INTRODUCTION

Errors

This book is founded on errors. First of all, mine. When I began to study the agrarian world of early modern Europe over 20 years ago, I made the commonsensical assumption that the peasant cultivators of that era, and by default the rest of the society of which they made up such a large part, were highly preoccupied with issues of what we would now call 'sustainability'. They depended, after all, on the continued fertility of the soil and the availability of resources for not just their livelihood, but their lives. That peasant society endured for so many centuries, or even in certain circumstances millennia, must be testimony to inherited wisdom on that count. It seemed likely to me then, and indeed remains the common wisdom now, that this previous ethic of care (or self-preservation) had been undone only relatively recently, by forces associated with the rise of capitalist economies and modern technologies. If this putative ethos of sustainability was characteristic of the peasants, it seemed likely that it suffused much of the social life of their world. This kind of thinking about the past was also shared by some of the pioneers of modern environmental thought, strident critics of despoliation and the consequences of capitalist development in the middle of the twentieth century. As emblematic of this writing we might take Fairfield Osborn's *Our plundered planet* of 1948, who declared of the European past that, 'people who lived and worked on their land did not think of it so much as a field for exploitation as

a sacred trust and means of subsistence… Thus was it protected and cared for.'[1]

But after a while I began to wonder: if the peasants cared so much about sustainability, why did they never talk about it? I believe the reason is that my assumption was wrong.

There is another version of this story of paradise lost that maintains its cachet to this day, although not one with which I ever agreed. This story has the same starting point of a pre-industrial ethic of care, but also argues that ancient and medieval people saw Nature as suffused with a life-force which all shared, and where an interconnection of, and respect for, all things was understood. In a famous essay, first delivered as a lecture to the American Association for the Advancement of Science, the historian of technology Lynn White proposed that modern science was the somewhat delayed offspring of Judeao-Christian thought and the injunction to 'subdue the Earth' that can be read from Genesis 1:28. Thus the story goes that the blighted child of Christian thought and modern science has been a blighted Earth, a mindset that has led to the estrangement of humanity from nature and the technological subjugation of all.[2] Carolyn Merchant has argued that the earlier idea of a vital nature was also seen to have female characteristics, of a mother Earth, that were valued. In her account the 'death of nature' was inflicted by a thousand cuts through the rapiers of the scientific revolution and the reduction of natural processes to the mechanistic interactions of inorganic atoms discovered by experiment. The chief villain in this story is the English statesman, lawyer, and polymathic scholar Francis Bacon (1561–1626). On the other side of that Baconian threshold in scientific thought lies a myopic reductionism. It has led to a fundamental misunderstanding of ecological interaction with hugely destructive consequences, and a valorising of the dominating, male, supposedly dispassionate gaze enshrined in scientific method.[3]

[1] Fairfield Osborn, *Our plundered planet* (Boston, MA: Little, Brown, 1948), p. 143.

[2] Lynn Townsend White, 'The historical roots of our ecological crisis', *Science*, New Series, 155 (10 Mar. 1967), p. 1205; Richard C. Hoffmann, *An environmental history of medieval Europe* (Cambridge: Cambridge University Press, 2013), pp. 87–9.

[3] Carolyn Merchant, *The death of nature. Women, ecology, and the scientific revolution* (San Fransisco, CA: Harper & Row, 1980). See also the 'Focus' essays on this work in *Isis* 97 (2006), pp. 485–533; and a restatement of Merchant's belief in the significance of Bacon in Carolyn Merchant, 'Secrets of nature. The Bacon debates revisited',

These stories are not entirely untrue. But they seem to me to be in error in important regards, and this book seeks to explain why, at least for the period and places with which it is concerned, that is, early modern Europe and some of its colonial offshoots. I make no claims at all for anywhere else or previous eras. And Merchant was certainly right that scientific endeavour in the period covered by this book was overwhelmingly dominated by men, its literary output even more than its practice (given that women played many important direct and indirect roles in sustaining scientific practice). Consequently, the pages of this book are also overwhelmingly filled with the voices of men, and by and large rich men, not because they had any intrinsically greater significance than women, but because they were able to participate in debates and leave a record of them in a way that women, and poorer men, were not.[4] The work of remedying this bias is far from complete in our politics today.

