Kate Hawkey

History and the Climate Crisis

Environmental history in the classroom

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KNOWLEDGE AND THE CURRICULUM

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Knowledge and the Curriculum aims to become a central hub for investigation into how disciplinarity, transdisciplinarity and interdisciplinarity can enable schools, teacher trainers and learners to address the challenges of the twenty-first century in knowledgeable and critically informed ways. The series explores questions about the powers of knowledge, relationships between the distribution of knowledge and knowledge resources in society, and matters of equity in access to justice and democratisation. It is committed to the proposition that the answers to questions about knowledge require new thinking and innovation, that they are open questions with answers that are not already known and which are likely to entail significant social and institutional change to make the powers of knowledge and of knowing equally available to all.

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To Ben, Holly & Rosa

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Preface

On the evening of 6 January 2021, I watched the unfolding spectacle of Trump supporters storming the US Capitol in defiance of the 2020 presidential election result. My 20-year-old daughter sat with me and she was quick to recognise the significance of what was happening before our eyes: 'It reminds me of authoritarian leaders in the past whipping up feeling so that their supporters take the law into their own hands.' Her school history education had provided her with the knowledge and conceptual understanding which enabled her to make sense of the day's headline news. The week before we had watched *University Challenge* on the TV. No one had buzzed to answer the question, 'What is the name given to the process where disease can be passed across species from animals to humans?' The answer, zoonosis, was not a part of the knowledge base of these eight highly knowledgeable university students. I was surprised, not least because we were, at that time, about to enter the third lockdown in England during the pandemic of Covid-19, a zoonotic disease, with deaths in the UK approaching 1,000 a day. The two anecdotes say something about the knowledge that our education system equips students with along with the gaps in that provision.

In November 2018, the city where I live, Bristol, became the first European city to declare a climate emergency, and others soon followed. The term 'climate emergency' became the *Oxford English Dictionary*'s word of the year in 2019. It expressed an urgency and need for action which earlier terms such as 'global warming' and 'climate change' had failed to achieve. The urgency remains apparent in the slogans adopted by campaigning groups such as Extinction Rebellion, Youth Climate Strike and Fridays for Future: 'Act now' and 'This can't wait until I'm bigger'. In the title of this book, the pressing seriousness of the climate crisis and associated crises of biodiversity loss and mass extinctions is clearly accepted. On the other hand, the book aims to offer a different response to our current situation by looking to history. While a focus on STEM subjects or geography may be the more obvious places to build

knowledge and understanding about the climate emergency, this book will argue that we ignore the historical roots of our current crises at our peril. Guldi and Armitage's *History Manifesto* (2014), in response to the current existential crises we face, makes the case for resisting the short-termism which so characterises much of modern social and political culture, calling instead for a focus on more 'long-term thinking'. Similarly, in history education, there have been various classroom initiatives which focus on the importance of the long term (see, for example, the Big History Project and World History for Us All). These ideas and commitments have shaped my work. In writing the book it has become increasingly clear to me how looking at the historical hinterland to our current crises offers the prospect of better understanding the current climate emergency. There may be an urgency to 'act now', but history can add knowledge, perspective and insight, essential if we are to forge a different future.

The roots of the climate crisis take us back to a consideration of the age-old discourse around the impacts of the interactions between nature and culture. Environment, therefore, as a sometimes overlooked agent in history, is also included within the focus and title of the book. By including environmental history, the intention is not to add another scholarly specialism to the already crowded school history curriculum. Rather, the current climate emergency demands that considerations of environment must become a central concern for all of us, and it is this broader perspective that informs the writing here. The foregrounding of environment as a necessary focus for all students of history is a provocation developed in the book. Furthermore, it leads to a critique of current academic and professional practice which, I argue, can result in strengthening and developing the disciplinary history that we offer to students in schools.

Environment is not given a central place in the current history curriculum. This book sets out arguments for making such changes in a process which I think of as academic ground clearing. It is an essential starting point for many curricular development initiatives and is the focus for the early chapters. The book is also concerned with classroom practice, and this focus becomes more evident in later chapters. In this sense, the book is a hybrid which deliberately straddles the worlds of academia and the classroom. I am alert to the dangers inherent with this approach. To continue the analogy, I may only have scratched the surface in many areas and not developed any area fully enough. My intention with such a broad sweep, however, is to start a conversation which others will hopefully pick up, shape and refine. Furthermore,

as I am a teacher educator, being clear about the reasons and justifications for what we teach, alongside developing appropriate classroom pedagogy, has always been the priority. This hybridity is at the heart of what we do. I leave readers to decide whether the approach succeeds.

While the book is ambitious in aiming to start a conversation, it also recognises where we are currently. While some might suggest that educating students about the climate emergency necessitates an interdisciplinary approach, this book is written with a strong subject-bound curriculum in mind, since this is the curricular organisation in English schools. It asks the question of what contribution history can make.

There are some small differences in how the National Curriculum is organised in England, Wales and Northern Ireland. In Scotland, schools follow the Curriculum for Excellence, where history is taught as part of social studies. There are, however, similarities in the history curriculum and topics taught across the four nations. For these reasons, the book uses the terminology of the UK, rather than separating out into the constituent four nations. The book aims to link with topics which are commonly taught in UK secondary classrooms, asking the question of how taking an environmental lens to a familiar topic can change what we learn. It uses the second-order concepts which underpin the history National Curriculum and asks how the climate emergency, along with adopting an environmental perspective, might impact on our understanding of these.

As a teacher and teacher educator I am all too aware of how busy and demanding schools and classrooms are today. If there was only more time available, we might all make considerable changes to the curriculum we design and teach and spend more time reading the latest scholarship. Sadly, those opportunities are limited. I also recognise that every teacher tailors subject materials to suit their own teaching, and as a result, the book avoids the presentation of tight lesson plans. Instead, it aims to introduce teachers to some key subject knowledge, perspectives and debates along with suggesting a range of possible enquiries, routes in or stimuli appropriate for secondary school classrooms. The extensive references and further reading at the end of each chapter will provide additional resources to those who find time or inspiration to take things further. The range of subject knowledge addressed is far from exhaustive and there are Anglo, Euro and Western biases inherent in the selections made. By way of justification for these choices, I keep close to the existing curriculum in the hope that this may make the possibility of small adaptations and innovations seem more possible and achievable to busy teachers.

Embedding environment as a central element in the history curriculum brings considerable subject knowledge challenges. Many history graduates have studied only relatively short spans of time and their courses have included few or no environmental aspects. They will, understandably, be hesitant and cautious to introduce topics traditionally neglected in both history degrees and school curricula. While the book offers a range of resources and possible approaches, there remains a need to develop more comprehensive teacher education and ongoing professional development in this new and burgeoning area.

While the book is written with the UK curriculum in mind, it argues that environmental history has been neglected in wider prevailing discourses about history education. The ideas presented here have clear relevance internationally, and the practical approaches which are presented are adaptable to many contexts around the world. Just as the environmental crisis has no national boundaries, neither does education's response to it.

The book is divided into two parts. The first part is more theoretical in scope, while the second part is more practical, although there are, inevitably, overlaps between the two. Chapter 1 makes the case for change in the school history curriculum in light of the current climate and environmental crises. It draws from the historiography of the discipline of history since its inception in the eighteenth-century Enlightenment with its associated focus on the nation, through the shifting priorities which resulted from twentieth-century social and political changes. The chapter locates the current arguments for bringing an environmental lens to the history curriculum within established wider revisionist agendas (Sörlin and Lane 2018).

Chapter 2 focuses on issues to do with scale. The impacts of the current environmental crisis are felt in places far distant from their origins, so that a focus on nations can seem less relevant than previously, while a 'shrinking' globalising world calls for understanding at much larger scales. Similarly, understanding the history of climate change and its relationship to humans necessitates an awareness of change over very large sweeps of time (Aldrich 2010; Christian 2004). Having made the case for 'scaled-up' history, the chapter also recognises the enduring appeal of bringing the past to life through human-scale stories. The chapter argues for history taught at different scales of granularity and sets out clear, practical approaches that can be used to navigate between history at different scales.

Chapter 3 develops the ideas introduced in Chapter 2 by proposing two synoptic overviews (Shemilt 2009) to support students' understanding

of turning points over large sweeps of time. The first overview addresses the question of how humans have survived over time, identifying the Neolithic and Industrial revolutions as key turning points. The second presents a synoptic framework of how humans have thought about their relationship with the rest of nature across time. Dominant worldviews associated with foraging, agriculture and industry are presented. Visual images are used to support understanding of complex sets of ideas, and images are selected for their power and appropriacy as resources to interrogate in secondary classrooms.

While Chapter 3 presents large-scale perspectives using synoptic frameworks, worldviews and the history of ideas, Chapter 4 changes scales to focus on more human-scale events and narratives, recognising that these approaches are more familiar within the current curriculum. It presents case study examples of how humans have lived with the rest of nature in different times and places in history. The concept of sustainability is examined critically (Warde 2018), and examples of humans living more and less sustainably with the rest of nature are presented. Chapters 3 and 4 serve to build subject knowledge in an area which is likely to be unfamiliar to many history teachers. Taken together, the two chapters also model how the arguments presented in Chapter 2 relating to teaching at different scales of granularity can be approached.

Having looked at history from the very large scale, Chapter 5 switches to history at the smallest of scales. The chapter argues that the co-evolution of microbes and humans, including epidemics through history, has been a major force in shaping history (Crawford 2007: 4). Far from being a small sub-field of history, this co-evolution is a key driver in understanding historical change as important as wars, revolutions and demographic and economic change (Enard et al. 2016). The chapter presents a microbial history including hunter foraging groups, early agricultural civilisations and the development of zoonotic diseases. It takes a microbial lens to examine the causes and impacts of the Black Death, smallpox, the Columbian exchange, transatlantic slavery, the Spanish flu pandemic of 1918–19 and the Covid-19 pandemic.

Chapter 6 returns to the revisionist agendas introduced in Chapter 1. It looks at the intersections of environment with other, more established, revisionist themes which are often included in the curriculum taught in history classrooms (Satia 2020). Specifically, the chapter focuses on the intersections of environment with race (Chiang 2014; Turda and Quine 2018) and gender (Merchant 1980). In the case of race, a thematic approach, anchored in American history, is used. The experiences and portrayals of the First Nation Americans and other people of colour over

time are explored alongside environmental discourses around wilderness (Cronon 1996). In the case of gender, a case study approach is used, focusing on the role of an individual in history, in this case Rachel Carson. The chapter looks at the reactions to, and the changing historiography in relation to, Carson's influential book *Silent Spring* (1962). In taking these two approaches, one thematic, the other focusing on an individual, the chapter develops ideas introduced in Chapter 2 and illustrates how environmental history can be embedded into the curriculum effectively in different ways. It also demonstrates how environmental history is not a neutral concept devoid of contestations of race, gender and power.

Chapter 7 starts from the premise that the discipline of history is itself a historical phenomenon and construction, before using an environmental lens to review the disciplinary concepts which underpin the current school history curriculum in the UK. It examines how the climate crisis impacts on our understanding of the concepts of causation, consequence, change and continuity, evidence, similarity and difference, interpretation and significance. Far from 'putting a spanner in the works' (Corfield 2011), the chapter argues that embedding environmental perspectives offers opportunities to strengthen students' critical understanding of disciplinary history.

Part II focuses more on environmental history in the classroom. Much of Part I focuses on the 'what' of teaching, whether that be the substantive or the disciplinary knowledge of the curriculum. Chapter 8 focuses more on the student and how their learning can be supported in recognition that 'knowledge matters, curriculum matters, but pedagogy probably matters most' (Husbands 2015: 49). Acknowledging the complex and controversial nature of climate change, the chapter examines the range of incoming preconceptions that students are likely to bring with them into the classroom, broadly categorising these as denialist, technicist and declensionist (Hughes 2006). In considering how teachers can respond to these different incoming preconceptions, the chapter draws from existing scholarship on the teaching of other sensitive and controversial histories, including teaching the Holocaust (Foster, Pearce and Pettigrew 2020). Finally, acknowledging how the student climate strike (among other developments) has sensitised many students to the issues of climate change, the chapter addresses how discussions about activism (Holmes, Gaynor and Morgan 2020) can be brought into the history curriculum and managed effectively in classrooms.

Environmental perspectives have yet to be fully embedded into classroom enquiries in the UK, with only a few notable exceptions (see, for example, Kitson and Langdon 2021). Chapter 9 begins to address

this gap by presenting topics for practical classroom work where an environmental focus has been embedded into the study. Three topics are presented, focusing on the seventeenth-century General Crisis; James Watt and the Industrial Revolution; and environmental attitudes from the 1960s to the present. In each case, the topic aligns closely to work which students often study in classrooms while different disciplinary concepts are also prioritised.

The final chapter returns to curricular critiques presented earlier in the book to suggest other radical implications which stretch beyond the current curriculum. While Chapter 1 drew from the current climate emergency to develop arguments for the inclusion of environmental history into the curriculum, Chapter 10 focuses more on the implications of biodiversity loss for the history curriculum. Just as social justice issues have challenged the traditional curriculum to include groups who have been marginalised and silenced through history, so this chapter suggests that the challenge of biodiversity loss means history needs to abandon its exclusive focus on human exceptionalism, which has characterised the history taught in schools. Two questions are presented. The first asks what was the most significant event in the last 100 years, while the second asks when did the Anthropocene begin. In both cases the focus is on how a more-than-human stance can be used in classrooms.

Part I
Perspectives on subject knowledge

1
How the history curriculum was shaped and why it needs to change

Introduction: change as the norm

The history curriculum is never static. It is the result of an ongoing relationship between the present and the past. What is selected for study, as well as what is omitted, reflects the priorities and concerns of the present. This chapter presents a brief disciplinary history, highlighting the changing, and persisting, priorities from the nineteenth century through to today. The chapter argues that the current environmental crisis, itself an historical phenomenon, necessitates further revisions to the curriculum.

We live in a time of rapid social change. Unsurprisingly, this has given rise to discourses about what we should be teaching our children, along with questions as to what criteria we use to decide. Discussions about the place of knowledge in schools and society, and considerations about what constitutes powerful knowledge, have shaped these conversations. The chapter locates the current environmental crisis within these discourses and presents arguments for the role that history education can make. It addresses criticisms of this position, making the case for relevance, presentism and ethical enquiry as criteria to use in the selections we make for what to include in a curriculum.

Origins: a focus on nations and evidence

The establishment of history as a discipline in the nineteenth century went hand in hand with the process of nation building in the period from 1750 to the present. A belief in progress was a strong European Enlightenment value, and this assumed belief meant historians set out to

trace the progress of humanity through history. The combination of belief in both nation and progress resulted in histories which focused on the defining features of different nations – what sets one nation apart from others, often oriented towards culture, ethnicity and people, and often with assumed ideas of superiority (Satia 2020). Battles, wars, revolutions and constitutional developments became important foci for historical scholarship, purposeful episodes around which shared national narratives could be forged. Canons of national heroes and enemies were constructed and took shape. The focus laid stress on humans as the central actors within human history alongside prioritising events as agents of change.

The nineteenth century was also the time when history became more professional. In order to achieve this status, historians needed to set out the theoretical and methodological basis which could justify their professional claim. University historians invented their own myths of origin, drawing from the work of Leopold von Ranke (Berger 2017) with the elevation of rigorous source criticism as the distinctive basis of expertise. Furthermore, the professionalisation was aided by emerging and existing nations which provided useful patronage and resources for historical writing as part of the national mission.

The curriculum today continues to focus on national history: it remains a key staple or 'guardian' (Berger 2017: 53) of the history taught in schools today. The curriculum is structured by disciplinary second-order concepts such as causation, change and continuity, and these give the subject its epistemological shape. Among these, the focus on sources and evidence continues to be an underpinning methodological approach which is prioritised in classrooms. The nineteenth-century origins of professional disciplinary history are, therefore, still very much in evidence in the school curriculum today.

Of course, there have been other shifts and developments in the discipline, away from a focus on the nation and human-level events as agents of change. Marxist, global, world and Big History are all examples of approaches which highlight larger social and systemic elements as agents of change. Similarly, the Annales School 'relegated the sensational to the side-lines' (Duby 1973: Foreword), focusing instead on longer timescales and comparative and interdisciplinary approaches. By the mid-twentieth century, additional challenges to the traditional national canon came from postcolonialism, along with other social and political movements of the 1960s. Postmodernity, and the recognition of positionality within the selections and narratives taught, have further disrupted the 'modern triumvirate' of nation, progress and history (Seixas 2017: 60) as a credible framework for understanding human life. Within

school history education, many of these trends in a changing world were reflected in the SCHP (Schools Council History Project), established in England in 1972. A traditional national canon was increasingly seen as less appropriate and SCHP instead prioritised the disciplinary underpinnings of the subject.

In summary, a traditional focus on nations along with a methodology anchored in sources characterised the early study of history and these priorities have remained as important elements in the curriculum today. Changes across and beyond the twentieth century have resulted in a plurality of voices becoming an additional important focus for the history curriculum, although the challenge of how selections are made to achieve this remains a formidable one.

Environmental challenge

Environmental awareness has a long history, although the 1960s can be seen as the start of the modern environmental movement, with Rachel Carson's *Silent Spring* (1962) often identified as marking the beginning of the upsurge of interest and concern. Focusing on declining bird populations due to the use of pesticides such as DDT, Carson drew attention to the fragility of that ecosystem, with a wider message of the need for nature to be protected by humans. The scholarly field of environmental history grew out of the environmental movement of the 1960s but can also be seen to have built on earlier roots such as the historiographical traditions of the Annales School, along with responses to the new discipline of ecology which grew up in the twentieth century. Aldo Leopold called for 'an ecological interpretation of history' (1949: 205) with the aim of using the new study of ecology to explain why the past developed in the way it did.

Since the 1960s, our understanding of the impact of human actions on the planet has grown enormously, with many now describing the current epoch as the Anthropocene, a time in the Earth's geological history in which human beings have for the first time become the primary agents of change on a planetary scale. Dipesh Chakrabarty (2009) argues that the Anthropocene rocks the very foundations of history; we may not experience ourselves as a geological agent, but we appear to have become one. The ongoing interactions between nature and culture serve to challenge the disciplinary self-image of history as being the story of human affairs separate from the rest of nature (Nordgren 2021). We live on a lively planet (Ghosh 2016) which we share with other species, and

climate change is an historical phenomenon (Sörlin and Lane 2018: 1). David Christian complains that 'there is a colossal elephant in the room that we as historians don't teach about and that is the Anthropocene, global warming' (Hughes-Warrington et al. 2019: 526). Humanity's impact on the environment, and how we have arrived at a point when this impact now determines the conditions for all future life on the planet, demand explanation and hence attention in the history curriculum.

Just as social movements relating to class, gender and race shaped new scholarship in universities before beginning to disrupt the traditional national narrative taught in schools, so too environmental history has become established as a field of scholarship within our universities (see, for example, the articles in the *Journal of American History,* 1990, which provide a good introduction to the field). Drawing on these scholarly origins, alongside current concerns around the climate emergency, it now needs to be afforded its place within the ever-evolving curriculum within our schools. The next section sets out the justifications for embedding environmental perspectives into the history curriculum in more detail.

Powerful knowledge and climate change

What is included in the curriculum is an ongoing debate particularly in times of great social change. There has been much discussion in recent years about the place of knowledge in the curriculum (see, for example, *Journal of Curriculum Studies,* 2021, issue 2). Michael Young's advocacy of 'bringing knowledge back in' (Young 2008) has been influential in shaping this 'knowledge turn' in education in England and elsewhere. His conceptualisation of powerful knowledge was invoked as an organising principle in the English National Curriculum review of 2011 (Department for Education 2011).

Young's powerful knowledge offers helpful insights with regard to the perennial dilemma about what we select to teach. He argues that knowledge may be under-socialised (characterised by a fixed, unchanging canon, reflecting the knowledge of the powerful) or it may be over-socialised (characterised by relativism so that no one type of knowledge can be deemed better than any other). The theory of social realism resolves this dilemma by arguing that while knowledge is certainly social in origin, there is also an independently existing reality which we strive to explain so that knowledge has value which stretches beyond the creator of such knowledge. Working from this social realist perspective, Young and Muller (2010) articulate three possible educational futures: they

argue against an under-socialised Future 1 (F1) and an over-socialised Future 2 (F2), before presenting the case for Future 3 (F3), powerful knowledge. F3, in contrast to F1, is recognised as being provisional, contestable, fallible and always subject to change. What is taught in schools should first 'enable students to acquire knowledge that takes them beyond their own experiences' (Lambert et al. 2014: 7), and second and importantly, provide knowledge that enables students to 'participate in a society's conversation about itself and its future' (Lambert et al. 2014: 62). Equally, however, acknowledging that society's conversations about itself will change over time necessitates an ongoing review of what schools teach within and across subjects.

One of the most pressing conversations that society is having relates to climate change and the broader environmental crises and how these can be addressed. It is, therefore, entirely appropriate that, by adopting a F3 position in relation to powerful knowledge, and affording a place for relevance, climate change should be included within the school curriculum. As Nordgren concludes, 'it seems obvious that environmental changes will eventually change the agenda of what is assumed to be relevant to know' (2021: 192).

Climate change and a subject curriculum

In terms of curriculum, Young places subjects and disciplines at the centre of what schools are there for and the aims for a child's education. The knowledge taught within a subject-bound curriculum is produced by specialised professional communities with shared disciplinary method-ologies. The organisation of that knowledge should be according to subjects, not least because these knowledge domains have established boundaries between each other, but also because subjects have a recognised stability in the public eye.

Young's arguments for a subject-bound curriculum sit in contrast to much of the thinking about how to approach teaching about the environmental crisis. Contemporary challenges, such as climate change, have been characterised and conceptualised as 'wicked problems'. First identified by Rittel and Webber (1973), 'wicked problems' (in contrast to 'tame problems', which can be resolved in reasonably straightforward ways) are complex issues that defy complete definition, and for which there can be no clear solutions since any resolution generates further issues (Brown et al. 2010). The issues are complex since those seeking to solve the problem are also the ones causing it: there is clear urgency but

no single authority to lead on the issue (Levin et al. 2012). Importantly, there is no field of knowledge that has the prerogative or single authority when it comes to addressing climate change, which will clearly require change at many levels ranging from the scientific and technological through to the political and behavioural. Wicked problems are messy and span across subject boundaries, so that interdisciplinary solutions and ways of working are called for. This presents a challenge for a subject-bound curriculum and indeed some curricular initiatives developed elsewhere, partly in response to contemporary challenges, do adopt more interdisciplinary perspectives (see, for example, the Big History Project). The focus in this book, however, is to set out what can be achieved within the current subject-bound curriculum in recognition that this is the way in which knowledge is organised within the English secondary educational system. It does not preclude other opportunities for work to stretch beyond disciplinary boundaries with a more porous interaction between subjects, but that is not the focus for this book.

Working within different specialist communities, different subjects have different contributions to make. In the case of history, one aim is to look at the past in order to better understand how and why the present is as it is or, as Guldi and Armitage express it, 'history's power to liberate ultimately lies in explaining where things came from' (2014: 13). While science may help students to understand how greenhouse gases work, and technology may look at strategies to limit the impacts of greenhouse gases, such learning will remain superficial if it ignores human behaviour, experiences and the impacts of ongoing interactions with the rest of nature over time. History has contributions to make here.

Starting with the current environmental crisis as the mainspring for a revised history curriculum is certainly not a neutral position and one which is open to critique and contestation. In the next section, I address criticisms of the position and develop the case for relevance, presentism and ethical enquiry as criteria to use in the development of a history curriculum.

Relevance, presentism and ethical enquiry

Alison Kitson (2021: 40) argues that while disciplinary boundaries will constrain content choices, they do not precisely define them because there is simply too much that we could select to teach in history. In making content selections, therefore, other rationales must come into play, such as knowing something about the children we teach but also about deciding what is most important for them to learn and what social values

should be conveyed to them. Dick van Straaten et al. make the case for foregrounding relevance in the history curriculum, by which they mean 'allowing students to recognize and experience what history has to do with themselves, with today's society and their general understanding of human existence' (2016: 482). In making their case, they cite research evidence to suggest that students regard history as largely irrelevant, findings in keeping with a survey conducted in the UK by Haydn and Harris (2010) in which less than a third of students connected the usefulness of history to an explanation of the present. For all its strengths, history education has been less than successful in convincing students that the past isn't just 'dead and gone'.

Similarly, Nordgren (2021) argues that teachers must regularly review what is worthwhile historical knowledge and, in doing so, will be processing the dynamic tensions between the intrinsic structure of the subject and the extrinsic objectives of the wider curriculum. Significance, for example, is an intrinsic principle and procedure for understanding historical phenomena, while relevance refers to what makes history important in the present for curriculum makers such as teachers, for students or for the public, while remaining extrinsic to the discipline. He argues that history education not only needs to attend to the intrinsic disciplinary elements of the subject; it must also refer actively to the contemporary world in order to make sense to students.

There are some within history education who argue that using contemporary concerns as criteria for historical study slips into dangerous anachronistic presentism, where we judge the past from the perspective of present values. François Hartog, for example, criticises presentism, describing it as 'a world so enslaved to the present that no other viewpoint is considered admissible' (2015: xiii). While traditionally seen as a pejorative term (see, for example Fischer's 1970 critique of Whig history), this derogatory view of presentism can be seen as a function of 'the conviction that we should study the past for its own sake and not in order to advance other agendas' (Walsham 2017: 1). It can also be seen as a legacy from the early days of professional history in the nineteenth century, when objectivity was elevated as an ideal to which all historical writing aimed: a legacy from the days before postmodernism and an acknowledgement that positionality cannot be avoided entirely.

There is evidence, however, that this aversion may be shifting, and considerable theorising about presentism within history education has taken place in recent years (Miles and Gibson 2022). History education can no longer take for granted a shared cultural heritage or a common frame of reference for how historical development should be understood

in the way that it once did (Nordgren 2019: 790). The increasing diversity of society is one factor which has resulted in a changing historical culture where considerations of the present may shape enquiries relating to past and future.

In 2017, the journal *Past and Present* invited several historians to reflect critically on presentism in relation to their own areas of specialism (Walsham 2017). Rather than rejecting presentism, the responses identified different aspects of value. Among the contributors, Peter Coss (2017) is proud to think of history as a form of action which can lead to 'human betterment' by helping us to understand, if not resolve, current problems; Catherine Hall (2017), working in the fields of slavery and women's history, describes how the writing of history and the effecting of change were closely connected; and Miri Rubin (2017) suggests that the engaged use of concepts and posing of ethical questions is the most honest, and perhaps the only, way of making history that does justice to the past and is accountable in the present.

In contrast to Rubin's position, the English History National Curriculum (Department for Education 2013) does not enshrine ethical considerations within the rubric of the curriculum as such. Ethical considerations, however, are a feature in school history elsewhere. They are central to German 'historical consciousness' (Rüsen 2005) and are very much embedded within the Canadian Historical Thinking Project, which identifies six underpinning concepts for a school curriculum of which understanding the ethical dimension of historical interpretations is one. Ethics and historiography is certainly a burgeoning field (see, for example, Hughes-Warrington and Martin 2022; Gibson et al. 2022), and an ethical dimension includes 'coming to terms with the past crimes and injustices whose legacies – either benefits or deficits – we live with today' (Seixas 2017: 67).

Just as the legacies of slavery are expressed in Black Lives Matter protests, so too the legacies of industrialisation are expressed in the youth climate strikes. Both demand attention within the curriculum: students need to be taught about those elements of the past which continue to resonate today, and which will shape and impact people's lives as the future emerges.

David Armitage (2020) critiques history's aversion towards presentism, suggesting that the subject needs to re-establish its role as capable of speaking to and supporting human flourishing. He argues that our collective endeavour to realise the best for humanity as a whole is at once present-centred, future-oriented and past-dependent. A similar view is suggested by Denis Shemilt, who comments: 'The disposition to

investigate and analyse the past from the perspective of possible futures is a key development in historical consciousness' (2009: 197). The logic of these positions is to see the past, present and future as connected, and for this recognition to impact on the way history is taught. Peter Lee laments the approach commonly seen in schools where a 'temporal apartheid cuts the past off from present and future' (2011: 130), while Rick Rogers characterises this apartheid as the 'mural past'. Murals, he says, 'are remote from the viewer . . . and the study of history reduced to an exercise in voyeurism' (2010: 3). The continuum past, by contrast, sees the past, present and future as connected. We all orient ourselves in time, looking forwards and backwards to make sense of our lives, and this 'orientation in time is not an optional move' (Lee 2005: 5). How we interpret the present, and the hopes and ideas we have for the future, are all connected to how we understand the past.

David Harlan (1997) advocates a kind of ethical criticism in our encounters with people in the past who may have lived by different values to the ones which prevail today. Ideas and practices of people in the past may enlarge our moral horizons and serve as moral counter-resources to, for example, the prevalence of capitalist consumerism which continues to dominate. Furthermore, if history can provide resources for thinking about what to want and what to value, it does so 'by exposing students to cultural repertoires that they would not normally encounter on Instagram or Facebook' (Paul 2021: 407); thus, it takes them beyond the confines of the present and their own experiences.

The challenge of climate change certainly calls for scientific and technical responses, and the priority given to STEM subjects (science, technology, engineering, mathematics) in schools may make important contributions here. However, climate change also makes demands on the human imagination, and it is in this realm that history, and the humanities more generally, have important contributions to make. Herman Paul (2021) suggests that the focus on 'crisis' tends to narrow our attention to technical 'problems' and 'solutions'. While stories of impending disaster may urge us to think of changing our habits of consumption, we also need stories with more upbeat meaning and purpose to make us think about what kind of world we want to preserve. This is an argument for the inclusion of stories of social and environmental justice within the curriculum (Barton and Ho 2021). It is also an argument for engaging with the ways of thought that our predecessors had as 'a way of stretching our imagination beyond the either-or scenarios dominant in our present age' (Paul 2021: 405). As climate scientist Mike Hulme argues (2009) with regard to climate change, the technological perspectives which tend

to dominate are fruitful only if they are embedded into larger visions of the future.

As a result, an aim in history education can become to 'explore the past – shape the future' (Graseck 2008), or, as Harlan expresses it, 'we must put history to the rack, we must compel it to answer our questions. Our questions, derived from our needs, couched in our terms' (1997: 30).

Conclusion

This chapter has sketched out how the history curriculum continues to reflect some of the priorities of its disciplinary origins while shifting to also include additional priorities of the present. The process is one of ongoing curricular revision, and the chapter argues that the current environmental crisis, itself an historical phenomenon, necessitates further revisions. The chapter sets out the case justifying the important contribution that history has to make in this curricular revision while also addressing concerns relating to relevance, presentism and ethical enquiry.

History can deepen our understanding not only of the origins of the current environmental crisis stretching back over centuries and millennia but also of the different ways in which people in history have thought about their relationship and interactions with the rest of nature. These are fundamental elements of environmental history. They are the foci for Chapter 3 and involve looking at history across very large sweeps of time. Acknowledging how difficult this can be to do effectively, Chapter 2 addresses issues relating to scale in history and sets out classroom approaches which can be used to support student understanding in this area.

Further reading

Barton, K. C., and L.-C. Ho (2022), *Curriculum for Justice and Harmony: Deliberation, knowledge, and action in social and civic education*. New York: Routledge.

Chapman, A., ed. (2021), *Knowing History in Schools: Powerful knowledge and the powers of knowledge*. London: UCL Press.

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2

Scale in history: why it matters and how to navigate between different scales

> We must, all of us, engage the big picture, and do so together, a task that we believe requires us to look backwards as well as ahead . . . tacking between big processes and small events to see the whole picture, and reducing a lot of information to a small and shareable version (Guldi and Armitage 2014: 13).

Introduction: environmental history and scale

The scales within which historians work are determined by the nature of the questions which they ask. Some enquiries lead them to focus on the nation as the unit of analysis for their studies, while others will lead them to focus on individuals, on different groups, regions or civilisations; other enquiries may lead them to focus on the global, the cosmic or even different species. Whatever the focus, historians also cannot write a history at just one scale. They might focus on depth and set this into a wider context, or they might focus on a larger-scale history which they illustrate with depth examples. History necessarily involves working at different scales.

This chapter looks at the implications that introducing environmental perspectives in the curriculum have on the scales at which we teach history. It sets out the challenges that scale can bring to classroom teaching and suggests ways in which these can be addressed.

Why do we need to scale up history?

Chapter 1 set out how the emergence of history as a discipline in the nineteenth century shaped the character and priorities of the subject.

A focus on the scale of the nation along with documentary sources tends towards study at a human-event level or scale, and while revisions to this traditional approach have influenced the discipline, this scale is still very much in evidence. In universities, historians have traditionally become successful and been promoted because they know an awful lot about a highly specialised field. Similarly, in schools, exam specifications suggest that detailed in-depth studies continue to be stressed. Despite the range of scales that historians can potentially work within, it is as if 'the lens through which we view the past has got stuck at a certain magnification' (Hughes-Warrington 2005: 17).

Chapter 1 also set out the case for revising the history curriculum in response to the current environmental crisis; these arguments call for an engagement with history at different scales from those traditionally pursued. Melting sea ice and the deforestation of tropical rainforests have impacts across the globe, while volcanic ash and pollutants, among other things, affect people and places far distant from their origins. To this extent, national boundaries can begin to look less relevant and, as scientists during the coronavirus pandemic argued, no nation can be safe from the virus until the whole world is vaccinated. To understand our globalising, 'shrinking' world (Pomeranz 2014), there is a need to include history at larger scales in keeping with Felipe Fernández-Armesto's wry observation of his own specialism, 'I only do one planet' (2002: 153).

Furthermore, climate change also calls for a focus on different scales not only in relation to place but also in terms of time. For example, developing knowledge and understanding of the history of climate change, and its relationship to humans, means going back to the end of the last Ice Age as well as looking at the transition from nomadic hunting and foraging to settled agriculture. It requires big-picture understanding, where students study change over very large sweeps of time. Such a focus disrupts the scales of time which often characterise the school history curriculum, where 2,000 years may be the largest sweep of time that students are typically asked to think about. In other words, including climate change in the history curriculum requires a large-scale focus with regard to both place and time. This sits in contrast to much, but not all, of the history currently taught in classrooms, which is more typically focused on the human-event scale.

The limitations of history which prioritise the human-event scale are well known. The UK's Office for Standards in Education (Ofsted) has commented that in some schools, pupils 'are not good at establishing a chronology, do not make connections between the areas they have studied and so do not gain an overview, and are not able to answer the "big questions"' (2007), and 'understanding of developments across time was

hazy, and their ability to link together the topics and issues they had studied or to draw out themes and show how they had evolved was poor' (2011). Such limitations, perhaps unsurprisingly given current curricular priorities in the UK, may well also be reflected in how broader society regards history. David Lowenthal's description seems familiar when he describes the past as being 'largely chaotic and episodic, a hodge-podge of chronologically unknown or mistakenly connected figures and events. In this heaving and formless sea stand a few islands of stratified narrative, on which we huddle for calendric security' (1988: 220).

Just as an ethical commitment to racial equality today calls for a better understanding of the origins and history of racism, so too a commitment to addressing the climate emergency calls for a better understanding of the long history of humanity's relationship with the rest of nature. These are clear challenges facing the world today which any curricular revision needs to respond to. Arguably, the 2014 National Curriculum opened opportunities to do that, with one of the most significant changes in the curriculum focusing on the scale at which we ask students to engage with history. Acknowledging Ofsted's criticisms, the curriculum's Programme of Study for England's Key Stage 3 (ages 11–14) states that pupils should 'gain historical perspective by placing their growing knowledge into different contexts, understanding the connections between local, regional, national and international history; between cultural, economic, military, political, religious and social history; and between short- and long-term timescales' (Department for Education 2013). Getting to grips with individual units, therefore, is not sufficient; students also need to make sense of the history they encounter across units and across their entire secondary experience. The 2014 curriculum pushed further in this same direction by foregrounding substantive concepts such as 'empire', 'civilisation', 'parliament' and 'peasantry', which can serve to structure the curricular content which is taught across the years in school with the aim of helping students to see the links and connections between different topics across time and place.

The 2014 History National Curriculum, therefore, has taken some steps in the direction of including history at larger scales and this offers a helpful foundation on which to build. The concepts suggested in the 2014 curriculum are rooted in the social and political priorities which characterise the current curriculum. Revising the curriculum further so that environmental history can also be included gives rise to a further set of concepts which can be used to structure the curriculum. Alongside 'empire', additional concepts such as 'Holocene', the 'Great Acceleration' and the contested 'Anthropocene' offer the prospect of supporting

students' understanding of the history of climate change. These concepts are discussed in more detail in Chapters 7 and 10.

The return of the longue durée

The tension between the human-event perspective and history at larger scales is not a new one, and there have been some wonderful metaphors developed to describe the relationship between the two. Emmanuel Le Roy Ladurie (1998) famously said that all historians are either parachutists or truffle hunters, while Fernand Braudel's work on the longue durée (1966) uses the metaphor of the ocean to describe change at different scales. Frustrated by traditional Rankean perspectives, Braudel presented the case for the longue durée, which, he argued, had been neglected in favour of a focus on both the courte durée (which we might think of as short-term political time) and the moyenne durée (which we might think of as economic and social time). Braudel likens the longue durée to the vast oceans where the movement of the deep waters is almost imperceptible; the tides represent the moyenne durée, and the froth of the waves represents the courte durée (see Figure 2.1). So much of our teaching in history classrooms emphasises the courte durée in our focus on individuals and detailed events, which, in Braudel's conceptualisation, overlooks the role that deeper structural systems play in historical change. The metaphors may be helpful tools in supporting students in getting to grips with history at different scales. The froth of the waves is also a reassuring way of thinking about some of the most pernicious individuals who may hold power today: they too will soon be gone!

Why is scale difficult?

In making the case for history education to include climate change in the curriculum, Richard Aldrich states, 'We live on an overpopulated spaceship whose life support systems are running out . . . Human history needs to be re-positioned within the context of physical history, the four and a half billion-year history of the Earth itself' (2010: 1). Similarly, the Big History Project sets out a curriculum which regards human history on Earth as just one episode in the much larger and longer history of the cosmos. The scale and ambition of these approaches can be giddying, just as a look at the Big History online timeline resource ChronoZoom can leave you feeling dizzy and certainly very small or insignificant.
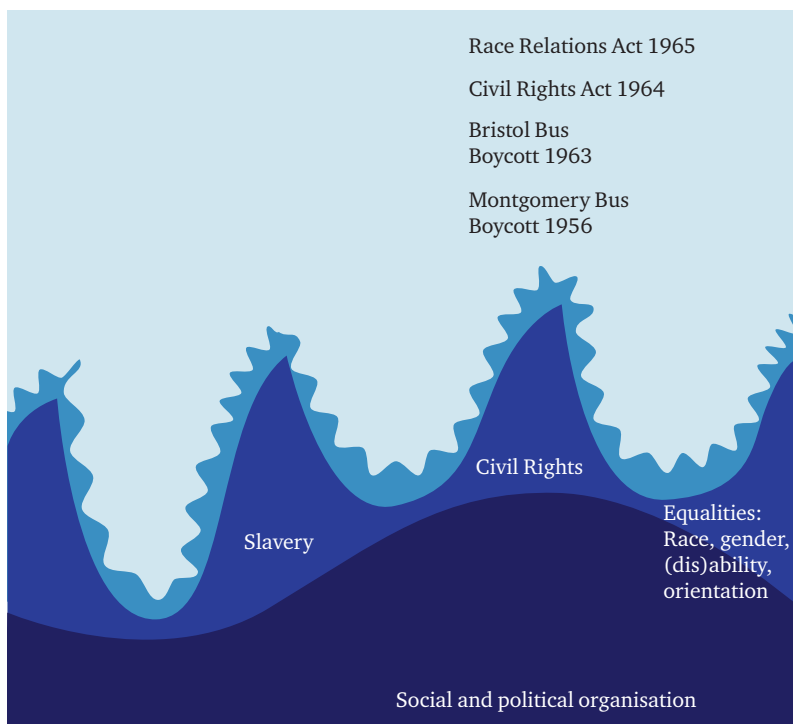
Figure 2.1   Example of the Longue, Moyenne and Courte Durée for use in the classroom. The visual resource uses Braudel's sea metaphor to show the relationship between different local, national and international (UK and USA) events in history and relating these to larger themes with the aim of linking human events to macro understanding.

