



timescapes of modernity

THE ENVIRONMENT & INVISIBLE HAZARDS

Barbara Adam

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TIMESCAPES OF MODERNITY

Time is the invisible ‘other’ that works outside and beyond the reach of our senses. Thinking of the environment as a timescape allows us to see the hazards of an industrial way of life. The invisible becomes tangible and we begin to recognise processes that work below the surface until they materialise as symptoms—sometime, somewhere.

Timescapes of Modernity focuses on time to facilitate a deeper understanding of the interactions between environmental, economic, political and sociocultural concerns. Barbara Adam argues that environmental hazards are inescapably tied to the successes of the industrial way of life: global markets and economic growth, large-scale production of food, the speed of transport and communication, the 24-hour society, even democratic politics. Emphasising the complexity of time, this book brings to the forefront of socio-environmental concerns the rhythms, timings, changes, latencies and contingencies that permeate the story of industrial success and excess.

Introducing a unique ‘timescape’ perspective, Barbara Adam dislodges taken-for-granted assumptions about environmental change, enables a reformulation of environmental problems and their cures, and provides the potential for innovative new strategies to deal with some of the most severe environmental hazards of our time.

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The environment and invisible
hazards

Barbara Adam



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For Chapters 3 and 6 I draw on material researched during the fellowship that has been published in the following articles: 'Beyond the Present: Nature, Technology and the Democratic Ideal', *Time & Society*, 5, 3:319–38 (1996c); 'Chernobyl: Implicate Order of Socio-environmental Chaos' in J.T. Fraser and M. Soulsby (eds) *Time and Chaos*, Madison, CT: International Universities Press (1997a); and 'Radiated Identities: In Pursuit of the Temporal Complexity of Conceptual Cultural Practices', in M.Featherstone and S.Lash (eds) *Spaces of Culture: City, Nation, World*,

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INTRODUCTION

Troubled times

These are troubled times. As I write, the UK beef industry is collapsing, all fishing is suspended off the coast of West Wales and the tenth anniversary of Chernobyl has brought the invisible dangers of radiation back to the forefront of public attention. Surrounded by so much disaster and tragedy it feels almost wrong and out of place to write about issues that I know to be important and deeply pertinent to this current round of environmental disasters. As friends and neighbours face existential crises, their livelihoods as farmers, fishermen, hoteliers, shopkeepers and artists seriously threatened by oil pollution and Bovine Spongiform Encephalopathy (BSE), I am forced to confront the relevance of my work not to the academic community of scholars but to the everyday lives of people caught up in the downward spiral of the industrial way of life. The grief and desperation in the area is palpable: a country and people stressed to their limits. West Wales, my adoptive 'home', has three principal sources of income: farming, tourism and fishing. All three have been deeply affected, threatened at the core by events that have arisen within one month of each other. Though concentrated in a particular time—space, these events are symptoms of global economic and industrial processes which, in turn, are inseparably linked to specific conceptions and approaches to time and space, the subject matter of this book.

Where I was previously able to have long and intensive discussions about modern farming methods, about my farming friends' relationships with their animals, or innovations in 'the industry', today my work and my friends' existential fears stand in a problematic relation to each other. A shadow has crept into the long-standing relationship of friendship and trust. Aware of their despair and their hurt over the wide-spread 'farmer bashing', I find myself scrutinising and reflecting on everything I say, trying to see the issues simultaneously through their eyes. My desire to interview them feels inappropriate and opportunistic; to get their story and their