Yet much of the thinking attributed to pre-Baconian thought was not widely shared in society but was actually the rather abstruse product of highly educated men drawing their own inferences from classical writers. The scientific revolution did not replace vitalism and a deeper sympathy with the processes of life with an instrumental, de-spiritualised mechanism. This view is wrong – at least in the circles examined in this book. The rather gradual refinement of what we now see as the scientific method did not estrange people from nature. Among the relatively elite groups who conducted botanical, meteorological and silvicultural investigations, the attention to detail and engagement with 'fieldwork' became far greater than ever before. The great mass of the population, about whom we know much less, probably saw very little change in their experience of, and knowledge about the natural world until the later experience of urbanisation and technological revolution that largely came after the early modern period. Far from disappearing, the influence of sixteenth-century 'vitalist' thinkers lauded by Merchant, such as Paracelsus, was long-lasting, including on Francis Bacon. Mechanistic views of nature, far from being all-conquering, had

Journal of the History of Ideas 69(1) (2008), pp. 147–62. Merchant's work has been far more warmly received in environmental history than the history of science.

[4] The critique of Merchant presented here is of her characterisation of early modern science and understanding of nature, especially the role of experiment and mechanistic thought; not the position of women and the possible influence of science upon that position, or any other issues raised in that book.

a partial few decades of fashion before falling out of favour in the early eighteenth century. Debate about the nature of life and human relationships with their climate and environment intensified from this time. And as a consequence, what we might call sustainability, which previously had not registered in public debate at all, or only in a rather indirect manner, emerged at the *end* of the early modern period, after the 1740s, as an urgent problem that society had to resolve.

I should be very clear at this point. I will argue in this book that the modern framing of 'sustainability', the kind of *problem* it was conceived as in political debate, was a product of the early modern period, and only really appeared in its full-blown form in the latter part of the eighteenth century. This does not mean that I think that the earlier societies of Renaissance, medieval and classical Europe, who did not make sustainability a social and political problem for public debate, were therefore unsustainable. Even less do I wish to argue that modern society, where many people are fully conscious of the problem, is sustainable merely by dint of knowing that it should be. This book does not seek to examine or answer those propositions at all. It is not a study of what people *did*, a search for exemplary sustainable societies. It is largely a history of the ideas that people expressed about whether *whole societies* and economies were dependent on the natural world in some way, and hence how those societies should be governed. One does not have to hold the concept of sustainability in order to engage in practices that might, quite inadvertently, promote that goal. Equally, we are not short of evidence that anxiety and hand-wringing about sustainability does not automatically translate into a collectively sustainable life.

Many studies have shown forces to be in operation in the early modern world that *did* create tendencies towards (what I must always tediously say 'what we now call…') sustainability. These ranged from the very localised wisdom of the peasant planting a field or grazing animals and wanting to know if her or his family will survive this year and the next, and perhaps even the next generation, to shifts in the availability of land or prices that might affect a couple's prospects of marriage, affecting in turn the birth rate and population trends. Ideas that households had a right to the resources (such as wood or grazing) for their subsistence, or that common property should be allotted in a proportional way among communities, were reflected in rules and policies that set limits to the exploitation of the soil and reserved land for

particular uses. Such 'homeostatic' forces exerted a balancing force on pre-industrial societies which has been much studied in agrarian and demographic history. But these tendencies usually found their articulation in debates about the justice of allocation or the desire to ensure respectability. These can be powerful forces for sustainability, but they do not need any conscious concern about the fragility of the environment to have force.

Argument

The word 'sustainability' appears only to have emerged in the English language in the early 1970s.[5] It is a remarkably recent coinage, although the German equivalent, *Nachhaltigkeit*, was already established in the mid-eighteenth century and its cognates a century earlier (although this is equally true of the English 'sustain').[6] Like any word, its meaning can be malleable and applied in many different contexts – providing your interlocutors understand what you are trying to say. In this book, I employ a very particular meaning of the term. 'Sustainability' is the idea that to endure, a society must not undermine the ecological underpinnings on which it is dependent. It must not degrade, to use a more archaic term, 'the Earth'. There may of course be many other reasons why a society or a polity does not endure, and indeed there is very rarely only one reason. But here, 'sustainability' is considered as an environmental problem, and I understand it as framing both the problem that people may behave *inappropriately* in regard to the limits of the environment which they inhabit, and that *the environment is changed by the society dependent on it so that society can no longer sustain itself*. Unsustainability, according to this particular definition, is the result of the Earth being modified by human action. I do not want to suggest that sustainability could not be defined otherwise, and usefully so. But that problem of degradation through human action is the issue I am considering here.