While there is clear merit in these macro ambitions, my own attempt here is much more modest. Scaled-up history presents challenges for history teachers whose university studies will typically have focused on much shorter timescales in history. Furthermore, my pragmatic aim is to look at what is possible in a subject-bound history curriculum without embracing the interdisciplinary challenges of history at the largest scales. I limit the scope of my attention to humanity's history on Earth, particularly since the Neolithic Revolution, not least since this can sit along the grain of the existing history school curriculum in the UK without great disruption. Even when the focus is limited to this period of humanity's time on Earth, scale remains hugely challenging to grapple with.

Below, I address three different challenges which arise when scaled-up history is included in the curriculum, and in each case I present ways in which the challenges can be addressed in classrooms.

Challenge 1: numbers and the enormity of time

History teachers are familiar with the difficulties students face when dealing with very large numbers. In teaching the Holocaust, for example, the numbers involved can make little sense unless they are related to known reference points such as the number of students in a school or fans seated in Wembley Stadium. Similarly, understanding large timescales is cognitively challenging not least because the ready reference points to draw from might include one's own lifespan, or the timespan of the history curriculum taught in schools, typically around 2,000 years. Anything larger than that is in danger of becoming meaningless, as John McPhee comments: 'Numbers do not seem to work well with regard to deep time. Any number above a couple of thousand years – fifty thousand, fifty million – will with nearly equal effect awe the imagination to the point of paralysis' (1981: 29).

However, if the history of climate change is included in the curriculum, this calls for the inclusion of larger timescales than those we have typically been used to dealing with. As David Christian argues: 'We are living through a turning point in the history of planetary life . . . What is happening right now, what humanity collectively is responsible for, is on a scale that you cannot even begin to grasp if your timescale is a few hundred years' (Hughes-Warrington et al. 2019: 527).

While introducing a history of climate change into the history curriculum may be a new initiative, the difficulty in grappling with the enormity of time has long been the focus for considerable theorising in history education. Synoptic overviews and usable historical frameworks (see, for example, Foster et al. 2008) offer conceptualisations which can support students' understanding of change and continuity over large swathes of time. Such thinking has led to a variety of terms and approaches being used in classrooms: 'overviews', 'outlines' or 'big pictures' (Howson and Shemilt 2011).

Denis Shemilt suggests ways in which students can develop synoptic overviews of the past which are 'internally coherent, connect with present concerns, and inform perceptions of possible futures'. These, he argues, are unlikely to develop or emerge from the mass of material presented over many months but rather the contents of history lessons are more likely to 'coalesce into meaningful and usable "pictures of the past"' if taught over short time spans of about one hour (Shemilt 2009: 141). In this way, students can work initially with 'starter frameworks' which can be regarded as 'provisional factual scaffolds' (Howson and Shemilt 2011: 73). These 'framework' overviews are then revisited, updated, extended and elaborated

at regular intervals as more information is introduced. Key to developing an understanding of frameworks is the concept of thresholds or boundary points. These are constructs which help to bring form and organisation so that characteristic features and differences can be identified.

Shemilt (2009) tentatively offers four possible synoptic frameworks which he suggests could anchor the historical study children engage in: modes of production; political and social organisation; growth and movement of peoples; and culture and mind. In examining what the synoptic framework of 'modes of production' might look like, he identifies possible key boundary points as being forager hunter, agricultural worker, industrial worker and service worker (Table 2.1). This simple starter framework sets up clear boundary points which call for explanations. How can we explain the shift from foraging and hunting to the rise of agriculture, for example, or the shift from agriculture to industrial production?

Shemilt's work on synoptic frameworks has been influential as an approach to support students' understanding of change over large sweeps of time. More recent research, however, has suggested that the transition to agriculture brought significant costs to humans; it is suggested that a less varied diet and dependence on one cereal grain resulted in more malnutrition as well as leaving communities more vulnerable to crop failure (Harari 2015). It is a helpful reminder that synoptic frameworks act as 'starter' 'provisional factual scaffolds' (Howson and Shemilt 2011: 73), always open to contestation and revision.

While these ideas about historical frameworks have, thus far, only had 'limited trialling in the classroom' (Counsell 2011: 211), there are examples of schools using a framework approach to structure their history curriculum (see, for example, Table 2.2: Rogers 2010; Rogers 2016). Shemilt argues that the benefits of a synoptic frameworks approach are only likely to become apparent when 'consistently pursued over long period of time' (2009: 164) and developments may be 'slow, painful and piecemeal' (2009: 143). Nonetheless, such approaches have the potential to address the identified weaknesses of children's understanding within the history curriculum as identified by Ofsted (Harris 2021).

Alison Kitson and Peter Langdon (2021) have taken Shemilt's ideas of synoptic frameworks and used these in relation to environmental history. The classroom enquiry asks, 'When did humans take over the world' and the unit of work identifies four key thresholds which help to explain history at a large scale (see Box 2.1). It is an exciting example of established disciplinary understanding being applied to environmental history using resources and an enquiry question appropriate for secondary school classrooms.

Table 2.1 Shemilt's synoptic framework for modes of production (Shemilt 2009).

Years ago	How do you spend your time?	What do you eat?	How long do you live?
60,000	FORAGER: you look for roots and berries, small animals, shellfish, snails and grubs. This takes all your time.	*Whatever you can find that you can digest.* *Often you eat very little.*	*You may be killed at birth. If not, you are likely to die before five years of age and are unlikely to live past 30.*
15,000	HUNTER GATHERER: if female, you still look for roots and grubs. If male, you hunt big game in a group of 50–100 people. You all follow the big animals as they move around.	*When lucky you eat meat. When times are hard, it's back to roots and snails. When unlucky, you starve or eat other people.*	*You're a bit more likely to get to 30. If sick or injured you're likely to be left behind to starve or be eaten.*
7,000	FARMER: you herd animals and protect them; sow, weed and gather crops; bake bread; make porridge and weak beer. A few of you with specialist knowledge and skills make baskets, pottery and cloth.	*When lucky you eat meat and drink milk. Every day you eat bread, beans and porridge. You store food to get you through hard times.*	*More, but not many, of you live to 30 or 40. You may recover from injuries and sickness but are more likely to get sick or be killed in warfare or in house fires.*

150	INDUSTRIAL WORKER: you go to work in a factory or a mine (women and men; boys and girls). You make bricks, machines, clothes and other things we still have today. You have a few hours a week for leisure and a few days a year at the seaside. There are still lots of farmers but you're more likely to work in a factory than on the land.	You eat meat, bread, fresh vegetables and fruit. You drink tea and eat a few things brought from other countries. As long as you can work and earn money you can always buy food and beer.	Most of you will live into your forties but disease is a big killer, especially of the under fives. If you get old or infirm and have no family willing or able to look after you, you're unlikely to live long.
NOW	SERVICE WORKER: you go to work in a shop, office or restaurant. You teach, nurse, wait on tables, write, solve difficult sums or use computers. A few of you even get paid for telling jokes or playing sport. There are still lots of farmers who grow food and industrial workers who make everything from electricity to paper cups, but you're more likely to work in an office than on the land or in a factory.	You eat junk food and fun food which you buy from a take-away or heat up from frozen. You also eat (and drink) far too much. You rarely feel hungry and are more likely to be overweight than starving.	Most of you can expect to live past 70 or 80, unless something goes wrong. We get almost all our food from overseas and world population is growing fast. SO WHAT COULD GO WRONG? Will there be enough roots and grubs if we need them?

Table 2.2 Two examples of using a synoptic framework to structure a history curriculum (Rogers 2010: 11; and Rogers 2016: Available at: https://www-bloomsburycollections-com.bris.idm.oclc.org/book/masterclass-in-history-education-transforming-teaching-and-learning/ch4-frameworks-for-big-history-teaching-history-at-its-lower-resolutions).

	Romans (43–410)	Dark Ages (410–1066)	Medieval (1066–1485)	Tudors (1485–1603)	Stuarts (1603–1714)	Industrial Revolution (1714–1945)	Modern (1945–)
How have we organised ourselves?	The Romans organised us into Roman Britain	We organised ourselves into lots of different kingdoms	England and Wales were united. Scotland was separate	England and Wales were united. Scotland was separate	Scotland and England shared a monarch. In 1707 they formed Great Britain	In 1801, Ireland joined Great Britain to form the United Kingdom. In 1922 the Republic of Ireland left the UK	In 1948, the UK joined the United Nations. In 1973, the UK joined the European Economic Community. In 1998, Scotland, Wales and Northern Ireland were given their own parliaments
How have we survived?	Most people farm and eat the food they grow. A few people earn money and buy food	Most people farm and eat the food they grow. Very few people earn money and buy food	Most people farm and eat the food they grow. A few people earn money and buy food	Most people farm and eat the food they grow. A few sell their farm produce. A few earn wages	Most people farm and eat the food they grow. A few sell their farm produce. A few earn wages	Farmers sell the food they grow and use the money to buy food. The majority of people work in manufacturing and earn wages. They then buy the things they need	Most people work for a living. Increasingly they work in service industries. They earn wages. Very few people are involved in manufacturing or food production

What did the British people think?	We thought like Romans. We liked civilisation and comfort	Not many people travelled. Not many people saw much. Not many people thought much.	People believed that God controlled the world.	There was an argument about which Church was right: Catholic or Protestant?	The argument about the Church continued. The argument also became about the power of kings	People began to live in cities. They learned to read and learned to think widely. They thought about democracy	People think about security and how to protect our wealth. We think it right to be tolerant of other races and religions
Who came and went?	The Roman army in 43 CE. After all a trickle of Romans	The Saxons from Germany and the Vikings from Scandinavia	The Normans in 1066. We went to Palestine and tried to dominate France	No groups came. We started to explore the New World	Britons started to colonise. At first Ireland, then the New World. Some religious refugees came to Britain	Britons colonised the empire. The Irish came to work in Britain	People came from former colonies to fill job vacancies. Some Britons emigrated to find new opportunities

Box 2.1 'When did humans take over the world?' classroom enquiry (Kitson and Langdon 2021).

Thresholds in human history

1   *Homo sapiens* appear and take over from other species
    200,000 to 5,000 years ago

    When *Homo sapiens* first appeared around 200,000 years ago, they were in many ways an **unremarkable animal**, and just one of **many different species** of human, including *Homo erectus* and Neanderthals. Over tens of thousands of years *Homo sapiens* **spread around the world**. **Other human species became extinct** and only *Homo sapiens* survived. Historians believe *Homo sapiens* may have violently destroyed other species, or they may have taken over from other species due to their **greater ability to adapt to changes, advanced communication and development of new ideas** and **technology** (e.g. clothing, boats, religion, farming).

2   Humans become a global species
    800 to 250 years ago

    In this relatively short period of human history, different groups of humans living around the world became **much more connected. Europeans explored the world** and made new connections with North and South America, which before they had not known about, and they found new ways to **travel more quickly around the world**. These discoveries led to humans sharing much more: they started to grow the same plants and animals around the world. They started to use the same technologies. More negatively, they also shared diseases, with millions dying in devastating **pandemics.**

3   Industrial Revolution
    250 to 100 years ago

    Starting in England, the Industrial Revolution saw humans develop many **important new technologies** very quickly. These inventions gave humans far more power over the world than before. **Dynamite**, for example, meant people could cause huge explosions and dig deep down into the earth to mine coal.

The steam train enabled people to travel much more quickly, **but burned** coal which released greenhouse gasses and meant humans began to change the climate of the planet. **Factories** produced lots of new products, but also created the idea that people needed to **buy more and more things.** We are still living with the consequences of many of these inventions today.

4   Great Acceleration
70 years ago

The 'Great Acceleration' was a very short time – only 70 years – during which some historians and scientists argue that the **impact** of humans on the planet **increased dramatically and very quickly.** Inventions like **nuclear weapons** gave humans terrifying new power to destroy. Humans burned **far more coal, oil and gas** than ever before and, as a result, contributed to **higher temperatures on earth than had ever been seen before.** As human population rocketed to nearly **eight billion** in 2021, the need for humans to **grow more food and build bigger cities contributed to the extinction of plants and animals.** By 2021, some scientists believed a species may go extinct **every five minutes.**

Chapter 3 develops these ideas further. Drawing on Shemilt's work, it uses synoptic frameworks to examine humanity's relationship with the rest of nature over large scales of time.

Challenge 2: evidence and narrative

A second challenge with scaled-up history in the classroom relates to the tension between evidence and narrative. The focus on sources and evidence has been a gold standard in history education, in keeping with the predominant focus on the study of unique events. Study at a larger scale brings new challenges. While evidence is still a key component, the nature of that evidence, in the case of climate change, is likely to include evidence of a different nature such as large digital datasets drawn from palaeoclimatology and historical climatology. Such evidence is highly complex, drawn from interdisciplinary fields, and may be regarded as more appropriate in science classrooms if indeed it can be presented in accessible enough forms for classrooms at all. Furthermore, a focus on the large scale necessarily requires a high degree of generalisation with a
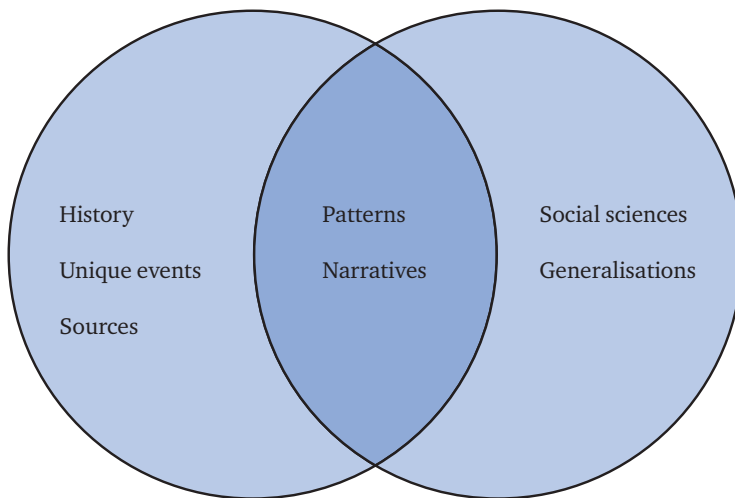
Figure 2.2 Tension between the unique and generalisation. Source: author.

focus on broad patterns in keeping with the parachutist metaphor (Le Roy Ladurie 1998). At a large scale, some of the detail necessarily disappears.

The tension between the unique and generalisations (see Figure 2.2) is often seen as a key difference between history and social sciences.

While the scrutiny of sources is rightly one of the cornerstones of disciplinary history which particularly supports history at the human-event end of the scale, it is an approach which is not without criticism. Christian suggests that the focus on primary sources can become 'a kind of fetishism' (Hughes-Warrington et al. 2019: 528), while David Rosenlund (2015) warns against sourcework becoming a 'straitjacket' in history education. It is perhaps more helpful to think about history needing different approaches at different scales. Large-scale generalised narratives are also a part of disciplinary history, and we can think of sources and narratives as sitting at either end of a continuum, but with both being key elements in disciplinary history.

Narratives, of course, run the danger of being seen as traditional, fixed or grand narratives, themselves more in keeping with Michael Young's Future 1 conceptualisations (Young and Muller 2010). On the other hand, as discussed in Chapter 1, the open, interpretive elements of Future 3 history mean that any narratives that are taught must always be open to scrutiny as interpretations rather than as uncontested factual accounts.

History is a mansion with many rooms. While traditionally a focus on sources, documents and the micropolitical may have been emphasised,

the current climate emergency calls for different priorities. In addition to sources, disciplinary history uses a methodology where broad narratives, which can be critiqued as interpretations, are also included. Both are important elements of history and students need to be supported in developing their competence in interrogating the large-scale as well as the human event.

Challenge 3: human stories

While the arguments for including history at larger scales in the curriculum are persuasive, there are also concerns that such generalised accounts might be seen as rather dull and lifeless. A focus on the human scale, the stories of individuals and the events they created and participated in, are some of the most engaging and popular aspects of studying history for many students. The study of history which ignored these for the larger big-picture structural explanations and accounts could end up becoming very dry. Such accounts could overlook the rich detail which brings people in the past to life and which offers a witnessing, a justice of sorts, to those who lived in the past. In light of this, attention needs to be paid to bridging the different perspectives of scale and to find the connections between the human-event scale and the larger scale. Among the community of history educators, there is good practice that has already been developed in teaching history at a larger scale. For example, schools teach studies in development, such as medicine across time, and teachers often structure programmes of study around 'thematic stories' (see, for example, Dawson 2008). Depth studies are taught and teachers have become adept at finding the 'overview lurking in the depth' (see, for example, Banham 2000). The inclusion of human stories alongside larger-scale accounts is one important strategy and this approach underpins the ambitions of Emily Wakild and Michelle K. Berry's *Primer for Teaching Environmental History* (2018). Teachers understand the importance of teaching large overviews or synoptic frameworks quickly over a single lesson, before using these to anchor subsequent enquiry. Outcomes which summarise change and show turning points using road maps or rollercoasters have been used effectively in classrooms (see, for example, Foster 2008). All these approaches are appropriate to use in embedding larger-scale perspectives into the curriculum. Furthermore, in aiming to develop meta-understanding of the nature and study of history, students can be invited to explicitly think about the affordances of adopting larger-scale and human-scale perspectives with the enquiry question 'why look at things from far away and close up?'

Other examples which illustrate how teachers can reconcile larger scale history with human-scale accounts are presented elsewhere in the book. Figure 3.4 shows how human-scale events interacted with large-scale environmental changes while Chapter 4 presents case study examples of how humans have thought about and lived with the rest of nature in different times and places in history. Similarly, the topics and ideas presented in Chapters 9 and 10 offer opportunities for classroom activities switching between scales.

Conclusion

This chapter has located the arguments for 'scaled-up' history, relating to both place and time, into a wider historiographical context including, for example, Braudel's longue durée as well as pedagogical approaches such as synoptic frameworks. The reasons why scale is difficult have been presented, along with ways in which the challenges can be approached in classrooms. The chapter set out theoretical ideas which lay an important foundation for the discussion of more practical implications to be picked up in later chapters.

Further reading

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Harari, Y. N. (2015), *Sapiens: A brief history of humankind.* New York: Harper.
Hughes-Warrington, M., and A. Martin (2022), *Big and Little Histories: Sizing up ethics in historiography.* London: Routledge.
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3

Key turning points in humanity's relationship with nature

Human society in general [has] been thinking about climate and society for millennia; and this history is a valuable resource for coping with twenty-first-century climate change (Dove 2014: 3).

In pursuing European conceptions of nature we move along two dimensions. The imperialist or mechanistic view regards nature as a system of resources to be managed and exploited for human benefit; standing apart from the natural world, humans can exercise dominion over it. In striking contrast, the organic or holistic conception holds that humans are part of nature, one component of a complex whole. Rather than dominion over nature, organicism reflects a central concern with what today we call ecological balance (Schwartz 2006: 325).

Introduction: two synoptic frameworks

This chapter sets out to develop subject knowledge relating to humanity's relationship with nature over time. This is a key element to address when embedding environmental history into the curriculum. The chapter draws from Shemilt's (2009) synoptic framework approach discussed in Chapter 2. It uses two of Shemilt's frameworks, namely modes of production and culture and mind, by asking two questions: firstly, *how do we survive?* Secondly, *what do we think about humanity's relationship with the natural world?* The starter frameworks presented use resources and images appropriate for classroom use and aim to build synoptic knowledge and understanding.

Synoptic overview: how do we survive?

Put simply, humans have survived by foraging, farming and industrial farming. If these modes of survival are related to environmental change, there are two main turning points, namely the Neolithic and Industrial Revolutions. Firstly, the warming of the planet at the end of the last Ice Age enabled a shift from foraging to agriculture, also known as the Neolithic Revolution. Secondly, the warming of the climate due to humans burning fossil fuels led to the build-up of greenhouse gases in the atmosphere, in a process accelerated by industrialisation. A key difference in these two turning points is that the first was caused by solar and climate changes while the second was caused by human activity. These two key turning points can be easily identified on a simple graph of changing global temperature (see Figure 3.1).

Adding more detail

Early humans were foragers, gathering plants, fruits and seeds, often on the move as nomads. Hunting was also a part of this early foraging existence. For at least 90 per cent of human evolutionary history people have lived as gatherer-hunters, and this relationship between nature and culture was still in evidence in 1500 in much of Australia and the Americas, as well as other places. The warming of the planet, around 12,000 years ago following the last glacial period, supported the
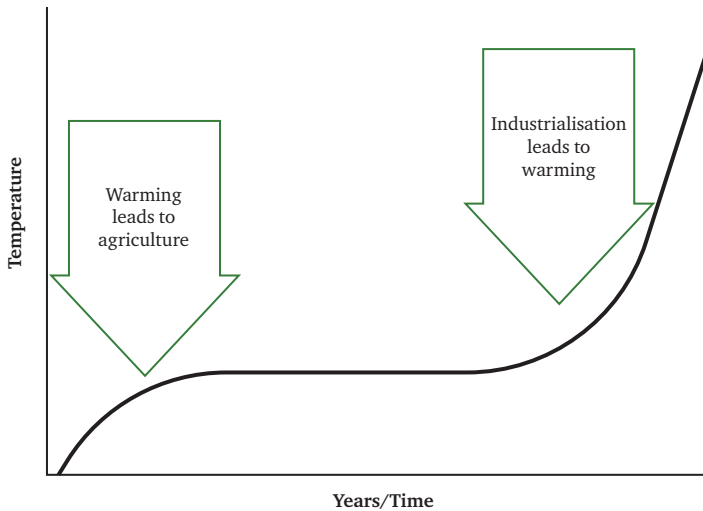

Figure 3.1 Simplified chart showing human activity and climate change. Source: author.

migration of people northwards as well as the development of agriculture. In more sedentary periods during the annual cycle, rapid-growing wild cereals could be harvested and gradually became domesticated. Animals too were domesticated and settlement in one place became established (although pastoralism continued in many areas, too). Agriculture enabled more complex societies to develop and populations to grow. The growth in population gave rise to the enclosure of land and the gradual intensification of agriculture. European expansion into the Americas enabled the exploitation of land resources and provided a spur to the emergence of capitalism.

To look after and harvest crops, human muscle, sometimes the labour of enslaved people, was used, and animals were also employed, for example in ploughing. Simple water- and wind-powered machines pumped water and ground grain into flour. Steam power had been used for many centuries, but it was the adaptations of Newcomen and Watt in the mid-1700s which made steam, from burning coal, a very powerful source of energy. It was more convenient than wind and water, less expensive than horses, and steam engines were soon powering locomotives, factories and farm implements. The discovery and exploitation of other fossil fuels – oil and gas – added to the build-up of greenhouse gases, including carbon dioxide, in the atmosphere and resulted in global warming.

If sustainability is understood to mean the factual premise that everything humans require for survival depends, directly or indirectly, on the natural environment, several observations can be made. Foraging communities tend to be sustainable. Populations remain small and are limited by the food sources available. Settled agricultural communities faced different challenges and over the course of time many civilisations collapsed because of environmental factors. In some cases, infectious disease played a part in their collapse (see Chapter 5). In other cases, collapse was the result of damaging the environmental support systems on which they depended (Diamond 2004). Many cultures had traditions restricting the use of natural resources in order that they could survive in the long term.

The famous 'hockey stick' graph of climate change (Figure 3.2) can be related back to the question 'How do we survive?' The global population has grown exponentially from the twentieth century onwards, and this suggests that, as a species, humans have not only survived, but also thrived over the last 100 years or so. Indeed, graphs of rising GDP add to the picture that humanity has thrived in recent decades (although the wealth is not evenly distributed across the globe). The growth in population, however, has also coincided with the rise in global temperatures and carbon emissions. Indeed, if carbon emissions are included in calculations, it is estimated that the world's population is currently using not one, but
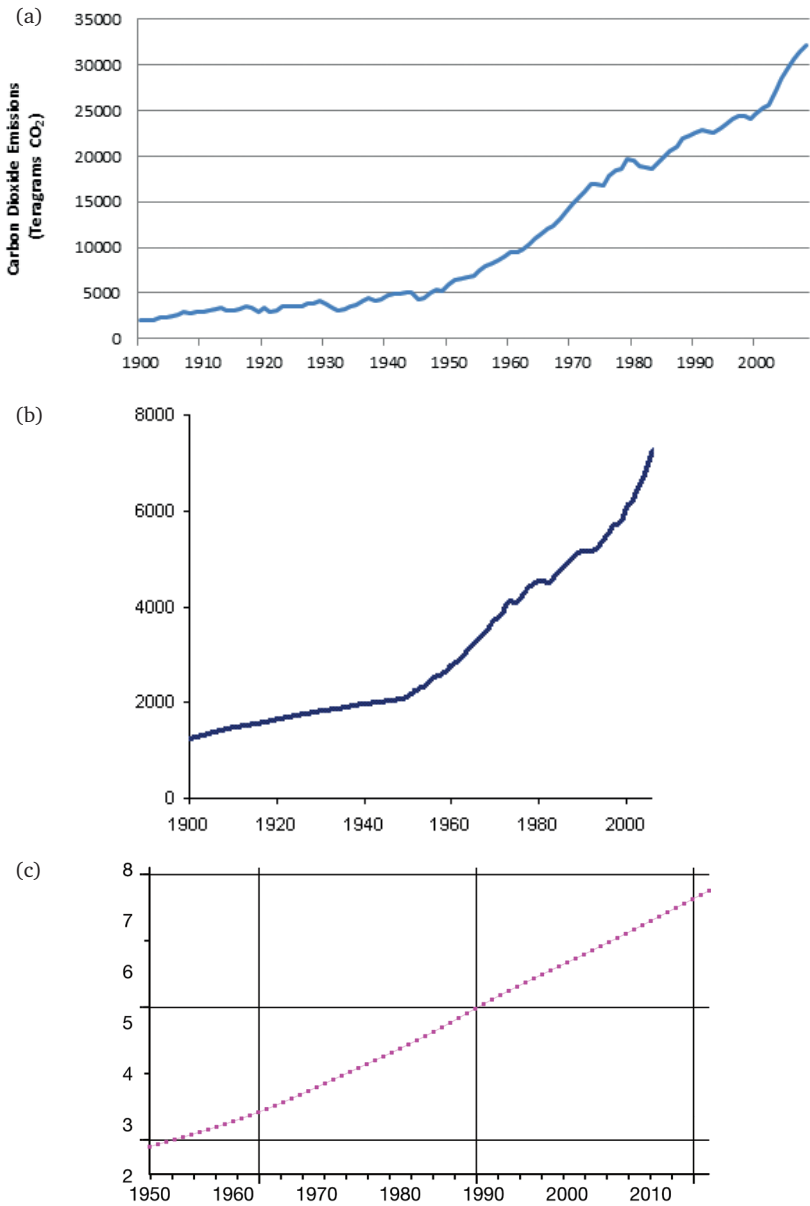
Figure 3.2 Great Acceleration 'hockey stick' graphs. (a) Carbon dioxide emissions 1900–2000 in Teragrams. © United States Environmental Protection Agency. Public domain. (b) GDP per capita 1900–2000 in US dollars. © Jacob Lundberg. Public domain. (c) World population 1950–2017 in billions. © Demmo, Conscious. Reproduced under the Creative Commons licence CC BY-SA 3.0.

the equivalent of one and a half Earths. If all humans consumed at the level that the United States does, we would need four Earths in order to be sustainable (McDonald 2015). The rise in population and GDP has been at an environmental cost which is unsustainable. The period of rapid change over the last 70 years or so which these graphs represent is sometimes called the Great Acceleration (Steffen et al. 2015).

Still more detail

The period between the Neolithic and Industrial Revolutions is sometimes called the Holocene and is the period on which the current history curriculum tends to focus (in reality, the secondary history curriculum in England tends to focus on just the last thousand years). It is a period where human civilisation has been possible only because of the climate temperatures which have enabled farming to flourish. The conditions in nature for human civilisation to thrive need to be just right, not too hot or too cold, in what some have described as the Goldilocks principle (Spier 2015). There is also value in identifying the fluctuations in temperature which took place during the Holocene (see Figure 3.3). The Roman Warm Period, the Medieval Warm Period and the Little Ice Age all offer rich opportunities within the current curriculum where teachers can focus on environmental history and the impacts on human societies. Figure 3.4
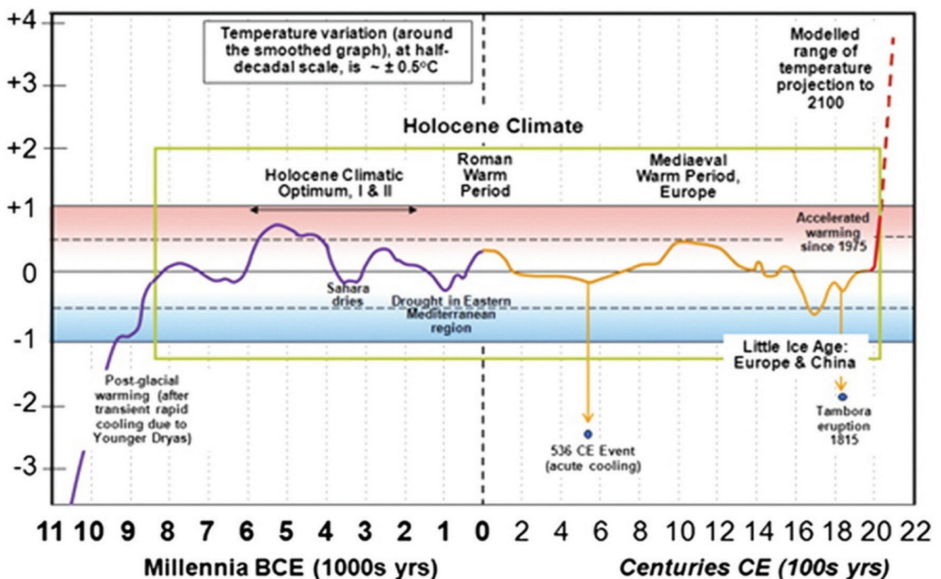
Figure 3.3 Climate change during the Holocene (from Michael 2012).
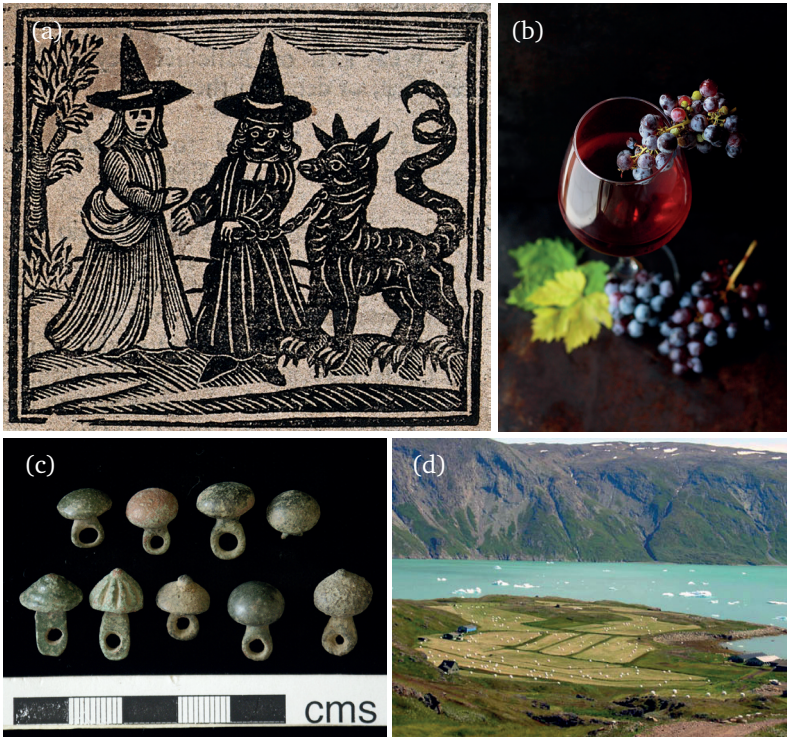
Figure 3.4 (a) A woodcut representation of witches. There was an upsurge in the persecution of witches during the Little Ice Age. (b) Grapes for wine making. During the Roman Warm Period it was warm enough to grow grapes and make wine in England. (c) Buttons which were invented during the Little Ice Age. (d) Agriculture in Greenland. During the Medieval Warm Period people established agricultural settlements in Greenland which were later abandoned during the Little Ice Age. All public domain/ reproduced under Creative Commons licence CC BY-SA 4.0.

shows initial classroom activities which can help to introduce environmental perspectives into the existing curriculum by showing connections between human events and climate change. Using the information in the graph about fluctuations in temperature, students can be invited to guess when particular human events took place.

Synoptic overview: what do we think about humanity's relationship with the natural world?

How humanity has thought about its relationship with the natural world has been a rich seam in the history of ideas. Clarence Glacken, with his

influential seminal work (1976), and Donald Worster (1994) are seen as two early pioneers in the field.

At its simplest, foraging people saw themselves as a part of nature. As agriculture became established, humans began to see themselves as separate from nature. European expansion into the Americas and other parts of the world, along with Enlightenment thought, further developed the ideas of human exceptionalism and a separation from nature. During the period of industrialisation, ideas such as Darwin's theory of evolution meant that humans could once again be regarded as an integral, and not as a separate, part of nature.

This, of course, is a highly simplified interpretation and very much open to criticism (see, for example, Graeber and Wengrow 2021). We know, for example, that hunter-foragers exploited nature beyond their immediate needs (see Chapter 10) and also that agriculturalists planned for sustainable practices. Nonetheless, the interpretation is offered as a starter framework which identifies three main turning points which can help us to understand how humanity has thought about its relationship with the rest of nature. These three turning points are the Neolithic Revolution, Enlightenment thought and Darwin's theory of evolution. As students build their knowledge and understanding, following teacher input, the question of turning points in how humanity has thought about its relationship with the rest of nature could open fruitful classroom discussion.

Adding more detail

The following section includes descriptions, images and sources which serve to introduce a variety of ways in which people in different times and places have thought about humanity's relationship with the rest of nature. This is a topic rarely taught in school, and the following section aims to build subject knowledge. It seeks to provide a balance between concision and accessible contextual detail. The accounts and examples included have a Western bias, the justification for which is that these examples have the potential to readily connect with the existing curriculum taught in schools.

Antiquity: from foraging to agriculture

Many prehistoric figurines have been found. This one (Figure 3.5), around 25,000 years old, was found in Willendorf, Austria in 1908. Most of these figurines have small heads with exaggerated abdomen, breasts, hips, buttocks and thighs. Different meanings have been attributed to such figurines, including speculations that they may have held religious

Figure 3.5 Willendorf figurine. © Anagoria, reproduced under Creative Commons licence CC BY 3.0.

significance, that they expressed health and fertility, or they may have represented mother goddesses or mother earth. They suggest that humans may have thought of themselves as being a part of nature. Their dating associates them with hunter-gathering foraging communities of the Upper Palaeolithic.

Figure 3.6 shows elements of the Neolithic Revolution, including threshing, a grain store, harvesting with sickles, digging, tree-cutting, ploughing and the domestication of cattle. Identifying the range of activities depicted shows the extent of the new complexities associated with the development of agriculture. The division of labour and hierarchy of roles which the fresco also shows contrast with typical gatherer-hunter societies where people tend to be of roughly equal status.

By around 8800 BC, there were many humans who were neither gatherer-hunters nor settled farmers, but who lived as nomadic pastoralists,

Figure 3.6 Fresco from the tomb of Nakht, Ancient Egypt, fifteenth century BCE. © Norman de Garis Davies, Nina Davies. Public domain.

moving around with their herds of cattle or flocks of sheep and goats. The boundaries between farmers and pastoralists started to become more clearly drawn. Disputes over territory between pastoralists and farmers were resolved through warfare. Farmers started defining what was 'home', while everything that wasn't 'home' was 'wild'. Within this outlook, nature became a place of threats, predators and destroyers, and a view that 'nature does not give produce but it is won by sweat and toil' (Simmons 2008: 61) gradually developed.

Not only did attitudes towards nature shift with the development of agriculture, but also religion became more formalised during the Neolithic period. Gatherer-hunting societies tend to believe in a multitude of spirits and gods which reflect their reliance on the variety of natural resources. Early agricultural societies, by contrast, tended to rely on relatively fewer simple food sources. This, along with a worldview which tended to see nature as something to be controlled, meant that early agriculturalists were sociologically predisposed to create religions with fewer, more powerful gods, increasingly in their own image (Simmons 2008).

The first priests were those who knew when to sow, water and harvest, and this knowledge of managing the environment set them apart. They would represent the high-status castes who may also have developed controls over scarce foods such as meat, which, in turn, may have developed into certain taboos around different meats, such as pork or beef, which several early religions developed. Religions were very much associated with rituals and regulation of the annual cycle, and 'dealing with environmental problems was not a separate sphere of action but an integral component of life' (Radkau 2008: 37).

Some religious historiography comments on human relationships with the rest of nature. In Genesis, God's instruction to 'subdue the earth' can be seen as an invitation for humans to control the natural world, to develop agriculture and to reap the benefits from the land. Humanity has dominion over the world, and, since he was made in God's image, man has a privileged position on Earth, to act as steward over the rest of creation. There are other views to be found in Christian historiography. There is, for example, the Christian image of man as the shepherd caring for his flock. While this might, on the face of it, suggest a more benign and harmonious relationship between humans and the natural world, it should be remembered that it is the job of the shepherd to protect sheep from the threats from nature: he defends the flock against a nature which is hostile and dangerous (Worster 1977: 26). The expulsion of Adam and Eve from the Garden of Eden can be read as a narrative of decline, where humanity's arrogance and hubris lead to disharmony with, and separation from, the rest of nature.

Ideas arising from humans controlling nature were distilled in Aristotelian thought, which proved remarkably durable over the centuries. Aristotle argued for a clear separation between natural and human history. In his schema, plants have life, animals have life and perception, and human beings have both characteristics along with rationality. Within this ascending scale of the complexity of life, Aristotle suggests in his *Politics* that 'plants are for the sake of animals, and that the other animals are for the sake of human beings' (Lord 2013: 14). Aristotle's ideas were essentially

based on the Scala Naturae, or 'natural ladder'. In the medieval period these ideas became incorporated into the Great Chain of Being.

Images from the medieval period

These three images (Figures 3.7–3.9) present the hierarchy which characterised dominant worldviews during the medieval period. Students could be invited to interrogate or annotate the images in order to understand the worldviews depicted.
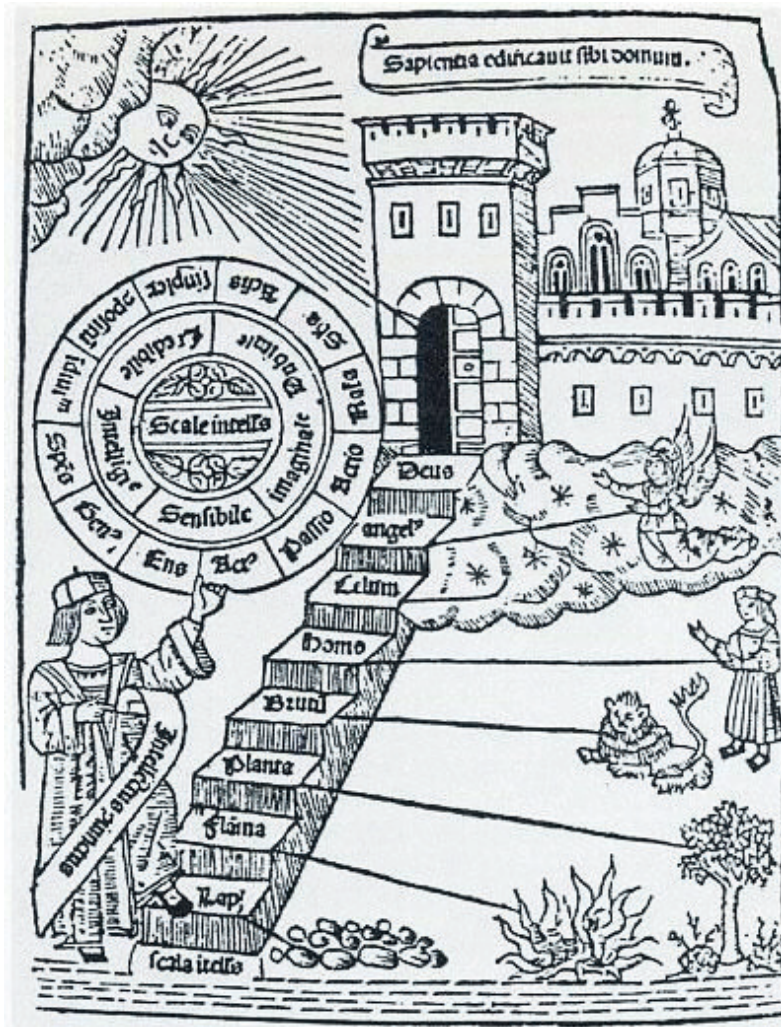
Figure 3.7 Scala Naturae, Ramon Llull 1304. © Norman de Garis Davies, Nina Davies. Public domain.