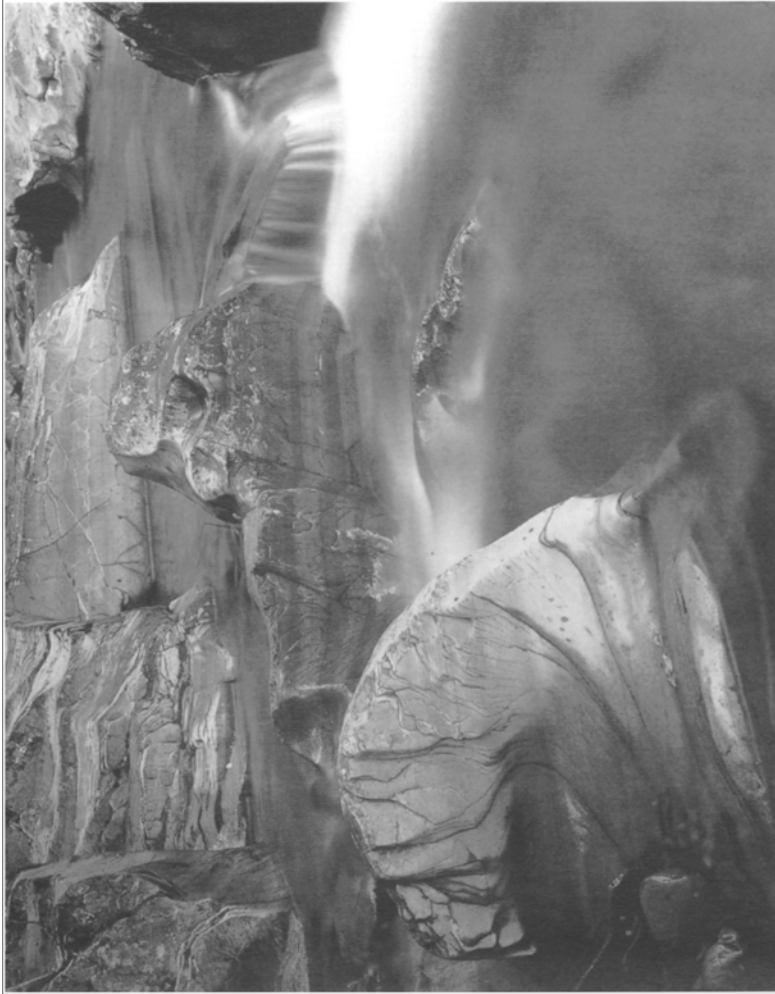


Plate 1 Ifor Tygwyn from Wales the First Place by Paul Wakefield. Source: Tony Stone Images.

views on both the causes and solutions of the beef crisis seems exploitative, insensitive to the gravity of the situation. In the midst of this tragedy, all I seem to be able to do is seek out and collate some of the less accessible information from the overload of stories provided by the media. Having followed events across the breadth of British newspapers and television I am able to pick out some of the thinly distributed morsels of conflicting factual information and pass them on like pieces of jigsaw for a still grossly incomplete puzzle.

My analysis of some of the temporal issues underpinning the crisis, however, has to remain invisible, since this would add insult to injury in a situation where the combination of existential threat, scientific uncertainty and governmental bungling causes paralysis in the afflicted, preventing them from engaging in constructive thought and purposive action. How could I talk about the compression of time and the valorisation of speed in a social system that relates to time on an economic basis when increasing yields in ever shorter time constitute part of farmers' skills, when such temporal compression is a source of pride, and brings them respect in the farming community? Talk about what is wrong with industrial farming would not go down well at a time when farmers anticipate losing their herds, their basis of existence and their self-respect. How could I talk about the need for a renewed sensitivity to the natural rhythms of farm animals and their environment at a time when the whole cashflow system of beef and dairy farmers has collapsed, when they can no longer sell animals to pay for feed and fertilisers, when their patterns of exchange—their daily, weekly, monthly and seasonal rhythms of buying and selling—are no longer workable and when the debts mount proportional to the uncertainty not just of the immediate but also the long-term future? The shock of seeing their life-worlds implode and their livelihoods destroyed by a government so clearly incapable of handling the situation mixes helplessness with anger and hatred, disbelief with frustration and suspicion, soul searching with a desperate search for villains: the Europeans, the EU, the media, government, scientists, consumers, and agri-business which provides both the suspect feed and the machines for mechanical rendering. There is no need, it seems to me, to add 'armchair theorists' to that list. It would indeed be highly inappropriate for me to amplify their plight by showing links between BSE and approaches to time, between the symptoms of the industrial way of life and the persistent disregard of *Eigenzeiten*, that is, the system-specific times and seasonal rhythmicity of the live-stock and land in their care. And yet, to establish those links seems to me to be absolutely crucial.

Knowledge for whom and what?

From the vantage point of hindsight these tragic events may well be considered as turning points, as opportunities for reflection and renewal. But somehow I do not see social theorists playing a central role in facilitating such changes. More than ever before, therefore, I am forced to question my work, query the purposes of my writing, confront my pride in scholarly activity. In the face of so much disaster and despair, I find it increasingly difficult to justify writing about conceptual matters for social scientists in the expectation that I affect their work and that this in turn will filter through to environmental policy and action. The need for theory and

practice to be brought into the closest possible relation with each other seems ever more important: what I have to say should connect with and be relevant to the everyday lifeworld of work and social interaction, the concerns of policy makers and, most importantly, all the socio-environmental spheres of action and impact.

I have learnt much in this respect from my colleagues in Germany where I am part of a project that brings to the public's attention scientific work on the time aspects of environmental matters. In the form of publications and conferences, hosted by the education wing of the Protestant church with additional funds from the Schweisfurth Stiftung, Munich and, more recently, the Deutsche Bundesstiftung Umwelt, the Tutzing Time Ecology Project' brings together scientific work and lay knowledge (Held and Geißler, 1993; Held and Geißler, 1995; Schneider, 1995; Adam *et al.*, 1997a). Here, academics are unashamedly programmatic and committed to present their work in a way that demonstrates the practical relevance of theory and scientific knowledge to the issues at hand. Moreover, they take account of the competencies of the lay public and are open to learning from the conference participants' specialist knowledge spheres. The subject matter of this project on time ecology may relate to agriculture, food, consumption, the treatment of water and soil, the changing pace of life, the economic perspective on the environment, the rhythmicities of nature and cities. Beyond this emphasis on praxis—the unification of theory and practice in the Marxian sense—the project puts into practice a theoretical commitment to embodied knowledge and aesthetic appreciation. Through a combination of science, art, music and poetry it presents as an integrated whole what institutional knowledge and professionalisation have set apart: academic knowledge, practical activity, embodied sense experience and aesthetic sensibilities. It thus fulfils its goal of truly embodied knowledge. Unlike the embodiment pursued in postmodern theory, however, this embodiment is not conceived as inscription but incorporation, not textual but practical, that is, tied to activity and praxis. (For an account of this project, see Adam *et al.*, 1997b.)

