REVEALED BIODIVERSITY

An Economic History of the Human Impact

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An Economic History of the Human Impact

Eric L. Jones

Emeritus Professor, La Trobe University
and
former Professorial Fellow Melbourne Business School
University of Melbourne

World Scientific

NEW JERSEY • LONDON • SINGAPORE • BEIJING • SHANGHAI • HONG KONG • TAIPEI • CHENNAI

Published by

World Scientific Publishing Co. Pte. Ltd.

5 Toh Tuck Link, Singapore 596224

USA office: 27 Warren Street, Suite 401-402, Hackensack, NJ 07601

UK office: 57 Shelton Street, Covent Garden, London WC2H 9HE

Library of Congress Cataloging-in-Publication Data

Jones, E. L. (Eric Lionel)

Revealed biodiversity : an economic history of the human impact / by Eric L Jones.
p. cm.

ISBN 978-9814522564 (hardcover)

1. Agriculture--Environmental aspects--History. 2. Agriculture--Economic aspects--History.
3. Nature--Effect of human beings on--History. 4. Human ecology--History. I. Title.
HD1433.J66 2014
333.95--dc23

2013019823

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

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In-house Editors: Philly Lim/Dipasri Sardar

Typeset by Stallion Press

Email: enquiries@stallionpress.com

Printed in Singapore

For Cliff Irish
And to the memories of Bill Dreghorn and Colin Tubbs
Naturalist companions of my schooldays

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PREFACE

Revealed Biodiversity takes an economic historian's view of the environment. The reason for this is that the natural world, as we experience it, is substantially a product of the economy and approaching it from this angle raises questions that are ordinarily easy to miss. Nature is not pure, abstract, independent of humanity, nor a mere punch bag for our greed. If we took nothing from the natural world we would drain it of interest to humanity; it would be a painted backcloth. Instead, first, we shape the environment through economic decisions; secondly, the decisions can be beneficial as well as harmful, either outcome being of academic and scientific interest; and thirdly we impart meaning to nature by consuming it. All the processes can be charted historically and many of the episodes will appear in the course of this book. Alongside the substance of the text runs an examination of the way in which environmentalists treat, or too often do not treat, the historical issues.

The environment is not simply a damaged remnant left over from human exploitation. Uses are not automatically threats; sometimes they broaden and increase natural variety or build harmonious landscapes in which both man and beast flourish. Despite this, almost everything written today about human dealings with the environment is negative. It is not Pollyanna-ish to lean a little to the opposite side, towards balancing the books. In many respects the environmental situation is bad, even frightening, but squinting at the world through a single eye can produce only misunderstanding and lead to bad policies. Let us not lament ecological losses, as if loss is all there is: let us be fair and take account too of the charm of humanised landscapes and the improvements in our ability to enjoy nature. It is these that create 'revealed biodiversity' — the biodiversity we see, or looked at from the economist's viewpoint, consume.

Three features are overlooked in much of the environmental literature and this book will try to provide them. Let us take them in order of importance: first, the social gains, the rise in human population, the lengthening

of life expectancy, and the better standard of living, are often set at naught compared with reduced numbers and distributions of some, indeed many, birds, animals, butterflies and flowers. No one deplores the losses more than me, as a lifelong naturalist. Nor does anyone resent the fact of changes more than I do, given that in the developed world they have often been unnecessary (bad policies again). Yet omitting the positive side of the environmental balance sheet is an inhumane form of accountancy, reckoning nothing for the well-being of poor people or economic growth in less-developed countries.

Secondly, the offsetting gains of human intervention, such as the recoveries of threatened species or land being taken out of agricultural production and (inadvertently) returned to nature on a large scale, are commonly skated over, ignored, or denied. Better to report these trends than imply that humanity has never ceased pushing the natural world to hell in a handcart. Much of this book consists of histories of fluctuations in wildlife which run counter to the narrative of uniform decline.

Thirdly, where ecosystems do receive a measure of conservation, the case for rescuing nature is sometimes advanced separately from claims for the conservation of the landscape on historical grounds. Naturalists tend to ignore cultural history or actively disdain it. The point may seem minor and relatively speaking it is. But the attitude is needless and undermines the coalitions of naturalists and landscape historians most likely to win campaigns for conservation. Moreover it is an example of blindness to human history on the part of environmentalists. Because this is more thoughtless than antagonistic (though it is that on occasion), the breach can and should be healed.