Figure 3.8 1579 drawing of the Great Chain of Being from Didacus Valades, *Rhetorica Christiana*. © Diego de Valadés. Public domain.

Figure 3.9 *Très Riches Heures du Duc de Berry* (June), 1412–16. Limbourg Brothers, Barthelemy d'Eyck or Jean Colombe. Public domain.

The Scale of Nature was a system with religious roots and depicted beings rising in a linear order of perfection, starting with inanimate minerals and rising through fossils (thought of as something between the mineral and the living) to plants, animals, humans, celestial beings and, ultimately, God. The staircase suggests the possibility of progress.

The Great Chain of Being illustration (Figure 3.8) is similar to the Scale of Nature with the addition of Hell at the bottom of the engraving showing Satan ruling over the realm of the fallen and sinners. Didacus Valades was part of the first group of Franciscan friars who arrived in Mexico in 1521 in order to convert the indigenous populations.

The illuminated manuscript in Figure 3.9 is an example of a Book of Hours. It clearly shows the assumed natural hierarchies which prevailed in medieval feudal Europe. The peasants tend the fields, while their masters live in the castle, which is closer to God who presides in the heavens. Furthermore, the divine right of kings is a concept taught in most classrooms, typically when teaching the English Civil Wars. Locating divine right within the larger concept of the Great Chain of Being affords a broader understanding where environmental history and ideas about human relationships with the rest of nature are supported while also sitting along the grain of the existing curriculum.

European expansion and the development of Enlightenment thought

Early trade encounters since the Middle Ages had given rise to ideas of the East and Africa as places of exotic wonders, lands of giants, pygmies and Cyclops (see, for example, the well-known fantastic creatures from *Cosmographia Universalis* by Sebastian Münster, 1544). These early encounters brought the West into greater contact with the 'mythologised other' (Soper 1995: 76). Increasing contact eroded the idea of these inhabitants of 'new' lands as monstrosities or freaks of nature. They were regarded as a part of the family of man, although to become fully human they needed to acquire Western culture. In 1537, for example, Pope Paul II declared that Native Americans were indeed human but that their full acceptance into the human race was conditional upon them becoming Christians (Soper 1995: 76). As these encounters continued, such thinking served to legitimise oppression if these peoples did not give up their heathen rites and become God-fearing Christians.

There were also developments in relation to thinking about the land. In Britain, enclosure of land, for greater agricultural efficiency, had removed large areas of previously common land. Further afield, the opening up of the 'new world' served to maintain the idea of nature as

plentiful. Here were new crops to be developed, new lands to be subdued and brought under the plough. Amid this plenty, man must not be an idle spectator; rather, it was his role to exploit nature's productivity.

These ideas were consistent with the emerging capitalism of the eighteenth century. Land itself became a commodity, to be exploited without restraint, according to the demands of the market economy. This view would become hugely influential and significant in understanding the expansionist encounters between people from the West and those living in other parts of the world who held different views about humanity's relationship with the rest of nature. It would lead to ethnocentric accounts and justifications for European domination without significant moral or social constraint.

The rise of science and the development of Enlightenment philosophy saw superstition replaced by rationalism. The assumed centrality of God was only slightly eroded and ideas of human exceptionalism remained intact. New conceptualisations, in keeping with the increasingly mechanised society where they developed, took hold. God became the architect of the machine, and the world 'was designed for a factory' by 'the Great Engineer' (Thomas Ewbank quoted in Worster 1977: 53).

The Enlightenment drive towards the categorising of knowledge is well illustrated in the work of the eighteenth-century Swedish botanist Linnaeus. He invented the category of *Homo sapiens* (the wise ape) and the taxonomies he drew up for the animal, vegetable and mineral worlds became the basis for the scientific classifications still used in biology today. In his *Imperium Naturae* (1758) Linnaeus explains how the natural world is still God's creation. Resonant with the Great Chain of Being, every creature enjoyed its 'allotted place', with clear hierarchies even within the human species, and he was 'giddy at the Creator's magnificent arrangement'. Furthermore, he wrote, 'all these treasures of nature, so artfully contrived, so wonderfully propagated, so providentially supported throughout her three kingdoms, seem intended by the Creator for the sake of man' (quoted in Worster 1977: 36). Human superiority was clear, and God could be regarded as both the supreme economist who had designed the Earth household for humanity as well as the housekeeper who kept it functioning productively (Worster 1977: 37).

The Comte de Buffon (1707–88), the French naturalist, likewise assumed that nature was in the service of humanity. He describes the camel as 'the most useful creature which was ever subjected to the service of man', and speculated that the camel's 'deformities', namely its humps, could be the result of its long history of hard labour for man. In his *Histoire Naturelle*,

he argued that each species had a general prototype but this could be debased or perfected according to climate or customs as the example of the camel shows (quoted in Rist 2014: 38). When it came to the family of man, in the temperate latitudes man becomes most perfect, especially as white is 'nature's primal colour'. Embedded within this is a view that different peoples have different potentials, never more so than the gulf between the peoples of the 'civilised' and 'uncivilised' worlds. Conceptions of civilisation were based on a particular Western model of culture being deployed as if this was a universal concept (Bruno Latour, quoted in Rist 2014: 105). By equating Western civilisation with the higher ranks in the family of man, 'civilised' man became more representative of 'humanity'. By contrast, the 'primitive', 'less civilised' 'savage' was, therefore, 'closer to nature'.

New fields of knowledge challenged existing ideas about the history of the world. Nineteenth-century research in fields such as geology, archaeology and palaeontology helped to expand human history beyond the traditional biblical time frame of 6,000 years. The world was much older than previously believed, and this 'time revolution' (Chris Manias, quoted in Sera-Shriar 2018: 15) opened up new questions about human origins and deep time. The new concept of prehistoric humanity saw humans as living alongside animals long since extinct. Such new knowledge, however, did little to disrupt the assumed model of civilisation's progressive development and human society was presented as opposed to wild nature, with the growth of civilisation contingent upon the extinction of large and dangerous animals, the clearing of wild spaces and the use of medium-sized mammals either for hunting or as domesticates. In such thinking, early 'savage' humans were often portrayed as being a part of the fauna and quite separate from humanity. The increasingly secular modes of thought developed into the positivism of the nineteenth century, where history itself could be seen to have moved through a series of progressive stages from primitive, to civilised, to modern industrial society.

In summary, while Enlightenment rationalism may have begun to displace God as the central reference for explanation, it did little to displace ideas of human exceptionalism. Indeed, the drive to categorise saw the elevation of 'civilised' groups in contrast to more 'primitive' or 'savage' groups of people, who were denigrated as being closer to nature. Alongside this, the rise of capitalism driven by the 'civilised' saw an increasing unfettered exploitation of the rest of nature.

From Darwin to today

These orderly worldviews of the nineteenth century were disrupted by Charles Darwin and his *Origin of Species* (1859). Although Darwin

avoided tackling the controversial subject of human evolution, the implications of natural selection as the main agent of change were clear. Man was subject to the same forces as everything else in the natural world. It is for this reason that I identify Darwin as a key turning point in understanding humanity's interaction with the rest of nature, with the challenge that Darwin's ideas present to the idea of human exceptionalism. The argument separates Darwin's scientific ideas from those ideas of social Darwinism (Claeys 2000), which resulted in quite different impacts.

The influence of Darwin's ideas on all academic disciplines was considerable and continues to unfold today. For science, Newtonian conceptions of a world that necessarily obeys the strict physical laws of classical mechanics began to look less certain. Evolution introduced an element of change not factored into scientific positivist thinking. Science itself became historicised, 'natural phenomena came to be studied over time and the so-called laws of nature came to be seen more as historical observations – rather like the observations the social historian makes' (Worster 1994: 25).

The impact of Darwin on historical thinking was no less profound. The Enlightenment confidence in progress gave way to the idea of struggle, and the idea of the family of man found a reworking in social Darwinism. While it was not based on the same careful observation of empirical data as Darwin's science of evolution, the idea of superior and inferior races was comfortably resonant with the science, enabling a ready acceptance among many that this was simply the way things were. The impacts, in twentieth-century eugenics and genocide, are all too familiar. Similarly, the anger at continuing racism and discrimination underpinning Black Lives Matter protests can be traced back to these same social Darwinist origins.

Linley Sambourne's cartoon (Figure 3.10) ridicules Darwin's theory by depicting the worm's evolution into an English gentleman. The messages which can be drawn from the cartoon include firstly, seeing humans as subject to the same processes as the rest of nature; and secondly, an ideology of racialised hierarchies associated with social Darwinism.

If Darwin's *Origins* initiated a challenge to human exceptionalism, then other developments in twentieth-century science, ranging from Einstein's theory of relativity through to chaos theory, cemented the challenge. The long-standing view that the natural world was orderly and underpinned by an equilibrium was challenged by the scientific evidence that 'wherever we seek to find constancy we discover change' (Daniel Botkin, quoted in Worster 1994: 150); far from stability, the

Figure 3.10   'Man is but a worm', *Punch* cartoon, 1882. Public domain.

natural world began to look less predictable, and more akin to the human world. Based on the historical record of evidence such as pollen samples and tree rings, nature can be seen to be always in a state of flux; it is 'as unstable as the human scene where wars, assassinations, invasions, depressions, and social turmoil of every sort constitute the only normal condition we know' (Worster 1994: 150).

The twentieth century also saw developments in the science of ecology and a greater understanding of the interdependencies between the human world and the rest of nature. Scholars argue that we are currently living in the sixth mass extinction event in Earth's history (Barnosky et al. 2011), which has been driven by human activity. The burning of fossil fuels, climate change, habitat and biodiversity loss have resulted in 60 per cent of mammals, birds, fish and reptiles being wiped

out since 1970 (Grooten and Almond 2018), while 25 per cent of plant and animal species are now being threatened with extinction as the result of human activity (IPBES 2019). Growing understanding of interdependency indicates that biodiversity loss negatively impacts human societies, threatening their health, food security, stability and ultimately their survival.

In terms of worldviews which speak to our current moment in history, two images (Figures 3.11 and 3.12), deceptively similar, are suggested. These images are also discussed in Chapter 9.

NASA's 1972 Blue Marble image (Figure 3.11) is one of the most reproduced images which arguably heralded a growing ecological awareness that developed in the 1970s; it became a rallying cry for the environmental movement. The image suggested just how dependent humans are on the fragile small blue planet which we share with the rest of nature.

NASA's Black Marble image (Figure 3.12) suggests a different relationship between humanity and the rest of nature. The connectedness of the whole Earth is still evident, although the lights in the Black Marble are the result of burning fossil fuels which thus point to humanity's impact on the planet. The geographical disparity and inequality between the

Figure 3.11   Blue Marble, NASA, 1972. © NASA. Public domain.

Figure 3.12   Black Marble, NASA, 2012. © NASA Earth Observatory.
Public domain.

wealthy and highly technological Global North and the Global South are
also evident. The Black Marble is an apt image for those who describe
our current era as the 'Carbocene', the age of coal and oil (LeCain 2015),
or the 'Capitalocene' (Moore 2015), highlighting the untrammelled
exploitation of the Earth's resources under capitalism, alongside the gross
inequalities that exist across the globe.

Conclusion

The beginnings of agriculture set in train changes in worldviews regarding
humanity's relationship with the rest of nature. The dominant view of
human exceptionalism was challenged by Darwinian science along with
other scientific developments in the twentieth century. The logic of
such scientific knowledge very firmly returns humanity to being an

integral part of nature. Of course, this doesn't mean that such ideas have become dominant in terms of how people or their societies and economies see themselves. Nonetheless, the premise of this book is that, as our scientific knowledge and understanding of the world changes, so the concerns and foci of our history curriculum need to change too. The period of history traditionally focused on in the school curriculum, also known as the Holocene, is associated with dominant worldviews which regard humans as separate from the rest of nature. As a cultural practice, the history curriculum, in turn, has reflected this assumed belief in human exceptionalism. The scientific understanding which underpins climate change and biodiversity loss provides powerful critiques for the history curriculum taught in schools today, along with an impetus for curricular change. The chapter has presented synoptic subject knowledge central to environmental history, using resources and images suitable for classroom use.

Further reading

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Isenberg, A. C., ed. (2017), *The Oxford Handbook of Environmental History*. Oxford: Oxford University Press.
Simmons, I. G. (2008), *Global Environmental History: 10,000 BC to AD 2000.* Edinburgh: Edinburgh University Press.
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4
Humanity's relationship with nature: examples from history

Introduction

While Chapter 3 presented larger-scale perspectives using synoptic frameworks, worldviews and the history of ideas, Chapter 4 changes scales to focus on more human-scale events, narratives and perspectives, recognising that these are approaches which may be more familiar within the current curriculum. The chapter aims to build subject knowledge in a number of ways. It begins with a critical discussion of the concept of sustainability, tracing the origins and development of the concept through to today. It then presents a brief survey of different twentieth-century governmental policies and their environmental origins and impacts; the focus is on those states which are often studied in classrooms, with the aim of highlighting environmental perspectives which could easily be included into the existing curriculum. The chapter then presents three case studies; while these are rarely taught in classrooms in the UK, they are included for different reasons with the aim of nudging the curriculum towards more environmental foci. Easter Island has been seen as emblematic of environmental degradation and this interpretation is critiqued. The English Diggers and Fordlandia are included as examples of failed utopias, with each example illustrating a different conception of humanity's relationship with the rest of nature, and thus adding depth to the ideas presented in Chapter 3.

Sustainability

The term sustainability is frequently used in current discussions about climate change and its meaning is subject to different conceptualisations

(Frank 2017). It is a slippery term and the environmentalist Bill McKibben has dismissed it as a 'buzzless buzzword' (McKibben 1996). At its simplest, and as noted in Chapter 3, sustainability is based on the factual premise that everything humans require for survival depends, directly or indirectly, on the natural environment. In this sense, it is a concept relevant to embedding environmental perspectives into the history curriculum and is an underpinning idea running through this whole book. Warde (2018), however, identifies an issue with the term, arguing that the concept of sustainability itself is an invention which has developed since the early modern period. To use the term within a discussion of humanity's relationship with nature throughout history runs the danger of being seen as anachronistic. In the following section, therefore, I trace the early development of the concept of sustainability where the term implies a level of consciousness within a society about what needs to be done to take a society off a path of unsustainability. This is followed by examples of societies in the twentieth century, looking at their policies through an environmental lens before returning to later developments regarding the concept of sustainability in the twentieth and twenty-first century.

Early development of the concept of sustainability

Woodland

Woodland has been an essential resource throughout history. Without wood for warmth and cooking, most people would have frozen during cold winters. Farmers used woodlands to supplement diets with nuts and berries and used woodland undergrowth as fodder for grazing animals. Many industries depended on wood, including for tanning, making glue, charcoal and glass and, of course, shipbuilding. Navies needed a continuing supply of suitable wood, especially oak and elm. It took 2,000 to 3,000 oaks to build a large warship. Much of medieval Europe was deforested, and by the seventeenth century, there was a growing realisation that shrinking woodland was a problem that needed to be addressed.

Caradonna (2014) identifies three important consciousness-raisers of the period. Firstly, in England, John Evelyn, a founding member of the Royal Society, wrote a best-selling book, *Sylva, or a Discourse of Forest-Trees, and the Propagation of Timber in His Majesty's Dominions* (1664). The book called for the planting of trees and had far-reaching impacts on forestry practices. Secondly, in France, the minister Jean-Baptiste Colbert's Forest Ordinance (1669) introduced the first sustainable forest management system. In both countries, a key motivation was to maintain

shipbuilding to ensure naval and state power. Finally, in Germany, Hans Carl von Carlowitz worked as a royal mining administrator. He knew that the profitable local metallurgy industry relied on a large supply of timber and turned his attention to the problem of deforestation. Carlowitz's famous treatise *Sylvicultura Oeconomica* (1713) has been regarded as setting out the first comprehensive strategy for sustained-yield forestry. His ideas were implemented in universities and forest schools, deforestation rates slowed in the Holy Roman Empire, and Germany became a world leader in forest management. Unsurprisingly, Carlowitz has been seen as an early pioneer of sustainability.

In each of these three cases, the move towards sustainable forestry was a technical constructive reaction to problems caused by population growth, resource overconsumption and economic expansion. Furthermore, while these planned initiatives around sustainability were European, the picture was also more complicated. Britain and France, having deforested and exhausted their own land, turned their attention elsewhere and seized and exploited resources in the colonial world. In summary, the inheritance from the early modern period relating to sustainability is complex.

Industrialisation, colonial expansion and early sustainability critiques
The traditional narrative around industrialisation praises the inventors and places technological advancement and economic liberalisation as central to a conception of progress. This narrative remains influential, with continued stress laid on technology and growth. The Industrial Revolution enabled many people to live longer and safer lives and the population to grow. On the other hand, if environmental factors are included, the narrative looks less positive, with the rise in greenhouse gases contributing to climate change and species extinctions.

Even at the time, industrialisation had a wide range of detractors offering a variety of critiques. The Romantics valorised the natural world and called for simple living while Friedrich Engels drew links between economic changes, social inequality and environmental destruction. John Stuart Mill questioned the logic of an economic system that spurred endless growth while the Luddites challenged the role of machines which put people out of work. Scientists in the nineteenth century also began to understand more about the environmental impacts of industrialisation. In 1824 the French physicist Joseph Fourier was the first to describe the Earth's natural 'greenhouse effect', and in 1861 the Irish physicist John Tyndall showed that water vapour and certain other gases created the greenhouse effect. As early as 1864, anthropogenic global change was

acknowledged by George Perkins Marsh in his *Man and Nature*. By the end of the nineteenth century, the Swedish chemist Svante Arrhenius concluded that industrial-age coal burning would enhance the natural greenhouse effect.

Coal was also the concern of the economist Stanley Jevons. His influential book *The Coal Question* (1865) raised concerns that the coal deposits that were fuelling Britain's growth and prosperity would be depleted in a hundred years. He argued that if the wasteful consumption of coal continued unchanged, England would lose its dominant industrial status. Importantly, he also argued that increased efficiency in consumption would not reduce demand for energy, but rather would spur increased use, and this would deplete supplies further. His insight, often called Jevons' Paradox, continues to be used today to explain why increased energy efficiency does not necessarily reduce demand for energy.

The inheritance of industrialisation for sustainability, then, is complex. Despite the narrative of benefits, many of the harmful impacts were identified at the time and the environmental consequences have become ever more clearly understood since then. Embryonic concerns about sustainability took shape in response to industrialisation.

There is a similarly complex inheritance from colonial expansion. The expanding capitalist economies of Britain and Europe devoured natural resources and transformed them into commodities at an astonishing rate. British and other European consumers and manufacturers sucked in resources that were gathered, hunted, fished, mined and farmed: sugar from the Caribbean; furs and cod from North America; ivory and cocoa from Africa; spices, cotton, tea and timber from India; wool from the sheep of the Antipodes; rubber from South-East Asia; gold from South Africa; oil from the Middle East (Beinart and Hughes 2007). These networks intensified the human exploitation of nature and resulted in profound impacts on natural environments. Crosby's (1986) description of 'ecological imperialism' is apt. The impacts stretched beyond the natural resources. Colonial capitalism in India and elsewhere resulted in increased rural poverty and hunger while famines, partly caused by the El Niño–Southern Oscillation, were exacerbated by the economic policies of the colonisers. Mike Davis's *Late Victorian Holocausts* (2002) concludes that the laissez-faire economic ideology of colonial governments resulted in 30–60 million people being killed in famines all over the world during the latter part of the nineteenth century.

In his book *Green Imperialism*, however, Richard Grove (1995) argues that European-controlled islands in the Caribbean, Atlantic and Indian Oceans had a major impact on the development of modern

environmental consciousness. While European nations had gradually been deforested over centuries, on tropical islands it was much easier to notice the rapid disappearance of forests, and its effect on climate, water systems and native species, since the changes took place over a shorter amount of time and smaller areas. Grove argues that, notwithstanding clear instances of imperial overexploitation, the colonial experience on these islands stimulated conservationist notions and informed the development of modern sustainable thinking beyond the colonies.

Industrialisation and colonial expansion, therefore, resulted in both very damaging environmental impacts while also giving rise to ideas about sustainability which have since been developed further (Caradonna 2014: 26).

Feeding the world's population

A different focus relevant to sustainability was identified by Thomas Malthus. He laid out his ideas in *An Essay on the Principle of Population*, first published in 1798. The book argues that while human population can grow exponentially, food production can only grow arithmetically; in other words, population grows faster than food production can keep up with. This, he argued, would result in a Malthusian trap of famine, war, poverty, reduced standard of living and depopulation. The ideas of Malthus have been, and continue to be, much discussed. It's possible to see a continuing thread between the ideas of Malthus and the publication of the *Limits to Growth* report (Meadows et al. 1972). This Club of Rome publication found that, if the trends in world population, industrialisation and food production continued, the limits to growth would be reached sometime during the following 100 years and this would probably result in an uncontrollable and sudden decline in population. Unsurprisingly, then, the ideas of Malthus have often been associated with calls to control population growth, itself a contentious position. The example of China's one-child policy introduced in 1980 amid concerns for overpopulation illustrates both the impact of a population planning initiative and the controversial human rights issue it raises.

Jared Diamond (2004) has argued that the Rwandan genocide of 1994 is an example of Malthus's ideas playing out in practice. Rwanda and Burundi are the two most densely populated countries in Africa and Diamond argues that overpopulation, famine and a shortage of available land exacerbated the ethnic tensions between the Hutu and Tutsi groups. The result was the slaughter of nearly a million Rwandans.

There are, however, criticisms of Malthus's predictions. Firstly, industrialisation, which really developed after his time, along with the efficient processing of food, the use of fertilisers and, in the twentieth century, increased productivity resulting from the Green Revolution (Glaeser 2011) have all ensured that food production has managed to keep pace with population growth. Secondly, Malthus did not predict the radical changes in fertility that have happened. As societies become more prosperous, their birth rate declines. Average birth rates are now declining rapidly, although there are big differences between the prosperous, developed world (where birth rates are often below replacement levels) and less developed parts of the world (where birth rates remain high). The global population is still increasing but may peak at around 11 billion by the end of the twenty-first century or may even start to decline in the second half of this century.

In summary, ideas about sustainability developed in response to concerns about deforestation in the early modern period and the impacts this would have on naval building and other commercial and mining activities. Further development of ideas about sustainability arose in response to environmental concerns in tropical colonial islands as well as ever-growing knowledge of the damaging environmental impacts of large-scale industrialisation. Finally, ideas about population and sustainability, first set out by Malthus, continue to inform different perspectives about sustainability today.

Examples of twentieth-century societies which were more and less sustainable

While the origins of sustainability as a concept can be traced back to the early modern period, this does not mean that this growing awareness always informed policy that followed. Indeed, the twentieth century was characterised by some of the most unsustainable environmental policies and practices across history, as the examples which follow demonstrate. All modern states, possibly without exception, have embraced Enlightenment thinking about humans improving on nature by exploiting it in a drive regarded unquestioningly as progress, with little concern as to the resulting costs on ecosystems. The following introductory survey includes examples which will probably be familiar to most history teachers since the topics are frequently taught in history classrooms. What follows takes an environmental lens to these well-known topics with the aim of bringing new perspectives and understanding in which issues of sustainability are foregrounded.

USA and the Dust Bowl

The Great Plains had been settled and cultivated since European immigrants travelled westwards in the nineteenth century. The immigrants were encouraged by the Homesteader Act of 1862 which handed out parcels of land to settlers as part of the government expansion into the West. Many had cattle and the land became overgrazed. The homesteaders benefited from an unusually wet period which supported cultivation of the land and settlers hoped this was a permanent change to the semi-arid conditions. More migrants moved to the Plains in the 1920s, hoping to benefit from the high commodity prices following the First World War. Mechanised farm machinery encouraged farmers to bring more and more traditional grassland under cultivation. Deep ploughing removed the roots of the prairie grasses which held the soil in place and retained moisture in dry periods. The collapse of commodity prices following the 1929 Wall Street Crash forced remaining farmers to work the land even harder to make up for their reduced income, and from 1930 onwards there were several years when the dry summers and drought returned. The result was soil erosion and, in the high winds that blow across the Plains, the topsoil was removed in huge dust storms. The storms were so large that dust was carried all the way to cities along the eastern seaboard. The human costs of the Dust Bowl were high, with tens of thousands of families being displaced from their homes through hunger and poverty, many migrating westwards to California. It is estimated that 3.5 million people left the Plains states between 1930 and 1940. The Dust Bowl was the result of a variety of factors, social, economic and ecological, and has been recognised as an example of human vulnerability to environmental change (McLeman et al. 2014).

President Roosevelt's New Deal from 1933 included federal government programmes to address the problems on the Plains, including new farming approaches and the planting of trees to anchor the soil and create wind breaks. Critics of the high-tech agribusiness which has developed on the Plains, however, suggest that these capital-intensive approaches which depend on artificial pesticides and fertilisers remain unsustainable (McLeman et al. 2014).

Soviet Union

England was the first country to industrialise, soon followed by other European states and the USA. Russia in the nineteenth century was still a feudal society and its defeat in the Crimean War exposed Russia's

underdevelopment and need for industrialisation. Some initial reforms were introduced under the tsars, but under the Bolsheviks modern technology was embraced as the engine of social change. They pursued large-scale management of nature in order to transform an agrarian society into an industrial powerhouse.

The race to industrialise was spurred on by the fear that capitalist countries would try to destroy communism in the USSR. At the First Conference of Workers in 1931, Stalin's famous speech commanded the workers to play a crucial role in industrialisation: 'We are fifty or a hundred years behind the advanced countries. We must make up this gap in ten years. Either we do it or they will crush us' (Stalin 1953: 454).

Projects on a massive scale were built using 'useless' nature and ensuring water did its 'duty' through hydroelectric dams and irrigation systems before it flowed into the sea (Josephson 2010). Such enormous projects demonstrated the power of the state along with the power of science and technology. While the USA embraced similar large-scale projects with, for example, the Tennessee Valley Authority and other New Deal programmes, the USSR was also demonstrating itself to be a strong competitor to the capitalist world. Nothing was allowed to slow production. From the 1930s, the infamous Gulag labour camps were established and filled with political prisoners, peasants suspected of being kulaks and minority nationalities. They were forced to build dams, canals, roads and railways, and dig coal and iron ore in the most inhospitable regions, all on very meagre rations. Victory over nature in the drive to industrialise was the priority, even at the cost of human life; pollution, hazardous waste, workers' safety and public health were not prioritised as considerations. Agriculture was also brought under centralised state control to fund industrialisation. Stalin's policy of forced collectivisation confiscated the property of the kulaks while other peasants resisted by slaughtering their farm animals. The land was overexploited with little opportunity for rejuvenation. Collectivisation certainly helped Stalin achieve the goal of rapid industrialisation, but it also contributed to the catastrophic famine in 1932–3 which resulted in between six and eight million deaths. The famine was officially denied, and any reports were classified as anti-Soviet propaganda.

Into the Khrushchev era (from 1956), the environmental problems continued. The Virgin Lands and corn planting campaigns of the 1950s were disastrous; after the ploughing up and exhaustion of millions of hectares of land, rampant erosion followed. The Aral Sea, once the fourth-largest lake in the world, began shrinking in the 1960s as a result of Soviet irrigation projects. By 2007, the sea had been reduced to four separate

highly saline lakes making up just 10 per cent of its original size. The commercial fishing industry ceased in the 1980s and dust storms carried highly toxic substances across wide swathes of land. This resulted in soaring rates of cancer, along with other diseases and the highest rates of infant mortality in the Soviet Union. Despite restoration projects in the twenty-first century which have begun to address the issues, Ban Ki-Moon, the former UN Secretary General, has described the shrinking of the Aral Sea as 'one of the planet's worst environmental disasters' (2010). In the Brezhnev era (from 1964), the Chernobyl nuclear power plant was built. It used an inherently unstable type of reactor and lacked containment vessels as a hedge against an explosion or meltdown (Josephson 2010). The Chernobyl explosion of 1986, the world's worst nuclear accident, resulted in ongoing costs to humans, flora and fauna; there have been higher numbers of cancers and birth deformities and large swathes of agricultural land have had to be abandoned. The reactor itself is now contained within a huge steel sarcophagus which may remain in place for 100 years. The town of Pripyat, with a population of 50,000, built to house workers at Chernobyl, was abandoned and remains a ghost town, now used as a laboratory to study fallout patterns.

People's Republic of China

Similar to the USSR, Mao's Great Leap Forward (1958–62) was an attempt to move China swiftly from an agrarian to a communist industrial state. The collectivisation of agriculture was planned to give the state a monopoly over grain production and its price, and thus raise capital to fund industrialisation. The plan aimed to industrialise the country using the mass of cheap labour in place of importing heavy machinery. While many workers were moved into steel and construction industries, those who remained in rural areas were organised into communes. Untested agricultural innovations, such as dense planting, were tried with the aim of increasing production, alongside deforestation, the use of pesticides and poisons. The innovations failed and grain production decreased. One early initiative of the Great Leap Forward was the Four Pests Campaign, which set out to eliminate rats, mosquitoes, flies and sparrows. The result was severe ecological imbalance; for example, with no sparrows to eat them, the number of locusts grew rapidly, causing further depletion of grain production. The harvest in 1958 was good, although in some areas it was left to rot because of the large number of workers who had been diverted into industrial projects. The Great Leap Forward, along with the associated ecological imbalance it brought about, led to widespread

hunger and mass starvation. Between 15 and 55 million people died in the famine, probably the worse famine in the world's history. In spite of the widespread famine in the countryside, China continued to export grain, with Mao presenting a picture of success to the outside world.

Nazi Germany

There are clear similarities between the Soviet Union and China. They shared a commitment to an ideology of progress driven by industrial technology. The drive to modernise as quickly as possible overrode environmental considerations, with huge ecological and social costs. On the face of it, Nazi Germany's experience was rather different. For one thing, Germany had industrialised earlier so didn't face the same pressures to 'catch up'. Furthermore, the idea of 'blood and soil' which underpinned Nazi ideology suggested a different outlook towards the natural world. The expression was first used in the late nineteenth century by German Romantics and nationalists. As with Romantics elsewhere, they criticised industrialisation and urbanisation, arguing for a 'back to the land' return to nature.

Walther Darré's 1930 book *Neuadel aus Blut und Boden* (*A New Nobility Based on Blood and Soil*) set out a proposed eugenics programme, suggesting that selective breeding would solve the problems of the state. His book popularised the expression at the time of the Nazi rise. In 1935, the Nazis instituted the Reich Nature Protection Law (RNG), which included provision to protect landscapes that were 'free nature' or that were aesthetically pleasing or that were in the interests of animals (Katz 2014). These elements of the RNG made Germany more progressive in matters of conservation and landscape planning than other industrialised nations at the time.

It is possible to see how a progressive love of landscape and nature became intertwined with beliefs about exclusivity in relation to who inhabits a region and who should be excluded as not belonging. The defence and preservation of local ecosystems became racialised under Nazi ideology. In 1934, the regime passed a Law Concerning the Protection of the Racial Purity of Forest Plants which ensured only the best phenotypes were used for 'certified seed production'. Avoiding unhealthy specimens as the source of tree production was entirely sensible for ecological reasons. The connection to racist ideology, however, was also very evident. Similarly, the whole forest ecosystem, rather than individual trees, was prioritised, mirroring the focus on the entire national community over and above the individual.

The connection was noted in the German journal *Deutsche Forst-Zeitung* which, in 1939 wrote, 'Ask the trees, they will teach you how to become a National Socialist' (Modersohn 1939). Another idea in the German conservation movement was anti-materialist and anti-consumerist. A member of the Volk would put community interests above individual ones. In Nazi eyes, the Jews represented the evils of individualistic and insatiable desire for money and wealth. Thus, the environmental goal of a less consumerist society was also understood through the category of race.

The plans for *Lebensraum* and expansion in the east were the culmination of the connection between Nazi ideology and environmental policy. The plans assumed that the entire Jewish population of the area would be removed, along with millions of Poles and other Slavs. Whether or not the plan was consciously connected to the Final Solution is a matter of historical dispute, although it is clear that the plan could not proceed without a belief that the Jewish and Polish populations were sub-human.

Whatever ecological and sustainable elements can be identified within these policies towards the natural world, it is also clear that these were racialised by Nazi ideology. There was also a gap between rhetoric and reality so that, for example, while the Nazis extolled the virtues of Germany's 'eternal forest', this didn't stop them from exploiting the country's timber resources aggressively. The 'green' policies of the Nazis demonstrate all too clearly how conservationism and environmentalism are never value-free or inherently benign enterprises, a theme which is returned to in Chapter 6 in a discussion of American wilderness. Furthermore, human domination over nature underpins these ideas, with the German race aiming to take coercive control of the natural landscape and shape it for their own purposes. As Bassin notes, 'The anthropogenic domination of the natural world was an essential part of the activist ethos of National Socialism' (Bassin 2005: 216).

UK

In order to maintain sustainable food supplies during the Second World War, the British government used emergency powers to implement rationing, an example of a state limiting individual freedoms for the greater good. The accompanying dig for victory campaign, which turned all available land into growing vegetables, has been credited with boosting not only morale but also nutrition during the years of the war (Smith 2013).

This singular narrative has certainly come in for critique by revisionist accounts. Calder's *The People's War* (1992) has done much to debunk the myth of the Blitz spirit. There was much resentment towards government controls, and in the last three years of the war there was a high number of strikes in key industries. There was a thriving black market during the war and social elites flouted the rationing rules by continuing to dine out in fine restaurants despite considerable disapproval (Ginn 2012). Rose (2003) argues that although there is clear evidence of collective solidarity in light of the emergency, this solidarity was also much more fragile than the rose-tinted and much celebrated established narrative suggests.

Summary

This brief survey of some states in the twentieth century suggests several conclusions in relation to sustainability. It is possible to identify the threads of different outlooks identified in Chapter 3 of how humans have thought about their relationship with the rest of nature. On the one hand there is a future-oriented outlook which embraces technology as progress, while on the other hand there are other threads of a more nostalgic, traditional outlook, which advocates living at one with nature. In both cases, a view of human exceptionalism prevails. Furthermore, in both cases, policies which reflect how humans regard their relationship with the rest of nature were never free-standing or neutral: they were always interacting with other social, economic and political policies.

Development of the concept of sustainability in the twentieth and twenty-first century

While the twentieth century saw some of the most unsustainable practices pursued across the world, it was also the time when scientific understanding of the damaging impacts of burning fossil fuels developed at a rapid pace. It was also the time when intergovernmental groups started to come together to discuss how the world can move forward to address issues of unsustainability. Box 4.1 summarises some of the key dates and developments. It includes optimistic developments of, for example, the introduction of Clean Air Acts following London's Great Smog, as well as the ozone layer, where an environmental problem has been addressed successfully. It also identifies some of the inaction and resistance to the calls for change.

Box 4.1   Sustainability developments in the twentieth and twenty-first centuries. Source: author

1913 – French physicists Charles Fabry and Henri Buisson identify the ozone layer (a region in the stratosphere which absorbs most of the sun's ultraviolet radiation).

1938 – British engineer Guy Callendar shows that temperatures rose over the previous century. He also shows that CO_2 concentrations increased over the same period and suggests this caused the warming. It is the first solid scientific observation linking climate warming with human carbon emissions.

1952 – London's Great Smog lasts five days in December. It is the result of the combination of burning coal along with cold weather. Between 4,000 and 12,000 die and 100,000 develop a respiratory illness. It leads to the 1956 Clean Air Act and the introduction of smokeless zones in the 1965 Act.

1957 – US oceanographer Roger Revelle and chemist Hans Suess show that seawater will not absorb all the additional CO_2 entering the atmosphere, as many had assumed. Revelle writes: 'Human beings are now carrying out a large-scale geophysical experiment.'

1958 – Charles Keeling begins systematic measurements of atmospheric CO_2 at Mauna Loa in Hawaii and in Antarctica. Within four years, the project provides the first unequivocal proof that CO_2 concentrations are rising.

1965 – A US President's Advisory Committee panel warns that the greenhouse effect is a matter of 'real concern'.

1972 – *The Limits to Growth* commissioned and published by the Club of Rome (a group of influential heads of state, UN administrators, scientists, economists and business people). It looks at the Earth's carrying capacity in relation to the population explosion and concludes: 'It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future.'

1975 – US scientist Wallace Broecker puts the term 'global warming' into the public domain in the title of a scientific paper.

1981 – Election of US President Reagan brings backlash against environmental movement to power. Political conservatism is linked to scepticism about global warming.

1985 – The depletion of the ozone layer is reported in an article in the journal *Nature*. International treaties follow, which results in the eventual banning of chlorofluorocarbons (CFCs) which damage the ozone layer. By 2016, an article in *Science* reports that the ozone layer is 'healing'.

1987 – *Our Common Future*, also known as the Brundtland Report, is commissioned and published by the UN. It concludes: 'Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.'

1988 – Intergovernmental Panel on Climate Change (IPCC) is formed to collate and assess evidence on climate change.

1989 – UK Prime Minister Margaret Thatcher – possessor of a chemistry degree – warns in a speech to the UN that 'We are seeing a vast increase in the amount of carbon dioxide reaching the atmosphere . . . The result is that change in future is likely to be more fundamental and more widespread than anything we have known hitherto.' She calls for a global treaty on climate change.

1990 – IPCC produces First Assessment Report. It concludes that temperatures have risen by 0.3–0.6°C over the last century, that humanity's emissions are adding to the atmosphere's natural complement of greenhouse gases, and that the addition would be expected to result in warming.

1992 – Conference in Rio de Janeiro produces UN Framework Convention on Climate Change, but US blocks calls for serious action.

1995 – IPCC Second Assessment Report concludes that the balance of evidence suggests 'a discernible human influence' on the Earth's climate. This has been called the first definitive statement that humans are responsible for climate change.

1997 – The Kyoto Protocol is agreed. Developed nations pledge to reduce emissions by an average of 5 per cent by the period 2008–12, with wide variations on targets for individual countries. The US Senate immediately declares it will not ratify the treaty.

1997 – Toyota introduces Prius in Japan, the first mass-market electric hybrid car; swift progress is made in developing large wind turbines, solar electricity and other energy alternatives.

1998 – Publication of the controversial 'hockey stick' graph indicates that modern-day temperature rise in the northern hemisphere is unusual compared with the last 1,000 years.

2006 – The Stern Review concludes that climate change could damage global GDP by up to 20 per cent if left unchecked – but curbing it would cost about 1 per cent of global GDP.

2007 – The IPCC and former US Vice-President Al Gore receive the Nobel Peace Prize 'for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change'.

2009 – China overtakes the US as the world's biggest greenhouse gas emitter – although the US remains well ahead on a per-capita basis.

2011 – Data shows concentrations of greenhouse gases are rising faster than in previous years.

2013 – The IPCC's Fifth Assessment Report says scientists are 95 per cent certain that humans are the 'dominant cause' of global warming since the 1950s.