I am further encouraged by the work of Michael Gibbons and his collaborators (Gibbons *et al.*, 1994) on the new production of knowledge. They identify a new breed of knowledge production that is more contextual and use oriented, transdisciplinary and non-institutional, reflexive and socially accountable than was conceivable in the traditional academic mode. While Gibbons *et al.* give evidence of the production of such new social science, however, they show us little of the epistemological and ontological difficulties that are encountered in the shift from disembodied, decontextualised, institutional, objective science to openly acknowledged implication and explicit engagement. Yet we need to appreciate that the pursuit of this path creates new problems and revisits old ones that make the production of such social science far from easy. It necessitates change at

the very centre of taken-for-granted scientific assumptions. Thus, to combine an appreciation of relativity as a fact of life (Adam, 1995a, Chapter 7) with a realist approach to nature, thorough-going reflectivity with a position of personal, embodied, contextual and critical engagement and, finally, disciplinary rigour with accessibility, demands dramatic revision of the social theory tradition. It necessitates a kind of social theory that, in his methodological writings, Max Weber (1949)—one of the founders of social science—designated impossible.

Over a much longer period, of course, feminist theorists have been leading the way towards such knowledge with their demand that theories have to become re-embodied and re-contextualised. Feminist scholars have consistently and persuasively argued against objectivist science and its alleged ‘unbiased observations’ from a position of nowhere and everywhere. They have rejected this ‘nobody’s power’, as Ermarth (1992:29) calls it, a power that is ‘at once human and unspecific, powerfully present but not individualised’ because it fails to acknowledge the narrator as an integral part of the story. At the same time, however, there is an acute awareness among feminist environmental theorists of the difficulties that might arise with such sensitivity to the contextuality and constructedness of accounts, since the ability to present an analysis of risks and hazards on such pressing issues as biotechnology, agricultural practices, radiation and the BSE crisis depends fundamentally on reference to a ‘reality’ outside the constructivity of representation. There is an appreciation, in other words, that acknowledgement of the constructive role played by observer-theorists, their frameworks of understanding and metaphors, creates problems. It makes it difficult, in other words, to speak about theories not being appropriate or adequate to the ‘reality’ they seek to explicate, to refer to a physical world beyond its description, and to offer a critique of environmental strategies.

This book is an attempt to put into practice and to show the relevance for environmental praxis of some of the insights and commitments arising from the Tutzing ‘Time Ecology Project’, Gibbons *et al.*’s (1994) *The New Production of Knowledge* and feminist theory. This means, in this treatise I fully acknowledge my personal influence on the analysis. I take seriously the demand that theory must not lose touch with experience and everyday practice and, finally, I embrace the recognition that theory is political in the sense that it is the basis for value-laden action. This is not a new development in my writing. Rather, my work to date has been a steady progression towards the theoretical position pursued and promoted here. Thus, for example, my *Time and Social Theory* (1990) is transdisciplinary in both content and approach. It is programmatic to the extent that it argues that social scientists have to engage with ‘nature’, technology and the work of natural scientists if their work is to be relevant to some of the key social issues of the late twentieth century such as globalisation and the

impact of technology on the environment. In *Timewatch* (1995a) I once more use the focus on time to effect a shift in basic assumptions, largely in the social sciences but also, implicitly, in everyday life. This is achieved through a substantive focus on health, education, work, globalisation and environmental pollution. In both books, theory is understood with reference to action; it is conceived as praxis. In both texts I have steered a path that avoids the unacceptable choices of traditional social theory and analysis: between biological and social determinism (where people are understood to be governed by either their biology or society), between realism and relativism (where the external world is thought to be either discovered or constructed by the understanding we bring to it), between meta-narratives and particularism (where analyses are considered to be embedded in the worlds of either overarching, universal theories or particular, unique contexts and events). I have shown how to take account of nature without succumbing to biological determinism, how to accept relativism as inescapable without losing the ability to talk about the physical world of 'nature' and technology, and how to be critical of metanarratives in a social world of global/ising relations.

With this book, I feel, there is a need to take this process one step further with reference to both the practice-oriented conceptual approach and its addressees. To this end I gather information from an eclectic range of sources. I engage with phenomena and processes marked by in/visibility, im/materiality, futurity and un/certainty, and demystify the capacity of science to provide truth(s). I tell stories that make taken-for-granted assumptions visible and attend to previously disattended ways of seeing. This entails that I treat implicit theories and conceptualisations, assumptions and presuppositions not as 'second order questions' (Benton and Redclift, 1994: 2) but as primary data, as sources equivalent to any other empirical data which social scientists might investigate. It means further that I am in pursuit of theory that is generated from a contextual, 'earthed', embodied position that reflectively acknowledges the theorist as part of her story and analysis. The focus on time enormously aids this endeavour. Since time permeates every aspect of existence, it functions as a constant reminder to the physicality of my being, that I am an embodied person inescapably implicated in my subject matter.