The position adopted here is plainly that of an economist and historian. The book is after all an economic history of the environment. Despite an absolute minimum of the terminology of economics and none of the techniques, biologists and conservationists will find the stance unfamiliar and may find it uncomfortable. My hope is that it may nevertheless help them to put names to the anti-market, command-and-control, attitudes that pervade conservation, and see that these are not the only ways of shining light on the subject. Ecology is rather politicised, more so than other sciences except for climatology. But again there is an element of thoughtlessness rather than malice in this and the issue can be teased out instead of leaving anti-market ideology uncontested. The economic calculus is relevant: for instance, wherever the environment has been protected, people must have been willing to pay — the market must have intruded. There is

an opportunity cost, since the money might have bought something else. Society has plenty of other urgent needs.

Academic and intellectual life have become so professionalised and compartmentalised — the fashionable metaphor is of separate silos — that ranging across two or three subjects, never common practice, is even less common than it was. The broad approach of the economic historian, joining economics and history, brings to the fore developments in the natural world normally left out of account or played down. New relationships come into sight from this perspective. Once in a while I also throw in an observation based on my own experience and I hope this too proves illuminating. A personal touch is out of fashion, in favour of academic writing that seems to me dry and implausibly detached. The purpose here is to add to the argument, to humanise it, and avoid the artificial pose of detachment.

Among environmental history's problems is a tendency to hark back to a Golden Age when nature was supposedly unsullied. At least this is better than comparing later times with no previous baseline at all. The baseline issue is serious: a reference point is needed against which to evaluate changes, though the usual practice is to criticise deviations from a Garden of Eden where, so to speak, the grass was always greener. Not only are lost species bewailed but new arrivals are condemned as though they must be unnatural — despite the fact that they present such fascinating experiments. This lachrymose attitude sinks into a larger mind-set in which the spread of people around the globe and the development of their economies are labelled destructive and wrong. Nine times out of ten, rank prejudice is smuggled into ecology through this back door, since the people slated for bringing about change are almost exclusively the Europeans.

Opposing the European record, shorn of all praise for its human achievements, romantic portraits are offered of pre-European ecologies and the role in them of Noble Savages. These suppositions, which form the background of much work in the field even when they are not the foreground, are simply unhistorical. They get in the way of developing global environmental history, in which the changes brought about when non-European populations exploded into fresh territory ought to figure alongside Europe's expansion. The present book attempts no complete history in this respect but does set against the spread of Europeans (whom Walter Bagehot, writing at their peak, called the 'conquering *swarm*') a description of the closest modern equivalent, the global impact made today by East Asians.

Economic growth in East Asia has provided enough wealth to convert biological items that were once luxuries into commodities affordable and

relentlessly sought on behalf of vastly more members of Asian society. There are signs that this is starting to calm down, as the tentative shoots of 'Green' movements begin among the Chinese and Overseas Chinese. But for traditions to alter completely may take generations. In the meantime accounts of the East Asian impact are necessary to offset one-sided histories in which the villains are always Europeans. (This was always nonsense, since Palaeolithic peoples in the Pacific islands had exterminated 20% of the world's avifauna before ever the Europeans arrived.) Two, or even three, wrongs do not of course make an ecological right: what is needed is a more dispassionate and complete history.

Closer to the ground, as it were, is the choice of baseline when particular sets of ecological changes are discussed. In much of the literature aimed at a wide readership, and hence significant for politics and policy formation, there is a tendency to concentrate on species and places that may be said to be declining. Recoveries of threatened species are reported (the case of the peregrine falcon comes immediately to mind) but happy events make up little of the news overall. Too often the results are negatively biased accounts of trends in which species that gain aggressively from habitat change are dismissed chauvinistically as interlopers.

Attention inclines to centre on the dwindling numbers of 'rare' species which are thought to have been common in the past — as if ecosystems have been stable through time. This assumption usually takes some rather arbitrary period as its baseline, perhaps as a nostalgic tribute to when the observer was young or to the time when detailed records first begin. Subsequent history is set against these starting points, which can mislead through failing to recognize where they stand amidst the fluctuations produced by agricultural and other changes. A difficulty is that during former centuries, even in the twentieth century, natural history observations were often sporadic rather than systematic. Nevertheless, with careful searching information may be found and even records that seem merely indicative can act as correctives to the thought that everything has invariably deteriorated. Changes in the bird and butterfly populations of southern England are used here to illustrate how dangerous it can be to set the baseline during the agricultural (or arable) depression of the late nineteenth century. At that period falling investment in farming and forestry created what naturalists conceived as superb habitats. They were brought back into production during the twentieth century, reducing again the populations of species that had been plentiful during the depression years, and causing naturalists of the philatelic or list-making persuasion to

scour the countryside for them in the belief that they cannot really have disappeared.