2015 – The UN publishes 17 global goals as a 'blueprint to achieve a better and more sustainable future for all'. The interlinked goals are to be achieved by 2030. The goals are: 1. No Poverty, 2. Zero Hunger, 3. Good Health and Well-being, 4. Quality Education, 5. Gender Equality, 6. Clean Water and Sanitation, 7. Affordable and Clean Energy, 8. Decent Work and Economic Growth, 9. Industry, Innovation and Infrastructure, 10. Reduced Inequality, 11. Sustainable Cities and Communities, 12. Responsible Consumption and Production, 13. Climate Action, 14. Life below Water, 15 Life on Land, 16. Peace, Justice and Strong Institutions, 17. Partnerships for the Goals.

2019 – News of disasters (tropical cyclones, wildfires, etc.) and intensified scientific warnings raise concern, especially among younger people, and spur public demonstrations and civil disobedience.

2021 – IPCC's Sixth Assessment Report says 'It is unequivocal that human influence has warmed the atmosphere, ocean and land'.

2022 – Europe experiences its hottest summer on record.

Three case studies

Before leaving the contested concept of sustainability, three further examples from history are included. The examples tend not to be included in the current curriculum but, as we shall see, each can help to develop and deepen an understanding of the concept of sustainability in different ways by looking at specific episodes from different times and places in history. The example of Easter Island is used to examine theories of environmental determinism while the examples of the English Diggers and Fordlandia are used to consider very different utopian ideas which relate to different ways humans have thought about sustainability and tried to put these ideas into practice.

Easter Island and the Moai

Easter Island is a Polynesian island in the Pacific, now a World Heritage Site due mainly to the almost 1,000 large stone Moai statues which still survive there. It has become emblematic as a story of environmental overexploitation through deforestation which led to soil erosion, hunger, conflict and economic and societal collapse (Ponting 1991; Diamond 2004). As a small island, the most remote inhabited island in the world, its story has been seen as a microcosm of what could be happening to the planet. Indeed, two researchers compared developments on Easter Island with the Club of Rome's computer-generated model of the future of the planet in the twenty-first century. The similarities were remarkable: both models showed dwindling resources, strong population growth for as long as that was sustainable, followed by a sharp drop over the course of just a few decades, and this decline in population heralded the disintegration of society (Bahn and Flenley 1992). Easter Island was seen to offer a 'grim warning' (Ponting 1991) from history which could speak to our current predicament. The iconic Moai monoliths, along with the simple, dramatic 'ecocide' narrative, can provide engaging starting points for classroom enquiry. As with much history, however, this account is open to critique, thereby also offering rich opportunities to complicate the account of why Easter Island society collapsed.

The ecocide theory

It's not entirely clear when Polynesians first reached Easter Island, but this occurred at some point between 800 and 1200. They established a thriving culture, evidenced by the remarkable Moai statues which were erected over the island. Archaeologists suggest these statues were symbols of religious authority, representations of their ancient Polynesian

ancestors: the Moai face away from the ocean and towards the villages, as if they are watching over the people. Archaeologists also suggest that the Moai were symbols of political power: the larger the statue, the higher the status of the person who commissioned it.

The island had been forested, but trees were cleared for cultivation as well as for boat building to support fishing; trees may also have been used to move the statues to their destinations around the island. Without trees to anchor the soil, fertile land eroded away, resulting in poor crop yields, while a lack of wood meant islanders couldn't build canoes in order to access fish. The island had exceeded the boundaries of sustainability, and this led to hunger, internecine warfare and even cannibalism. The population plummeted, and the Moai were deliberately toppled as the social structure collapsed. The rise, heyday and fall of Easter Island took only a few centuries to unfold. When the first Europeans arrived, they saw the impoverished remains of a once flourishing civilisation. Ponting describes it:

> The Dutch Admiral Roggeveen, on board the Arena, was the first European to visit the island on Easter Sunday 1722. He found a society in a primitive state with about 3,000 people living in squalid reed huts or caves, engaged in almost perpetual warfare and resorting to cannibalism in a desperate attempt to supplement the meagre food supplies available on the island (Ponting 1991: 1).

Critiquing the theory

Jan J. Boersema's book (2015) offers a comprehensive critique of the ecocide theory supported by a wealth of sources. His own research started with Roggeveen's journal to see how far this substantiated Ponting's claim. He found that there was almost nothing in the journal to corroborate Ponting's account. Instead, Roggeveen encountered a healthy population, saw no weapons and even traded linen for chickens and bananas, describing the land as 'exceptionally fertile, producing bananas, potatoes, sugarcane of considerable thickness, and many other fruits of the earth'. The island could have been 'turned into an earthly paradise' (quoted in Boersema 2015: 3).

There are other sources from the time which question the ecocide narrative. In 1786, a French expedition visited Easter Island. A gardener on the trip commented that 'three days' work a year' would be enough to support the population, while another on the trip wrote:

> Instead of meeting with men exhausted by famine . . . I found, on the contrary, a considerable population, with more beauty and grace than I afterwards met in any other island; and a soil, which,

with very little labour, furnished excellent provisions, and in an abundance more than sufficient for the consumption of the inhabitants (quoted in Heyerdahl and Ferdon 1961: 57).

Research has cast doubt on the claims made by Ponting and Diamond. Certainly, the island suffered deforestation and environmental degradation, but causes were more complex than the simplistic ecocide accounts. Rats, first introduced from Polynesia and then from Europe, led to gradual deforestation, and non-migratory birds disappeared as the forests were cut down. Some research has looked at climate change and periods of drought as contributing to the deforestation, although this remains somewhat speculative. The argument that trees were cut down to move the Moai has also been challenged by research suggesting that the Moai could literally have been 'walked' from the quarry to their destination. Further research in palaeo-osteology shows little evidence of substantial mortality resulting from violence. The extent of the decline in population by the time Europeans arrived has also been questioned. Rather than a collapsed society, when Europeans arrived, Easter Island was an example of a self-sufficient society (Peiser 2005), certainly impoverished but still sustainable (Boersema 2015).

The ecocide narrative, therefore, is unhelpfully simplistic and is open to the charge of environmental determinism. Ponting's 2007 edition of his book *A Green History of the World* included the subtitle *The environment and the collapse of great civilizations*. This mirrored Diamond's choice of words in his bestselling book *Collapse* (2004). It seems entirely possible that the subtitle was intentional to gain attention and as a call to action, to stop overexploitation across the whole planet and avoid societal collapse, rather than being an accurate description. Indeed, Boersema explains how the environmental movement of the 1960s is an important backdrop to the accounts of what happened in Easter Island recorded in Ponting's and Diamond's books as well as those by other writers of the time.

Collapse, however, is an accurate description of what happened on Easter Island, with the important caveat that it occurred later in the nineteenth century and was not caused by deforestation but by other human behaviour. In the 1860s, Peruvian slave-raiding expeditions targeted Easter Island, with around 1,500 men and women (perhaps half the island's population) being violently abducted. When the slave raiders were forced to repatriate the inhabitants they had kidnapped, people carrying smallpox also disembarked, and the resulting epidemic further reduced the population. Tuberculosis was also introduced by whalers in

the mid-nineteenth century and killed about a quarter of the population. In 1877, the population had fallen to an all-time low of just 111 native inhabitants. In 1868 sheep ranching was introduced on the island, and in the years that followed, the managers of the ranch, along with missionaries, started buying up the newly available land of the deceased. Unsurprisingly, this resulted in confrontations between natives and settlers. In 1888, Chile annexed the island and established the majority of it for sheep ranching, with only limited areas set aside for use by the Easter Islanders.

Collapse, then, may well be an accurate description of what happened on Easter Island. The ecocide narrative, however, is not consistent with the evidence and needs to be seen in the context of its time as an interpretation which emerged out of growing environmentalism in the later twentieth century. Rather, collapse on Easter Island has much more in common with more familiar accounts of colonial encounters along with the devastating effects of disease against which remote populations had little or no defence (see Chapter 5).

Utopias

Humans have always imagined better worlds. At the heart of these idealised constructions is a human engagement with the question of what our relationship with the environment is, how we can best live in the world and what we want the future to look like. Each construction speaks, at least to some degree, of the context out of which it grew, while also reflecting more perennial concerns. In many cultures, including the monotheistic religions which grew out of the Neolithic Revolution, there is a myth or origin story of a time when humans lived in simple harmony with nature. By contrast, in science fiction, there are often utopian ideas reflecting a commitment towards technologically oriented imagined futures. Utopian ideas across time, therefore, offer a rich seam with many examples of how humanity has thought about its past, present and future relationship with nature.

While such imaginaries have always been a part of culture, Thomas More's imaginary island Utopia (no place) or Eutopia (good place) (1516) coined the phrase which has stuck. His work was an austere utopia with no taverns or alehouses and where hard work was insisted upon. In his vision for a fairer society, there was no private property, and he described how every few months, the people pile up loads of stuff in the market place and come and take what they need, a vision perhaps of a sort of Renaissance recycling centre! More's writing spawned a wave of further

utopian writing in the sixteenth and seventeenth centuries, with visions either looking back to a simpler past or forward towards a technologically driven future. For example, the polymath and Lord Chancellor of England Francis Bacon's book *New Atlantis* (1627) regarded science as a saviour to guarantee England's pre-eminence on the world stage in a utopia which also envisioned aeroplanes and submarines.

On occasion people have tried to put utopian ideas into practice. Two examples are included here, although many others could be included. One, the English Diggers, was a utopian experiment which looked back to a golden past, while the other, Fordlandia, embraced a technological future. These examples illustrate the two different conceptions about humanity's relationship with the rest of nature set out in Chapter 3. The examples focus on the ideas and actions of two individuals and thus may support students' understanding of the large and abstract ideas presented in Chapter 3 through more human-scale accounts. They are included here to add detail and specific historical context and to illustrate how ideas have been enacted in material ways.

English Diggers

On Sunday 1 April 1649, a small group of women and men started digging and sowing vegetables on the wasteland of St George's Common near London. Their leader was Gerrard Winstanley and he declared that their actions were 'making the earth a common treasury for all, both rich and poor, that everyone that is born in the land, may be fed by the earth his mother that brought him forth'. Many of the group came from poor families who had no land of their own. Their decision to take direct action and cultivate land that didn't belong to anyone in order to feed those who worked the land attracted attention. Others joined them on St George's Hill and new groups were set up in Northamptonshire, Buckinghamshire, Nottinghamshire, Bedfordshire, Hertfordshire, Middlesex, Leicestershire and Gloucestershire. The movement became known as the Diggers or True Levellers (to distinguish them from the Levellers led by John Lilburne and Richard Overton).

At first this experiment in agrarian socialism went well. Unsurprisingly, however, some local landowners became concerned and asked Sir Thomas Fairfax, leader of the New Model Army, to investigate. He visited St George's Hill and decided that the Diggers were doing no harm, advising the landowners to use the courts instead. The local lord of the manor organised gangs to harass and attack the Diggers and one of their communal houses was burnt down. The courts found them guilty

(of belonging to a different sect, the Ranters) at a trial where they weren't allowed to speak in their own defence. They abandoned St George's Hill in August 1649 knowing that, had they not done so, the army would have evicted them. The experiment was over and there was no lasting impact. Indeed, Winstanley was not even particularly well known in his time: few read his written work, and his public activity lasted only four years between 1648 and 1652 (Gurney 2012). His significance, however, should not be underestimated both in terms of what he represented at the time as well as how he has been interpreted subsequently.

The roots of the Diggers' agrarian socialism can be traced back to the enclosure of land, which had been happening since the fifteenth century. The expansion of the profitable cloth industry resulted in the conversion of arable to pasture land: common land was enclosed and smaller farms amalgamated. Enclosure resulted in former tenants, who were no longer needed, being thrown off the land and forced to beg, steal or work for low wages and live in poverty. Thomas More's *Utopia* was a work of social criticism partly aimed at landowners who enclosed the commons to produce woollens, leaving little land for food production. Anti-enclosure riots were nothing new, and in the spring of 1607, thousands of people in the Midlands rose to protest the enclosure of common lands. Between 1580 and 1620, the enclosure movement resulted in a large upward redistribution of wealth, while the 1590s and 1630s were decades of severe subsistence crises. The years 1646–50, when the Digger movement was created, saw the worst series of bad harvests of the seventeenth century, as well as the lowest real wages for working people.

Winstanley, as with many others, suffered as a result of the Civil War. His textile trading business went bankrupt in 1643 and he was forced to find work as a cowherd. He was not alone in looking back to a legendary golden era before the Norman yoke robbed the common people of their liberty and what was theirs by right. Charles I's execution in January 1649 was seen by some as a sign that the new millennium was close, and many radical groups optimistically looked forward to greater freedoms. The winter of 1648–9 was particularly bad, with reports of shortages, famine and many deaths. In London people were said to be eating dogs and cats. Many proposals for addressing poverty were aired, including from radicals buoyed by the spirit of reform. The return of commons and waste ground to be used by the poor was a standard demand, with the Leveller Richard Overton in 1647 calling for enclosed or impropriated commons to be 'laid open againe to the free and common use and benefit of the poore'. By withdrawing their labour, the Diggers

aimed to re-establish a relationship with the earth and hoped that other common people would follow their example. By 'labouring in the Earth in rightousnesse together', the True Levellers intended to 'lift up the Creation from that bondage of Civil Propriety, which it groans under'.

In his own time, therefore, Winstanley can be seen to represent a rejection of the newly emerging profit-driven social relations of the enclosure movement, along with an ecological position rooted in the interrelatedness and interdependency of all living things.

Few read Winstanley's work until the late nineteenth century, when he was rediscovered by a German politician and political thinker, Eduard Bernstein, and gained wider attention from German and Russian Marxists. Since then, his rediscovery has grown. In 1918, in celebration of the 1917 revolution, Lenin ordered that the inscription on the obelisk in Alexander Gardens, Moscow, be changed. The names of the tsars were erased and 19 leading revolutionary thinkers were inscribed in their place. As expected, Marx and Engels were included in the list, and eighth on the list was Gerrard Winstanley. In the twentieth century, the Marxist historian Christopher Hill's book *The World Turned Upside Down* (1972) made seventeenth-century radicalism, including the Diggers, accessible to the sixties generation and brought Winstanley to further prominence and wider attention. Since then, Winstanley has been the subject of plays, films, songs and novels and inspired land-based protest movements into the twenty-first century.

In 2008 Richard Reynolds, the founder of GuerrillaGardening.org, planted red tulips next to the obelisk in Moscow in honour of Winstanley, 'the seventeenth-century guerrilla gardener'. Others have hailed him as an early activist in the urban allotment movement, as well as squatting and freeganism. In 1996 the MP Tony Benn linked the protesters who planted fruit and vegetables along the proposed route of the Newbury bypass to Winstanley, while the *New Statesman* has compared the environmental writer and activist George Monbiot to Winstanley. On the 350th anniversary of the start of the Diggers experiment, supporters of the organisation The Land Is Ours set up camp on St George's Hill for 12 days. The Labour leader Michael Foot visited the camp. In 1974 Susan Inkster stood for election as a Digger candidate in Cambridge on an environmental conservation platform (and gained 369 votes). Since 2011 Wigan has hosted an annual festival to celebrate Wigan-born Winstanley and the Diggers' movement.

St George's Hill remained open land until the twentieth century, when it was sold for development. Today, with its golf course and tennis courts, and luxurious mansions, it has become one of the most

exclusive private and gated estates near to London, and home to many celebrities.

In 2010 the World People's Conference on Climate Change and the Rights of Mother Earth adopted the 'Universal Declaration of the Rights of Mother Earth' (see Chapter 10) and submitted it to the United Nations for consideration. While discourses regarding natural rights largely emerged in the Enlightenment, many of the ideas in the declaration resemble the ideas expressed by Winstanley and the Diggers in the late 1640s.

Fordlandia

Henry Ford is best known as a successful American industrialist. The Model T car was developed in 1908 and became the first successful mass-produced assembly line car, with 50 million being sold in 20 years. In some respects, Ford was progressive in his approach towards his workers, who earned a competitive wage of $5 a day with access to libraries and a two-day weekend. Ford was successful in sourcing the raw materials needed for every stage of production. Latex from the rubber tree which was used in the production of pneumatic types was the one remaining element he wanted to bring into his industrial complex.

Rubber trees are only native to Brazil, which had a monopoly on latex production. The British were keen to break this monopoly and the explorer Henry Wickham smuggled rubber seeds out of Brazil and took them back to England in 1876. From there they were taken to India and other British colonies in South-East Asia. The rubber plants thrived in these new environments where, unlike in Brazil, they had no natural predators. The British benefited and they started producing most of the world's rubber, which also helped to keep the price high. This was the situation Ford wanted to change. He knew that rubber could only grow in a tropical environment. He persuaded the Brazilian government to give him a large tract of land in the Amazon rainforest in 1928 on condition that the Brazilian government could take 9 per cent of the profits it generated.

Ford had ambitions to create a model industrial society in the Brazilian rainforest based on the principles he had used successfully in Michigan. Fordlandia was a pre-fabricated town which could house up to 10,000 people. Everything that was needed to construct the place was brought in from the USA, along with foods which Americans were used to eating. Ford's utopian vision was to create a town which looked exactly like one from the Midwest, complete with paved roads, American-style bungalows and gardens with white picket fences. Houses had electricity

and running water, and there were schools and a modern hospital for the local workforce and their families. There was even a nine-hole golf course. The problem with such housing was its unsuitability for the area. Steel roofs and asbestos insulation meant houses were too hot; the benefits of traditional adobe thatch houses raised off the ground for good ventilation had been ignored. Further mistakes were made in establishing the rubber plantations. Botanists were not consulted and trees were planted too close to each other. The proximity between the newly planted trees provided an ideal breeding ground for pests. This was further compounded when they tried to eradicate the pests: they used a substance that included kerosene, which killed the remaining saplings (Grandin 2009).

The work practices that Ford introduced were very different from those the local workforce was used to. The American nine-to-five working day was different from the local practice of working early and late, with a break in the middle of the day when temperatures were high. Punch-card timekeeping systems of clocking in further exacerbated these tensions. Some of Ford's ideas were a little odd. His utopian vision included mandatory square-dance and poetry sessions – which, at least in his eyes, seemed a small request if the locals were going to benefit from leaving poverty behind and embrace modernity and prosperity. The enforcement of alcohol prohibition was also not welcomed by the locals. As a result, in 1930, the local workers, tired of eating tinned American food, revolted in the town's cafeteria. The trigger for revolt was requiring workers to stand in line rather than be served by waiters. The rebels set fire to the machine shop, destroyed vehicles and time-clocks, looted, cut the telegraph wires, and chased the plantation managers and the town's cook into the jungle until the Brazilian army arrived and suppressed the revolt.

Because of the problems, Ford decided to relocate downstream to Belterra, and Fordlandia was abandoned in 1934. The development of synthetic rubber damaged the Belterra initiative and both towns were sold back to the Brazilian government at a huge loss in 1945. Ford's utopian experimental American dream had failed. It did, however, inspire Aldous Huxley when he wrote his dystopian novel *Brave New World*, a science fiction work in which a supposed futuristic utopia turns out to be a nightmare World State where people are psychologically manipulated and trapped, losing all humanity.

Summary

These two examples of enacted utopian ideas from different times in history both failed. Indeed, the history of utopian ideas being put into

practice successfully is very thin on the ground. There remains, however, value in studying utopias in history for several reasons. Firstly, such constructions, whether imaginary or enacted, illustrate how humanity has thought about its relationship with the rest of nature. In this sense, thinking about utopias is an important element towards embedding environmental perspectives in the history curriculum. Secondly, looking at two contrasting examples of enacted utopian experiments can support students in building their understanding of the different conceptions humans have had with regard to their relationship with the rest of nature. Chapter 1 suggests there is a need for imagination in looking forward to possible futures, and the ongoing interest in and changing interpretations of the English Diggers suggest a persistent desire to retrieve a closer connection in our relationship to the land.

Conclusion

This chapter has focused on building subject knowledge relevant to embedding more environmental perspectives into classroom practice. The concept of sustainability is critiqued and its development as a conscious or deliberate idea from the early modern era through to today is presented. Examples of societies and experimental communities which pursued more and less sustainable policies are introduced. The topics in Chapter 4 exemplify the large-scale ideas presented in Chapter 3 and, taken together, illustrate different scales of granularity which can be used in classrooms.

Further reading

Bassin, M. (2005), 'Blood or soil? The Völkisch movement, the Nazis, and the legacy of Geopolitik', in F-J. Brüggemeier et al. (eds), *How Green Were the Nazis?* Athens: Ohio University Press.

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Josephson, P. R. (2010), *Would Trotsky Wear a Bluetooth? Technological utopianism under socialism, 1917–1989.* Baltimore, MD: Johns Hopkins University Press.

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5
The role of microbes in shaping human history

I started writing this book during the Covid-19 pandemic. It was a clear illustration of how modern societies remain vulnerable in the face of sudden outbreaks of infectious disease. The concentration of large populations combined with the ease of global communications, including air travel, facilitates the spread of microbial infections. Furthermore, the current context of habitat loss, climate change and wildlife trafficking dramatically increases people's exposure to dangerous zoonotic pathogens, where infection jumps between animal species. The pandemic was a stark reminder that we belong to a biological species, *Homo sapiens*, and that our species is connected to many other species with which we share our genes, our habitats and our parasites (Sivasundaram 2020). Coronavirus is the result of human–animal entanglement, while the circumstances and context of its origins in this time of species loss mean that the pandemic can be seen as the first global-scale human disaster to result from the sixth mass extinction of life on earth (Alagona 2020: 598). As the Dasgupta review (2021) cautioned, the coronavirus pandemic may be 'just the tip of the iceberg' if we continue to encroach on natural habitats. Furthermore, the often-heard claim that pandemics only happen about once in 100 years looks shaky in light of the early twenty-first-century record of zoonotic infections. SARS, avian flu, Ebola and Covid-19 can all be seen as 'dress rehearsals' (Snowden 2019: 7) for what we can expect to see more of in the twenty-first century.

This chapter argues that the co-evolution of microbes and humans, including epidemics through history, is a major part of historical change and development. Far from being a small sub-field of history, this co-evolution is an important driver in understanding historical change (Enard et al. 2016), as important as wars, revolutions, demographic and economic change. The chapter sets out to tell a short microbial history of how humans and microbes have co-evolved, along with the impact that microbes have had on individuals and on populations as a whole.

The chapter does not attempt an exhaustive microbial history; it is necessarily selective and a number of important and significant developments have been omitted. The aim, rather, is to focus on topics which are often taught within the current history curriculum and on how taking a microbial lens to the subject offers opportunities for new insights and perspectives. As with other themes in the book, the chapter presents this history at different scales, ranging from individual events and developments through to comparative evaluation of large-scale population demographics.

When micro goes macro

Each person houses around 100 million microbes in their body, weighing about a kilogram in total, and outnumbering their own body cells by ten to one. Most don't cause harm; in fact, they help to digest food, protect against infection and even maintain reproductive health. Some, however, can cause harm. If a microbe is very virulent and kills its victim outright, the microbe will probably die too along with its host. If a microbe is less virulent it runs the danger of being defeated by the host's immune system and thus limits its spread. Over the many centuries of coexistence between microbes and humans, ensuring a balance between these two extremes has helped to optimise the survival of both. Everyone alive today is descended from ancestors who survived epidemics of disease who passed on some inbuilt resistance to their offspring. The ability of microbes, however, to adapt and change rapidly tends to give microbes an advantage and puts them one step ahead in the ongoing struggle with humans.

Recent research in the field of genome sequencing has confirmed the 'out of Africa' pattern of human migration and thus contributed to our understanding of early human history. A study of the full genetic code of the common human herpes simplex virus type 1 (HSV-1) compared different strains of the virus collected in North America, Europe, Africa and Asia. They found that all the African strains clustered together, all the virus from East Asia clustered together, and almost all the virus in Europe and America clustered together. It confirms what the archaeologists and anthropologists have told us about where humans originated and how they spread across the planet (Enard et al. 2016).

Agricultural revolution

The move from hunting and gathering to agriculture triggered a 'microbe bonanza' (Crawford 2007) where microbes could exploit those aspects

of daily life which were absent from nomadic communities, such as the build-up of refuse, the density of expanded populations and the proximity of domesticated animals. Many microbes jumped species, from animals to new human hosts where there was no initial resistance. There must have been many early epidemics which infected everyone in small, isolated farming communities before the microbes died out, having nowhere else to go. Eventually microbes did manage to establish their infectious cycles in humans independently of their animal hosts in a process known as zoonosis.

Most of the microbes that cause well-known childhood infectious diseases, such as smallpox, measles, mumps, diphtheria, whooping cough and scarlet fever, were originally exclusively animal pathogens. At some point the microbes crossed the species barrier to infect humans. To begin with, these would have caused severe zoonotic infections. Gradually, over a period of about 150 years, they would become established as purely human pathogens in a process that generally resulted in a milder disease.

The ancient world

Epidemics were a major problem for ancient civilisations, often killing a significant proportion of the population. Irrigation and wetlands supported the development of agriculture. Reservoirs and irrigation canals were built next to farming communities and provided ideal breeding grounds for malaria-carrying mosquitoes which infected humans. Irrigation and agriculture produced more food, which gave rise to higher populations while, at the same time, malaria accompanied these same developments. Similarly, irrigation supported freshwater snails that serve as vectors for schistosomiasis (also known as bilharzia): parasitic worms that live in the snails burrow through the intact skin of humans wading in contaminated water, before making their way to the bladder where the female deposits her eggs. These return to the outside world through human urine, the eggs hatch in water and the new parasites immediately seek out their host, the water snail. One symptom of schistosomiasis is traces of blood in the urine, leading Herodotus to refer to Egypt as the place 'where men menstruate'.

The ancient world experienced many epidemics, although the microbes which caused them have not yet always been identified. The impacts of these epidemics in the societies affected and beyond were profound. There is evidence of a community at Hamin Mangha being annihilated in north-eastern China around 5,000 years ago; the Athenian Plague of 430 BCE, documented by Thucydides, may have killed 25 per cent of the population in the city. The Antonine Plague of 165–80 CE, which may have been smallpox, and was documented by Galen, was brought back to Rome by the army and may have killed five million people

throughout the Roman Empire. The Antonine Plague caused such a huge drop in population that the Roman Empire began to founder both militarily and economically. The plague also affected ancient Roman traditions, leading to a renewal of spirituality and upsurge of religions which created the conditions for spreading new faiths, including Christianity. The Plague of Cyprian of 247–62 CE, which, at its height, killed up to 5,000 in Rome each day, led to manpower shortages in food production and further weakened the Empire. The Justinian Plague of 541–2 CE killed 10,000 a day in Constantinople at its height and killed an estimated 100 million across the Eastern and Western Roman Empires. The military struggled to recruit and fill its ranks and ultimately failed to retake Rome for the Empire. The Justinian Plague has been positively identified, from DNA in the teeth of plague victims, as *Yersinia pestis*, the same bacterium responsible for the Black Death; there were several repetitions of the plague outbreaks over the following years. Meanwhile, as the Byzantine Empire experienced these challenges, the nomadic Arab tribes, moving through areas of sparse population in relative isolation, were well positioned for the rapid expansion of Islam.

Black Death

Worldwide the Black Death may have killed an estimated 150 million people, and in England alone the death toll was some 1.4 million, around a third of the population. The Black Death has become an established topic on the history curriculum. The narrative taught tends to focus on the social and political consequences, ranging from its impact on the erosion of feudal society, the role of the church in society and the position of Jews in Europe. If, however, the topic is taught with different magnifications in mind, or with a focus on environmental as well as microbial history, the result is a set of different narratives which can be taught. As a popular topic, it also affords opportunities for teachers to introduce different interpretations which move beyond traditional narratives.

Teaching the Black Death with a different magnification reveals consequences not typically taught in schools. The Black Death and recurring plague epidemics were not simply episodes in Western European history: they also affected Asia, North Africa and other parts of Europe. For example, the Black Death led to a demand for labour, particularly in southern Europe, which had been particularly severely hit by the number of deaths. Italian merchants and Portuguese adventurers looked increasingly to Africa as a source of labour, thus giving rise to raids further down the coast of West Africa (Arnold 1996). In this way, depleted

populations provided one impetus towards what eventually developed into the enslavement of Africans and transatlantic slavery.

If 'environment' is foregrounded as a factor in relation to the Black Death, different narratives are afforded. The onset of the Little Ice Age, which affected the entire northern hemisphere, can be seen as one factor in the Great European Famine of 1315–18, and this in turn may have contributed to the high levels of mortality among the poorly nourished during the Black Death itself (Galloway 2010). Other research also suggests that, following the Black Death, the reduced number of labourers resulted in fields being neglected, an increase in the number and spread of trees, and thus a reduction in the amount of carbon dioxide in the atmosphere. As a result of these changes, the Black Death may itself have contributed to some extent to the Little Ice Age that continued until around 1800 (Van Hoof et al. 2006). Similar claims have been made in relation to the Great Dying, the annihilation of native Amerindians following the Columbian Exchange, which, it is suggested, led to land being abandoned, causing natural vegetation to grow back and resulting in the cooling of temperatures (Koch et al. 2019; Ruddiman 2005).

If microbial history is foregrounded, a different narrative again emerges. Around 10 per cent of Europeans have a genetic mutation which provides immunity to HIV, a proportion which is much higher than in other populations (Hopkins 2005). While the mutation has been present for 2,500 years, it would take repeated outbreaks of a pathogen over many generations to increase the frequency of the mutation across a population. The likelihood is that this pathogen was the Black Death, although some have argued that smallpox may have been responsible. Either way, the persistent presence of plague (or smallpox) over many generations has afforded immunity to HIV in some people whose ancestors survived such pestilence.

The Black Death, therefore, offers opportunities to introduce students to a variety of different interpretations which result from focusing on different elements of history, whether that be looking at different scales or foregrounding environmental or microbial history.

Columbian Exchange

For many centuries, the Atlantic Ocean provided a natural barrier between Europe and the Americas. Before Atlantic navigation was established, the intensification of trade had brought leprosy to West Africa and, in exchange, European travellers took schistosomiasis back to Europe. The development of long-range shipping across the Atlantic, however, brought about a microbial exchange on an unprecedented scale.

When Europeans did travel to the Americas, they took with them smallpox, measles and influenza, devastating Amerindians who had no resistance to these new diseases. Smallpox decimated the Aztecs and facilitated Cortez's conquest of Mexico. The Inca Empire was hit by measles, which paved the way for Pizarro's conquest of Peru. Influenza led to many outbreaks among the Amerindian tribes. Taken together, an estimated 90 per cent of these Amerindian populations were wiped out by the introduction of these new diseases from Europe (Mann 2005), with the population decreasing from 60 million (about 10 per cent of the world's population) to five or six million. In Hispaniola (now Haiti), home to around eight million Native Americans when Columbus arrived, not one remained some 40 years later. In exchange, syphilis may have travelled from the Americas to Europe and then to the rest of the world.

Malaria and yellow fever, transmitted by mosquitoes, spread from Africa to the Americas, probably carried in water barrels aboard ships transporting enslaved Africans. In those areas where malaria became established in America, this led to labour shortages and created a set of conditions which supported the further development of transatlantic slavery. Populations that are exposed to malaria over time can build up some resistance to the disease. Those people are still affected by malaria, although they may not suffer the most debilitating symptoms. For native Amerindians and European indentured labourers, malaria was often lethal, while Africans had some resistance. This provided a spur to the growth and intensification of transatlantic slavery. Furthermore, there is evidence that higher prices were paid for Africans from more malaria-ridden regions where malarial resistance was greatest (Esposito 2018).

If malaria was a factor in the enslavement of African peoples, there were also some similarities with yellow fever. There was a severe outbreak of yellow fever in Rio de Janeiro in 1849; people of European descent were particularly badly hit compared to the Black population, which was relatively unaffected. Some at the time interpreted this as a judgement from God at Brazil's reluctance to abolish slavery. The real explanation was that the Black population were enslaved Africans, many of whom had contracted yellow fever in childhood in Africa and acquired some immunity. Unlike malaria, however, yellow fever doesn't afford innate resistance, despite this being a claim made by many historians in the past. Deterministic explanations based on skin colour or acquired immunity have been very dangerous. Just as Christian justifications for slavery were based on racist myths, so too, in its extreme form, yellow fever determinism held that the Christian God created Africans immune to yellow fever, with the intention that they should serve white plantation owners in the New World as slaves (Watts 2001).

The potato is well known as a significant crop of the Columbian Exchange. Potatoes originated in the Andes of South America, and Europeans brought the crop back home with them on their ships. The potato is a nutritious staple which, supplemented with a little milk, provides all the vitamins needed to stave off malnutrition and, acre for acre, could feed twice as many as the grains it soon replaced. The widespread consumption of potatoes coincided with the end of famine in northern Europe, and William H. McNeill has argued that potatoes lead to empire: 'Potatoes, by feeding growing populations, permitted a handful of European nations to assert dominion over most of the world between 1750 and 1950' (McNeill 1999: 67).

What may be less known is that, along with the potato, Europeans brought back Andean potato cultivation methods, including the use of the world's first intensive fertiliser, Peruvian guano (excrement from seabirds and bats). Andean Indians had used it for centuries. Before the nineteenth century, in Europe, bonemeal was the best-known additive for crops, with bones taken from slaughterhouses along with some other sources including the battlefields of Waterloo and Austerlitz. The appearance of avian faeces as an alternative fertiliser seemed completely reasonable. Guano started arriving into European ports in the 1830s, to be followed by 'guano mania' in the 1840s. In 1841 Britain imported 1,880 tons; by 1845 it imported 219,746 tons. In this way, potatoes led to the development of the agro-industrial complex combining high-yield crops, high-intensity fertilisers and, eventually, factory-made pesticides (Mann 2011: 253).

There are, of course, other stories to tell. Guano deposits were hard to extract on the Chincha Islands of Peru. High cliffs and deposits of guano as tall as a 12-storey building made living and working on these islands difficult and dangerous. Tools were basic pickaxes, shovels and wheelbarrows to transport the guano from the cliffs to waiting trade ships. Initially, traders forced local natives and prisoners to mine the guano, but this quickly became inadequate in light of the European demand. Entrepreneurs soon saw another opportunity in East Asia, where there had been a rise in the Chinese birth rate. They offered Chinese migrants the opportunity of an escape from poverty, often promising they would work in the Californian gold mines, only to then take them to Peru to extract guano as indentured labourers. A horrifying aside is that enslaved people imported from Africa were considered 'too valuable' for working on the guano mines, not only due to their resistance to malaria, but also because of the propensity of workers in the guano mines to end their own lives, such were the terrible conditions there.

There is a further twist to the potato story. There is evidence that potato crops were blighted in the eastern United States in the early 1840s,

and it is speculated that the blight that caused the Irish Famine in the mid-1840s was brought by ships sailing from America to Ireland. An alternative, viable theory suggests that the fungus-like organism which caused the potato blight may have been imported alongside the guano (Wade 2001).

The Columbian Exchange, therefore, offers rich opportunities to revisit a traditional topic with a microbial perspective in mind. In so doing, it also illustrates important intersections between microbial history and themes such as imperialism.

Spanish flu

The Spanish flu pandemic of 1918–20 infected one in three people on Earth, or 500 million people. Between March 1918 and March 1920, it killed 50–100 million, or between 2.5 and 5 per cent of the global population. Military operations at the end of the First World War, and widespread overcrowding, contributed to its rapid spread across the globe. Some argue that it may have tipped the outcome of the war because it affected the armies of the German and Austro-Hungarian Empire sooner and more virulently than their Allied opponents (Price-Smith 2008). In terms of single events causing major loss of life, it surpassed the First World War (17 million killed), the Second World War (60 million killed) and possibly both put together. It was the greatest wave of death since the Black Death (Spinney 2017). Despite these statistics, the Spanish flu pandemic is generally not taught in schools, in contrast to the world wars and the Black Death, which almost always are. Similarly, there are many more books written about the world wars than have been written about the Spanish flu. It has not yet entered our shared collective memory in the same way that the two wars have. A number of factors may account for these differing priorities.

Wars and plagues are remembered differently. Wars are intimately connected to shared, often national identities, and their remembrance serves to build collective memory. The deliberate, institutional practice of remembrance which started after the First World War helps to keep the wars of the twentieth century in fresh view while also telling us something about who we are. For victors, there is often a heroic version to hand down to posterity. A pandemic, by contrast, is much harder to categorise, and the narratives we tell about it are less clear. For one thing, it's difficult to count the dead: they die in large numbers, spread across many places, often being buried in mass graves even before any diagnosis; for another, while millions died, others caught the flu and survived, experiencing it

only as a usual winter virus. Telling the story of pandemics calls for a different type of narrative from those associated with wars.

There were other reasons why the Spanish flu has been overlooked in public memory. The world was still reeling from the tragedies of the First World War and a further tragedy was difficult to accommodate. Indeed, the labelling of the pandemic as 'Spanish' is a consequence of censorship by the nations fighting in the war and their reluctance to give any publicity to the pandemic, in contrast to Spain, a neutral country in the war, where early media coverage of the pandemic was generated. The flu didn't originate in Spain but its press coverage did. War was certainly the main event in Europe, with France losing six times as many people in the war than from Spanish flu, while the multiple in Germany was four, and three in Britain. However, on every continent except Europe (and Antarctica), more people died from Spanish flu than in the First World War.

Earlier plagues had been interpreted as acts of God against which humanity had no protection and which needed to be accepted fatalistically. The development of germ theory in the nineteenth century facilitated a more scientific understanding of the Spanish flu and its causes. Despite those advances, however, humanity's inability at that time to either prevent or cure the flu in 1918 was felt as a humiliation. The pandemic was a reminder of earlier plagues and it interrupted a narrative of steady human technological progress. It was not a tale of victory to pass on to future generations. In some cases, the public silence was even more profound. The Yupik of Bristol Bay, Alaska, suffered more than almost anywhere else. Following a terrible loss of life, the Yupik made a pact not to speak about the pandemic which had virtually destroyed their culture.

One of the most famous casualties of the pandemic was US President Woodrow Wilson. He contracted flu shortly after arriving in Paris in April 1919 for peace talks at the end of the First World War. His doctor Cary Grayson wrote to a friend, 'The president was suddenly taken violently sick with the influenza at a time when the whole of civilization seemed to be in the balance.' Wilson's staff, however, played down his illness, saying that the cold wet weather in Paris had sparked a cold and fever. On 5 April, the Associated Press reported that Wilson was 'not stricken with influenza' (quoted in Solly 2020).

In reality, Wilson was struggling with high temperature and disorienting hallucinations. At one point, he became convinced that he was surrounded by French spies. He was severely weakened at the crucial point in the Versailles negotiations. His initial aim that the Allies should go easy on Germany to facilitate the success of the new League of Nations did not bear fruit. The French prime minister Georges Clemenceau, whose

country had suffered so badly, was successful in achieving a much tougher stance. Days after coming down with the flu, an exhausted Wilson conceded to the demands, setting the scene for a harsh settlement which led to a revived German nationalism and became a rallying cause of Adolf Hitler.

Whether Wilson would have pushed harder for more equitable terms if he hadn't come down with the flu is, of course, impossible to say. The story, however, is one which warrants inclusion in understanding the Treaty of Versailles.

Covid-19

If the Spanish flu was the forgotten pandemic, it raises the question of how we will remember the coronavirus pandemic of 2020–2. One key difference is the development of vaccines in the century between the two pandemics, along with the very swift rollout of vaccinations during the coronavirus pandemic. While science was largely unable to blunt the impact of Spanish flu in the early twentieth century, 2021 saw the beginning of a massive programme of vaccination for coronavirus less than a year after the genetic sequence of the new virus had been identified by Chinese scientists.

The impressive delivery of vaccines, at least in wealthy parts of the world, may lead to a narrative on familiar ground, that this was a battle won by humanity against the virus, another tale in our steady technological advance. During the coronavirus pandemic itself there were also signs that the narrative around the pandemic was being framed in traditional, nation-oriented ways, at least by some when, for example, US President Trump referred to the 'Chinese virus'.