I illuminate events in the round, that is, from a multitude of angles, leaving readers to make their own judgements about 'right' and 'wrong', 'good' and 'evil'. More crucially, I am committed to creating theory that is meaningful not only to social scientists but also to people as they are affected by global/local (from now on *glocal*) socio-economic relations and the environmental impact of the industrial way of life. Currently, such people are outside the stakeholder circle of this social science discourse. This gap between social science explanation and lay perception of environmental issues, however, is not the focus of my attention. Instead, I

consider that gap as something to be narrowed. As cultural theorists such as Jacques Derrida and his followers produce ever less accessible theory I want to move in the opposite direction: the more complex the ideas to be presented, the more accessible I feel needs to be the form in which the story is told.

I see this move towards theoretical transparency and public accessibility as essential for a number of reasons. First, in modern industrial societies the primary and most widely accessible ‘social theory’ is provided by the media, that is, press, radio and television. Journalists, however, do not consider the production of high quality social theory and analysis as one of their primary tasks. In the tabloid press this function of the media is fulfilled particularly poorly. Sadly, therefore, the quality of media social theory stands in an inverse relationship to the number of readers it reaches. As I show in [Chapter 5](#), the public are served badly in cases where social analysis is left to the theoretical and analytical prowess of journalists. In the light of this worrying state of affairs, the approach presented here is intended as an essential supplement to the primary social theories of contemporary industrial society. The objective, however, is not a critique of the sort of social theory offered by the media; it is not a mere academic exercise. Rather, it is to focus on the ‘parts’ of socio-environmental life that media social theory cannot reach. I recognise that it might be impossible to bridge the gap between academic social theory and the media theory provided by tabloid press. But I feel confident that the issues I raise in this book connect with the experiences and concerns of recipients of media analyses in the widest sense.

A second reason for the pursuit of theoretical accessibility relates to the nature of current environmental issues. Where in previous historical periods academic work and scientific research would be left to trickle through the social fabric unaided and at its own pace, the compression and concentration of environmental impacts of the industrial way of life mean that the traditional path of communication between academia and public life has become too slow. With the acceleration of technological innovation and its intensifying effects world-wide on socio-environmental life, there is now a need to find more direct paths of communication. Speedy and direct multiplex communications seem to be of the essence when inappropriate habits of mind today guide actions that create at an ever-increasing rate long-term, time—space distantiated hazards for generations hence. The days of the trickling-through mode of academic (social) science are numbered. The search for new public theory and institutional structures is on the agenda. The focus on time is central to this endeavour.

A brief note on 'we'

In this book I tend to use the 'we' as my mode of address to the reader. But who is included in this 'we'? This is an important question. In a book that argues the futility of the quest for objectivity and static truth it makes sense to use the 'we' in an unproblematic way. If I acknowledge and argue that what I can see and understand depends on and changes with context, then the 'we' cannot be fixed either. It too changes with the context.

In addition to the diversity of my social self, therefore, the 'we' encompasses the readers of this book; fellow social/environmental theorists; (social) science colleagues; other women, mothers, daughters, wives, and parents; fellow Europeans and people sharing the same historical period; members of industrial societies; people who have grown up with Western philosophic and scientific traditions; other human beings as earth dwellers who share their habitat with all other life forms at this or other specified times. There are no boundaries to this 'we'. It is indefinitely extendible in time and space. The context, as I have noted above, determines which kind of 'we' is evoked. Only where there is ambiguity and possible doubt, therefore, will I specify the particular inclusiveness of the 'we'.

Time for the environment

Put at its simplest, the argument of this book is as follows: steeped in the thought traditions of the industrialised West, we learn about and relate knowledgeably to a multidimensional space, but our understanding of the temporal dimension of socio-environmental life is pretty much exhausted with knowledge about the time of calendars and clocks. Nature, the environment and sustainability, however, are not merely matters of space but fundamentally temporal realms, processes and concepts. Their temporality, furthermore, is far from simple and singular. It is multi-dimensional, a multiplex aspect of earthly existence. Without a deep knowledge of this temporal complexity, I suggest, environmental action and policy is bound to run aground, unable to lift itself from the spatial dead-end of its own making.

The prevailing knowledge of clock time, moreover, is intimately tied to the conceptual principles of Newtonian physics and the linear perspective, which encompass within their knowledge frame assumptions about linear causality on the one hand and reversibility on the other, as well as abstraction, rationalisation and objectivity. These assumptions have material consequences which stand in a problematic relationship to the contextual, irreversible temporalities of life and the multiple rhythmicities of nature. The conflict is twofold: first, this industrial time is centrally implicated in the construction of environmental degradation and hazards; second, as a panacea it worsens the damage. Industrial time, in other words, is both part

of the problem and applied as a solution. As long as time is taken for granted as the mere framework within which action takes place and is used in a preconscious, pre-theoretical way, I consequently argue, it will continue to form a central part of the deep structure of environmental damage wrought by the industrial way of life.