This approach begs the obvious question about what should be the social unit to be sustained – whose livelihood is sustainable,

[5] 'Sustainability'; *Oxford English Dictionary.*
[6] Paul Warde, 'The invention of sustainability', *Modern Intellectual History* 8 (2011), pp. 153–70.

and is it even desirable that it should continue in its current form? What kind of livelihood should this be? It is frequently pointed out today that discourses about sustainability often do not sufficiently take into account the social distribution of benefits and risks attendant to environmental change. The perils of climate change are not equally distributed, whether geographically or across our very unequal societies. Considering different social or spatial scales of analysis will lead to different answers about what is appropriately 'sustainable' behaviour, and indeed such differences account for the high levels of disagreement in the modern world where nearly everyone, at least notionally, is signed up to sustainability as a good idea. This is not a normative book: it does not seek to make a judgement on what *counts as sustainability.* As the reader shall see, there has never actually been any clear agreement on this question, either what makes for a good and just society, or what resources are required to underpin it. Such debates have been and will remain the stuff of political life. Rather, my interest is how in its emergence the issue of 'sustainability', as what one might call a 'discursive field', a theme to argue about, was bound to particular social and territorial units, and especially the idea of the state as unit of political, economic and environmental management. That is frequently how governments still consider the issue today, although not necessarily the best one. But it is hard to divorce thinking about sustainability from our political organisation, and it always has been.

This is not, then, a book about the basic tenet of farming or gardening, that you cannot endlessly plant certain crops in the same place without the yield declining, whether because of the exhaustion of certain nutrients, or the build-up in ineradicable pests. This fact must have been learned almost immediately during the transition to settled cultivation, and is familiar to anyone who tends a vegetable patch. There is no necessity that repeated cultivation would lead, however, to a *permanent* degradation of soil quality, or that cultivators would have had cause to think so. Of course, other things do lead to such degradation: long-term leaching of nutrients from exposed soils, erosion, and so on. These problems were certainly noticed episodically in classical times, but do not seem to have led to a continuous discourse on the issue stretching into the medieval and modern eras. Neither, importantly, were these general ecological constraints framed as a wider problem for society or the polity at large. It is the emergence of this *wider* social and political discourse that establishes, in my view, 'sustainability' as a

general developmental problem. One farmer mismanaging a field is not generally considered worthy of discussion in terms of sustainability. If all farmers are mismanaging their fields, then we begin to worry.

How then did sustainability emerge as a wider issue of debate and focus of anxiety in European thought? Like all profound and troubling ideas, this did not arrive as a revelation to someone one bright morning (even if it sometimes seems that way to individual people, who all share the experience of a private moment of enlightenment), but was the consequence of many things. Thus this book is not about pinpointing some critical juncture, but identifying that array of factors that demarcated a new field for debate. My account begins with the emergence of a more proactive state in the sixteenth century, seeking to transform religious allegiance and practice, regulate markets, increase revenue, regularise military forces, and control indigence. All these activities built on late medieval precursors, alongside the expectation that public authorities should be guarantors of a supply of essential resources to households. This did not mean that the state worried about the general state of 'the environment' as such. This concept simply did not exist, even though authorities were certainly interested in exploiting and managing parts of the natural world. This spirit of reformation, in its broadest sense, began to make the state of that natural world a *political* issue, one by which the polity might be judged. This was most especially in regard to the supply of grain, discussed in Chapter 1, 'Living from the Land', and wood, discussed in Chapter 2, 'Governing the Woods'.

As we move into the seventeenth century, a desire for increased revenue, international competition in commerce, war and religion, and efforts towards post-war reconstruction after the terrible conflagration of the Thirty Years' War posed these questions of public responsibility and resource management in a more dynamic form. Society was expected to *develop*, and wealth to increase over time, and this posed the question of whether the supplies of basic material could be kept in step with growth in population and riches. Should such dependencies be resolved by trade, or, in a world of uncertain geopolitics, be secured domestically? Should certain sectors of the economy receive privileged access? These questions were asked above all in relation to wood. Such issues of balance, population, resources, and an emerging political economy are handled in Chapter 4, 'Paths to Sustained Growth'. Certainly, by this time many European polities, not only the economic

trailblazers of the United Provinces and England, expected economic activity and state revenue to expand over time.

However, the intellectual context for those fiscal and political ambitions was only partly fostered by governments. Knowledge about resources was not usually provided by the state. Even when it was debated and developed by men who were public officials, they did so in what we might call a 'personal' capacity that embraced both their own interests *and* the discharge of public office, which was in any case often being done from their own splendid residences. Thus another crucial development for this story, and one that we need to appreciate before examining the rise in thinking about resource use that focused directly on the needs of the state, was the emergence of networks of people (nearly all men) generating, sharing and arguing about nature and its uses: about botany, about agricultural improvement, about trees and forestry, about climate and soil. This knowledge was also generally seen as purposeful, and thus intended to be applied as part of a wider purpose by suitably dedicated and resourced men. This is the subject of Chapter 3, 'Ambition and Experiment'. Much of this literature, which in England from the early seventeenth century can be characterised as the literature of 'improvement', was highly optimistic about the prospects for increasing output. In other words, the concern for 'sustainability' that we are so familiar with today – for limits and their transgression – did not loom large. I argue that this was partly because, despite many opinions offered, the writers of the time had little idea why plants, the essential providers of nearly all basic resources, grew. There were certainly various explanations, but crucially, none of them seemed to imply any fundamental limit, some finitude that might hold development back. Indeed, the problem was rather the opposite: how to unleash the powers that surely lay dormant.