Comparative evaluation

Each of these individual episodes in microbial history is worthy of study in its own right and each has had significant impacts on the societies affected, as well as shaping future developments. In addition, and in keeping with this book's argument for an enhanced place for scaled-up history, setting these individual events into a wider context offers valuable learning opportunities. Table 5.1, adapted from Patterson et al. (2021), can support a number of comparative enquiries around population demographics, change and continuity, and differing management strategies and impacts.

Table 5.1 Contexts and impacts of major pandemics (based on Patterson et al. 2021). All figures are estimates. Covid-19 figures are based on data to April 2021.

	Black Death 1347–51	Smallpox, New World 1520–7	Spanish flu 1918–20	Covid-19 2020–
World population	365 million	500 million (Americas 60 million)	1.86 billion	7.80 billion
Mortality (% global population)	150 million (41%)	15 million (3%) (Up to 50% Aztecs; up to 90% Incas)	50–100 million (2.5–5%)	5 million (0.06%)
Case fatality rates	Bubonic plague 50% Pneumonic plague 95%	Aztecs 50%	2–3%	0.2% or lower
Number infected	Unknown	Unknown	500 million	260 million
Risk factors	Overcrowding, poor housing, proximity to fleas and animal reservoirs	No previous exposure to disease in the region	Healthy 15–40 year olds	Old age, pre-existing conditions
Transmission	Flea bite or close contact with respiratory droplets of pneumonic plague patient	Contact with respiratory droplets	Contact with respiratory droplets	Contact with respiratory droplets
Medical intervention and scientific understanding	No knowledge of germ theory	No knowledge of germ theory	Knowledge of germ theory but no vaccine	Virus isolated and genome sequenced. Vaccine developed

(Continued)

(Continued)

	Black Death 1347–51	Smallpox, New World 1520–7	Spanish flu 1918–20	Covid-19 2020–
Disease control	Travel restriction, strict enforcement, aimed against specific groups	Minimal	Masks, social distancing, limits on social gatherings, sporadic enforcement and too late	Near global lockdown, quarantine, masks, track and trace
Population effects	European population did not recover to pre-plague levels until mid-sixteenth century	Minimal effect on global population growth but wiped out New World populations, either extinction or 90% reduction of some groups	Temporary global population growth decline during outbreak	No anticipated effects on global population growth
Long-term economic effects	Labour shortages led to higher wages, peasant revolts, shift in socio-economic power dynamics. Increased innovation and mobility of labour	Collapse of Native Americans and enrichment of European colonial powers	Limited and obscured by First World War	

Conclusion

This chapter has argued that microbes have played a major role in human history, as important as wars and social, political and economic revolutions. Rather than presenting a full, comprehensive microbial history, the chapter builds subject knowledge by taking a microbial lens to examine the causes and impacts of topics which are often taught, or could be taught, in history classrooms, namely the Black Death, smallpox, the Columbian Exchange, transatlantic slavery, Spanish flu and Covid-19.

Further reading

Crawford, D. H. (2007), *Deadly Companions: How microbes shaped our history.* Oxford: Oxford University Press.

Schama, S. (2023), *Foreign Bodies: Pandemics, vaccines and the health of nations*. London: Simon and Schuster.

Spinney, L. (2017), *Pale Rider: The Spanish flu of 1918 and how it changed the world.* London: Jonathan Cape.

6
Environment and other revisionist themes in history

This chapter returns to the revisionist agendas introduced in Chapter 1. Traditional history has been disrupted by a greater plurality of voices, with the result of a wider diversity of narratives being added to the curriculum. The chapter looks at the intersections of environment with other, more established, revisionist themes which are often included in the curriculum taught in history classrooms (Satia 2020). Specifically, the chapter focuses on the intersections of environment with race (Chiang 2014; Turda and Quine 2018) and gender (Merchant 1980). In the case of race, a thematic approach, anchored in American history, is used. The experiences, and portrayals of, the First Nation Americans and other people of colour over time are explored alongside environmental discourses around wilderness (Cronon 1996), access to public spaces and resources, and environmental disasters. In the case of gender, a case study approach is used, focusing on the role of an individual in history, in this case Rachel Carson. The chapter looks at the reactions to, and the changing historiography in relation to, Carson's influential book *Silent Spring* (1962). The denigrating, gendered criticism of her scholarship is examined, alongside other critiques, both positive and negative, which illuminate the scientific, economic and Cold War political context within which the book was written. Parallels between Carson and Greta Thunberg, and the portrayals of their contributions by media, reflecting contrasting political and commercial interests, are explored.

In taking these two approaches, one thematic, the other focusing on an individual, the chapter develops ideas introduced in Chapter 2 and illustrates how environmental history can be embedded into the curriculum effectively in different ways. It also demonstrates how environmental history is not a neutral concept devoid of contestations of race, gender and power.

American wilderness

As Chapter 3 sets out, a notion of wilderness can be regarded as originating in the Neolithic Revolution: once land was cultivated and managed, it was distinguished from land that remained wild; without domestication, there is no wilderness. The distinction developed into a dualistic system where humans were seen to be separate from nature, along with a binary worldview of the superiority of human culture and civilisation contrasting with an untamed and dangerous wild.

Throughout much of human history, wilderness has been largely ignored, regarded as something outside the concerns of human civilisation. When areas of wilderness were protected, it was for the benefit of some groups of people as, for example, when medieval English kings established royal forests as the king's official hunting grounds. The areas became subject to forest, rather than common, law and the practice of villagers' subsistence farming and collecting firewood was banned.

The nineteenth century saw an upsurge of interest in wilderness in the Western world. In England, the paintings of Turner and Constable focused on the beauty of nature, while the poetry of Wordsworth set out and elevated the intrinsic value in wilderness. The Romantic movement was partly a reaction to the rapidly changing world of the Industrial Revolution, and it tended to look backwards to an idealised and simpler past. Similarly in the United States, the interest in a pristine wilderness developed in the nineteenth century and can be seen as a response to a time of huge social change and the rapid expansion of European immigration and expansion across the American West.

In 1803, President Thomas Jefferson purchased Louisiana from the French government. This doubled the size of the United States and Jefferson believed that westward expansion was the key for the nation's survival. This expansion became a defining theme of American history in the nineteenth century right through to the 'closing' of the frontier in 1890. Furthermore, to Jefferson, land ownership went hand in hand with virtue: he declared that 'Those who labour in the earth are the chosen people of God'. By 1845, the journalist John O'Sullivan had put a name to the idea that drew so many towards the frontier. Westward migration was Americans' 'manifest destiny' to carry the 'great experiment of liberty' across the continent: to 'overspread and to possess the whole of the land which Providence has given us' (O'Sullivan 1845).

John Gast's painting (Figure 6.1) illustrates the westward march of civilisation across the United States (on the right) towards the dark edges of wilderness (on the left) inhabited by Native Americans. Columbia, the

Figure 6.1 *American Progress* by John Gast, 1872. Autry Museum of the American West. Public domain.

personification of America, leads the journey, flying overhead, holding a schoolbook and stringing the telegraph wires that would connect the two coasts of America. On the ground below her, are the different sorts of transport that took the settlers westwards.

By 1890, with so much of the continent settled, the US Census Bureau declared that the American frontier, the boundary between civilisation and wilderness, was no more and the mission to tame the American wilderness was largely completed.

While the American frontier was being pushed ever further westwards, back on the east coast of the United States, early American environmentalism was beginning to take shape. Romanticism gave rise to New England transcendentalism, with its beliefs in the power of the individual along with the inherent goodness of people and nature. Ralph Waldo Emerson's *Nature* (1836) set out his ideas of the divine and the transcendental as being at one with nature. Henry David Thoreau, influenced by Emerson, set out his own reflections of living simply in nature in *Walden: Life in the woods* (1854). While Emerson and Thoreau were setting the intellectual tone on the east coast, the artist George Catlin travelled west across the Great Plains to document the last of the 'wild' Indian tribes through his paintings. In *Letters and Notes on the*

Manners, Customs, and Condition of the North American Indians (1841), Catlin lamented what he thought was the beginning of the extinction of the buffalo and the tribes who depended on them. He proposed that the United States should create a 'Nations' park containing man and beast, in all the wild and freshness of their nature's beauty'. Catlin's ideas didn't immediately take effect, but gradually the idea of protecting spectacular natural areas took hold, with the establishment of Yellowstone and Yosemite National Parks from the 1860s onwards.

John Muir, a Scottish-American naturalist, was an influential advocate for the preservation of wilderness. As the co-founder of the Sierra Club (1892), which argued for the establishment of National Parks, Muir is often seen as the revered father of the National Parks movement. In the early years of the twentieth century, Theodore Roosevelt was influenced by Muir's writings and the two men went on a three-day camping trip together in Yosemite in 1903. Muir persuaded Roosevelt of the need to protect the land, and as president, Roosevelt enacted extensive conservation policies and established a further five National Parks as well as 150 National Forests. The two men, however, held different views. Roosevelt argued for national planning to maximise the long-term economic benefits of natural resources, while Muir argued for the preservation of the wilderness for its beauty alone, suggesting that conservation policies would not offer enough protection because they focused on the natural world as a source of economic production. The difference between the conservationists and the preservationists came to a head in the public debates over the construction of the Hetch Hetchy dam in Yosemite National Park in 1914 to supply water to San Francisco, a project which Muir and the Sierra Club opposed.

The modern environmental movement in the United States is regarded as starting in the 1960s, while its earlier bedrock is seen to be the conservationist movement of the early twentieth century, as well as the contributions in the nineteenth century of the likes of Emerson, Thoreau and Muir. In 1967, Roderick Nash published *Wilderness and the American Mind*, which quickly became a classic study of America's changing attitudes towards wilderness. It also heralded the beginning of critiques relating to wilderness. Nash argued that before the 1890s, the commonly held perception was that wilderness was something to be feared and tamed, in keeping with the dark lands depicted in Gast's *American Progress* (Figure 6.1). In Nash's words, westward expansion in the American imagination was thought of as a march of 'godly' development in a 'war against wildness' (Nash 1967: 37). It was only once the frontier was closed in 1890, however, that Americans began to

recognise what they had lost and started to regard the wilderness as something to be treasured and protected. It is in this light, Nash argued, that the early conservation movement should be understood. The historiographical debate was further developed with the publication of William Cronon's seminal essay *The Trouble with Wilderness or, Getting Back to the Wrong Nature* (1996). Cronon critiqued the American fascination with wilderness as a fantasy or a misguided flight away from history. He challenged the idea that wilderness represented 'untouched' or 'pristine' nature, arguing instead that wilderness was largely a cultural invention infused with moral values and cultural symbols, as well as national and religious meaning. Importantly, he argued that wilderness was created through the exclusion of Native Americans, who had been moved off the land and confined to reservations from the 1830s onwards.

Cronon comments that 'the movement to set aside national parks and wilderness areas followed hard on the heels of the final Indian wars, in which the prior human inhabitants of these areas were rounded up and moved onto reservations' (1996: 10). They had been moved off the land they had regarded as their home for centuries. Cronon's critique also challenged the idea that the Native Americans lived in idealised harmony with nature which some modern environmentalists in the 1960s believed. Rather, the Native Americans actively shaped the world around them, for example by burning forests to encourage the growth of plant species or to facilitate the hunting of game. The first white settlers who observed the magnificent Yosemite Valley commented on the wide open meadows covered in native grasses and flowering plants, describing it as a place that had the appearance of a well-kept park or a prairie planted with fruit trees. What these observers were in fact witnessing was a cultural landscape showing how the valley had been managed for centuries by Native peoples.

The myth of the wilderness as 'virgin' uninhabited land was created to satisfy those tourists who could enjoy the illusion that they were seeing their nation in its pristine, original state. Furthermore, the new National Parks could be enjoyed as peaceful places with an absence of violence whereas in fact the actual frontier had often been a place of considerable conflict for control of land and resources. American wilderness, Cronon insists, is a cultural invention which serves to erase the history from which it sprang. This critique of the concept of wilderness suggests it was not only a created myth but also one which replicated a colonial pattern of settler privilege alongside the effective erasure of Indigenous peoples.

A closer look at some of the key players in the early environmental movement similarly points to underpinning ideas of white superiority.

In his essay *Walking* (1862), Thoreau suggested that American greatness arose as 'the farmer displaces the Indian even because he redeems the meadow, and so makes himself stronger and in some respects more natural'. Muir envisioned national parks as pristine wilderness, without domesticated animals or Indians. In *My First Summer in the Sierra* (1911), when Muir describes his Sierra Nevada travels in 1868, he wrote disparagingly of the Indians he met there, equating Indians with unclean animals that did not belong in the wilderness. On another occasion, describing meeting Indians at Mono, he wrote, 'A strangely dirty and irregular life these dark-eyed dark-haired, half-happy savages lead in this clean wilderness.' He regarded Indians as the polar opposite to the pristine lands in which he found them. He was appalled by Indian women, writing of one:

> Her dress was calico rags, far from clean. In every way she seemed sadly unlike Nature's neat well-dressed animals, though living like them on the bounty of the wilderness. Strange that mankind alone is dirty. Had she been clad in fur or cloth woven of grass or shreddy bark, she might then have seemed a rightful part of the wilderness; like a good wolf at least, or bear.

On another occasion, he came across some Indian women collecting wild grain and beating out the seed, commenting:

> The worst thing about them is their uncleanliness. Nothing truly wild is unclean. Down on the shore of Mono Lake I saw a number of their flimsy huts on the banks of streams that dash swiftly into that dead sea, mere brush tents where they lie and eat at their ease.

In an essay collection published in 1901 to promote national parks, Muir assured prospective tourists that 'As to Indians, most of them are dead or civilized into useless innocence' (all quotations from Muir are taken from Merchant 2003).

While both Thoreau and Muir have been regarded as progressive 'Indianists' living at a time of violent colonisation of the continent, both men were also influenced by popular narratives of Indians as 'noble savages'. Such patronising and romanticised views saw Indians as inferior, dirty, lazy and childlike. For both Thoreau and Muir, their work and admiration of American nature was a way in which a certain kind of white person could become symbolically native to the continent (Purdy 2015) and wilderness become equated to whiteness (Merchant 2003).

Two other early influential conservationists, Madison Grant and Theodore Roosevelt, both members of the wealthy Manhattan elite, were motivated by a conviction that a country's treatment of its land and wildlife was a measure of its character. Both were also involved in the eugenics movement, with Grant's book on the subject, *The Passing of the Great Race* (1916), being praised by Hitler.

Roosevelt viewed Native Americans as standing in the way of white settlement of the United States and he believed that white frontiersmen had forged a new race – the American race – by 'ceaseless strife waged against wild man and wild nature.' His vision wasn't limited to the United States and in his 1889 book, *The Winning of the West*, he argued that 'it is of incalculable importance that America, Australia, and Siberia should pass out of the hands of their red, black and yellow aboriginal owners and become the heritage of the dominant world races'.

African Americans

European colonisers regarded both Native Americans and African Americans as savage and inferior, although how they were treated was different. Native Americans were removed in the colonisers' mission to civilise the land, while African Americans were traded and enslaved. The image of both groups of people served to create and bolster the concept of 'whiteness' in contrast to the 'other'. Environmental justice advocate Robert Bullard expressed it bluntly: 'The nation was founded on the principles of "free land" (stolen from Native Americans and Mexicans), "free labour" (cruelly extracted from African slaves), and "free men" (white men with property)' (Bullard 1993: 16).

The post-Civil War era saw many previously enslaved African Americans migrating to urban industrial centres. While the mixing of different racial groups did happen in the years after 1865, by the 1890s, many neighbourhoods had become segregated along colour lines. Jim Crow laws, and the Supreme Court's 'separate but equal' doctrine expressed in its *Plessy v. Ferguson* decision (1896), legitimised racial segregation for the next 70 years. By the early twentieth century, there was rigid separation in cities with segregated Black and white parks, schools, train stations and streetcars. Segregation led to city ghettoes: neighbourhoods perceived to be high in crime and poverty.

Robert Woods's *The City Wilderness* (1898) records deteriorating urban neighbourhoods which he described as morally and socially depraved, while Booth Tarkington, in *The Turmoil* (1914), portrayed them as sooty, polluted and diseased. The coincidence of the conservation

movement with cities becoming negatively characterised Black areas were two separate developments, although both produced negative consequences for African Americans (Romm 2002). The creation of forest reservations served to reduce people's access to land, while racial segregation ensured that ownership of the remaining private land was reserved for whites. Furthermore, in the South, freed people were expected to buy land with wages at a time when lands in the West were promoted to whites as free lands. In short, state regulations restrained opportunities for people of colour, while protecting white power and privilege.

The twentieth century saw continuities in relation to policies relating to race and environment, as these two examples illustrate: landfills and incinerators were located in inner cities, in ghettoes and on Native American reservations (Bullard 1993), while studies on Hurricane Katrina demonstrate how the impacts of that natural disaster were disproportionately damaging for people of colour (Squires and Hartman 2006).

Carolyn Merchant summarises the construction of the concept of wilderness:

> to many Americans, the valence of wilderness had been reversed. The city had become a dark, negatively charged wilderness filled with blacks and southern European immigrants, while mountains, forests, waterfalls, and canyons were viewed as sublime places of white light . . . Dark, smoke-filled cities contrasted with the purity of mountain air and the clarity of whitewater rivers, waterfalls, and lakes. Sublime nature was white and benign, available to white tourists; cities were portrayed as black and malign, the home of the unclean and the undesirable (Merchant 2003: 385).

In short, the idea of wilderness was a white settler construct, an imagined pristine wild landscape, unspoilt and unpeopled. It led to an ideal of an American colonised Eden, a controlled and managed garden from which Indigenous people and people of colour were excluded through policies of removal and segregation.

The modern environmental movement and clashes with Native Americans

The twentieth century saw further tensions at the intersections of race and environment. The 1960s was a time of huge social upheaval across America.

Black civil rights, women's liberation and the anti-war movement were joined by the Red Power movement among Native Americans as well as rebellious, predominantly white middle-class, countercultural youth. As part of that rebellion, the counterculture looked to other cultures. With echoes of Thoreau and Muir, they regarded Native American traditional culture as being in harmony with nature and aimed to emulate this ideal with a 'back-to-the-land movement and an aesthetic that unequivocally evoked the Indian – long hair, headbands, moccasins, beads and feathers, leather and fringe, turquoise and silver' (Gilio-Whitaker 2020: 103).

The particular aim of the Red Power movement was to demand self-determination for Native Americans. The Relocation Act of 1956 had resulted in many American Indians migrating to cities as part of government policy to encourage and provide support to find jobs in cities and improve the lives of Native Americans away from the poverty-ridden reservations. Many of these promises didn't materialise, so that Native Americans found themselves distanced from their cultural lands and economically worse off than before. As a result of the Red Power campaigns, government policy changed with the Indian Self-Determination Act of 1975, which gave tribes governance over their own tribe and reservations.

In the years that followed, there were many clashes between the Native Americans and environmental lobbies. In 1985, for example, the Sierra Club sued to prevent Tlingit and Haida in Alaska from logging on Admiralty Island (Gilio-Whitaker 2020: 105). In 1999, when the Makah tribe in Washington state successfully hunted and killed their first grey whale in more than 70 years from a traditional cedar canoe, their actions were met with death threats and hate mail from various anti-whaling and animal rights groups (Andersen 1999).

Opposition to gaming has also been a platform upon which environmentalists have battled with tribes. When attempts to stop the Federated Indians of the Graton Rancheria from establishing a reservation and casino in Sonoma County, California failed, environmentalists argued that building the casino would harm the habitat of the endangered tiger salamander. The environmentalist case was ultimately thrown out, but not before it had gone all the way to the US Supreme Court (Gilio-Whitaker 2020: 137).

The tensions inherent in these examples prompt troubling questions about the conflict between the preservation arguments of the non-Indian environmentalists and the rights to exercise sovereignty among Native Americans who have had their own relationship to their environment disrupted by settler colonialism in the past. If the roots of American environmentalism lie in ideas stretching back to manifest destiny and an

imagined pristine wilderness, it is unsurprising that some ask the question, 'To what degree is environmentalism deployed as just another weapon of colonial domination in unpopular tribal economic development projects?' (Gilio-Whitaker 2020: 108).

From the 1990s, however, there are some signs of changing alliances. With the rise of climate justice movements, the Dakota Access Pipeline, for example, has united environmentalists and Native Americans in their opposition and campaign of civil disobedience.

Rachel Carson and *Silent Spring*

When asked about the books which have had the most significant impact on natural science, the naturalist, David Attenborough, cited Darwin's *Origin of Species*. As the second most significant book, he cited Rachel Carson's *Silent Spring*. Published in 1962 and focusing on the dangerous effects of pesticides, the book immediately sparked controversy and has often been regarded as the progenitor of the American environmental movement. As a topic for a curriculum aiming to include environmental history, it is rich in opportunities. Acknowledging the challenges that teaching scaled-up history can bring, this is a human-scale story of the work of one individual and the impact that one person's book can make. It is also a topic which demonstrates how environmental history is not neutral but rather intersects, in this example, with contestations relating to gender and political and commercial power.

Quiet, reserved and very private, Carson was born in 1907 in Springdale, Pennsylvania. As a child, she aspired to be a writer, but at college she switched her studies from English to biology. During the Depression of the 1930s she had to interrupt her doctoral studies for financial reasons and took a job as a biologist with the US Bureau of Fisheries. In this role she wrote and edited materials for the public, thus combining her skills as a scientist with her ability to communicate to non-specialist audiences. In her spare time she also wrote, and three of her books were on the bestseller lists; she became well known as one of the most popular nature writers of the 1950s. This enabled Carson to stop her job and to write full time. She turned her attention to the issue of new chemicals used in agriculture and pest control. She tried to get other writers interested in this, but in the end wrote the book *Silent Spring* herself. While she was researching the book, Carson was diagnosed with breast cancer. When the book was published and Carson made many public appearances defending her work, she hid her illness,

wearing a wig and sometimes moving with difficulty. She died in 1964 at the age of 56.

The book was initially published in instalments in the *New Yorker*, and even before the whole work had been published it created huge controversy. '*Silent Spring* Is Now Noisy Summer' was the headline in the *New York Times* just five weeks after the first instalment had been published. When it finally appeared in book form, it stayed on the bestseller list for 31 months.

At the heart of Carson's book was an understanding of the interconnectedness of environmental processes and how chain reactions are involved. When DDT enters the biosphere to kill bugs such as mosquitoes, that isn't the end of the story. The bugs are part of the food chain, so the DDT in turn threatens birdlife and fish. Humans are also part of the food chain and so are also at risk. Furthermore, DDT is particularly potent because it accumulates in the environment. It remains in the water and builds up in the bodies of everything that comes into contact with it. Carson found that DDT may alter our genes' structure, thus potentially making us more susceptible to cancer. She also noted how the overuse of chemicals results in resistance towards them and was critical of the industry's response to keep developing more potentially deadly chemicals.

Carson was not the first person to write about the overuse and misuse of chemical pesticides but hers was the first book which really drew public attention to the issue. Because she was a well-known nature writer, she had a large following of people who, by 1962, were eagerly awaiting her next publication. Her work was also written in a way that was accessible to the general public, and with chapter headings such as 'Elixirs of Death', 'Needless Havoc', 'And No Birds Sing' and 'Rivers of Death', the writing was certainly impassioned. It was also, however, scrupulously well researched, and critics struggled to identify specific inaccuracies.

There were further reasons why the American public was ready to hear the messages in *Silent Spring*. The recent open-air tests of nuclear weapons had alerted people to the worrying spread and dangers of nuclear substances. Carson had made comparisons between pesticides and radiation: both were invisible and dangerous. *Silent Spring* mentioned the 1954 *Lucky Dragon* episode, which had become a major international incident. The Japanese fishing boat had been unexpectedly covered in radioactive fallout following a hydrogen bomb test in the Pacific. The crew had become sick, the radioman had died and the contaminated fish had been sold in markets before the dangers were realised. *Silent Spring*

also referred to a health scare about contaminated food in 1959, when cranberries had been contaminated by a weedkiller that was known to cause thyroid cancer in laboratory rats; the drop in cranberry sales around Thanksgiving was headline news. In 1962, just as *Silent Spring* was being published, the media reported that Frances Kelsey, a female physician with the Food and Drug Administration, had resisted all commercial pressure and been successful in preventing the sale of thalidomide on the American market. The drug had been prescribed in Europe to prevent morning sickness during pregnancy, but had been shown to cause appalling birth deformities. Each of these stories, reported in the press, made Carson's account of invisible chemical poisons extremely timely and resonant.

Kennedy's government was quick to investigate Carson's claims and by May 1963 had endorsed the book's key messages. Further regulation of chemicals followed. The Toxic Substances Control Act of 1976 resulted in the banning or severe restriction of all six compounds indicted in *Silent Spring* – DDT, chlordane, heptachlor, dieldrin, aldrin and endrin.

It is no surprise, then, that the publication of *Silent Spring*, and the work of one individual, has been seen as a significant moment not only in the history of science but also in the history of the environmental movement, particularly in the United States. The story of Carson and *Silent Spring*, however, is revealing in other ways. While the US government broadly accepted the work, leaders of the chemical industry were quick to fight back to protect their commercial interests in agriculture and industry, and one company sent a letter to the publishers threatening a libel suit if it published the book.

Carson concluded her book with the statement that '"control of nature" is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man' (Carson 1962: 297). Her view, that humans are part of nature and it is futile for humanity to think it can take full control of nature, was in sharp contrast to the views expressed in industry. The chemist Robert White-Stevens wrote that 'man has crossed his Rubicon and must advance into the future armed with the reason and tools of his sciences, and in so doing will doubtless have to contest the very laws and powers of Nature herself' (quoted in Dunlap 2008: 114). Together, their different views illustrate the long-standing contrasting worldviews described in Chapter 3. Carson and White-Stevens met in 1963 in a CBS broadcast about *Silent Spring*. Although Carson was sick with her cancer she came across as calm and reasonable, in contrast to White-Stevens's often exaggerated statements such as, 'If man were to faithfully follow the

teachings of Ms Carson, we would return to the Dark Ages and the insects, and the diseases, and the vermin would once again inherit the Earth' (quoted in Dunlap 2008: 112).

Following the publication, the National Agricultural Chemical Association (NACA) funded a public relations campaign with advertisements, letters to the editor and published pamphlets arguing that agricultural chemicals were safe and necessary to feed a growing world population. In 1963, the company Monsanto published *The Desolate Year*, a parody of 'A Fable for Tomorrow', *Silent Spring*'s opening chapter, describing a world of mass starvation without chemical pest control.

In 1971, another chemist, Thomas Jukes, working in the industry, published a paper arguing that banning DDT would cause the collapse of the anti-malarial campaign and cost human lives. For many years, the World Health Organization (WHO) had insisted that DDT was the only cost-effective means to control malaria-carrying mosquitoes. However, by the early 1970s, it was clear that mosquitoes were everywhere and were acquiring resistance to DDT due to its overuse in agriculture. The WHO stopped using DDT against malaria, but this was not due to the publication of *Silent Spring*. Nonetheless, a link between Carson's book and the banning of DDT was established and the misinformation continued. Carson was criticised in publications such as *Forbes*, the *Washington Times* and *National Review*, and more recently the libertarian advocacy group Competitive Enterprise Institute set up a website, RachelWasWrong.org. In 2007, the centenary of Carson's birth, the accusation that *Silent Spring* indirectly killed millions of Africans flooded the internet (Stoll 2012). The claims were easily disproved, but the broader aim of the misinformation was to spread doubts about the science and to undermine confidence in government regulation. There is much similarity between these methods and those used by corporations to counter both the science that smoking is dangerous and that climate change is happening (Oreskes and Conway 2010).

Other opposition to *Silent Spring* took the form of personal attacks on Carson herself, including by the popular press, which drew on stereotypes of women as overly emotional and tending towards hysteria. Comments which described Carson as 'unmarried', 'never married' and 'a shy female bachelor' served to disparage her in an era when marriage and motherhood were elevated as women's highest calling. Because Carson had no institutional affiliation, she was dismissed as an amateur, someone lacking professional understanding and misreading or distorting the science. Since she often used terms such as 'nature', 'natural' and 'balance of nature' she was dismissed as a sentimental nature lover.

One agricultural expert commented, 'You're never going to satisfy organic farmers or emotional women in garden clubs'; another wondered why a 'spinster was so worried about genetics', and a reviewer in *Time* criticised her 'emotion-fanning words', characterising her argument as 'unfair, one-sided, and hysterically overemphatic' and tracing her 'emotional and inaccurate outburst' to her 'mystical attachment to the balance of nature' (quoted in Stoll 2012: 17).

The publication of *Silent Spring* in 1962 at the height of the Cold War led to further criticism of Carson as radical and unpatriotic. A letter to the editor of the *New Yorker*, for example, argued:

> Miss Rachel Carson's reference to the selfishness of insecticide manufacturers probably reflects her Communist sympathies, like a lot of our writers these days. We can live without birds and animals, but, as the current market slump shows, we cannot live without business. As for insects, isn't it just like a woman to be scared to death of a few little bugs! As long as we have the H-bomb everything will be OK (quoted in Stoll 2012: 17).

The political and cultural norms of the early 1960s, therefore, set the tone of many of the criticisms levelled against *Silent Spring*. That same context, however, also gave rise to the significant impact that the book created. Carson had challenged the authority and dominance of the scientific-industrial complex and this became a rallying point for the new environmental movement in the United States. Her challenge was also an attack on misplaced and ineffectual paternalism and came at a time when others were launching their critiques. Betty Friedan's *Feminine Mystique* was published in 1963; her call for women to throw off patriarchy related to Carson's own message that women could no longer assume that someone was looking after things, or that the spraying with pesticides must be all right or it would not have been allowed. Carson had challenged the post-war notion that 'father knows best' and her message was resonant with the early feminist writing of the 1960s. Many women championed Carson's work and grassroots groups for change multiplied in the 1960s. Women went on to play key roles, leading campaigns to ban the bomb, clean up rivers, save forests and stop pollution (Unger 2014).

The impact of *Silent Spring* differed between the USA and Europe. In the main, European agriculture did not have American agriculture's extensive monocultures or the consequent need for pesticides and aeroplane spraying. Europeans also tended to trust their governments more, and had confidence in scientists to protect them from harmful

environmental chemicals. On 18 March 1967, however, the SS *Torrey Canyon* caused a serious oil spill along the ecologically fragile coastline of south-west England. This was the first major oil spill from a super-tanker and served to shock Europeans into the realisation that they faced the same environmental problems as the United States. Some historians date the beginning of environmental concerns in Europe to that event.

In the United States, environmentalism helped prepare the way for other radical cultural, social and political activism in the 1960s. In Europe the direction was different, with many of the leaders and participants in the protests and radical movements of the 1960s later moving into the various green movements.

A study of Rachel Carson brings the further opportunity to compare her work with that of Greta Thunberg, a character with whom all school students will be familiar. Both are examples of people who were prepared to challenge the establishment single-handed, and both have had considerable impacts globally. There are also similarities in the ways in which they have been criticised. When Thunberg travelled to America by boat in 2019 to attend a UN climate action conference, she was followed by male vitriol. The multi-millionaire Brexit activist Arron Banks tweeted that he wished a freak accident would destroy her boat (later claiming he was only joking), a conservative Australian columnist called her a 'deeply disturbed messiah of the global warming movement' and the British far-right activist David Vance attacked the 'sheer petulance of this arrogant child' (Gelin 2019).

When *Time* magazine made Thunberg person of the year 2019, President Trump tweeted: 'So ridiculous. Greta must work on her Anger Management problem, then go to a good old fashioned movie with a friend! Chill Greta, Chill!' Thunberg, like Carson before her, didn't rise to the bait. Her retort, when Trump lost the 2020 presidential election and demanded a recount, is well known. She tweeted: 'So ridiculous. Donald must work on his Anger Management problem, then go to a good old fashioned movie with a friend! Chill Donald, Chill!' When Trump left the White House for the last time. Thunberg remarked, 'He seems like a very happy old man looking forward to a bright and wonderful future. So nice to see!'

Conclusion

History is never static: new themes and priorities for study emerge from the concerns of the present. Traditional history has been challenged by

perspectives where issues of race and gender (among other themes) are focused on. This book has argued that environment is another such theme which needs to be included in the diversified curriculum. This chapter has looked at the intersections between firstly, environment and race and secondly, environment and gender. By taking a thematic approach, and then one where the focus is an individual, the chapter shows how the intersections of different themes can be addressed within classrooms.

Further reading

Gilio-Whitaker, D. (2020), *As Long as Grass Grows: The Indigenous fight for environmental justice, from colonization to Standing Rock.* Boston: Beacon Press.

Merchant, C. (2003), 'Shades of darkness: Race and environmental history'. *Environmental History* 8: 380–94.

Oreskes, N., and E. M. Conway (2010), *Merchants of Doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming.* London: Bloomsbury.

Stoll, M. (2012, updated 2020), 'Rachel Carson's *Silent Spring,* a book that changed the world'. *Environment & Society Portal.* https://www.environmentandsociety.org/exhibitions/rachel-carsons-silent-spring (accessed 28 March 2023).

7
How environmental perspectives impact on disciplinary concepts

This chapter starts from the premise that the discipline of history is itself a historical phenomenon and construction, before using an environmental lens to review the disciplinary concepts, such as causation and consequence, which underpin the current school history curriculum in the UK and elsewhere. The challenges that climate change raise for the discipline are considerable: as Penelope Corfield asks, 'Does climate change put a spanner in the works for history education?' (Corfield 2011). This chapter argues that, far from undermining our work, by bringing an environmental lens to the history curriculum we can in fact strengthen students' critical capacity in relation to second-order concepts and thus support students' understanding of history and the nature of the discipline.

Causation

Environmental or economic causes?

History is the study of causes, and causation is a mainstay of every history teacher's classroom. Embedding environmental history into the curriculum means shifting a traditional focus on just human factors towards the inclusion also of environmental, or natural, factors, in the accounts and explanations that we teach. There is a need for greater porosity between the human and cultural and the natural and environmental factors. The categories that we typically use when talking about causation don't quite get us there. Political and religious factors may often be almost exclusively human in origin and the social may depend on how it is interpreted, while 'economic' doesn't quite do justice to what we mean by the term and needs

to be problematised. The etymology of the word 'economic' and how it changed over time is revealing. In the 1530s, economic referred to 'household management'; by the 1650s its meaning had shifted to 'wealth and resources of a country'; and from 1792, the meaning had shifted again to 'science of wealth'.[1] While I make no claims as a linguist, the shift seems to illustrate its move from an everyday household term to something more in keeping with the elevated and scientific rationalism of the Enlightenment. The first book with 'political economy' in its title was published by the Scottish economist James Steuart in 1767, while Adam Smith's more famous work published in 1776 explicitly addressed what builds the wealth of nations.

Economic usually refers to a factor as it impacts on humans, and thus it retains a very human-oriented focus while overlooking the deeper origin, which may pertain to the natural world. Often in history, the economic is underpinned by natural factors, such as poor harvests, famines and the scarcity (and therefore the price) of grain. That we talk about economic, rather than environmental, factors suggests a traditional orientation where the porosity between human and natural factors is resisted or overlooked, with a preference towards an exclusively human-centric focus. One simple step, but potentially a very powerful one, that history teachers can take is to include 'environmental' as an additional potential factor, as appropriate to the topic, in their accounts of causes. The focus on the seventeenth century in Chapter 9 is an example of this.

Causation or origination?

Critiquing the familiar term 'economic' leads to a consideration of what remains hidden, left implicit and embedded within the term. I have suggested that environmental factors are often the origin of what we call economic causes. This raises a provocation that we should focus our attention more on origins and, to that extent, it challenges the primacy of causes that history has traditionally prioritised. The Harvard philosopher Aviezer Tucker develops the argument. Historians, he suggests, can be too concerned with causation while a focus on origins offers a more straightforward, simple and useful concept. He uses examples to illustrate his meaning. Many of the unquestionable paradigmatic success stories of science have been about the discovery of origins – for example, that the universe originated in a Big Bang, or that the origins of humanity are in East Africa. In the case of Darwin, he was able to identify the origin of species, and this remains his key contribution, even though he got some of the causal evolutionary relationships wrong. Other examples Tucker

cites include the established common origins of the Indo-European languages, even though it is unknown when and how the languages split from each other historically. As he summarises, 'like Darwin or the founders of historical linguistics who inferred some token common causes of species and languages did not possess an exhaustive or even partial list of possible common causes' (Tucker 2020: 107). Similarly, the origins of the Polynesian word for potato and indeed the potato itself are clearly South American. We also know that the potato arrived in Polynesia before the Europeans arrived there, but the pre-Columbian causal chain or chains that transmitted the plant and its name from South America to Polynesia are unknown. In everyday life, Tucker concludes, our focus is often on origins rather than on causes. Furthermore, a focus on origins, rather than causes, he argues, offers the prospect of a unified epistemology across all types of history at different scales ranging from Big History to traditional social and political history.

Tucker's ideas offer considerable challenges for established classroom practice. A focus on causes is not about to disappear from our classroom repertoire, although Tucker's provocation is a useful reminder of the need to avoid excessive categorisation and prioritisation of causes, which can very easily result in over-determined accounts. More positively, adding a focus on origins to our routine classroom repertoire may be particularly helpful when including history at a very large scale. For example, in reviewing how humans have viewed their relationship with the rest of nature over large swathes of time (see Chapter 3), a focus on origins and subsequent developments, rather than causes, seems a more appropriate set of terms to be using.

In summary, when thinking about causation, the climate emergency calls for additional concepts to be employed in classroom history: environmental, as distinct from the human-centric economic, is one important addition; origination, as distinct from causation, is another.

Consequence

Consequence has often been seen as 'causation's forgotten sibling' (Fordham 2012) and others have also suggested that this needs to change. Richard Kennett, in a blog post about teaching empire (2021), argues that our focus on causation tends to maintain a focus on the coloniser and looking at how empires were established. If the emphasis is shifted to the colonised, in keeping with efforts to decolonise the curriculum, it is more illuminating to focus on consequence. What happened once empire was

established, what were the impacts and experiences of the colonised, what are the legacies of this history? Similar arguments can be applied to the teaching of environmental history, since both focus our attention on what has been absent from, overlooked or silenced in the histories that we teach.

A focus on consequence also shifts our attention towards ethical enquiry, a feature of the history curriculum in some countries but not made explicit in the English National Curriculum. Consequence brings a focus to future-facing impacts and thus is clearly pertinent when considering climate change. Likewise, focusing on unintended consequences can help in understanding the world today while also drawing attention to how human actions have damaged and disrupted ecological systems – sometimes knowingly, at other times in ignorance or unintentionally (see Chapter 9 on James Watt). Other concepts relating to consequence which are relevant for environmental history include whether impacts are single and one-off, or whether they are cumulative in nature, potentially resulting in the tipping points and unprecedented changes which scientists are now warning of.

A final consideration relating to consequence concerns the scales at which we set out enquiries. Chapter 2 has argued that the curriculum tends to focus on the human and political scales of time, while the inclusion of environmental history calls for an engagement with much larger scales. By embedding environmental history into the curriculum, we can open up our enquiries to look at consequences over much larger swathes of time. Chapter 2 has suggested, for example, that we are currently living with the consequences of the Neolithic Revolution, while Chapter 5 discusses consequences of the Black Death which stretch into the present. There has always been an artificiality to where we end 'the story' when considering consequence, not least for pragmatic reasons in the classroom, and there has always been value in raising this as a question for students to think about and reflect on. Our understanding today, that the environment is changing all the time, is yet another reminder of the cautions we need to apply when determining consequences.

Change and continuity

Tipping points and unprecedented change?

While origination stretches back to before causes, tipping points pull in a different direction, to where causes become change. One of the mantras in history education is that nothing in history is inevitable until it actually

happens. With the weight, or benefit, of hindsight we can interpret an event in such a way that we think it could only have happened in the way that it did. As history teachers, we are alert to this misconception, recognising how it ignores human agency and the open, contingent and complex nature of how and why things actually happen.