In this book I therefore explore the timescapes associated with that way of life. This entails concern with approaches to time and the multiple intersections of the times of culture and the socio-physical environment. The aim is to make the taken-for-granted visible, to render explicit as well as question what is currently assumed 'natural'. To this end I focus on the conflicts that arise within the industrial modes of life from a) the complexity and interpenetrations of rhythms: cosmic, natural and cultural; b) the imposition of industrial time on the rhythmicity and pace of ecosystems; and c) the prevailing emphasis on visible materiality and quantity at the expense of that which is hidden from view and latent. Such a time-based analysis of contemporary socio-environmental phenomena and processes not merely shifts traditional emphases and dislodges taken-for-granted assumptions, but allows, in addition, for an innovative revision of approaches and strategies associated with some of the most intractable environmental hazards to date.

While space is associated with visible matter and sense data, time is the invisible 'other', that which works outside and beyond the reach of our senses. This makes time such a pertinent focus for environmental issues. Whether we are encountering chemical processes, ozone depletion, air and water pollution, radiation, or a new disease such as BSE, we are dealing with phenomena where the impacts of actions work invisibly below the surface until they materialise as symptoms—some time, somewhere. At the point of materialisation, however, they are no longer traceable with certainty to original sources. That is to say, these industrially produced phenomena and processes are characterised by invisibility and periods of latency. More often than not, they are recognisable only once they have been identified through the mediating loop of science and technology. This means, many of the products of the industrial way of life are not graspable with the conceptual tools of their construction. In order to engage successfully at the level of practice with the dangers we cannot see, hear, taste, touch or smell, therefore, new theoretical tools and strategies for sustainable action are needed.

Nuclear radiation can serve as an initial illustration. (See [Chapter 7](#) for an extensive treatment of the temporalities of radiation.) Radiation works silently and invisibly from within. It is known only to our cells. As such, it proceeds outside the everyday reach of our senses. Its materiality extending beyond the capacity of human perception and sensibility (except where extended by scientific instruments), radiation affects the collective present and long-term future, our own and other species' daughters and sons of a

thousand years hence. It permeates all life forms to varying degrees and it disregards boundaries: skin, clothes and walls, cities and nations, the demarcation between the elements. It is a fate that we share with a global community of beings. Unbounded, it is dispersed in time and space and marked by complex temporalities and time-space configurations. Its life cycles of decay span from nanoseconds to millennia. This means its time horizon too exceeds human capability and concern. Thus, at the level of everyday life, the 'materiality' of radiation falls outside the conventional definition of 'the real', outside conceptions where real means material and where this in turn is defined by its accessibility to the senses. Invisibility, vast, incredibly fast, and variable time-spans of decay, networked interdependence and the fact that effects are not tied to the time and place of emission, therefore, make radiation a cultural phenomenon that poses problems for traditional ways of knowing and relating to the material world. As such, radiation is one of the prime examples of contemporary phenomena and processes whose temporality extend beyond industrial relations and approaches to time; others include chemical and petrochemical pollution, global warming and the depletion of ozone, the effects of genetically modified organisms (GMOs) and culturally induced diseases such as BSE.

My attempt to bring the complexity of time(s) to the forefront of attention allows me at the same time to bring into view the in/visible, latent, immanent and implicate dimensions of socio-environmental phenomena and processes. Such an approach almost by default facilitates the creation of new conceptual tools for practical engagement with the less tangible phenomena and processes of the global environment mentioned above. In the light of their diverse temporalities, 'nature', 'culture' and 'the environment' are reconceived. On the basis of concern with matters of environmental time—space, I am able to revise views on the role of money and markets, mediated knowledge and the manufacture of uncertainty, values and responsibility. And, finally, my effort to shift the emphasis in environmental praxis from explicit space and implicit time to the complex temporalities of contextual being, becoming and dwelling has led to the development of the notion of timescapes. To understand socio-environmental phenomena and processes in terms of timescapes is a way of seeing and a conceptual approach that permeates and informs the substance of this book. Where other scapes such as landscapes, cityscapes and seascapes mark the spatial features of past and present activities and interactions of organisms and matter, timescapes emphasise their rhythmicities, their timings and tempos, their changes and contingencies. A timescape perspective stresses the temporal features of living. Through timescapes, contextual temporal practices become tangible. Timescapes are thus the embodiment of practiced approaches to time. Such an understanding, I want to suggest, has tremendous benefits for environmental praxis and the potential to create sustainable futures.

Timescapes of Modernity: an overview of the chapters

Conflicts between timescapes permeate these pages with each chapter focused on different aspects of created stresses as they arise from the socio-environmental impacts of industrialisation and its specific configurations of time. Industrial time, I propose, is centrally structured to a) the invariable beat of the clock, b) the economic commodification of time and c) the scientific use of time as measure of abstract motion. In this triple configuration, industrial time is central to the discussions on environmental economics and politics as well as the way the media present environmental issues. It is deeply implicated in scientific and political approaches to nuclear and gene technologies. It is centrally tied to the hazards associated with industrial food production and agricultural practices. And, finally, it is crucially involved in approaches to nature, sustainable development and the construction of socio-environmental futures.