Wider educational currents of the late sixteenth and seventeenth centuries, demands from military activities and navigation, and pressures of estate and fiscal management, gradually spread familiarity and enthusiasm for mathematics and geometrical techniques of surveying. Although their prevalence should not be overstated, in tandem with the drive towards improvement such methodologies provided the basis for a new calculus of resource management that shaped the activities of surveyors, foresters and the 'political arithmetic' that took shape in the seventeenth century. These developments were closely entwined with an interest in extracting more revenue from

the land, and hence largely employed by landowning classes. Indeed, throughout the early modern period it was landlords who were much better placed to alter the management of the landscape than central government. States lacked the capacity to do so without a high degree of co-operation from local elites. Hence the techniques for making inventories and surveys, and assessing the future prospects of resource use, tended to be employed in ways to reinforce the dominance of the landed classes. All too often the interests of the ordinary people of Europe (and later the colonies) were considered only as a 'population', a dumb and mute mass. Where resistance to change and policies of 'improvement' was manifest, it was treated as evidence of backwardness and irresponsibility by rulers and their allies.

By the last three decades of the eighteenth century – again, a slow process – such technologies of survey, measurement and control had become widespread, above all in their intellectual esteem and political influence rather than actual practice: a 'new husbandry', a 'scientific forestry', and in the emerging political economy. A quantifiable framework had been provided for thinking about resources – although not yet generally implemented – by which judgements about 'sustained yield' could be made, especially in forestry. This was certainly a new framing and means by which nature was conceptualised, or made 'legible'. These new technologies of power may also have offered the temptation to experts and authorities to treat nature as simpler, more malleable and controllable than the reality, an argument made famously and influentially by James C. Scott.[7] Yet its transformative influence in this period should not be overstated, and an overemphasis on the grand survey seeking to render a territory 'legible' can distract historians from the huge efforts that went into the detailed and nuanced study of natural processes. Hence Chapter 5, examining this history, is more appropriately entitled 'Nature Translated' than implying anything as yet transformed.

The desire for a balanced economy and a sustained yield did not necessarily lead to a concern for the possible *degradation* of the Earth. This required a further step, in what anachronistically but appropriately we can call the 'life sciences' (including chemistry). This is because this step related to ideas about the nature of life itself, a problem that had

[7] James C. Scott, *Seeing like a state. How certain schemes to improve the human condition have failed* (New Haven, CT: Yale University Press, 1998).

long puzzled scholars. From the middle of the eighteenth century, the idea rapidly suffused through Northern Europe that the much-debated source of food of plants included some vital element than provided the quickening impulse in living things, and that this substance might be in finite supply. 'Vitalism' was the keystone that bridged the gap between previous ideas about resource management and discourses of sustainability, because mismanagement and loss of this vital element or 'juice' would shrink the life-giving properties available to society. Allied to a new taste for theories of circulation, which emerged across a wide range of thinking including biological debates, hydrology and political economy, the idea emerged of a natural base to society, a recurrent circulation of essential nutrients that must be maintained for survival. Intuitions of these relationships can be found in, for example, the works of Scottish political economists of the mid-eighteenth century, but at that point they were still but a minor theme. They found their true florescence in the writings of agronomists at the turn of the nineteenth century, modelled in a fully-blown quantitative system by writers such as Albrecht Thaer and Johann Gottlieb von Thünen. Modern writers, reading these works, have supposed them to be refined statements of the basic assumptions of the pre-industrial economy. In truth, they were novel. Even if an understanding of the chemical properties of the soil and plants moved on rapidly, above all in the work of Justus Liebig, the basic intuition of finite elements and necessary recycling remained. These crucial developments are set out first in Chapter 6, 'Theories of Circulation', that deals with developments in science and agronomy. Chapter 7 subsequently examines the reception, or indeed indifference to such ideas in 'Political Economies of Nature'.

Chapter 8, 'History and Destiny', examines a new enterprise that then became possible in the light of sustainability thinking; understanding of the past and projections about the future that judged society by the 'sustainability' of its practices. Now environmental concerns were integrated into 'stage theories' of history that could explain the rise and fall of empires, with the expectation that poor husbandry of the Earth would result in similar fates for the profligate in the future. Just as the glittering empires of the Middle East and Rome had crumbled to dust, so would modern societies currently in their pomp. These ideas had particular resonance as a critique of the poor husbandry of the North American 'frontier' (as seen by Europeans or Americans of the eastern seaboard) or in observations of other colonial