However, when it comes to climate change, this long-established mantra faces considerable challenge. The language of 'tipping points' has become firmly established in the discourses of climate change. The IPCC Fifth Assessment Report (2014) defines a tipping point as an irreversible change in the climate system. Media headlines across the political spectrum agree about the seriousness of the current situation. In response to a high-profile article in *Nature* (Lenton et al. 2019), the *Sun*'s headline read, 'End of the world: Earth has "now reached 9 climate change tipping points" as top scientists warn of "domino effect catastrophe"' (Pettit 2019), while the *Guardian* headline stated, 'Climate emergency: world may have crossed tipping points. Warning of "existential threat to civilisation" as impacts lead to cascade of unstoppable events' (Carrington 2019). The language here is uncomfortable. 'Cascade of unstoppable events' and 'domino effect catastrophe' suggest that once we go beyond those tipping points, there is a certain inevitability about the changes that will follow, and which cannot be stopped.

While history has traditionally emphasised human agency over historical time, the current climate emergency suggests that we may have reached the limits of what the biosphere can sustain. Human history has bumped into natural history, as the authors of *Limits to Growth* (Meadows et al. 1972) first told us nearly 50 years ago (Voros 2018). While the tipping points which science is presenting in relation to climate change certainly challenge previously held assumptions about the dangers of inevitability in history, this doesn't mean causation is reduced to environmental determinism. The role of human agency, though perhaps reduced because of the climate emergency, is also not removed completely.

While the scientific projections are certainly depressing, the future does remain open. Anecdotally, in 2020, a planning application for my local airport to expand was rejected by the local council. An activist who had campaigned against the expansion of the airport tweeted at the time 'Is this what a tipping point looks like?' It suggests an optimistic view that human agency could possibly still shape the future in more sustainable ways.

The discourse of tipping points has also been associated with the concept of unprecedented change (see Chapter 10 for a discussion of this). Zoltán Simon (2019; 2021) characterises our moment in history as

unprecedented, without continuities from developmental history. Instead, ours is a time which doesn't simply unfold out of past conditions but suddenly erupts in the shape of game-changing events which will bring about a whole new world. The urgency of the climate emergency is clear and there is no scope for complacency; however, the notion of unprecedented change can be challenged on two grounds. Firstly, humans are notorious as a problem-creating but also as a problem-solving species. The future will include many continuities and gradual changes which may include remedial actions. As Corfield (2011: 17) reminds us, 'even major changes will be mitigated and counter-balanced by continuities and micro-changes' or, as Tyson Retz (2021) describes it, 'an accumulation of tiny instances'. Secondly, the notion that these changes are unprecedented can be challenged on the grounds that there are historical precedents in the experiences of many people in the world who faced imperial and capitalist expansions which often also destroyed natural ecosystems. As Alexander Benger (2021) argues, there are many 'peoples who have experienced, resisted and adapted to "game-changer events", in both an environmental and cultural sense'.

The concepts of tipping points and unprecedented change present further challenges for teachers, not least because of the anxiety which they may create for students (see Chapter 8 on pedagogy for a discussion of this). The need for action is certainly urgent but this does not completely disrupt the open and contingent nature of the future. Retz (2021) summarises his hope 'that in developing a new knowledge regime, and in the old rivalry between freedom and necessity, history will continue to reveal life as an open-ended field of possibility'.

Periodisation

Every history teacher is familiar with the commonly used dual definitions of their subject: history can refer to both the past, and to the record of the past. If the latter definition is used, it begs the question as to what records of the past we are referring to. Rooted in the discipline's Enlightenment origins, those records were predominantly the written records of the past. The logic of that position gave rise to distinctions being made between history and prehistory, as a time before there were any written records. The dangers of this position are clear. It can easily result in an account of the past which sees a clear disjuncture between prehistory and history, thus creating inaccurate accounts of change and continuity. Prehistoric people can, all too readily, be regarded as primitive, savage and without sophistication, while civilised people who settled and developed written

language and pursued learning can be seen as superior. While the development of written language has enabled more extensive study, it is unhelpful to see people without written records as distinctly different. Shryock and Smail (2011) denounce the view that history begins with 'civilisation' and criticise the inertia of history curricula which perpetuate it. Instead, they argue that history begins not with the invention of writing, but with the evolution of anatomically modern human beings and thus stretches back into deep time.

A focus on environmental history requires looking at history at large scale. The concept of deep time refers to time on geological scales: these are almost unimaginable when we think in terms of human timescales. How can we understand that the earth is 4.5 billion years old? History and geology are different disciplines but environmental history blurs the boundaries. Furthermore, the climate crisis means that we need to understand human history as a part of the planet's much longer history. Chakrabarty (2017: 43) sets out the implications for the discipline with clarity:

> An awareness of 'deep time' is what will inform the social sciences of the future. Man will have to be placed in the larger context of the deeper history of life on this planet. This does not mean that our usual disputations about intra-human in/justice, inequalities, oppressive relationships will not continue; they will. But the climate crisis leaves us more aware of the obsessively human-centric nature of the social sciences. Such anthropocentrism may be necessary but will increasingly seem inadequate if one looks at the impact of the human ecological footprint on other forms of life and on the planet itself. So our inevitable anthropocentrism will need to be supplemented (not replaced) by 'deep time' perspectives that necessarily escape the human point of view . . . These are necessarily stories of deep time, and they make us aware that humans come very late in the history of this planet, and that the planet was never engaged in readying itself for our arrival. We do not represent any point of culmination in the story of the planet.

Chapter 10 develops these ideas further by looking at other-than-human histories.

The periodisation we use in history classrooms, therefore, needs to change. The distinction between history and prehistory needs to be critiqued. While deep time is unlikely to be a prominent feature as the current curriculum stands, an introductory awareness of its meaning provides a helpful and critical perspective to support students' understanding of the nature and scope of history.

Embedding environmental history into the curriculum calls for other periodisation to be introduced. Holocene, Anthropocene (see Chapter 10 for a discussion for this and competing terms), Medieval Warm Period, Little Ice Age and Great Acceleration are all periods which warrant inclusion. Doing so opens up excellent opportunities for students to discuss the arguments for and against the inclusion of these periods, to look at how they differ from the commonly used periods in the current curriculum, and to debate the affordances of their inclusion.

Evidence

When teaching trainee teachers about historical interpretations, my opening question, 'Why do we have different interpretations?', is always met with responses which unfold along a familiar pattern. The teachers talk first about the historians who produce the different accounts, the social and political 'baggage' they carry, the culture of which they are a part and the audiences they are writing for, and explain how all these factors can influence the interpretations they produce. The perspective of the historian is always prioritised in their early responses. With prompting, they move to talk about the questions they are aiming to answer and then, eventually, they start talking about the evidence they draw from. I offer a further prompt about official secrets and how new evidence comes into the public domain before we eventually have a conversation about new types of evidence which can change our interpretations of the past. Carbon dating is generally mentioned, as well as the place of big datasets which digital technologies enable; occasionally a teacher will talk about proxies such as pollen analysis. The shape of the conversation is always the same and suggests to me how history education has been very successful in training its practitioners to foreground the positionality and perspective of those who create the sources we work with. While this is all to the good, the shape of the conversation also reveals the continued prioritising of human factors over and above those which relate to the rest of nature.

If environmental history is to be embedded into the curriculum, we need to become more adept with using a wider range of sources of evidence in the accounts we tell in our classrooms. Perhaps one day when I ask the new teachers 'Why do we have different interpretations?' they might start by listing proxy data such as tree rings, fossilised pollen and carbon dioxide concentrations in the air bubbles in glacial ice. That, for me, would indicate a step forward. How such proxies can be used in

classroom settings is explored further in Chapter 9 in relation to the seventeenth-century general crisis.

Environmental historians look beyond the literary and the visual to the environment itself as a source. Environments are layered with 'strata of memory' (Schama 1995: 7) that can be explored by being in the environment itself. A river, for example, may be seen as an archive of choices shaped by dams and mills and weirs, that reveals human relationships to water and land (Dudley and Pearson 2017). Demuth (2019) sets their students an assignment to find an environmentally related source from the last 500 years; this offers an opportunity to stimulate interest and to encourage students to look at their local environment in new ways. Furthermore, given the tendency for students to focus first on the positionality of a source, there is value in encouraging the use of more environmental and archaeological sources since any bias is absent from these, and this can thus encourage interrogation without the impediment that perspective can bring. Including environmental history into the curriculum, of course, does not mean abandoning all the many types of sources history teachers currently use, as will be clear from the visual and documentary sources suitable for classroom use which this book has employed.

The scrutiny of sources is rightly one of the cornerstones of history, and has been since the start of professional disciplinary history. Without the traces of the past there is no history, and having access to those traces can be one of the most exciting elements of bringing the past to life. Just as important, the interrogation of claims is a key and indispensable part of living in a free society which needs to be protected and prioritised in classrooms. The place of sources in history teaching, however, also has its limitations. As every teacher knows, we need to beware of pointless exercises in reliability and bias, as well as the potential tyranny of source enquiry where we invite students to make informed, critical judgements on the basis of limited, inadequate 'gobbet' evidence (Kitson 2003; Counsell 2000), and where too strong a focus on sources can serve to stifle curiosity or imagination.

While environmental history calls for us to draw from a wider range of evidence, including proxies, and from other disciplines, it also calls for us to engage with much larger explanatory accounts or narratives. Sources and narratives are both key elements in disciplinary history. Narratives, of course, run the danger of being seen as traditional, fixed or grand narratives. Embedding environmental history into the curriculum may mean including more large-scale explanatory accounts, but these need to be taught as representations with verisimilitude, remaining open to scrutiny as interpretations rather than as uncontested factual accounts.

Similarity and difference

Discourse in history is impossible without making generalisations. At the same time, too much generalisation reduces history to a single, simple narrative. Not all individuals or groups experienced events or developments in the same way, so that showing the complexity of the past is an important aim for all teachers. The use of the term 'Anthropocene' illustrates the tensions at play. The Anthropocene has been defined as 'the current geological age, viewed as the period during which human activity has been the dominant influence on climate and the environment' (*Oxford Learner's Dictionary*). The definition draws attention to humanity's impact, as a whole species, on the planet. Closer critique, however, reveals much greater complexity which relates to the uneven distribution of power across the globe. Wealthy nations have been the main beneficiaries of industrialisation and those who industrialised first have been emitting carbon dioxide into the atmosphere for longer. In contrast, many of the poorest parts of the world, who contribute very little in terms of carbon emissions, are, and will be, disproportionately affected by the harmful impacts of climate change. These ideas are discussed further in Chapter 10.

Interpretation and significance

History is an interpretive subject; the content which teachers, or the curriculum itself, set out to teach necessarily prioritises some aspects of the subject over others. Analysing how and why the curriculum has changed over time is itself a study of historical interpretation. The central argument in this book for the inclusion of environmental history results from a critique of the current curriculum and its Enlightenment disciplinary origins. In this sense, therefore, historical interpretation is a thread which runs through the whole book. In many of the chapters, I have taken an environmental lens to an often familiar topic, and this has resulted in a new interpretation.

When we talk about historical interpretation, significance is never far away: as Peter Seixas reminds us, 'questions of curriculum selection, textbook construction, historical interpretation, the meaning of "history" itself, all hinge on the question of significance' (Seixas 1997: 27). Unlike other second-order concepts, significance is a reflective meta concept: it sits above all the other concepts. At its heart, it is the continual questioning about why some people, events and trends end up being remembered both at the time and subsequently. It is never fixed with some intrinsic value: it is always assigned.

In working with trainee teachers, looking at their lesson planning and observing them teaching, I often ask the question, 'Why are you teaching this?' The initial answer, that it's on the curriculum, is not really sufficient. Of course, busy teachers working to support students to get the best grades possible can become very caught up in the operational side of delivering the curriculum. If, however, they never pause to reflect on why the topic is included on the curriculum, they are failing to fully engage with questions of significance. Students in many classrooms up and down the country will know why William won the Battle of Hastings but fewer perhaps will know why the topic is included on the curriculum and why it matters (Haydn and Harris 2010).

The flip side of significance is silence. Trouillot and Carby (2015) describe how the way history works can result in 'erasure' and the silencing of some stories and accounts. Any thinking about significance needs also to reflect on the accounts which don't get heard, and the current decolonising process and agenda sets out to address some of these silences. Chapter 5 looks at one example of silence in history, namely the 1918–19 Spanish flu pandemic and the reasons why this was studied so little in the years that followed. During the coronavirus pandemic, however, there was an upsurge of renewed interest in the 1918 pandemic, which became regarded as highly significant. This illustrates well how the ongoing interaction between the past and the present impacts on how we ascribe meaning and significance.

Given the curriculum that we currently have, introducing environmental history brings issues of significance to the fore. It opens a question which goes to the heart of history, about why are we teaching this now. This is a good question for every student of history to think about as part of their education, and one we should not shy away from. As Matthew Bradshaw (2006: 18) argues, 'historical significance should be creating controversy in the classroom'. Chapter 8 discusses pedagogy in relation to teaching controversial issues.

Conclusion

This chapter has taken an environmental lens to the second-order concepts which underpin disciplinary history. The ideas presented in this chapter represent initial interrogations only, and they will benefit from further exploration and development in classrooms. The second-order concepts should not be thought of as fixed, reified or set in stone; rather, they are best thought of as provisional and always emergent, shaped by

theoretical thinking alongside many and varied classroom explorations. The chapter has argued that environmental history offers the prospect of strengthening students' critical understanding of the nature of history and the associated second-order concepts. The following two chapters employ the ideas raised in this chapter in the context of topics and examples which can be taught in classrooms.

Note

1   https://www.etymonline.com/word/economy#etymonline_v_980.

Further reading

Retz, T. (2022), 'Teaching history on the scale of the Anthropocene: Three ethical challenges'. *Historical Encounters* 9(2): 7–17.
Sörlin, S., and M. Lane (2018), 'Historicizing climate change: Engaging new approaches to climate and history'. *Climatic Change* 151: 1–13.

Part II
Into the classroom

8

Pedagogical approaches to the challenge of teaching environmental history

Much of this book has focused on the 'what' of teaching, whether that be the substantive or the disciplinary knowledge of the curriculum. This chapter focuses more on the student and how their learning can be supported in recognition that 'knowledge matters, curriculum matters, but pedagogy probably matters most' (Husbands 2015: 49). More specifically, the chapter looks at children's incoming perceptions relating to the climate crisis, along with discussing how teachers can navigate the controversial elements and possible emotional responses that teaching about the climate crisis involves.

Is environmental history controversial?

Teaching environmental history is not necessarily controversial. It is, after all, just another broad lens we can bring to our study of the past to complement the well-established foci on, for example, social or political history. How we plan to teach environmental history will need to attend to all the same considerations we have when teaching any history. Michael Riley (2000) has done much to shape our understanding and practice in relation to the use of carefully crafted enquiry questions while others (for example Mohamud and Whitburn 2019) have extended and developed the work further. In summary, when planning sequences of lessons, teachers need to check:

- Does the enquiry capture the interest and imagination of your pupils?

- Does it place an aspect of historical thinking, concept or process at the forefront of the pupils' minds?
- Does it result in a tangible, lively, substantial, enjoyable 'outcome activity' (i.e. at the end of the lesson sequence) through which pupils can genuinely answer the enquiry question? (Riley 2000: 8).

Mohamud and Whitburn add to this, 'Issues of social justice and fairness are paramount for us, so we include the ethic of an enquiry as an essential element of our plans' (2019: 28).

While environmental history isn't necessarily controversial, Mohamud and Whitburn's additional consideration helps in understanding why it can be controversial to teach. Firstly, it is revisionist history and therefore challenges traditional and established narratives. While history is never a settled account, there are some who would like it to be so. Any challenge to the canon can be regarded as a politically charged disruption, as, for example, the furore which followed the toppling of Edward Colston's statue in Bristol in 2020 indicates.

Secondly, revisionist histories often focus on elements which have been absent or silenced in earlier accounts. In doing this, issues of social justice are often brought to the fore as is clear with revisionist histories focusing on race, gender or class. The same is true for environmental history. Furthermore, environmental history does not sit as a neutral addition to other histories; rather, it interacts with them and, as Chapter 6 shows, environmental history is not devoid of contestations of power.

Thirdly, environmental history, particularly as it relates to discussions about how to respond to the current climate crisis, connects with people's different opinions and beliefs. As George Monbiot comments, 'You think you're discussing technologies, you quickly discover that you're discussing belief systems . . . We choose our technology – or absence of technology – according to a set of deep beliefs; beliefs which in some cases remain unexamined' (Monbiot 2011). As Chapter 3 shows, how humans have thought about their relationship with the rest of nature has a long history which still has relevance and resonance today.

Fourthly, the urgency and the magnitude of the current climate crisis has the potential to overwhelm. Strong emotional responses, which can range from sadness and grief to anger and resignation, can make teaching environmental history highly sensitive and emotive.

Environmental history, therefore, can be controversial in classrooms in different ways, and teachers need to be alert to managing these different sensitivities. Because it is such a new focus in the curriculum, there is currently very little knowledge arising from classroom experience.

As environmental history gets taught more, so too our understanding of effective pedagogy will strengthen. There is, however, a good understanding more generally of how incoming preconceptions can impact on learning (see, for example, Donovan and Bransford 2005), along with quite an extensive literature on appropriate pedagogy for teaching other controversial issues in history classrooms (see, for example, Historical Association 2007). Much of this is relevant to environmental history.

Children's preconceptions

Children don't arrive in our classrooms as empty vessels. They bring with them a full range of beliefs, prejudices and views, sometimes inherited from their families or local communities. Their views can be strongly held and invested with emotion, which can give rise to difficult classroom interactions. This is true for any element in history where there are connections to identity and belief, and it is also true when climate change is discussed. There are different ideas and beliefs which are likely to be present among the student body and these can be grouped very broadly into three types, which can be categorised as denialist, technicist and declensionist (Hughes 2006). Each has its own history which could itself, potentially, also be the focus for study in the classroom.

Denialists: those who deny climate change

Climate change denial has its own history as part of the wider culture wars of the late twentieth century. Particularly prominent in the United States, that history stretches back to sophisticated campaigns funded by the fossil fuel industry from the 1970s onwards (Oreskes and Conway 2010). In 1997, research showed there were virtually no differences between Democrats and Republicans in their views about global warming, with around half thinking that warming had begun. By 2008, 76 per cent of Democrats accepted the science of global warming compared to just 42 per cent of Republicans (Maibach et al. 2009). The questioning of the scientific facts and the broader cultural milieu of mistrusting experts has helped to bolster such beliefs. There are also more 'casual' deniers. Rather than outright denial, these people might suggest that the science has been exaggerated or that the scientists haven't yet reached a consensus. In the meantime, they might argue, it is best to restrict exposure to such concerns, in a well-trodden human tendency towards avoidance of things

which are difficult and challenging along with an element of wishful thinking. Denial can feel easier than being afraid or confused.

The denial of difficult facts is nothing new across history. The Catholic Church's reaction to Galileo, the activities of the tobacco industry and Holocaust denial are all well-known examples. Clive Hamilton (2013) describes other instances where denial has been prominent and influential and draws some parallels with climate denial today. His first example is Einstein's theory of relativity. This attracted fierce controversy in the 1920s from ultra-nationalists who could not separate Einstein's political views (as an internationalist and a pacifist) from his scientific views. Einstein wrote to a friend, 'This world is a strange madhouse. Currently, every coachman and every waiter is debating whether relativity theory is correct. Belief in this matter depends on party political affiliation' (quoted in Hamilton 2013: 20). Science was viewed through political lenses, just as some outlets and social media continue to do today in relation to climate change.

Hamilton's second example is that of Winston Churchill during the inter-war years, when he argued against appeasement. Hindsight aside, the public was still traumatised by the memory of the First World War and understandably wishful in thinking that lasting peace would endure. The warnings that Churchill and a few others made were met with derision, and they were often ridiculed as being alarmists and doom-mongers. Again, there are echoes of a similarly dismissive response to climate change by some world leaders reported in news outlets today (see, for example, Elliott and Weardon 2020; Buller 2021).

Hamilton's third example is the historical allegory of Albert Camus's novel *The Plague* (1947), in which the protagonist, Dr Rieux, recognises his patients' symptoms as signs of plague long before others begin to accept the facts. Camus details the strategies the townspeople adopt to avoid or deny the meaning of the plague. First they attribute deaths to something else, then they say life will soon return to normal, and later they cling to superstitions or drink more wine because a rumour says it kills the bacillus. The strategies are not a world away from some of the suggestions publicised during the Covid-19 pandemic, such as President Trump's remarks about bleach, Brazilian President Jair Bolsonaro's directive to Brazilians to 'stop whining' (BBC 2021) or suggestions that the virus was just like flu.

Stanley Cohen's seminal work on denial (2013) shows how forms of denial are very pervasive, operating at different levels from internal denial (of an alcoholic who denies the extent of their problem), to public acts of denial (of the outward happy persona of a dysfunctional family),

through to state-wide or official denial (of the 'bystander' state that stands in silence despite knowledge of widespread horrors). Moreover, he argues, all these forms of denial have social origins and are learned through the normal cultural transmissions.

In the face of difficult facts, denialism continues to be alive and well in the world today, and teachers can expect that such views may surface in classrooms when topics which connect to climate change are mentioned.

Technicists: those who accept climate change and believe that technology will find solutions

A second broad group of people accept the science of climate change and feel either confident or hopeful that human ingenuity and the development of new technologies will lead to solutions. There are, after all, a great number of technological achievements which have demonstrably improved the quality of life for millions of people, including clean drinking water and sanitation. At a deeper level, this optimism may also be anchored in a worldview narrative of progress, the history of which is discussed in Chapter 3.

Declensionists: those who accept climate change and believe that we are heading towards catastrophe

A third broad group of people accepts the science of climate change but sees no solution to the problem. In terms of worldviews discussed in Chapter 3, the views of these people may be rooted in a narrative of decline. For some, these declensionist narratives suggest that we are heading for an environmental catastrophe anyway, and it's too late to do anything about it. James Lovelock, after a lifetime's concern with the environment, argues, in language which is far from neutral, that any talk of sustainable development is too little, too late, 'even now, when the bell has started tolling to mark our ending' (Lovelock 2007). As the urgency and severity of the climate crisis has become more and more evident, denialism may have become less prominent while narratives of decline have become more evident. Ecoanxiety is on the rise, and may well have become a more pressing challenge than denialism. A poll in the United States found that Americans are now nearly four times more likely to say they're alarmed about the climate crisis than to be dismissive of it (Leiserowitz et al. 2022). Recent research in 10 countries across the globe

surveyed 10,000 young people aged 16–25 (Hickman et al. 2021). Respondents in every country expressed worry about climate change, with 59 per cent saying they were extremely worried. Almost half of those surveyed said their feelings about climate change negatively affect their daily life, while 83 per cent said they think people have failed to take care of the planet. There were similar findings in a review of 51 international studies conducted between 1993 and 2018 which focused on the perceptions and understanding of climate change among young people between the ages of 8 and 19 (Lee et al. 2020).

Ecoanxiety is particularly in evidence among young people (Hickman et al. 2021) and nowhere is this more apparent than in the figure of Greta Thunberg, who suffered years of debilitating depression in response to governments and people doing so little, as she saw it, to address the climate emergency before being galvanised into her own, now famous, climate strike. Psychologists explain how we can expect to see strong emotional responses as students engage with issues of climate change. They may feel despair at their own powerlessness to make a difference, or panic and anxiety in the face of many future uncertainties; they may feel overwhelmed by the complexities involved, and anger towards older generations to whom they may attribute blame. These three groups are ideal types, and while some people may fit neatly into one group, others will hold less clear-cut ideas which may straddle the different groups. The purpose in setting out these groups is to help teachers to understand the range of perceptions that students are likely to be bringing with them into the classroom. Of course, students may display other responses. They may have little or no interest in the issue of the climate crisis, or find themselves preoccupied with more immediate and pressing concerns, such as poverty or hunger. Perspectives on how to manage incoming preconceptions are presented in the next two sections.

Avoiding avoidance

As state-funded institutions, schools are bound by government guidelines on political impartiality and teacher neutrality. Looking at different scenarios, the Department for Education (2022) guidance for England states:

> Where teaching covers the potential solutions for tackling climate change, this may constitute a political issue. Different groups, including political parties and campaign groups, may have partisan

political views on the best way to address climate change. This part of the topic should be taught in a balanced manner, with teachers not promoting any of the partisan political views covered to pupils.

While this does not preclude teachers addressing issues to do with climate change in their classrooms, there is evidence that teachers may feel cautious about teaching anything which might be seen as advocating activism (Dunlop and Rushton 2022; Howard-Jones et al. 2021).

Beyond the policy context, there are educational reasons why teachers may be cautious to teach climate change. The Historical Association's report *Teaching Emotive and Controversial History* (2007) identifies reasons why teachers avoid controversial issues in their classrooms, ranging from not knowing enough and believing students to be too immature, to not wanting to cause offence and avoiding potential complaint which might arise at the interface between school and community histories. Kitson and McCully's (2005) research, conducted in Northern Ireland, sets out a typology of different teacher stances towards teaching controversial topics. They characterise these as avoiders, containers and risk-takers (Table 8.1).

Kitson and McCully argue that teachers need to become risk-takers; furthermore, the history classroom, with its established procedures relating to evidence and enquiry, may be one of the most appropriate spaces where controversial issues can be explored in structured and supported ways.

Table 8.1 Avoiders, containers and risk-takers (Kitson and McCully 2005).

Avoider	Avoids teaching topics that might be controversial; purpose of teaching history is to make pupils better at history; does not agree that history teachers have a wider contribution to make
Container	Controversial issues are taught but contained through the historical process; pupils not encouraged actively to engage in the root of the controversy; might teach parallel topics that are not too close to home
Risk-taker	Fully embraces the social utility of history teaching; consciously links past and present; seizes opportunities to tackle controversial issues; not afraid to push the boundaries

Barton and McCully (2007), drawing from international studies as well as their own extensive research in Northern Ireland, set out helpful guidance about how to approach teaching controversial issues in history classrooms. Classroom discussion is a key element with demonstrably positive outcomes. Empirical findings suggest that students who regularly take part in classroom discussion are more likely to vote, support basic democratic values, take part in political discussions, follow political news in the media, be interested in the political process and have confidence in their ability to influence public policy (Barton and McCully 2007: 14). There may be a need to establish ground rules as to what can be expressed and how views can be responded to. However, if more extreme views are not permitted, this can be a sure way to shut down discussion and students may conclude that school history is irrelevant to their own concerns. Teaching controversial issues necessarily includes engaging the emotions; using visual images, along with music and film clips, can be useful ways to support this. Interrogation of such sources, carefully structured, is essential to support students in developing their own agency and ideas. Engaging with emotions, however, also brings with it responsibilities, and because of this, there may be a need to give students time to wind down at the end of a lesson before moving to another class.

In terms of teacher positionality, Barton and McCully advise that teachers can reveal their position. They draw from research which suggests that students can generally infer their teachers' positions in any case through body language and other subtle cues; furthermore, students consider themselves to be capable of developing positions on controversial issues without being influenced by their teachers. Barton and McCully also advise teachers to admit to their own uncertainties. This may be particularly relevant when issues relating to the current climate crisis are considered. Climate change has been recognised as a 'wicked' problem (Rittel and Webber 1973) which is difficult or impossible to solve because any effort to solve one element may reveal or create other problems. In light of this, being confident and sure about solutions to climate change may be considered either naïve or arrogant.

The inherently future-oriented, ongoing nature of the climate crisis gives rises to other challenges which teachers need to navigate. Teaching environmental history as it relates to the current climate crisis may result in discussions around activism. The youth climate strikes demonstrate the relevance of climate change as a pressing concern to many school-aged children today. The inclusion of environmental history in the curriculum offers the opportunity for students to better understand the origins of the current crises to which the climate strikes are a response. Teachers may

be concerned that the inclusion of environmental history could be seen as political advocacy and steer away from this as being too controversial. On the other hand, the years of denial, of not talking about or adequately addressing issues of climate change, have been a factor in children's level of frustration erupting into the climate strikes. Just as Cohen (2013) turns his attention to the flip side of denial, arguing for acknowledgement, so too the climate strikes can be seen as a rejection of denial – as people preferring instead to 'do something: intervene, help, become committed' (Cohen 2013: x).

Furthermore, the youth climate strikes can be set into their historical context as a form of political protest, just one of the most recent iterations of people campaigning and fighting for social and environmental justice, a successor perhaps to other civil rights campaigns of the twentieth and twenty-first centuries.

I have argued that environmental history connects closely with other revisionist histories where social justice is a focus. Just as civil rights have become an established part of the curriculum, so too should environmental history. These connections are clear to activists who campaign for action to address the climate crisis. Greta Thunberg, in a 2019 speech to the American Congress, invoked the spirit of Martin Luther King and the other civil rights leaders who marched from Selma to Montgomery in protest against discrimination towards Black voters in Alabama (Thunberg 2019). Similarly, Extinction Rebellion meetings routinely refer to civil rights and suffrage movements (Holmes et al. 2020), while the prestigious journal *Nature* published a call for scientists to engage in 'non-violent civil disobedience', drawing from the examples of Rosa Parks, Emmeline Pankhurst and Mohandas Gandhi (Gardner and Wordley 2019). Establishing these connections in our teaching illustrates Anna Lowenhaupt Tsing's observation and argument that 'it takes concrete histories to make any concept come to life' (Tsing 2015: 66).

Lessons of history? What can we learn from teaching the Holocaust?

A quick search on the internet will reveal comparisons being made between climate change and the Holocaust not only for the resulting loss of life but also for the dangers of denialism. The search will also reveal almost as many criticisms by people recognising that any comparison between the two is a crass one. The Holocaust and climate change each

have their own set of origins, with their course being the result of the complex interaction of many causal and contingent factors. While climate change has yet to become a feature in the history curriculum, the place of the Holocaust is clearly established in history education internationally. Much of this focus has been on the theme of 'lessons' we can learn from a study of the Holocaust, an approach where the past is instrumentalised into lessons for today, including, for example, a plea for tolerance or knowing that racism is wrong.

Paul Salmons critiques this 'lessons from history' approach as being unhelpful, since:

> to reduce the Holocaust to a lesson in anti-racism is an oversimplification which . . . does not reveal the complexities of historical process to the student. It leads to the assumption that there was a straight path from racist ideology to the extinction of a people. It overlooks the possibility that there was a 'twisted road to Auschwitz' (Salmons 2010: 59).

Similarly, Michael Marrus critiques the type of lessons which might be presented in classrooms. He takes the well-known mantra 'All that it takes for the triumph of evil is that good men do nothing' and argues that this is insufficient and inaccurate as a lesson to learn from the Holocaust. Rather, the statement is a distortion of history with regards to the Holocaust since many good men did indeed do much more than nothing, often at great personal cost, and still the Holocaust happened. Marrus argues that taking such a 'lessons of history' approach has dangers, namely it 'presents a childishly simple view of how genocide functions' (Marrus 2016: 156).

There are other problems with the lessons of history approach when teaching the Holocaust. It can run the danger of dismissing people in the past for making the wrong moral choices, as Salmons explains:

> Comfortable 'explanations' that people made the wrong moral choices may lead to resolutions that we will act more morally than our forebears. We can then experience the catharsis of saying 'Never again' and congratulate ourselves on our strong moral values . . . Our attempt to galvanise our students to stand against injustice today then comes at the cost of denigrating people in the past, whose behaviour we have not explained (Salmons 2001: 35).

Again, the easy moral elevation of our supposedly superior judgement today is far too simple in its account of people both in the past and today.

Arthur Chapman develops the point further. Drawing from Primo Levi's work, he makes the case for detailed contextual knowledge of the Holocaust rooted in specific and situated detail. He draws a parallel between the 'stereotypical binary thinking [that] was at the base of the rhetorics of hatred that helped to drive the Holocaust' and 'the operation of precisely the same tendency to simplify and reduce complexity in the present' (Chapman 2020: 71). Such reductive and binary thinking is unhelpful and dangerous. Instead, Chapman concludes, 'Thinking about lessons involved a combination of historical and ethical thinking and a form of thinking that attended closely to specificity rather than one that traded in absolutes and universals' (2020: 71).

Much of this discussion around teaching the Holocaust is relevant to the teaching of aspects of environmental history. If the history of climate change is focused on, it is quite likely that some students may ask, 'How could this have happened? Why didn't anyone do more to limit carbon emissions and stop the rising temperatures? How could people continue living their high consumption lives in the full knowledge of the damage which this was causing?' In addressing such questions, teachers need to avoid a generalising disparagement of people in the past and look instead at the complex range of factors which contributed to climate change – including, of course, the unintended consequences. Similarly, there are no simple answers to these questions when looking at the actions of people and governments in the present. Climate change, after all, is a 'wicked' problem with all its attendant entanglements. It is a reminder of the importance in history of eschewing simplistic lessons or binary responses in favour of seeking out the complexities which more accurately characterise historical causation and in understanding change and continuity.

Emotional response is another dimension that teachers need to attend to in their teaching of sensitive histories and again, the experiences of teaching the Holocaust can be helpful here. The Imperial War Museum's Holocaust exhibition is not recommended for children under the age of 14 due to the distressing nature of the mass extermination that the exhibition details. Likewise, schools tend to teach the Holocaust in any detail only to children over the age of 14 for the same reasons. Even then, teachers need to be alert to students finding the material upsetting. Knowledge of what pedagogical approaches are appropriate for teaching the Holocaust is fairly well established, with several excellent sources of guidance (see, for example, the websites of the Centre for Holocaust Education and the Imperial War Museum). Avoiding shocking graphic images, for example, and instead using human stories, often based

around simple everyday objects, can be a more successful means of supporting deeper engagement. Making it personal can help students to care about what happened in the past and can engage both the emotions and the intellect. Using highly emotive language is likely to provoke emotive responses, which may heighten anxiety and result in disengagement. Critically engaging with historical events and their interpretations is likely to result in more productive engagement.

A similar sensitivity is required in terms of decisions around teaching different elements of environmental history. While teaching about the Little Ice Age may not provoke strong emotional reactions, the inherently future-oriented nature of the climate crisis, with existing and ongoing impacts on the lives of students today, may well provoke strong emotional reactions. Teachers will need to decide at what age it is appropriate to teach any particular topic, mindful of both potential intellectual and emotional demands, carefully selecting resources and thinking about how they can be used effectively and appropriately. This is not to say that all elements of environmental history relating to the climate crisis need to be avoided until later secondary school. On the contrary, some studies show that younger children are more accommodating to new scientific models of climate change and less impeded by worldviews and cultural values compared to older adolescents (Lee et al. 2020). Such findings suggest the value of teaching about climate change early on in a child's schooling.

Conclusion

Acknowledging the complex and controversial nature of climate change, this chapter has examined the range of preconceptions that students are likely to bring with them into the classroom, broadly categorising these as denialist, technicist and declensionist (Hughes 2006). In considering how teachers can respond to these different incoming preconceptions, and amid the paucity of current empirical research in this area, the chapter has drawn from existing scholarship on the teaching of other sensitive and controversial histories, including the Holocaust (Foster et al. 2020). It critically reviews 'lessons from history' (Salmons 2010; Chapman 2020) approaches as too simplistic and binary, and argues instead for approaches that foreground historical concepts and the interrogation of causation, continuity and change. Finally, acknowledging how the youth climate strike (among other developments) has sensitised many students to the issues of climate

change, the chapter has addressed how discussions about activism (Holmes et al. 2020) can be brought into the history curriculum and managed effectively in classrooms.

Further reading

Hall, S., S. LeMenager and S. Siperstein, eds (2016), *Teaching Climate Change in the Humanities*. Abingdon: Taylor & Francis.

9
Embedding environmental perspectives into classroom practice

Introduction: into the classroom

This chapter presents subject knowledge and practical ideas which can be developed into classroom enquiries relevant to the current history curriculum. In each case, an environmental focus has been embedded into the study. The materials can be adapted for children at different stages in their school education. The examples are presented as stimuli, sketching out possible classroom approaches rather than tightly structured or planned enquiries. They illustrate how ideas introduced in earlier chapters can be used with students, for example showing how classroom practice can address different second-order concepts (discussed in Chapter 7) alongside introducing an environmental perspective into the curriculum.

The first example focuses on the causes of the seventeenth-century General Crisis, when many states suffered social and political unrest, including the UK with the Wars of the Three Kingdoms (also known as the English Civil War). It introduces students to the changing historiography of the period and considers the evidence base on which some more recent interpretations draw. It shows how the introduction of environmental elements does not equate to environmental determinism (discussed in Chapter 7).

The second example takes a fresh look at the familiar topic of James Watt and the Industrial Revolution. The enquiry focuses on Watt's significance, looking at this in different timeframes, from the time of his work through to today, as well as extending this into a speculative discussion about his possible future significance. It illustrates how the past, present, future continuum discussed in Chapter 1 can be introduced into classroom work.

The third example focuses on environmental attitudes from the 1960s through to the present day. The concepts of change and continuity are foregrounded and the example also illustrates how classroom activities can navigate between different scales (as discussed in Chapter 2) to support student understanding.

Seventeenth-century General Crisis

Background: what was the seventeenth-century General Crisis?

The mid-seventeenth century in Europe saw more instability, war, regime change and popular revolts than any previous or subsequent age. It was also a period of particularly bad weather, crop failure and severe economic hardship. Historians have called this the General Crisis of the seventeenth century and it includes the English Civil War, the Fronde in France and the Thirty Years War.

Historical scholarship and changing interpretations

The idea that such widespread conflicts and unrest in the seventeenth century were somehow connected was first put forward by Eric Hobsbawm in 1954 and then developed by Hugh Trevor-Roper in what became a well-known debate between the two historians. Hobsbawm saw the General Crisis as an economic crisis, a catalyst for the transition from a feudal society to capitalism, which in turn would lead to the Industrial Revolution. Trevor-Roper, by contrast, saw the crisis as one between society and state brought about by an expanded bureaucracy. In both accounts, causation was anchored in the traditional causal categories of economic, social and political. Geoffrey Parker's account (2008; 2013) not only broadened the historical discussion to look at the crisis globally and beyond Europe, but also introduced the factor of climate and showed how this was a key causal factor in understanding the crisis of the seventeenth century. Parker was careful to avoid climate determinism in his account: 'We must not paint bull's-eyes around bullet holes and argue that since climatic aberrations seem to be the only factor capable of causing simultaneous upheavals around the globe, therefore those aberrations "must" have caused the upheavals' (Parker 2008: 1073). While Parker's research looks at how climate changes impacted on human history, the most recent research includes ways in which human history also impacted on the climate (Koch et al. 2019).

Resources: why don't historians agree about the causes of the seventeenth-century crisis?

Drawing on the work of Worth (2016) looking at historians' introductions, students can compare the concerns and different interpretations of the four historians just by interrogating short introductions to their research (Box 9.1) and identifying the differences in their accounts. In addition, by examining these extracts students can begin to discern how the historiography relating to the General Crisis of the seventeenth century has developed, along with suggesting reasons for these changes in focus.

Box 9.1   General Crisis of the seventeenth century: Four historians' introductions.

Hobsbawm 1954: 33:

In this article I wish to suggest that the European economy passed through a 'general crisis' during the seventeenth century, the last phase of the general transition from a feudal to a capitalist economy. Since 1300 or so, when something clearly began to go seriously wrong with European feudal society, there have been several occasions when parts of Europe trembled on the brink of capitalism. There is a taste of 'bourgeois' and 'industrial' revolution about fourteenth-century Tuscany and Flanders or early sixteenth-century Germany. Yet it is only from the middle of the seventeenth century that this taste becomes more than a seasoning to an essentially medieval or feudal dish. The earlier urban societies never quite succeeded in the revolutions they foreshadowed. From the early eighteenth century, however, 'bourgeois' society advanced without substantial checks. The seventeenth-century crisis thus differs from its predecessors in that it led to as fundamental a solution of the difficulties which had previously stood in the way of the triumph of capitalism, as that system will permit.