Together, these three aspects of industrial time—machine, economic and laboratory time—form a powerful conceptual bloc: time becomes a quantifiable resource that is open to manipulation, management and control, and subject to commodification, allocation, use and abuse. Emphasis is placed on visible materiality at the expense of that which is latent, immanent and hidden from view: the bulk below the surface remains inaccessible. The complex temporalities of the majority of environmental degradations and hazards, however, are located outside the reach of this particular conception. That is, a large proportion of the processes associated with the most difficult environmental problems tend to be inaccessible to the senses, invisible until they materialise as symptoms.

In the first two chapters I set out the prevailing scientific and economic habits of mind and explore their impact on environmental action. In the chapters that follow, those habits of mind are displayed in their institutional and socio-environmental effects: that is, in their permeation of environmental politics and policy, agricultural practice and food production; ‘green’ technology, scientific innovation and media coverage; as well as environmental activism on the one hand and environmental degradation and hazards production on the other.

The habits of mind under scrutiny in the first chapter relate to the tradition of (Western) industrial societies that understands nature in dualistic terms as the ‘other’ of culture, as that which it is not: artefacts, culture, Self, humans and the cultivated realm of agriculture. As countryside and meadows, mountains and forests, wild animals and birds, this vision refers exclusively to the *products* of nature, to the externalised outcomes of processes, to de-contextualised physical phenomena without activity and process. As a living entity, however, nature is active and changing and its processes are contingent upon contexts: birds are nesting and migrating at specific times and places; a localised countryside is changing colour with the

seasons; specific mountains are showing signs of erosion. That is to say, temporality and context are essential to life and thus to any representation of living phenomena and processes. Without the contextual time—space of activity nature remains abstract and remote, detached from Self, cultural activity and humanity. Thus, traditional habits of mind with their exclusive focus on nature as product, as external framework for human activity and as economic resource fail to take account of the immanent forces that give rise to the phenomena identified with nature. They exclude the energy as well as the re/productive and re/generative capacities of nature that operate irrespective and despite of human activity: the sprouting of new growth after a tree has been felled, the mutations which emerge in response to herbicides and pesticides, in other words, that which humans battle against and seek to bring under their control. As this force works below the surface and beyond the reach of our senses it tends to fall outside the remit of scientific investigation and measurement and, not surprisingly, therefore, be neglected by both physical and social sciences.

When we focus instead on the timescapes of socio-environmental phenomena and events, as I show in the first chapter, a very different picture emerges. First, we recognise that the spheres of nature and culture are not as neatly separable as common language use would lead us to suspect. Second, the centrality of earthly rhythms comes to the fore. Third, the pervasiveness of Newtonian physics in socio-environmental and everyday theory becomes apparent and the positive as well as negative power of the Newtonian habits of mind visible. Finally, the trust in science and its capacity for prediction and control is severely tempered.

Chapter 1 therefore points out that seasons and tidal extremes, for example, are affected by industrial activity just as some of the limits to these activities are set by the fact that humans are tied to the rhythms of night and day—that we, alongside most other living beings, are constituted by a multitude of circa rhythms. These rhythms range from the very fast firing of neurones to the heart-beat, from digestive to activity-and-rest cycles, and from the menstrual cycle to the larger regenerative processes of growth and decay, birth and death. Those internal and species-specific rhythms, moreover, pulse in synchrony with the rhythms of the cosmos. Environmental changes from dark to light, warm to cold, wet to dry set the developmental pattern for all life on this planet, to be internalised and adapted to for specific evolutionary and environmental niches. From cells to organs and even brain activity, our physiology is tied to those periodicities. Women's reproductive cycles are tuned to it and so are our collective activity and rest patterns—all superbly timed and orchestrated into a symphony of rhythms. Sickness and even deaths tend to cluster around specific times of the day, and be synchronised with the temporal patterning of our earth: asthma attacks shortly after midnight, heart attacks and strokes around nine o'clock in the morning, onset of fever from bacterial

infection between early morning and midday, and fever onset from viral infections between early afternoon and evening (Rose, 1989:87–90).

This multitude of coordinated environmental and internal rhythms gives a dynamic structure to our lives that permeates every level and facet of our existence. It constitutes temporal frameworks within which activities are not only organised and planned but also timed and synchronised at varying speeds and intensity, and orchestrated to intricate scores of beginnings and ends, sequences, durations and pauses. All aspects interpenetrate and have a bearing on each other. All coexist and are lived simultaneously. All are known at an everyday level with varying degrees of clarity from the taken-for-granted to the theorised. A symphony of rhythms and temporalities thus underpins our development as humans and as living organisms. It marks us as creatures of this earth, as beings that are constituted by a double temporality: rhythmically structured within and embedded in the rhythmic organisation of the cosmos. From a temporal perspective there is no nature—culture duality: we are nature, we constitute nature and we create nature through our actions in conditions that are largely pre-set for us by evolution and history. Instead of emphasis on dualities—such as external and internal, spatial and temporal, natural and cultural—focus on time(s) facilitates additional understanding of the interactive and constitutive aspects of socio-environmental praxis.

