a significant force only as a result of the ecological crisis of the 1960s. Nonetheless, environmental history has to this day remained largely a 'fringe area' of historical research. It is far better established in the United States than in Europe, particularly thanks to the work of Donald Worster (*Nature's Economy. A History of Ecological Ideas*, 1977), William Cronon (*Changes in the Land. Indians, Colonists and the Ecology of New England*, 1983) and Alfred W. Crosby (*Ecological Imperialism. The Biological Expansion of Europe 900–1900*, 1986) and to the journal *Environmental History*. The continental, particularly the German-speaking, discourse was long dominated by a more technological-historical approach, but is now broadly diversified and integrated through the European Society for Environmental History, founded in 1999. Rolf Peter Sieferle (*Rückblick auf die Natur* ['A look back at nature'], 1997) provides a comprehensive system-theoretical approach. Christian Pfister has distinguished himself in the field of historical climate research (*Wetternachhersage* ['Weather post-diction'], 1999). J. Donald Hughes (*What is Environmental History?*, 2006) and more recently Verena Winiwarter and Martin Knoll (*Umweltgeschichte* ['Environmental history'], 2007) have provided introductory overviews.

Environmental history examines the past interaction between people and the rest of nature, that is, the environmental conditions which prevailed in the past, and their perception and interpretation by contemporaries:[11]

> The object of environmental history is the social and economic dimension of human communities with respect to interactions in a habitat ... The 'environment' in environmental history is thus all phenomena which influence the life situation of a human community. It takes into account all human actions which have any effect – even indirect – on the resource base and the natural spatial surroundings.[12]

In J. D. Hughes's view, there are three main areas of environmental historical interest which apply to all epochs of world history:

> (1) the influence of environmental factors on human history; (2) the environmental changes caused by human actions, and the many ways in which human-caused

[11] Hughes 2001, 4–5; Hughes 2006, 1; Winiwarter and Knoll 2007, 14–15.
[12] Winiwarter 1994, 154.