Trevor-Roper 1959: 31:

The middle of the seventeenth century was a period of revolutions in Europe. These revolutions differed from place to place, and if studied separately, seem to rise out of particular, local causes; but if we look at them together they have so many common features that they appear almost as a general revolution. There is the Puritan Revolution

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in England which fills the twenty years between 1640 and 1660, but whose crisis was between 1648 and 1653. In those years of its crisis there was also the series of revolts known as the Frondes in France, and in 1649 there was a coup d'état or palace revolution, which created a new form of government in the United Provinces of the Netherlands. Contemporary with the troubles of England were those of the Spanish empire. In 1640 there was the revolt of Catalonia, which failed, and the revolt of Portugal, which succeeded: in 1641 there was nearly a revolt of Andalusia too; in 1647 there was the revolt of Naples, the revolt of Masaniello. To contemporary observers it seemed that society itself was in crisis, and that this crisis was general in Europe.

Trevor-Roper 1959: 61–2:

It was a crisis not of the constitution nor of the system of production, but of the state, or rather, of the relation of the state to society. Different countries found their way out of that crisis in different ways. In Spain the Ancien Regime survived: but it survived only as a disastrous, immobile burden on an impoverished country. Elsewhere, in Holland, France and England, the crisis marked the end of an era: the jettison of a top-heavy superstructure, the return to responsible, mercantilist policy. For by the seventeenth century the Renaissance courts had grown so great, had consumed so much in 'waste', and had sent their multiplying suckers so deep into the body of society, that they could only nourish for a limited time, and in a time, too, of expanding general prosperity. When that prosperity failed, the monstrous parasite was bound to falter . . . In England therefore the storm of the midcentury, which blew throughout Europe, struck the most brittle, most overgrown, most rigid court of all and brought it violently down.

Parker 2013: xvii–xix:

The failure of most historians to exploit the data available in these two 'archives' (human and natural) for the seventeenth century is particularly regrettable, because an intense episode of global cooling coincided with an unparalleled spate of revolutions and state breakdowns around the world (including Ming China, the Polish–Lithuanian Commonwealth and the Spanish monarchy), while other states came close to revolution (notably, the Russian and Ottoman empires in 1648; and the Mughal empire, Sweden, Denmark and the

Dutch Republic in the 1650s). In addition, Europe saw only three years of complete peace during the entire seventeenth century, while the Ottoman empire enjoyed only ten. The Chinese and Mughal empires fought wars almost continuously. Throughout the northern hemisphere, war became the norm for resolving both domestic and international problems.

Historians have christened this age of turmoil 'the General Crisis', and some have seen it as the gateway to the modern world. The term was popularized by Hugh Trevor-Roper in an influential essay, first published in 1959 . . . But of 'climate' in its literal sense Trevor-Roper said not a word, even though the upheavals he described occurred during a period marked by global cooling and extreme weather events.

The climatic evidence is both clear and consistent. Daily readings from an international network of observation stations reveal that winters between 1654 and 1667 were, on average, more than 1ºC cooler than those of the later twentieth century. Other records show that 1641 saw the third coldest summer recorded over the past six centuries in the northern hemisphere; the second coldest winter in a century experienced in New England; and the coldest winter ever recorded in Scandinavia. The summer of 1642 was the 28th coldest, and that of 1643 the 10th coldest, recorded in the northern hemisphere over the past six centuries; while the winter of 1649–50 seems to have been the coldest on record in both northern and eastern China. Abnormal climatic conditions lasted from the 1640s until the 1690s – the longest as well as the most severe episode of global cooling recorded in the entire Holocene Era – leading climatologists to dub this period 'the Little Ice Age'.

This volume seeks to link the climatologists' Little Ice Age with the historians' General Crisis – and to do so without 'painting bull's eyes around bullet holes': without arguing that global cooling 'must' have somehow caused recession and revolution around the world simply because climate change is the only plausible common denominator . . . The sources now available, however, allow historians to integrate climate change with political, economic and social change with unprecedented precision. Accounts of climatic conditions in Africa, Asia, Europe and the Americas in the mid-seventeenth century abound, while millions of measurements of tree-rings, ice-cores, pollen deposits and stalactite formations are available.

Nevertheless, the new data, however abundant and however striking, must not turn us into climatic determinists.

Koch et al. 2019: 13–14:

The arrival of Europeans in the Americas in 1492 CE marks the onset of disease epidemics resulting in the loss of the majority of indigenous people living in the Americas over the subsequent century. Indigenous land use was widespread before European arrival, particularly in Mexico, Central America, Bolivia and the Andes where terraced fields and irrigated agriculture was practised, and across Amazonia where diverse pre-Columbian land uses left its traces in the composition of contemporary Amazon forests. Thus the Great Dying of the Indigenous Peoples of the Americas after 1492 CE likely led to a reduction in land use. Fields and fallow areas then underwent secondary succession and in many cases increased carbon stocks as they reverted towards similar prior states – with local, regional and potentially global consequences for the Earth System.

The uptake of carbon on the abandoned anthropogenic lands after European contact may have been large enough to impact the atmospheric CO_2 record. Furthermore, at the same time high-resolution Antarctic ice-core records of atmospheric CO_2 concentration show an anomalously large decline of ~7–10 ppm beginning in the 1500s with a minimum in the early 1600s. Isotope analysis shows that the anomaly was driven by an increase in the terrestrial carbon sink. Hence, the carbon uptake that is thought to have occurred following the arrival of epidemics in the Americas may have reduced atmospheric CO_2 levels and led to a decline in radiative forcing that may then have contributed to the coldest part of the Little Ice Age.

Classroom activities: what sources of evidence have historians used?

Looking at the work of these four historians, it is clear that the more recent writers have drawn from a range of different types of sources. Students can be invited to highlight these on the texts. Students can also be invited to think about what other types of sources might have been useful for Parker to draw from in his research. The activity can help students to understand how, when new types of evidence become available, history can change, and how this can lead to the development of new knowledge. Parker's research can help students to understand how evidence, from both the human and the natural archive, can contribute to new interpretations.

Parker draws from 'an avalanche of new data' (2008: 1065) which has transformed our knowledge of early modern weather over the last half century or so. He summarises the evidence he uses into different types (Box 9.2).

Box 9.2   Human and natural archive of evidence (Parker 2008).

The human archive includes four types of records:

- Narrative information contained in written texts (chronicles and histories, letters and diaries, judicial and government records, newspapers and broadsheets) and oral traditions.
- Numerical information compiled from documentary proxy data (such as the changing date on which the harvesting of certain crops began each year, or the annual volume harvested) or, occasionally, from narrative reports ('Rain fell for the first time in 42 days').
- Pictorial information contained in dated visual representations of natural phenomena (paintings that show the position of a glacier's tongue in a given year or that depict ice floes in a harbour during a winter of unusual severity).
- Epigraphic or archaeological information, such as inscriptions on structures that date flood levels, or excavations of settlements abandoned because of climate change.

The natural archive provides abundant complementary material on long-term trends. This was a time before scientific instruments were available to track climate change. The natural archive includes four types of records:

- Ice cores: the annual deposits on ice caps and glaciers around the world, captured in deep boreholes, provide evidence of changing levels of volcanic emissions, precipitation, air temperature and atmospheric composition.
- Glaciology: the alternating advance and retreat of glaciers, together with an analysis of the debris left behind, sheds light on both precipitation and erosion.
- Palynology: changes in pollen and spores deposited in lakes, bogs and estuaries reflect the natural vegetation at the time of pollen deposit.
- Dendrochronology: the varying size of growth rings laid down by trees during each growing season reflects local conditions in spring and summer. A thick ring corresponds with a year favourable to growth, while a narrow ring indicates a year of adversity (Parker 2008: 1065–6).

Bringing the two archives together has enabled climatologists to re-create detailed weather maps for Western Europe dating back to 1659 month by month, and back to 1500 by season. Drawing from both human and natural archives, Parker also shows how this was a period of extreme cold and prolonged drought around the globe. The thorough detail of his research is summarised when he writes:

> Between 1643 and 1671, the Indonesian archipelago experienced the longest drought recorded during the past four centuries. In 1640, northern China experienced the single driest year recorded during the last five centuries; while in 1641, central China experienced its second driest year in two centuries, with a drought so severe in Shandong Province that the Grand Canal dried up for the only time on record. In Egypt, the Nile fell to some of its lowest recorded levels between 1640 and 1643; much of West Africa suffered droughts of great intensity in 1639–1643; and prolonged drought reduced Lake Chad to the lowest level ever recorded (Parker 2008: 1069).

The following evidence (Box 9.3), taken from Parker's work (2008; 2013), is drawn from both human and natural archives. Students can be invited to categorise the sources into different types. There are also opportunities, using these sources of evidence, to focus on how contemporaries understood the changing climate, including the scapegoating of witches and the attribution to God's punishment for sin or the alignment of the planets.

Background: what caused the Little Ice Age?

The human and natural archives have enabled historians to understand more about the Little Ice Age while climatologists have identified its causes. Unlike today's climate change caused by the burning of fossil fuels by humans, the Little Ice Age had natural causes. Firstly, solar activity reached its lowest level in two millennia. Sunspots (the 'flares' that make the sun shine with greater intensity) became exceedingly rare. During the period around 1645–1715, fewer sunspots appeared than in a single year in the twentieth century, with only 100 seen compared to a more typical 100,000 now seen in a 60-year period. A second cause was volcanic activity. There were 12 major volcanic eruptions around the Pacific during the period between 1638 and 1644: an all-time record. They all occurred near the Equator, so that the dust veils which they emitted reduced the solar energy received by the most densely populated areas of the world

Box 9.3 Examples of evidence from the human and natural archive (Parker 2008, 2013).

In Russia, tree-ring, pollen and peat-bed data show that the springs, autumns and winters between 1650 and 1680 were some of the coldest on record.	In the Alps, fields, farms and even whole villages disappeared as glaciers advanced to their maximum extent between 1640 and 1644. Summers as well as winters were unusually cold in those years. In eastern France, cool summers delayed every grape harvest between 1640 and 1643 by a full month and reduced harvest yields.
In China, unprecedented cold wet weather caused famine and one-third of the population died from different disasters. Government records show that the total amount of cultivated land in the empire fell from 191 million acres in 1602 to 67 million in 1645, the year after Qing forces occupied northern China, taking over from the Ming.	In America, New England's colonists experienced the second coldest winter in a century in 1641–2. John Winthrop, governor of the Massachusetts Bay Colony, noted in his journal that 'The frost was so great and continual this winter that all the Bay was frozen over, so much and so long, as the like, by the Indians' relation, had not been so these forty years'.
The total number of food riots in England rose from 12 between 1600 and 1620 to 36 between 1621 and 1631, with 14 more in 1647–9.	1641 remains the coldest year ever recorded in Scandinavia.
The abnormal frost, snow and ice gave rise to the popular genre of 'winter landscapes' by Dutch painters such as Avercamp and Brueghel.	In 1649, the River Thames froze over as far as London Bridge and the barge carrying the corpse of Charles I to its final resting place after his execution on 30 January 1649 avoided ice floes in the river only with difficulty.
During the Great Frost of 1683–4, the Thames was completely frozen for two months, with the ice 28 cm thick in London. Solid ice was reported extending for miles off the coasts of the North Sea, causing problems for shipping and stopping the use of many harbours.	In his account of the 1683–4 frost fair, John Evelyn wrote, 'Coaches plied from Westminster to the Temple, and from several other stairs to and fro, as in the streets; sleds, sliding with skeetes, a bull-baiting, horse and coach races, puppet plays and interludes, cooks, tippling and other lewd places, so that it seemed to be a carnival on the water.'

French soldiers born in the second half of the seventeenth century were on average about an inch shorter than those born after 1700; and those born in famine years were notably shorter than the rest. Thus 'stunting' reduced the average height of those born in 1675, the 'year without a summer', or during the years of cold and famine in the early 1690s, to only 63 inches: the lowest ever recorded.	The wooden backs of the violins made by Antonio Stradivari of Cremona in northern Italy display remarkably narrow growth rings, reflecting the unique succession of cold summers in the mid-seventeenth century that stunted the growth of the trees with which he worked.
Governments saw the misfortunes as God's punishment for tolerating activities which they disapproved of. In 1642, the English parliament banned stage plays, with the Act's preamble stating, 'Call for all possible means to appease and avert the wrath of God . . . and stage-plays being spectacles of pleasure, too commonly expressing lascivious mirth and levity . . . all public stage plays shall cease.'	An English almanac predicted that the two lunar eclipses and unusual planetary conjunction forecast for 1642 would bring 'many strange accidents', namely 'fevers, war, famine, pestilence, house-burnings, rapes, depopulations, manslaughters, secret seditions, banishments, imprisonments, violent and unexpected deaths, robberies, thefts and piratical invasions'.
Johannes Kepler, the foremost mathematician of his day, warned in his *Astrological Almanac* for 1618 that the conjunction of five planets in May would cause extreme climatic events, and if a comet also appeared everyone should 'sharpen their pens', because it would indicate that a major political upheaval would follow.	A Jesuit living in the Philippines speculated that the simultaneous eruption of three volcanoes in 1641 meant that 'Divine Providence wishes to show us something, perhaps to warn us of some approaching catastrophe, which our sins so deserve, or the loss of some territory, because God is angry'.

In Scotland in 1649, after a decade of drought, high grain prices and war, the Scots Parliament decided 'that the sin of witchcraft daily increases in this land'. To avert further disasters, they issued some 500 commissions to try suspected witches, resulting in more executions for sorcery during the famine of 1649–50 than at any other time in Scottish history.	In southern Germany, a hailstorm in May 1626 followed by Arctic temperatures led to the arrest, torture and execution of 900 men and women suspected of producing the calamity through witchcraft.
In 1612, Sir Robert Sibbald, a Scottish physician and geographer, lamented that 'The bad seasons these several years past hath made so much scarcity and so great a dearth, that for want, some die by the way-side, some drop down on the streets, the poor sucking babes are starving for want of milk, which the empty breasts of their mothers cannot furnish them . . . And it is not only common wandering beggars that are in this case, but many house-keepers who lived well by their labour and industry are now by want forced to abandon their dwellings and they and their little ones must beg.'	Almost from its foundation in 1607, Virginia experienced (in the words of its first governor) 'a worlde of miseries', because drought caused its early settlers 'to feele the sharpe pricke of hunger', forcing some to eat 'doggs, catts, ratts and myce' as well as 'bootes, shoes or any other leather'. Although at least 6,000 English men, women and children had come to Virginia from England since 1607, by 1624 the colony still numbered only 1,200.
In July 1675, the learned Parisian Madame de Sévigné complained that, instead of the normal summer heat wave, 'We suffer horribly from the cold and have the fires lit', and speculated that 'the behavior of the sun and of the seasons has completely changed.'	In the 1740s, Voltaire concluded his lengthy *Essay on the Customs and Character of Nations*, 'Three things exercise a constant influence over the minds of men: climate, government, and religion.'

(Parker 2008). These two factors not only caused the global temperature to lower; they also affected the climate.

Parker describes two broad impacts. Firstly, El Niño (or ENSO: El Niño/Southern Oscillation), which usually occurs about once every five years, was disrupted twice as often as usual during the mid-seventeenth century (in 1640, 1641, 1647, 1650, 1652, 1655 and 1661). Each time, the regions normally affected all experienced abnormal weather. Secondly, mean temperatures declined much more in the northern hemisphere (home to the majority of humans and the site of most mid-seventeenth-century revolts and wars) than at the Equator. This was partly because increased snow cover and sea ice reflected more of the sun's rays back into space so that any significant extension of the polar ice caps and glaciers (both of which happened in the mid-seventeenth century) further reduced temperatures in northerly latitudes.

The decrease in human population, caused by the Black Death, and later the Great Dying in America, may also have been contributory causal factors of the Little Ice Age. According to this theory, when land was abandoned, the subsequent reforestation sequestered carbon and thus lowered temperatures (Koch et al. 2019).

Historical scholarship and changing interpretations: can climate change cause a revolution?

Parker is clear that climate by itself did not cause the English Civil War. He does, however, give examples where extreme weather anomalies did trigger or exacerbate major political upheavals, including in the case of Scotland, Ireland and the Civil War.

When Charles I, and Archbishop Laud, set about introducing the new Prayer Book in Scotland, they had chosen a dangerous moment. Scotland had suffered from more extreme weather than England and in June 1637, the Privy Council in Edinburgh issued emergency legislation to deal with a plague epidemic, an acute shortage of coins and a universal 'scarcity of victuals' because of the poor harvest. According to the Earl of Lothian, one of Scotland's worried landowners,

> The earth has been iron in this land . . . and the heavens brass this summer, till now in the harvest there have been such inundations and floods and winds, as no man living remembers the like. This has shaken and rotted and carried away the little corn [that] came up, [so] that certainly they that are not blind may see a judgment come on this land (quoted in Parker 2008: 1074).

The floods of 1637 were followed by one of the driest years that Scotland had experienced in a century. The natural archive reveals that Scotland experienced the worst recorded drought in a millennium between 1636 and 1649. Such climate-induced difficulties provoked popular riots and led landowners, such as the Earl of Lothian, to join the Covenanting Revolt against the new Prayer Book. Along with drought, a decade of cold, wet summers had also ruined one harvest after another. This helps to explain why the Covenanting army occupied northern England, billeting as many of their troops as possible south of the border in the 1640s, and why they extracted such a huge ransom before they agreed to withdraw. Although they knew this to be unpopular with their supporters in England, many Covenanters felt that unless they exploited their assets in England as much as they could, Scotland would simply starve.

The climate similarly played a role in Ireland. Adverse weather ruined the harvest in Ireland in 1639, 1640 and 1641, causing widespread food shortages and reducing exports by about one-third. The province of Ulster suffered worst because the presence of the troops raised by Strafford for the invasion of Scotland soon consumed all available resources. For many, rebellion seemed like their only option. Furthermore, when the uprising by Irish Catholics on 23 October 1641 drove the Protestant minority from their homes, no one had foreseen the severe cold snap, with heavy frost and snow at a time and in a place that rarely has snow. The surviving accounts of those affected by the uprising record more deaths from 'snow and frost' and 'extreme cold' than directly from violence, indicating that the Little Ice Age at least doubled – and may have tripled – the number of Protestants who met an unnatural death in autumn 1641. Thousands of Protestants died of exposure, thus turning a political protest into a massacre. Many called for vengeance and Oliver Cromwell would later use the episode to justify his brutal campaign to restore Protestant supremacy in Ireland.

Clearly climate cannot explain everything, although the role it played should not be overlooked. Charles's actions and intransigence in matters of religion, coupled with climate factors, led to state collapse while, in Ireland, the Little Ice Age exacerbated the events as they unfolded.

Summary

The seventeenth-century General Crisis offers good opportunities to embed environmental perspectives into a topic which is taught in many schools. Examining the changing historiography supports students' learning about new interpretations along with building their understanding of the varied

evidence base that history draws from. It illustrates how purposeful history in the classroom often involves working with more than one second-order concept at a time.

James Watt and the Industrial Revolution

Background

The Industrial Revolution is a topic regularly taught in history classrooms. It revolutionised the means of production and set in motion changes which would have far-reaching impacts for the climate globally and, as such, the topic is particularly relevant to embedding an environmental perspective into the curriculum. In this example, the focus is on one individual, James Watt (1736–1819), whose contribution to industrialisation, by improving the steam engine, is well known.

Historical scholarship and changing interpretations

It is widely acknowledged that Watt's improvements to the steam engine 'converted it from a prime mover of marginal efficiency into the mechanical workhorse of the Industrial Revolution' (Anderson 1981: 685). The significance of his work was recognised during his own lifetime. In 1784 he was made a fellow of the Royal Society of Edinburgh, and in 1806 he was awarded an honorary Doctor of Laws by the University of Glasgow. He was also elected as a member of several elite scientific and philosophical societies.

His significance continued in the years after his death. The watt unit of power was named after him; the name became the official unit in Britain in 1889 and was later recognised internationally in 1960. His garret workshop was left untouched, as a sort of shrine, after he died. In 1924, when the house was due to be demolished, the Science Museum took all the contents and recreated the workshop in its entirety. It remains on public display as part of a Science Museum exhibition, 'James Watt and our world'. In the nineteenth century, streets, libraries, a college and a university were named after him, along with numerous buildings. Statues of Watt have been erected in Glasgow, Edinburgh, Birmingham, Manchester, Leeds and London as well as in his home town of Greenock.

The most impressive statue was erected in St Paul's Chapel in Westminster Abbey in 1825 (Figure 9.1). It was a huge white marble statue, so large that its pedestal had to be divided into three pieces and

Figure 9.1 Francis Legatt Chantrey's statue of James Watt. © Astrochemist. Public domain.

dragged into place, destroying an ancient tomb lid in doing so. The statue only just fitted through the door and the floor gave way under its weight; had the area not been planked over, the workmen would have fallen in. The statue remained there until 1960, when it was moved because it was far too large for where it was positioned. It was moved to a different location and was finally placed in the Scottish National Portrait Gallery.

The inscription alongside the statue read:

> Not to perpetuate a name which must endure while the peaceful arts flourish, but to shew that mankind have learned to know those who best deserve their gratitude. The King, His Ministers, and many of the Nobles and Commoners of the Realm raised this monument to JAMES WATT who, directing the force of an original Genius, early exercised in philosophic research, to the improvement of the Steam Engine, enlarged the resources of his Country, increased the power of Man, and rose to an eminent place among the most illustrious followers of science and the real benefactors of the World. Born at Greenock MDCCXXXVI Died at Heathfield in Staffordshire MDCCCXIX.

There is much, therefore, to suggest that Watt was regarded as a heroic figure both during his lifetime and through the nineteenth century.

Having established his significance, students can evaluate how far the evidence supports this interpretation of the man and his work. They can review the many ways in which the Industrial Revolution transformed and improved people's lives, alongside an acknowledgement of the hardships that industrialisation also brought for many.

Watt's reputation, at least in some quarters, remained high into the twenty-first century. In 2011, a new £50 note entered circulation with portraits of Watt alongside his business partner Matthew Boulton. Quotes attributed to each of the men were inscribed on the note: 'I sell here, sir, what all the world desires to have – POWER' (Boulton) and 'I can think of nothing else but this machine' (Watt). More recently, however, and in the context of Black Lives Matter, Watt's memorials have come in for criticism. His immediate family was intimately connected with trans-atlantic commerce, including on occasion trading enslaved persons in Greenock. Watt's father traded sugar and tobacco with middlemen in North America and the Caribbean from 1733 until 1771, the profits from which supported his son's formative apprenticeship in London in 1755. Watt's younger brother, John Watt, worked in his father's business, and on at least one occasion he imported and sold an enslaved child, Frederick, in Scotland in 1762. James Watt was also directly involved in that particular sale (Reeves 2020). Several statues to the engineer in Glasgow are part of the city and the university's review of how they should acknowledge its historic links to slavery, with campaigners demanding statues and street names are either removed or amended. In Birmingham, the statue of Watt was put into storage in 2017 while work was carried out on the Metro system. The council has decided that when the statue is reinstated they will add a new plaque explaining Watt's family connections to slavery.

Watt's reputation, therefore, has changed over time and, as with other monuments of public history, reflects a shifting significance over time. If environmental elements are also included as part of the enquiry, his reputation and significance shift again. Knowledge about the impacts of burning fossil fuels on the climate emerged long after Watt was dead so that there can be no personal responsibility attributed to Watt and his work. His contribution, however, does lead into a consideration of the unintended consequences of his ingenious innovation.

Classroom activities

Drawing from what was known about climate change in 2011 when the Watt and Boulton £50 note was issued, there is scope for good classroom

discussion about whether or not Watt should have been included on the note.[1] There are good arguments on both sides of the debate.

The discussions can be developed further. Discussing who is, and isn't, included on currency notes and what is says about both the decision makers and the society of the time can be a purposeful activity in classrooms, helping students to develop their critical understanding around the nature of public history. In 2021, a new £50 note, with a portrait of Alan Turing, entered circulation. Students can be invited to infer and debate what these two choices for the £50 note say about how our own contemporary society is shifting and changing.

Finally, students can be asked to think about the question, 'How will we remember James Watt in 100 years' time?' Of course, the simple answer to this question is that we simply cannot know how he will be thought about into the future. Nonetheless, there is value in thinking through possible responses. The question highlights how there is at least some degree of continuity from the past, through the present and into the future. What has been set in motion from the development of Watt's steam engine will continue to have impacts into the future. It focuses attention on what needs to change in order to address the current dangers of climate changes that scientists are warning about, while also understanding the origins of historical and environmental developments.

Summary

Industrialisation is a topic taught in all classrooms. Focusing attention on James Watt offers great potential not only to embed environmental perspectives into the curriculum but also to strengthen and develop students' critical understanding of several concepts central to disciplinary history. It focuses attention on consequences, including unintended consequences; on changing interpretations and significance over time; the role of the individual in history; the connections between past, present and future; and the nature of change and continuity over time.

Environmental attitudes from the 1960s to the present

Background

The 1960s was a time of enormous social and cultural change, at least in the Western world. It was also the time when the Cold War manifested in the space race between the USA and the USSR. Both of these aspects of

the 1960s are often taught in history classrooms. Adding an environmental lens to the study of the period opens up further possibilities. The 1960s has been regarded as the start of the environmental movement (see the section on Rachel Carson in Chapter 6), which, along with trends towards globalisation, helped to make NASA's images of the planet particularly powerful icons. These images, two of which were discussed in Chapter 3, are the focus for this example.

Historical scholarship and changing interpretations

We live in an era with a strong visual culture. The idiom 'a picture paints a thousand words' is confirmed by the pervasive popularity of social media, where visual imagery dominates. Images are powerful tools which can be used to arouse emotional responses, to persuade or to change attitudes and behaviour.

Images of the Earth taken by NASA as part of their space programme in the 1960s rapidly became iconic across the globe. The revolutionary potential of these images was quickly recognised. The World Commission on Environment and Development (WCED), in its influential report, *Our Common Future*, described it this way:

> In the middle of the 20th century, we saw our planet from space for the first time. Historians may eventually find that this vision had a greater impact on thought than did the Copernican revolution of the 16th century, which upset humans' self-image by revealing that the Earth is not the centre of the universe. From space, we see a small and fragile ball dominated not by human activity and edifice but by a pattern of clouds, oceans, greenery, and soils (World Commission on Environment and Development 1987: 308).

Such a powerful decentring of humanity might be expected to result in new forms of understanding about the environment and associated forms of governance. Sheila Jasanoff's review of the impacts of the images, however, concludes that they 'failed to move entrenched national interests in resource management regimes ranging from seabed mining to the protection of biodiversity' (2001: 29). Indeed, the Black Marble image (see discussion in Chapter 3) would suggest that the WCED's heady claim has not been fulfilled.

The activities below set out to introduce students to four of the different images of the Earth (Figure 9.2) and to examine the impacts that they had with regard to environmental attitudes or policy. Each image has
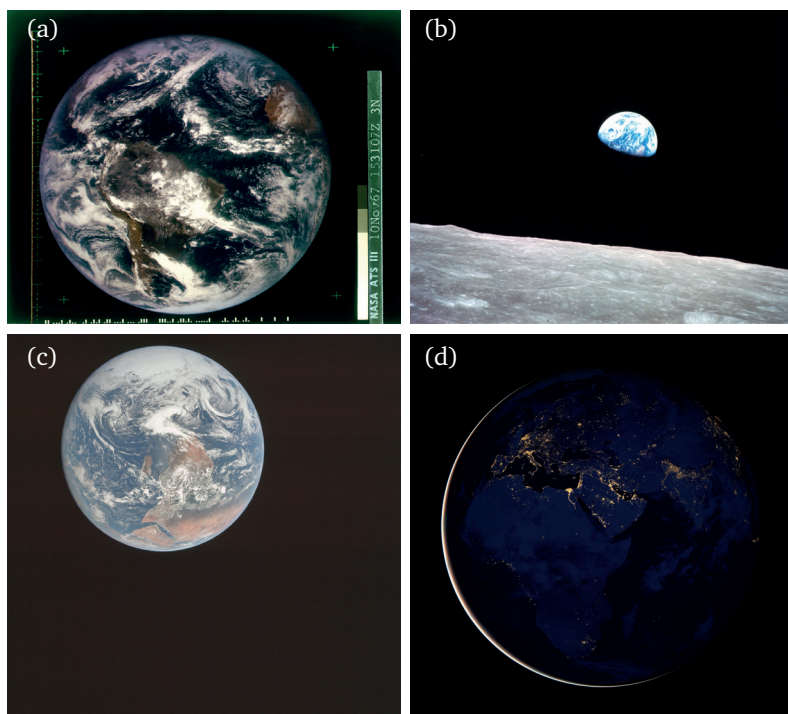
Figure 9.2 Four images of the earth (NASA). (a) 1967 cover of *Whole Earth Catalog*; (b) 1968 Earthrise; (c) 1972 Blue Marble; (d) 2012 Black Marble. Public domain.

its own, human-scale story to tell, which will serve to engage student interest as well as developing their understanding of the impact of such images.

Classroom activities

Comparing two images

At its simplest, there is value in students comparing just the last two images of 1972 and 2012. Take each image in turn.

1972 Blue Marble: Ask the class, 'What do you see in the picture? Is there anything unusual about the photo?' Draw out: i. You need to be a long way from Earth to see the whole planet; ii. The sun must have been behind the photographer to show the Earth fully illuminated with no shadow; iii. Antarctica is at the top (in contrast to most map orientations of the Earth, which put Antarctica at the bottom). What thoughts, feelings or questions does it raise for you? This question may

open many and varied responses, which can simply be noted. Can you give the image a title?

2012 Black Marble: Ask the class, 'What do you see in the picture? Is there anything unusual about the photo?' Draw out: there are no clouds. How could the image have been made? Data for the image was collected over 22 days and 312 satellite orbits in 2012. What can we infer from the light and dark areas of the land? Draw out: the image suggests that humans have pretty much conquered the planet, practically almost eliminating the night itself, at least in the Global North. Looking closer, the contrast between the bright lights of Europe and the great swathes of darkness in Africa seems to highlight the accomplishments of modern high-tech human societies along with huge global inequalities that exist too. What thoughts, feelings or questions does it raise for you? This question may open many and varied responses, which can simply be noted. Can you give the image a title?

Comparing the two images: What are the similarities and differences between the two images? Draw out: technological developments enabling the detailed composite image of 2012. Are your thoughts, feelings and questions the same for both images or in what ways are they different? Can the two images tell us anything about global changes between 1972 and 2012? Draw out: they show different aspects of the Earth. What other sources might help us to understand global changes between 1972 and 2012? Can the two images tell us anything about how humans have thought about their relationship with the rest of nature, and whether this has changed? What other sources might help us to answer this question?

A possible extension

Students can be invited to think about, 'What should we call the age we live in today? This is an opportunity to explore different terms such as Anthropocene, 'Carbocene', the age of coal and oil (LeCain 2015), or 'Capitalocene' (Moore 2015), the capitalist system which has created great inequalities across the globe (see discussion in Chapter 10).

Developing a more extensive interrogation of the four images

The aim of this enquiry is to see how far each of the four images played a role in the environmental movement. Did the images bring about change in humans' relationship with the rest of nature, or in how humans thought about the relationship with the rest of nature? In the case of the first and third images, an engaging human story is used to introduce the image, to hook in interest and to pique students' curiosity.

Image 1 (1967)

Since the 1950s, the public gradually became more aware of environmental concerns about air and water pollution, pesticide poisoning and concerns over the burning of fossil fuels. The *Whole Earth Catalog* was an American counter-culture magazine which focused on sustainability. It was published by Stewart Brand and ran between 1968 and 1972. From 1966, Brand ran a public campaign to have NASA release their satellite photos of the Earth as seen from space. He thought the image might be a powerful symbol bringing people together to understand the shared destiny of everyone on the planet. He was convinced that the image would change attitudes and make a real difference: 'There it would be for all to see, the earth complete, tiny, adrift, and no one would ever perceive things the same way' (Brand quoted in Maher 2017: 92). He made little buttons with black text against white backgrounds: 'Why haven't we seen a photograph of the whole Earth yet?' He would wear a white jumpsuit and a dark top hat with a heart and flower on it and a Day-Glo billboard as he walked around selling the buttons for 25 cents on university campuses.

When NASA did release a satellite image of the Earth in 1967, Brand used this as the cover of the first edition of the *Whole Earth Catalog* in 1968. Brand was convinced that the image helped to boost the environmental movement: 'The photograph of the whole earth from space reframed everything and became a powerful cultural symbol of the ecology movement' (Brand quoted in Maher 2017: 94).

Brand's narrative has clear appeal and has often been reproduced, although the history is less straightforward. The environmental concerns of the 1960s were focused more on the dangers of nuclear fallout, pollution and pesticides (see Chapter 6 on Rachel Carson). In the classroom, Brand's assertion can be critiqued. On 7 July 1969, *Newsweek* ran a cover story called 'The Moon Age' which also included a section titled 'Good Earth?'. That section was illustrated with alarming photographs of rubbish-strewn roadsides in New Orleans and waste being dumped into New York's Hudson River. The text of the article stated: 'The same technological impulse that is carrying Apollo 11 outward to the moon is also threatening the home environment' (*Newsweek* 1969).

There were other environmental accidents which focused the minds of environmentalists and the public more generally. The *Torrey Canyon* oil spill in 1967 and the Santa Barbara oil spill in 1969 both resulted in the loss of thousands of birds and other sea life and angered people in the UK and the USA. In June 1969, oil in the Cuyahoga River caught fire and, around the same time, Lake Erie was declared 'dead' because of sewage and chemical dumping. The publicity surrounding these events led activists and some politicians to campaign for environmental regulation.

This led to the first Earth Day being organised in 1970 and the day has continued to be marked each year. The organisers of the first Earth Day used a handful of symbols on posters, flyers and T-shirts, of which the gas mask was by far the most prominent.[2] Very few included an image of the Earth and none included a photograph of the planet from space (Maher 2017). The decade that followed the first Earth Day saw legislation being passed to regulate air and water pollution in the USA.

Image 2 (1968)

The 1968 image has also been regarded as another stimulus to the environmental movement although, again, the history is more complex. On 24 December 1968, Apollo 8 astronauts Frank Borman, Jim Lovell and Bill Anders became the first humans to witness the Earth rising above the moon's barren surface. Anders's image, Earthrise, inspired the Pulitzer Prize-winning poet Archibald MacLeish to write an essay on what the image meant to him:

> Men's conception of themselves and of each other has always depended on their notion of the earth . . . To see the earth as it truly is, small and blue and beautiful in that eternal silence where it floats is to see ourselves as riders on the earth together, brothers on that bright loveliness in the eternal cold – brothers who know now they are truly brothers (MacLeish 1968).

The essay appeared in the *New York Times* on Christmas Day 1968. On the same front page there was a report from Vietnam about a truce in the war there being marred by violence. This was also the year that Martin Luther King and Bobby Kennedy had been assassinated. For MacLeish, the Earthrise image offered hope for the dawn of a new era on our planet as a kind of lifeboat, 'that tiny raft in the enormous, empty night'. The essay was widely read and suggests that the image of the Earth from space was seen as representing an idea of global unity rather than prompting planetary environmental concern (Maher 2017).

Image 3 (1972): who took the only photo of the whole Earth?

The photograph was taken on 7 December 1972 during the Apollo 17 mission. This was the last manned mission to the moon. There were three astronauts on board, Gene Cernan, Ronald Evans and Harrison Schmitt, and each of them had a tight and detailed schedule of what they were to do at each stage of the flight. The rocket had left its orbit of the Earth and was making its journey towards the moon when the astronauts looked out of the window and saw the Earth fully illuminated by the sun. One of

them picked up the on-board camera and took photos. They weren't supposed to be looking out of the window or taking pictures. No one was scheduled to take the photo, but one of them did. The astronauts were weightless and couldn't see the continents clearly: the photo taken showed Antarctica pointing to the top, unlike usual map orientations. The astronaut who took the picture said nothing about it on the radio or to his crewmates. The spacecraft continued its journey to the moon and Cernan and Schmitt became the last two men to have ever walked on the moon. The mission returned to Earth 10 days later and the film was processed. The photo showed an image of the world looking like a 'blue marble' floating in dark space. It is the only complete image of the Earth taken by a person. Other photographs which have been taken of the Earth either include shadow, or were taken from satellites, or were composite images.

The photo became an immediate sensation and was printed on the front page of nearly every newspaper on the planet. Once the picture had become famous all three astronauts remembered seeing the extraordinary sight and each one claimed they had been the one to take the photo. The argument was never resolved (Reinert 2011).

Although the Blue Marble picture seems to have been a lucky accident, not everyone agrees with this explanation. The historian Neil Maher (2017), after carrying out research for his book on the space race and the environmental movement, argued that NASA rerouted Apollo 17 in order to have the opportunity to capture that image. Many environmentalists thought that the space race was all to do with Cold War politics and a waste of precious resources which would be better spent on cleaning up pollution on Earth. NASA, according to Maher, was keen to show how its work was environmentally friendly and the Blue Marble image helped with this.

Over time, the Blue Marble has certainly been influential. James Lovelock credits the image in this way:

> To my mind, the outstanding spinoff from space research is not new technology. The real bonus has been that for the first time in human history we have had a chance to look at the Earth from space, and the information gained from seeing from the outside our azure-green planet in all its global beauty has given rise to a whole new set of questions and answers (Lovelock 1979: 8).

The historian Robert Poole (2008: 126) calls the Blue Marble 'a photographic manifesto for global justice', arguing that the image transformed humanity's idea of itself and of its home planet.

Throughout the 1970s and 1980s, however, the images used in the annual Earth Day media did not include images of the Earth. In 1980, for example, images referenced the OPEC oil crisis, the Three Mile Island nuclear accident and endangered species, especially whales. It wasn't until Earth Day celebrations in 1990 that images of the Earth from space featured on flags. In that year, there was also a public service announcement on TV where the Muppet Kermit the Frog appeared, singing 'It's not easy being green' from inside a whole-Earth stage set floating in space (Maher 2017).

The images of the Earth may have become more influential over time, but their impact was not quite as Stewart Brand had predicted. Furthermore, not everyone agreed about how the images were interpreted, with some activists criticising the Blue Marble image as unhelpful. They argued that seeing the whole Earth in this way threatened to obscure important differences on Earth, including racism, sexism, war and pollution that divided communities across the planet (Kelsey 2011).

Image 4 (2012)
Since 2012, there has been a growing understanding of global inequalities. As McDonald (2015) notes, if we all consumed at the level that the USA does, we would need four Earths in order to be sustainable. The reminder that we all depend on one shared Earth has underpinned recent writing on sustainability as well as protest slogans. *There Is No Planet B* is both the title of Mike Berners-Lee's (2019) acclaimed book, and a popular slogan at climate strike and Extinction Rebellion protests.

Why did it take so long before a human was able to take a photo of the Earth?

An additional discussion can ask the question, 'Why did it take so long before a human was able to take a photo of the Earth?' (Or, 'Why couldn't early foraging humans take a photo of the Earth?') This question moves the focus from a concern with the human scale of time, towards an engagement with a much larger timescale, the longue durée. The question invites students to brainstorm with a free flow of ideas and this would be done most successfully in small groups. The question aims for students to identify the technology, in the broadest sense of the word, that was needed to launch the NASA mission and to puzzle through how humans were able to achieve this capability. It is a challenging activity, and the level of challenge for students will depend on how experienced and confident they are at moving between the scales from their previous school history experience. The activity may work best by moving back

through time step by step. It is essentially an activity in deconstruction. Excessive detail is best avoided, and the aim is to draw out key developments only (see the discussion of this in Chapter 2). For example, rockets need metal and fuel, which needs mining and industrial production. Long before this sort of sophisticated technology, collective learning was also needed, and this was helped by written communication which developed when humans settled as part of the Neolithic Revolution. In this synoptic summary, therefore, the two key developments or turning points which enabled humans to take a photo of the earth are the Neolithic and the Industrial Revolutions. The Neolithic Revolution enabled the development of written language, which meant that humans could develop collective learning which could continually develop and be passed down the generations. The harnessing of steam power and the exploitation of fossil fuels on an industrial scale enabled the development of technological processes, which would eventually lead to rockets being built. This synoptic overview is similar to other frameworks presented in Chapter 3 with the Neolithic and Industrial Revolutions identified as key turning points.