And yet, simultaneous with the transcendence of dualisms we are forced to recognise important distinctions between cultural time(s) and the temporalities of nature while appreciating their mutual interpenetration and influence. In the case of industrial societies, cultural time(s) are predominantly rooted, as I suggested above, in the habits of mind associated with technology, classical economics and science. The interaction and conflictual interdependence of these divergent timescapes are theorised with reference to environmental degradation and the creation of socio-environmental hazards.

In [Chapter 2](#) the economic relation to time and its role in both the promotion of ‘green business’ and the production of environmental hazards are scrutinised. Thus, in the light of the overall argument about timescapes, the focus is on a number of key assumptions and practices associated with neo/ classical economics and industrial time: the valorisation of calculation and its associated dependence on quantification, measurement and linear causality, the reliance on visible surface phenomena—the *Merkwelt* and *natura naturata*—on past-based knowledge and on the pursuit of certainty. Cost-Benefit Analysis (CBA) is used as exemplar for neo/classical economic approaches that depend on a combination of the above for their taken-for-granted assumptions, and demonstrates their shortcomings for economic environmental (from now on economental) management, control and risk assessment. The crippling effects of the practice of discounting the future are exposed, and its impact on our capacity to take account of the long-term

future on the one hand and the potential to safeguard sustainability on the other is considered. Finally, the temporality of economic growth is distinguished from the timescape of living processes of re/production and re/ generation.

The time of economic exchange functions as an abstract exchange value, it translates the work of people and machines into money. As such, it depends centrally on quantification which is achievable only on the basis of the rationalised and decontextualised time of the clock. Clock time is based on the principle of repetition without change. Distanced from the variable rhythms and contextual differences of living systems it recasts time in an atemporal form. As such it can be applied anywhere and any time. In contrast to commodified time, however, the rhythmically constituted processes of ecological transactions and reproduction are not easily quantified and decontextualised. This makes their translation into money almost impossible. In a world where money is synonymous with power, any time that cannot be given a money value is by definition associated with a lack of power and falls outside the value system of economic relations of production and consumption. The time of ecological give-and-take becomes subsumed under the time logic of economic exchange, consumption and globalised market forces. The result is out-of-sync time frames, a prominent feature of a great number of environmental problems: ground water, top soil and forest eco-systems that took thousands of years to develop are exploited in centuries and decades. The time-scale of their reproduction thus stands in an inverse relation to the time-scale of their use, degradation, depletion and destruction. I focus on these and other distinctions not in order to establish a new dualism of natural and industrial commodified time, not to erect a hierarchy of values, not to promote the authority of one over the other. Instead, I elaborate those temporalities in order to bring to the fore the conflicts that arise from their intersections and to provide a base from which to make conscious and informed choices for action.

Throughout this chapter I show the inappropriateness of neo/classical economic assumptions not just for dealing with environmental hazards marked by latency and invisibility but for the establishment of a sustainable, time— space distantiated economy. The prognosis for the future, however, is not as bleak as the analysis would suggest: the necessary leap of the imagination is both huge and minimal. It is radical and dramatic at the level of unquestioned habits of mind that have informed the rise of industrialisation and the global economy to the present and, at the same time, unspectacular and easy since it is lived already in the moonlight economy of environmental praxis: in the household and the garden, in demonstrations for animal rights and the concerns associated with environmental protests. Where the official economy with its principle assumptions of objectivity and abstract self-interest fails, the informal, ethical and temporally sensitive *oikos* economy is eminently suited to step into the breach.

Chapter 3 shifts the focus of attention to liberal democratic political practice and explores the role of the habits of mind, discussed in Chapters 1 and 2, for environmental politics. The material effects of these unquestioned assumptions are theorised with reference to the historically rooted ideal of democracy on the one hand and globalised economics on the other. The chapter demonstrates how central decisions with extremely long-term socio-environmental effects are abdicated to science and transnational corporations, neither of which are socially or politically accountable for their deeds. It suggests that the situation is further exacerbated by the Liberal Democracies' unequivocal commitment to a global economy and the quest for sustained economic growth. With their economic perspective which tends to elide the distinction between rights of people and rights of money, Liberal Democracies have difficulty taking account of the needs and/or rights of anything or any being without economic power or political influence. Future people and environmental sustainability, therefore, are not readily encompassed within the boundaries of their concerns. Finally, the chapter outlines the disjuncture between the spatially oriented politics of nation states and the complex temporal features of socio-environmental hazards, and identifies the need for a temporalising of democracy which could close the credibility gap between current liberal democratic practice and the popularly held democratic ideal.

In Chapter 4 I utilise the focus on time to bring to the fore difficulties which arise when the rhythmic organisation and time scales of nature are denied or ignored and when cultural constructions which work on the basis of different temporal principles are superimposed as alternatives not just on the everyday lives of humans but on the livestock and crops associated with agricultural production. Industrial agriculture with its dependence on science, technology and global economics, and its allied emphasis on the times of science, machines and economic relations, is a pertinent case in point. The ensuing clash of principles between these divergent temporal systems— industrial as opposed to the rhythmicity of life and ecological relations— means that their interactions and interpenetrations entail costs and losses that feed into environmental crises. A brief look at nature in the laboratory and laboratory time can illustrate the wider argument.

Since science predominantly studies nature in the laboratory, the subject matter of science is invariably severed from its networked ecological context and the rhythmicity of life. That is, laboratory nature is abstracted from its temporal interconnections and contextual dependencies. In laboratory science, therefore, rhythmic interdependencies are negated and the contextual, embedded temporality of living beings (seemingly) becomes an irrelevance (on 'laboratory time', see also Nowotny, 1994, Chapter 4). A number of implications follow from this move. First, abstracted from interdependencies and context, processes can be controlled, programmed, manipulated, changed, speeded up and slowed down. Second, everything is

available at any time and in readiness for use 24 hours a day, 365 days a year. This control of time and constant availability of products finds everyday expression in the arhythmic and decontextualised non-stop principle, just-in-time production processes and the consumer expectancy of being able to buy seasonal foods everywhere and at all times. The taking for granted of such transcendence of rhythmicity and seasonality, I show in this chapter, has dramatic effects on the health and safety of people and the environment.

Once upon a time and distant places it was and is considered 'natural' for the seasons, climate, weather and location to impose limits on human activities, just as it was/is taken-for-granted that these restrictions pose a challenge to human ingenuity. Despite their quest to overcome the vagaries of the weather and to transcend the climatic extremes of the seasons, people were/are embedded in the light and dark, wet and dry, cold and warm, growth and decay, birth and death cycles of nature's earthly rhythms. As long as the human production of food remains seasonal, which also means predominantly local or at least regional, and as long as the primary producers of food retain control over the means not just of production but reproduction, the system remains one of contextual, embedded, interdependent growth cycles. With new methods of food production, processing and preservation, this dependence on time and space has been largely transcended. With globally sourced foods the relative monotony of seasonal produce is replaced by the absolute monotony of the same chemically assisted (and, more recently, irradiated) jet-setting foods that are available to citizens of industrial/ising societies everywhere and all the time.

Such aseasonality and decontextualisation are achieved at a price. They are accomplished at the expense of the health and well-being of citizens, of farmers, their livestock and their land, and of the wider globally networked environment. Thus, contemporary food hazards are intimately tied to this transcendence of time and space associated with industrial methods of food production and preservation. Focus on the temporal dimension of these production processes shows hitherto disattended relationships and makes hidden dangers visible and tangible. It makes explicit what so far had been implicit connections between science, the chemical industry and agricultural production.

Finally, this chapter considers the conflicting concerns and risk strategies of the major actors in the food system—farmers, traders and food processing corporations—and shows how farmers occupy by far the highest risk position in terms of both their livelihood and their health. Focus on the timescape of agricultural practice, food production, the trade in globally sourced foods and its impact on citizens facilitates a novel interpretation of those interdependencies and leads to unconventional practical suggestions for change. First, I argue that in order to safeguard a sustainable environmental future, farmers need to reclaim not only the ownership of the

means of reproduction but also of time, since this combined ownership restores to them control over the pace of agricultural life and its sustainable future. Second, I propose that locally grown, fresh produce and full information on the life histories of foods need to be granted as basic rights, since this seems to be one of the few sure ways to secure citizens' safety, health and well-being.

In [Chapter 5](#) I discuss the role of the news media as a primary source of public information about environmental hazards. I use the recent tragic developments associated with BSE in UK cattle and Creutzfeldt-Jacob Disease (CJD) to bring to the fore issues that have thus far escaped attention. I use the focus on time to foreground the dissonances that arise for news-workers faced with the task of treating environmental hazards as 'news' and making them conform with such news values as immediacy, novelty, recency, here-and-now, urgency, timeliness and mediagenicity. Clearly, these values which apply to the description of accidents, crimes, disasters and economic-political events are ill-suited to the reporting of environmental hazards. They are largely inappropriate to environmental hazards since these tend to be long-term, chronic and cumulative and because their dangers tend to be largely invisible. Such phenomena do not require factual description of the here and now but, rather, necessitate historically located analysis of knowledge that is inescapably mediated by competing scientific interpretations. This demands of newspaper journalists a mode of operating that they are neither equipped nor motivated to achieve.

Instead of rising to this particular challenge, the media in general and newswriters in particular tend to convert environmental hazards into matters of economic concern. Thus, in the case of the UK BSE crisis, a highly complex health hazard issue is transformed into an economic beef crisis and with it restored to the journalistic world of certainty and facts, of risk calculation and the descriptive reporting of dramatic outcomes: empty cattle markets, figures about lost revenues to the afflicted countries, menus of schools and restaurants, and political statements.

Here as in previous chapters, I show how the habits of mind discussed in [Chapters 1](#) and [2](#) work against the necessary confrontation and engagement with the new challenges presented by the hazards that accompany the industrial way of life. But, similar to the conclusions in previous chapters, with respect to the media reporting on the environment, there is not merely a need to change habits of mind and journalistic tradition and culture. The problem is more far-reaching than that. With hazards of this kind, there arises the need for new institutional structures that are able to provide public information and analyses outside the high-pressure, economically competitive framework of press and television news.

In [Chapter 6](#) the complex temporality of environmental hazards is given its most extensive treatment. The fundamental multiplicity of times is