The task could be elaborated further. The two key turning points could be recorded onto a chronological framework and then the Great Acceleration could be added. This, in turn, could be used to illustrate how rapid the necessary changes have been since the onset of industrialisation, in contrast to the much slower rate of change before. The speeding up of change, which resulted from industrialisation and the Great Acceleration, is a key insight when considering change and continuity across many aspects of history, and this activity supports students in developing their understanding of this element of change.

Summary

Using images of the Earth offers rich opportunities to embed environmental perspectives into existing work which focuses on the 1960s as well as the space race. Interrogating the images and the narratives that surround them, students can strengthen their understanding of both evidence and interpretations as well as evaluating how far the images suggest change or continuity over time with regard to environmental attitudes. Discussing the question 'Why did it take so long before a human was able to take a photo of the Earth?' offers opportunities to strengthen students' synoptic understanding of change over very large scales of time.

Conclusion

The chapter has sketched out three topics which sit along the grain of the existing curriculum and where environmental perspectives have been foregrounded. Without tight prescription, the chapter has presented how each topic addresses changing interpretations, and other second-order concepts, as well as suggesting approaches and discussions which can be embedded into classroom practice.

Notes

1   I'm grateful to David Hughes-Jones for these activities.
2   Robert Leydenfrost and Dan Brewer's gas mask poster is available here: https://enviroethics. org/2012/07/19/vintage-poster-earth-day-april-22-1970 (accessed 5 April 2023).

Further reading

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10
Challenging the curriculum

Man in his arrogance thinks of himself a great work, worthy the interposition of a deity. [Yet it is] more humble and, I believe, true to consider him created from animals (Darwin 1838).

There is something Newtonian, not yet Einsteinian, besides something morally naïve, about living in a reference frame where one species takes itself as absolute and values everything else relative to its utility (Rolston 2004: 75).

In the classroom as on the farm, fruitful cultivation does not mean plowing the same furrows and sewing the same seeds year after year. Experimenting with new varieties, rearranging parcels, and incorporating innovations keeps our garden healthy, and so too should our courses develop fresh and stimulating materials both for students and for ourselves (Schwartz 2006: 347).

Introduction: more-than-human

The book has developed the arguments for including environmental history in the history curriculum and the discussions about subject knowledge and classroom practice have largely been related to the curriculum currently in place in English secondary schools. This chapter returns to the initial curricular critiques presented earlier in the book. While Chapter 1 drew from the current climate emergency to develop arguments for the inclusion of environmental history in the curriculum, this chapter focuses more on the implications of biodiversity loss for the history curriculum. While earlier chapters have focused on different aspects which all relate to humans and their relationship to the rest of nature, this chapter focuses still more explicit attention on the other-than-human players in history. Just as social justice issues have challenged the

traditional curriculum to include groups who have been marginalised and silenced through history, so this chapter suggests that the challenge of biodiversity loss means history needs to abandon its exclusive focus on human exceptionalism which has characterised the history taught in schools. As J. R. McNeill's provocation argues, 'We ought to accept that we are only one species among many and should gracefully share top billing at times with bison, tsetse flies, and El Niño' (McNeill 2003: 36).

The chapter explores these issues through two classroom discussions and, along the way, also aims to build subject knowledge. The first discussion starts with the question, 'What is the most significant historical event of the last 100 years?' This question introduces how a more-than-human stance in studying history can be introduced (Tamm and Simon 2020) and includes a focus on animals in history and species extinction. The second discussion asks, 'When did the Anthropocene start?' and includes a critical examination of the relationship between capitalism and environmental change (Chakrabarty 2009; 2014).

What is the most significant historical event of the last 100 years?

This opening question starts on ground which will be familiar in many history classrooms. Depending on the topics which have been studied, the suggestions from students might include the two world wars, the Cold War, the contraceptive pill, the extension of civil rights and equalities legislation. It might also include suggestions such as the exponential rise in population and the climate emergency. The teacher can then make their own suggestion, in this case an event in February 2019 when a small rodent, the Bramble Cay melomys, was declared extinct by the Australian government. It was the first animal to be declared extinct due to human-driven climate change. The small rodent was named after an island of the same name, the only place in the world where they had been spotted. The melomys' 10-acre habitat, the Bramble Cay, sat less than 10 feet above sea level and was destroyed by climate change – specifically rising sea levels along with the increased frequency and intensity of tropical storms.

The extinction of the melomys points to a much larger biodiversity crisis. The current rate of loss is estimated to be between 100 and 1,000 times higher than the naturally occurring extinction rate (Barnosky et al. 2011; De Vos et al. 2015). It is happening faster than at any other time in human history and is set to continue to grow. It impacts all animal groups: mammals, birds, reptiles, amphibians, fish and insects.

Why does biodiversity matter?

The Millennium Ecosystem Assessment (2005) set out to look at the consequences of ecosystem change for human well-being, drawing on the expertise of 1,360 experts worldwide. They developed the concept of 'services' which ecosystems provide for humans and sorted these into a number of categories: provisioning services such as food, water and timber; regulating services that affect climate, floods, disease, waste and water quality; cultural services that provide recreational, aesthetic and spiritual benefits; and supporting services such as soil formation, photosynthesis and nutrient cycling. Ultimately, the human species is dependent on the flow of ecosystem services and cannot survive without them.

Ceballos et al. (2020) set out the dangers of the current levels of species loss stating that the crisis 'may be the most serious environmental threat to the persistence of civilization, because it is irreversible'. The Harvard biologist E. O. Wilson (2016) expresses it differently, describing our age as the Eremocene or the Age of Loneliness. He argues that we are a biological species that has co-evolved with other species over millions of years and, in a world denuded of biodiversity, the feeling of sadness would be immense and permanent. He concludes that there needs to be a shift in moral reasoning with a greater commitment to the rest of life, if we are going to meet this challenge. Campaigns to address the climate emergency often focus on carbon dioxide levels along with rising temperatures, and the goal of limiting this to a rise of no more than 1.5°C. The associated need to protect ecosystems can become marginalised but remains equally important.

Are we living in the sixth mass extinction?

More than 99 per cent of the four billion species that have ever lived on Earth are now extinct. Newer species evolve to fit into ever-changing ecological niches as older species disappear. Extinction opens up opportunities for new species to emerge and is a natural part of our planet's evolutionary history. The rate of extinction, however, is far from constant. Five mass extinctions have taken place in the planet's 4.6 billion-year history. In a mass extinction, at least 75 per cent of species go extinct within a relatively short period of time, which, using a geological standard, is typically less than two million years.

Many scholars argue that we are currently living in the sixth mass extinction, also known as the Holocene, or Anthropocene, Extinction (Barnosky et al. 2011). This extinction, which includes the disappearance

of large land animals known as megafauna, started at the end of the last glacial period around 10,000 years ago, when it is estimated that more than 178 of the world's largest mammals became extinct. There is strong evidence that these extinctions were driven primarily by human hunting, with the arrival of humans in Australia and North and South America coinciding with these extinctions. Far from living in harmony with ecosystems, very small populations of hunter-gatherers changed them forever. A few million people killed off a large number of species. Natural climate changes may also have exacerbated the pressures on wildlife, but the extinction of the megafauna (also known as the Quaternary mass extinction) can't be explained by climate alone. Our hunter-gatherer ancestors were key to the demise of these megafauna. Human impact on ecosystems, therefore, dates back tens of thousands of years, despite some of the arguments that this is a much more recent phenomenon.

The current rate of extinctions adds to the argument that we are living in the sixth mass extinction. For example, today there are approximately a million animal and plant species at risk of extinction, many of which can disappear within years, not decades. In the UK, nearly half of the country's wildlife and plant species have been lost since the Industrial Revolution. While the previous big five mass extinctions (Box 10.1) were driven by factors such as volcanism and natural swings in climate, this time humans are the primary driver of environmental changes through burning fossil fuels, deforestation, hunting and pollution of ecosystems.

Can we write a history of animals?

Over the last 30 years, non-human animals have increasingly become the focus for scholarly attention. Erica Fudge has argued that 'we must write a history which refuses the absolute separation of the species; refuses that which is the silent assumption of humanist history' (Fudge 2002: 16). Another pioneer in the field of human and animal relations through history, Harriet Ritvo, wrote in 2004, 'animals have been edging toward the mainstream' (Ritvo 2004: 205), and Donna Haraway (2007) has argued for greater focus on the rich seam of human–animal relations, which she describes as 'contact zones', through history. While it is clearly unrealistic for a school history curriculum to take on this huge area comprehensively, I suggest it is entirely possible to introduce students to this revisionist history through a few short inputs.

Firstly, students can be invited to think about why we have the pets we have. The most common pets are cats and dogs. The origin of our

Box 10.1 Five mass extinctions.

1. End Ordovician (444 million years ago; mya): Possibly caused by continental drift and subsequent climate change; affected small aquatic creatures.
2. Late Devonian (360 mya): Possibly caused by rapid growth and diversification of land plants which generated rapid and severe global cooling; affected tropical marine life forms.
3. End Permian (250 mya): Possibly caused by asteroid strikes, volcanic activity, climate change and microbes; affected a huge range of species, including the vertebrates. It was an abrupt extinction, with 96% of the marine and the terrestrial animal species becoming extinct – hence this event is often referred to as the Great Dying.
4. End Triassic (200 mya): Possibly caused by major underwater volcanic activity which caused global warming, and a dramatic change in chemistry composition in the oceans; affected terrestrial and marine reptiles and plant species.
5. End Cretaceous (65 mya): Possibly caused by an asteroid impact in Yucatán, Mexico, which caused global cataclysm and rapid cooling; affected the dinosaurs.

relationship with our main companion species, cats and dogs, stretches back to the domestication of wild animals at the time of the Neolithic Revolution. The storage of grain meant that rodents became pests, and cats proved very effective at helping to control this by catching rats. Dogs, domesticated from wolves, proved to be useful animals for herding grazing animals such as sheep. The domestication of animals was an important change in humanity's history and part of the Neolithic Revolution. Introducing students to this key development via a discussion about pets we keep today can strengthen students' understanding of change and continuity over very large sweeps of time.

Secondly, there have been times when even these close companion animals have been vilified. In the Middle Ages, people believed that the devil assumed human and animal forms, and cats were by far the animal most closely associated with evil. Thousands of cats were burned at the stake along with their owners on suspicion of being witches. By the early fourteenth century, Europe's cat population had been severely depleted, with the result that when the Black Death arrived, the rodent population, which helped to spread the plague, had surged.

Thirdly, as Chapter 3 sets out, while Enlightenment thought began to erode superstitions, it did nothing to dismantle ideas of human exceptionalism. As church authorities began to lose some of their power over people's lives, autopsies were performed to learn more about human anatomy. In the sixteenth century Vesalius advocated cutting open living animals to teach students about blood circulation while in the seventeenth century Descartes wrote that animals were mechanical things like clocks and therefore could not feel pain. It became more socially acceptable to cut open animals while they were alive for medical purposes, and vivisection and animal experimentation became wide-spread in Europe in the seventeenth and eighteenth centuries. At this time 'blood sports' were popular entertainments, including bull and bear baiting with dogs, cock fighting and dog fighting. The English Puritans thought such practices were cruel and outlawed them; however, when the monarchy was restored, blood sports returned and became more popular (Thomas 1991).

The Enlightenment was also the era when some philosophers and writers started to speak out against the mistreatment of animals, including John Locke, Alexander Pope, David Hume and Immanuel Kant. In 1824, the Society for the Prevention of Cruelty to Animals was set up; when it was recognised by Queen Victoria in 1840, it became the RSPCA. More recently, Peter Singer (1975) has argued that animals have been victimised by humans. He equates human mistreatment of animals through history with racism and sexism; and blames 'speciesism' for the systematic abuse of animals in agriculture and research.

This rapid review of just a few of the main 'contact zones' (Haraway 2007) between humans and animals in history illuminates not only the origins of our relationships with companion species, but also the hierarchies which have characterised how humans have thought about their relationship with the rest of nature. As Chapters 3 and 4 set out, various categories of humans – the enslaved, women, the poor, the colonised – have at times been construed as 'less than human'. Over time many of these groups have become, at least to some extent, emancipated. It is highly questionable, however, whether this has become the case for any non-humans (Corbey and Lanjouw 2013).

Can we write other histories where humans are not at the centre?

The study of natural history is arguably the simple and accurate answer to this question. However, the premise of this book is that there is a need for a blurring of boundaries between natural history and the history of

humanity, with greater porosity and interaction between the two. While there are sound arguments behind shifting the focus away from humans, it remains important to recognise that humans have become the dominant species on the planet. Such dominance brings with it responsibilities towards all other species, in a position Chakrabarty describes as 'enlightened anthropocentrism' (2014).

As human impact on the environment becomes ever better understood, there has been an upsurge of interest in the rights of nature. Advocates of a shift towards a more environmentally protective system of law argue that our current legal and economic systems are inadequate because they regard nature as property, something to exploit and which can be degraded for profit. Aldo Leopold expressed an alternative view in this way: 'When we see land as a community to which we belong', rather than 'a commodity belonging to us', we can 'begin to use it with love and respect' (Leopold 1949: xxii). Importantly, this recent interest in the rights of nature can be seen as a rediscovery of long-standing traditions and worldviews which are present among many Indigenous peoples. In many instances, a connection with the natural world is so deep that nature is regarded as a living ancestor. From this position, it follows that humans have responsibilities to protect nature as one would a family member. Legislation has started being passed in a number of different countries recognising rivers, national parks, glaciers and mountains as legal persons (Kauffman and Martin 2021). They are entitled to representation and to have a voice much like a minor has when represented by a parent or guardian. Quite how effective these developments may prove to be remains to be seen, although establishing nature as a legal living entity may be an important first step.

Can we write a history of the land?

The narrative running through the history curriculum is one of human exceptionalism, with the land figuring often as little more than a backdrop to human activity, or as a resource to be exploited. This is one history of the land which we are familiar with. There are other conceptualisations, many of them with a much longer genealogy than either the history curriculum or the commodification of the land. Students may well be familiar with the beliefs of the Indigenous peoples of North America and the sacred relationship they have with the land (see Chapter 6). Similarly, the Aboriginal peoples of Australia understand both time and place in ways which challenge Western conceptualisations. The Songlines are maps of the land that Aboriginal

people live on. They are the journeys taken by the creation ancestors when they emerged from the earth and the sky and started to travel across the land, forming landscapes and creating living things. This happened during the Dreamtime, which is understood as a beginning that never ended and which stretches into the future. The paths of the Songlines are preserved in traditional songs, stories, dances and art, and people sing about their kinship with the land as they walk. While thinking about Aboriginal ideas about the Dreamtime can be dizzying to anyone schooled in Western perspectives, it may be purposeful in simply helping students to realise that there are other, very different ways of looking at the world and the place of humans in it.

Today, with the growing understanding of the hazards of biodiversity loss, there is a considerable interest in Indigenous knowledge about how humans can live more sustainably with the land, and for good reason. Indigenous people, who make up between 300 and 600 million of the world's population, live on a quarter of the world's land area, but this is home to 80 per cent of the biodiversity of the world (IPBES 2019). As the title of Nick Estes' book on the long-standing resistance of Indigenous peoples proclaims, *Our History Is the Future* (2019).

There are other histories of the land, closer to home, which can be told. Chapter 4 tells the story of the English Diggers' attempts to live by cultivating common wasteland. The enclosure of land, and protests against the loss of common land, is a theme which runs through much of British history. One of the demands of the Peasants' Revolt in 1381 was the right to freely use the forests for firewood, timber and game, while Kett's, the Midland and the Western rebellion were just three of many protests against enclosure in the early modern period. The enclosure of forests for parks and hunting lodges was also met with resistance. In the early eighteenth century, gangs of poachers would take deer from the forest, having 'blacked' their faces with soot both as a disguise and so they weren't spotted at night. The 'Black Act' of 1723 was the vicious response of prime minister Robert Walpole. The act authorised the death penalty for more than 50 offences connected with poaching and resulted in hundreds being hanged for the crime of feeding themselves with wild meat.

The Scottish Clearances, which took place from the mid-eighteenth to the mid-nineteenth century, saw tenants evicted from the Highlands and across Scotland to make way for sheep and cattle farming. The majority of the removals were coerced by landowners, including the burning of homes to ensure people could not return. Those evicted relocated to coastal areas or Scotland's industrialising cities, or they emigrated.

In the Fens of East Anglia, a group of wealthy landowners, the 'Gentleman Adventurers', set out to drain the wetlands so that the peat soils could be used for profitable cultivation. The Adventurers would be repaid for their investment by a grant of land and in 1630 they hired a Dutch engineer, Cornelius Vermuyden, to mastermind a drainage scheme. There was fierce local opposition to the scheme, which would deprive villagers of their livelihood from fishing, wild fowling and reed cutting. The 'Fen Tigers' smashed dams and tore down the newly built dykes, setting reedbeds on fire to sabotage the scheme (Boyce 2021).

The arguments for enclosure talked about 'improvements' and were couched in narratives of progress. Certainly there were benefits: the enclosing of land and establishment of large farms did much to enrich landowners, but there is little evidence that it benefited consumers, workers or farmers (Allen 1992). Similarly, industrialisation continued the same process with regard to the concentration of wealth. The situation today is that while extreme world poverty has declined significantly, there remains a huge concentration of wealth in the hands of a few. Just 1 per cent of the world's adult population controls 46 per cent of the world's wealth. Furthermore, such 'enormous disparities of opportunity, wealth and power' are considered among the 'immense challenges' to sustainable development (United Nations 2015); and 'sustained, inclusive and sustainable economic growth . . . will only be possible if wealth is shared and income inequality is addressed' (United Nations 2015). It is within this context that protests such as the Occupy movement of 2011 can be studied, with their slogan of 'the 99 per cent' referring to the concentration of wealth among the top 1 per cent.

In summary, the enclosure of land and the concentration of wealth into fewer hands, along with the protests against such changes, is an important, if often overlooked, theme in British history. Not only does it offer an environmental complement to the established civil rights work which is taught in the curriculum, it also offers rich opportunities for including local history into the curriculum.

In 1830, the environmental poet John Clare wrote a poem, 'The Lament of Swordy Well', in which he describes the evils of enclosure (see below). The land at Swordy Well has been used in different ways over the years. It has been used as a landfill site and as a race track before becoming a nature reserve managed for and by the local community. In small scale, it can be argued that this reflects humanity's changing relationships with the rest of nature (BBC 2008). Significantly, Clare chose to make the narrator of the poem the land itself, and such an approach can be included in classroom practice. To write a history from the perspective of the land

offers the possibility for students to critically reflect on ideas of human exceptionalism which they are likely to have grown up with.

> Lord bless ye, I was kind to all
> And poverty in me
> Could always find a humble stall,
> A rest and lodging free.
> Poor bodies with a hungry ass
> I welcomed many a day
> And gave him tether-room and grass
> And never said him nay.
> There was a time my bit of ground
> Made freemen of the slave.
> The ass no pindar'd dare to pound
> When I its supper gave.
> The gipsies' camp was not afraid;
> I made his dwelling free,
> Till vile enclosure came and made
> A parish slave of me.
>
> from 'The Lament of Swordy Well' by John Clare

Entangled futures?

Historians are notoriously poor at predicting the future. In looking towards possible futures, however, the following three vignettes are offered – without, of course, carrying any weight of prediction. In each case the vignette highlights interactions between humans and non-humans where the humans have responsibilities and the non-humans have rights.

The first vignette is from Iceland. The glacier Okjökull (also known as OK) was declared dead in 2014, the result of changing climate. In August 2019 a plaque was installed. It is a letter written to the future which reads:

> OK is the first Icelandic glacier to lose its status as a glacier. In the next 200 years all our glaciers are expected to follow the same path. This monument is to acknowledge that we know what is happening and what needs to be done. Only you know if we did it.

At the end of the plaque, there is the global atmospheric carbon dioxide reading for that month: 415 ppm.

The second vignette is from Lake Vättern in Sweden. This is the second-largest lake in Sweden and supplies water for about 250,000 people. It is also a site which the military have used for shooting practice for many decades. The lake contains many remnants from cartridges as well as other large dumps of ammunition. There have been impacts on the quality of the water and the biodiversity of the area. In 2019, the Earth Rights conference held a tribunal and declared that such continued activity around Lake Vättern violated the Universal Declaration of the Rights of Mother Earth.

The third example is from Finland. The Onkalo repository is a deep underground facility where spent nuclear fuel will be stored for the next 100,000 years. In constructing the site, a lot of thought was given to how messages could be presented to the future to indicate that the site is dangerous to life (see Figure 10.1). The plaque reads, 'This place is not a place of honour. No highly esteemed event is commemorated here. Nothing valued is here. What is here is dangerous and repulsive to us. This message is a warning about danger.' The aim is to dissuade any future visitors from exploring the facility, which could mistakenly be thought of as a place of hidden treasure (think Tutankhamun's tomb). Importantly, the warnings are thinking about how such a message can be communicated to whatever future life form might come here, long after humans have disappeared from the Earth.

In each of these examples, along with John Clare's poem, the current prevailing view of human exceptionalism is challenged. Rather than being seen as something special, humanity is seen in relation to

Figure 10.1   Multigenerational warning sign. Public domain.

some of the other voiceless inhabitants with which we share the planet. And the responsibilities of humans towards these other players are focused on. The vignettes also illustrate how the future can and, as the book has argued, should also be part of our remit as history educators. History has never been just about the past; it has always been about the ongoing relationship between past, present and futures.

When did the Anthropocene start? And why can't we agree on the term?

Embedding environmental perspectives into the curriculum brings disruption to some of the established periodisation we use in history. For example, as Chapter 7 sets out, the distinction between history and prehistory needs to be problematised. Similar debates surround the term Anthropocene. The aim of this enquiry is to look first at the different contenders for when the Anthropocene started. An enquiry of this sort would introduce students to the current debates around periodisation in relation to the Anthropocene; it could also offer an opportunity to revisit and reinforce understanding about the key turning points in humanity's relationship with the rest of nature over time (see the synoptic frameworks in Chapter 3). A second aim, more conceptually demanding and therefore perhaps more appropriate with older students, is to look at the debates surrounding the use of the term itself and why the disagreements continue. The second question, 'Why can't we agree on the term?', aims to highlight how the term itself is never a neutral one. It can be used in different ways to advocate for different policies; it can also be critiqued as a term which ignores global inequalities as well as marginalising non-human others.

Derived from the Greek word *anthropos*, meaning 'human', and *-cene*, meaning 'recent', the Anthropocene is the idea that the Earth has entered a new epoch in its geological history, in which human beings have for the first time become the primary agents of change on a planetary scale and leaving their mark on the geological record. The *Oxford Learner's Dictionary* defines the Anthropocene as 'the current geological age, viewed as the period during which human activity has been the dominant influence on climate and the environment'. As early as 1864, anthropogenic global change was acknowledged by George Perkins Marsh in *Man and Nature*. His book was one of the first to set out the effects of human action on the environment and challenged the idea that the Earth's resources were inexhaustible. Although the term Anthropocene was used informally by some scientists in the latter part of the twentieth

century, it was popularised as a term when the Nobel prize-winning chemist Paul Crutzen started using it in 2000 (Crutzen and Stoermer 2000). It remains a contested term without official recognition as a period in geological time. One element of controversy is deciding on when the Anthropocene started, and there are several contenders.

Firstly, William F. Ruddiman (2003) suggests that the Anthropocene began around 8,000 years ago with the development of agriculture. Looking at the global climate system over two million years, there have been numerous colder glacial and warmer interglacial periods recurring at intervals of 100,000 years. Ruddiman argues that the change in land use to agriculture, including the clearance and burning of woodland, raised levels of greenhouse gases such as methane and carbon dioxide. These gases, by raising temperatures, have protected the planet from the cooling expected from the natural climatic cycles. In this way, Ruddiman argues, the raised temperatures which resulted from the onset of agriculture served to delay the onset of the next ice age.

Secondly, Maslin and Lewis (2020) suggest that the start of the Anthropocene coincided with the arrival of Europeans in the Americas for two main reasons. The first is that the amount of plants and animals that were exchanged between Europe and the Americas during this time drastically reshaped the ecosystems of both of these landmasses, evidence of which can be found in the geologic layer. The second reason is the drop in carbon dioxide levels, which reached their lowest level in 1610: a phenomenon Maslin and Lewis termed the 'Orbis (Latin for 'world') Spike' and which can be found in the geologic layer. Contact with Europeans and the new diseases they brought (see Chapter 5) led to the deaths of an estimated 50 million, or 90 per cent, of the Indigenous Native American population. With such a rapid decline in population, farmland was abandoned and forests regrew with the resulting sequestration of carbon dioxide and cooling of temperatures. In this way, human activity may have contributed to the Little Ice Age in North America (Ruddiman 2005). By arguing that the Anthropocene started in 1610, Maslin and Lewis draw attention to the views of several Indigenous scholars who argue that the Anthropocene is not a new event but rather the continuation of practices of horrifying dispossession and the chilling realities of colonialism which started with the arrival of the Europeans and continued thereafter (Davis and Todd 2017). Unequal power relationships are central to their argument.

Thirdly, Crutzen proposes the Industrial Revolution, and an approximate date of 1800, as the start of the Anthropocene. Fossil fuels represented a vast energy store of solar energy from the past that had

accumulated from tens or hundreds of millions of years of photosynthesis. The discovery and efficient exploitation of fossil fuels enabled rapid change, and human energy use rose sharply. In general, those industrial societies used four or five times as much energy as their agrarian pre-decessors, who in turn used three or four times as much as our hunting and gathering forebears (Steffen et al. 2011). While the Industrial Revolution had barely begun in 1750, by 1850 it had transformed England as well as spread to other European countries and the USA.

Fourthly, in January 2015, 26 of the 38 members of the International Anthropocene Working Group suggested the Trinity test on 16 July 1945 as the starting point of the proposed new epoch. This was the first detonation of a nuclear weapon over New Mexico and there have been more than 2,000 detonations since, including most famously at Hiroshima and Nagasaki. The nuclear fallout from such bombs leaves a radioactive marker in rocks, a geological record and signal which future generations should be able to measure for millennia.

Finally, and most recently, in May 2019 the members of the Anthropocene Working Group (AWG) proposed a start date in the mid-twentieth century, a period also described as the Great Acceleration (Steffen et al. 2015). This refers to the upsurge in the rate of growth across a large range of measures of human activity from the mid-twentieth century and continuing today. The data is drawn from a range of socio-economic data (such as population, transportation, water use, paper consumption and international tourism) as well as the impacts of these on Earth system data (such as levels of carbon dioxide, methane and biosphere degradation).

There are, therefore, a range of contenders for dating the start of the Anthropocene. The enquiry can support students in thinking critically about periodisation rather than just accepting terms as established and given; it can help them to better understand the evidence base, typically rather different to that used in more traditional history classrooms, which underpins much environmental history; and it can help them to see how different evidence can be used to support arguments for different start dates of the Anthropocene.

If dating the start of the Anthropocene is contested, the term itself has come in for criticism. Chapter 3 presents alternatives such as 'Carbocene' and 'Capitalocene' (Moore 2015) which recognise the importance of fossil fuels as well as the global inequalities in under-standing how to name and conceptualise our present moment in history. 'Anthropocene' suggests that humanity as a whole is responsible for the

damage caused while ignoring that the problem is a political one, resting on the uneven distribution of power across the world. The primary actors for the ecological damage that has been done are those societies that have benefited from industrialisation and the wealth it has brought them, and the term Anthropocene doesn't draw out this distinction.

A further related challenge arises when the Anthropocene is thought of as an era of 'unprecedented change', or as 'a change that does not simply unfold out of past conditions over the course of a historical process, but one that suddenly erupts in the shape of game-changing events which bring about a whole new world' (Simon 2021). Following this line of thinking, and as discussed in Chapter 8, it could be argued that the concept of change which underpins disciplinary history is fundamentally challenged. How can we make sense of 'unprecedented change' if it defies everything that we know and are familiar with? The understanding that climate change will bring increasing regularity of extreme weather events is, for many in the wealthy world, the first time when their belief in the overall stability of their lives was first questioned. This, however, is not the experience of most people in the world. As Benger (2021) argues, 'unprecedented change has some historical precedent in the experiences of peoples the world over faced with imperial and capitalist expansions'. In this sense, the Anthropocene is not so much unprecedented change but rather the opportunity for the wealthy world to see the current predicament as closely connected to the long-standing experiences of many in the world. The climatologist Wallace Broecker (2008) famously described the climate system as 'an angry beast and we are poking it with sticks' to draw attention to the radical uncertainties involved in climate change. The palaeohistorical evidence points to sudden change in the past and it is entirely possible that this will happen again. Unpredictability is what characterises the situation we are all in now. This is new for many in the wealthy world but has characterised the experiences of many across the globe for many generations.

How the term is used today presents a further challenge. Even while the term remains contested, using it may help to draw attention to the urgent need for action to mitigate the impacts of climate change. Even here, however, there is no clear consensus as to what action is required. On the one hand, some environmental scholars and scientists have issued the Ecomodernist manifesto (2015), arguing that 'A good Anthropocene demands that humans use their growing social, economic, and technological powers to make life better for people, stabilize the

climate, and protect the natural world'. On the other hand, a different perspective argues that a more desirable future would be characterised by low-tech, local food chains and responsible water use. Richard Heinberg of the Post-Carbon Institute describes these two positions as a 'techno-Anthropocene' (with a 'we're-in-charge-and-loving-it' attitude); and a 'lean-green Anthropocene' (Heinberg 2015). These two positions reflect the contrasting perspectives towards how humanity has regarded its relationship with the rest of nature throughout history, as set out in Chapter 3.

Finally, the idea of the Anthropocene can be critiqued on the grounds that it 'smacks of species vanity' (Corfield 2011: 9). In keeping with much else in history, it can serve to retain a focus on humans. Embedding environmental perspectives into the existing curriculum provides an opportunity to take one step away from an exclusive focus on human exceptionalism. In the following section, I look at an example of early capitalism with a focus afforded to the tree which was exploited. In Amitav Ghosh's book *The Nutmeg's Curse* (2021), he looks at the history of the nutmeg tree and sees in this the origins of today's climate crisis in microcosm. Human history has always been entangled with earthly materials, including spices, tea, sugar cane, opium, fossil fuels and, in this example, nutmeg; humans have regarded nature in a mechanistic way, as if it existed only for our own ends, and overlooked nature as full of meaning and agency. In developing his argument, Ghosh reframes colonialism as 'the project of muting and subduing the Earth'.

What stories would the nutmeg tell?

In this enquiry, students are invited to tell the history of the colonial exploitation of the Banda Islands from the nutmeg's perspective. How would the nutmeg tell the history of the Banda Islands? What would the nutmeg say about the different episodes? The approach of using a non-human object or player to tell a history has been successfully used before. Michael Riley (British Museum n.d.) has used the Akan Drum to tell accounts of transatlantic slavery. Decentring humans and narrating accounts from a neutral other can be a powerful approach to take, particularly when addressing sensitive and controversial histories. The history can be told through a series of episodes and presented as a storyboard or booklet using words and pictures. Possible episodes for the enquiry 'What would the nutmeg say?' are indicated by the paragraph breaks in Box 10.2.

Box 10.2 Enquiry: What would the nutmeg say?

The Banda Islands are a small group of volcanic islands in the Indian Ocean. Until the eighteenth century, and because of the islands' ecology, it was the only place on Earth where nutmeg and mace grew, both products of the nutmeg tree. For many centuries, the spices had been brought to Europe by Arab and Venetian traders and were popular for both culinary and medicinal uses. The price of nutmeg soared. In the late medieval period, nutmeg was so valuable that just a handful could buy a house or a ship, and by the sixteenth century it was much in demand because people thought that nutmeg could cure the plague which was so prevalent in the Elizabethan period.

European navigators set out in search of these Spice Islands, the location of which Arab traders had kept secret from the Europeans. The Portuguese, Dutch and English all established trade with the Bandas and fierce rivalry between the Dutch and the English developed. The Governor-General of the Dutch East Indies Company, Jan Coen, was determined to establish a Dutch monopoly.

In 1621, Jan Coen landed more than 2,000 men on the islands, including Japanese mercenaries. His men began a campaign of expulsion, demanding that the local inhabitants surrender their arms, demolish their fortifications and submit to deportation. When they resisted or fled into the mountains, Coen ordered a punitive massacre of burning settlements, torturing, killing and beheading inhabitants. Survivors fled as refugees or were enslaved and sent to other parts of the Dutch East Indies. It is estimated that 90 per cent of the population was killed, enslaved or deported during the Dutch conquest.

Coen then divided the productive land into parcels which were handed out to Dutch planters. Slaves were brought in to work on the plantations. One more remote island in the Banda group, Run, was harder for the Dutch East India Company to control. They destroyed all the nutmeg trees on the island in a move to thwart any British ambitions, as well as maintain high nutmeg prices.

In 1667, the Dutch and the British signed the Treaty of Breda. The British gave up Run, which they swapped for New York's Manhattan. The highly profitable Dutch monopoly of nutmeg continued for 200 years.

The British ambitions didn't altogether disappear. During the Napoleonic Wars, the British and French were both trying to control lucrative trade routes in the Indian Ocean. The Dutch were vassals

of Napoleonic France and in 1810 the British successfully defeated the Dutch in the Banda Islands. Before the Dutch retook control of the islands seven years later, the British, in their determination to break the Dutch monopoly, removed many of the nutmeg trees and transplanted them to Ceylon and other British colonies. The competition largely destroyed the value of the Banda Islands to the Dutch.

Indonesia, including the Banda Islands, became independent in 1945. In the twenty-first century, the massacre of 1621 has been regarded as an example of genocide in pursuit of a trade monopoly (Ghosh 2021).

Other species: what would the mushroom say?

Fungi and humans share a long entangled history together. As with other microbial agents (discussed in Chapter 5), the diverse microbial populations in our guts point to our long evolutionary history when we've pulled microbes on board to help us in our digestion. We've also used fungi in many fermentation processes, from bread making, alcohol and soy sauce to vaccines and penicillin. Fungi appear in many folklore traditions (Dugan 2008), and on occasion they have contributed to political upheaval. When the Habsburg King Charles VI died in 1740 after eating death cap mushrooms on a hunting trip, the ensuing War of the Austrian Succession led to repercussions as far afield as the American colonies and India. As Voltaire remarked, 'a dish of mushrooms changed the destiny of Europe' (quoted in Bertelsen 2013). Fungi have also been shown to break down and consume all kinds of pollutants, including the deadly components of VX gas, used by Saddam Hussein in the 1980s in the Iran–Iraq War. Similarly, fungi can degrade pesticides, the explosive TNT, crude oil, some plastics and a range of human and veterinary drugs not removed by wastewater treatment plants (Sheldrake 2020). While this might seem to offer much-needed potentially powerful solutions today, what can be achieved in laboratories cannot be so easily replicated in complex ecosystems.

The story or history of the matsutake mushroom illustrates the complexity well. Matsutake are wild mushrooms; they are able to nurture trees and help forests to grow in less hospitable places. Matsutake can be hard to find because of the rare, specific mixture of forest and terrain which they need. Wild animals such as squirrels, rabbits and deer also eat

the mushrooms and compete with human foragers. Matsutake are highly prized in Japanese cuisine, although domestic production has suffered because of the pine-killing nematode, a pest which spread from its native America. Matsutake live in forests which have been disturbed by humans. Just like rats and cockroaches, they can tolerate the environmental messes that humans have made. It is said that after the atomic bomb was dropped on Hiroshima, the first form of life that appeared was the matsutake mushroom (Tsing 2015).

The story of the matsutake shows how life requires the interplay of many kinds of being; importantly, it also suggests the possibility of coexistence within environmental disturbance. It is not, however, and won't be, the only story to tell as we face the future. Humans are an intelligent and adaptive species which has always developed and harnessed technologies in new and creative ways. Historians cannot predict the future or say how the interaction between these different types of knowledge will play out. With no definitive answer to offer as to how the future will unfold, I give the last word to Iceland's OK glacier and its letter to the future: 'We know what is happening and what needs to be done. Only you know if we did it.'

Conclusion

This chapter has focused on two questions suitable for discussion in classrooms which offer the opportunity to move away from an exclusive focus on humans in the histories that we teach. It is an apt way to end a book which has taken the reader on a journey from the disciplinary origins of history through to the discourses which are shaping its development today. Unlike the early beginnings of disciplinary history where a focus on nations was prioritised, environmental history, the backdrop of the climate emergency and associated crisis in biodiversity need to be kept at the centre in our discussions of history today. These concerns necessitate an engagement with scale and we need to build confidence teaching at different scales of granularity.

Keeping environment as a central focus in history teaching serves to disrupt, but not displace, the second-order concepts that underpin the discipline. Indeed, an examination of the implications of environmental history for second-order concepts offers the opportunity for students to strengthen and develop their critical understanding of history. Similarly, the pedagogical implications of embedding environmental history into the curriculum are considerable, although existing knowledge about the

teaching of sensitive and controversial histories provides helpful foundations for working with the difficult and emotional elements to which environmental history can give rise. As with all foundations, there is more research and constructive classroom work to be done, and the ideas in this book represent initial starting points only.

One of the most pressing areas to attend to is subject knowledge. In many cases, history teachers join the profession with little or no grounding in environmental history. This needs to change. The book has provided environmental subject knowledge relevant to school history curricula in both the UK and internationally. It has related environmental themes to other themes, in particular race and gender, which the curriculum attends to, and has shown how the themes intersect. Far from simplistic, the intersections complicate narratives, recognising that such themes are never neutral or devoid of contestations of power. The book has challenged the traditional assumption of human exceptionalism and offered approaches where other-than-human agents are afforded more central positions in the histories we teach. The subject knowledge introduced in the book is a start. In moving forward, however, there is a need for undergraduate courses, history teacher education courses and ongoing professional development for history teachers all to do more. Addressing the gaps and hesitancies that teachers express in embedding environmental perspectives into their practice is priority. It starts with conversations – with colleagues, at departmental meetings and in wider networks – and builds with small, planned interventions and innovations. Nothing less than a change in the norms and defaults of history education is needed, so that teachers feel confident and supported in building a new history education culture where environmental perspectives are fully embedded in classroom practice. The challenge is both urgent and exciting.

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Index

'There has never been a better time to explore how history can help young people make sense of the climate crisis and this book is the perfect starting point. It takes us on a journey across broad timespans and smaller stories, providing fresh insights into what is already taught in classrooms and introducing us to surprising and fascinating perspectives along the way. Its breadth and accessibility will make it indispensable to teachers at every stage of their career and I cannot recommend it highly enough.'

Dr Alison Kitson, Associate Professor of Education and Programme Director, Centre for Climate Change and Sustainability Education, UCL Institute of Education

'A welcome and much-needed book that will be invaluable for all those thinking about how to better integrate environmental sciences and history into the classroom. An incredibly helpful resource for teachers – and therefore for pupils too.'

Peter Frankopan, Professor of Global History, Worcester College, University of Oxford

History education has a key contribution to make in developing a deeper understanding of the current environmental crisis, but its role is too often overlooked. When embedded in the school curriculum, environmental history adds crucial layers of knowledge to the learning from other subjects and can enable students to make their own informed contributions to one of the most pressing concerns of the twenty-first century.

History and the Climate Crisis makes the case for including an environmental focus in the secondary school history curriculum by locating its arguments within established historiographical and revisionist debates. It provides much-needed subject knowledge in an area that is new for most history teachers. The author considers the disciplinary and pedagogical challenges and demonstrates how including an environmental focus can strengthen students' disciplinary knowledge. She also builds her argument through the use of many examples and offers practical strategies for use in classrooms, including developed enquiries suitable for the secondary history curriculum. The book focuses on environmental history within a strong subject bound curriculum and will be relevant to teachers, academics and policymakers in the UK and internationally.

Kate Hawkey is a senior lecturer at the University of Bristol where she coordinated the secondary history initial teacher education programme for many years.