Understanding the degree to which the environment is an economic artefact is clarifying. A sketch of the history of economic development will help to substantiate this. Agricultural history is especially relevant because farming uses one factor of production, land, so heavily. Farming is ecologically significant, that much is obvious. Related to agricultural history are the histories of hunting, shooting and angling, all of which are intimately bound up with ownership or access to the land. They were enormous in scope and taken to be the birth-right of every settler of wild land, besides conferring status on participants in the old-settled countries. Status continues to be associated with shooting, especially in England. Scrupulously omitting to mention the inherent cruelty and hiding behind the morality of supposed public good, its defenders put up a financial case. Blood sports, they say, employ rural labour and generate income for rural areas. What they do not mention are the opportunity costs, that is to say the income which might arise from employing the same resources on something less destructive.

Learning the chronology and geography of industries which exploited wildlife for the sake of usable products is also desirable. Specialists in the history of whaling and fur-trapping are among the most sophisticated of environmental historians. In these industries the data go back some centuries and the series are more complete than in most cases. It may be a 'big ask' to expect biologists to go out of their way to acquire historical knowledge but, since it is a key to fluctuations in wildlife numbers, the effort is worth making. The desiderata extend to acquiring a sense of the main phases of growth and depression. An outline economic history is not hard to acquire; it is not, as they say, rocket science.

What is needed is an acceptance of just how far habitats and wildlife numbers, past and present, have been shaped by patterns of land ownership and the demands of the market. Bland statements such as 'man has been a major influence on the natural world' do not go far enough. The relationship benefits from disaggregation. International trade coordinates multiple stories of exploitation. Business enterprises were responsible for great schemes of drainage and land reclamation that had massive repercussions on wildlife. We begin to pick up this saga in sixteenth-century Holland, whence enterprise and engineering skills set out to tame wetland habitats across Europe and beyond. Early seventeenth century Amsterdam made grain, herring, spices and whale oil objects of speculative trading. But

London overtook Amsterdam to become far and away the biggest market for biological goods and had an unprecedented impact on distant ecosystems. We trace some of this through what was offered for sale at Leadenhall market in Victorian times.

To help establish the significance of markets it is useful to consider the environmental implications of staple theory, especially but not exclusively in the lands of new settlement. The main force of the theory (borrowed from development history and economics) is to envisage areas that are cultivated for export products as sequential commodity landscapes. When it is profitable a given crop or an export like timber will stamp its mark on the landscape and a particular array of wild species of animals and plants will become associated with its dominance. A major shift in prices may overturn the association and breed up fresh ecosystems adapted to the landscape formed by the next profitable export. On occasion market conditions will oscillate, meaning that there are historically or economically induced cycles as well as longer-term trends to take into account. To treat past ecosystems as if they were uniform, or as uniformly deteriorating through time, obscures the reality.

This book concentrates heavily though not exclusively on birds. Not only do I know most about them, having been a birdwatcher since my schooldays, but birds are 'portable' in two senses. First, they are mobile, some more than others and at some seasons of the year more than others. Many migrate over global distances. This ensures that there is always something to be seen, which keeps birdwatchers interested all the year round, at least in the northern hemisphere; students of, say, butterflies are less fortunate. Secondly, birds are ubiquitous, which means one can take their study and enjoyment along as part of one's luggage. Birds, then, are the ultimate 'consumables' of the natural world and for an economist that is what matters. More people take an interest in them than in other organisms, especially the creepy-crawlies of the invertebrate kingdom. There is however less interest, dare I say value, in the birds of places one cannot visit. Air travel has drastically cut the number of places the favoured few in the rich countries are unable to reach, and television has made the range of vicarious experiences a global one. But television is a thin substitute for reality, as those tele-naturalists, Chris Packham and David Attenborough, are the first to admit.

At this stage a more concrete summary of the book's contents is in order. By and large I have avoided the fashionable topics of the day, which are too often discussed in generalities. It seems preferable to come as close as

possible to what was happening to flora and fauna in the arenas examined. In varying degrees the periods covered run from the sixteenth century to the present. Early chapters try to refute a thesis in the historical literature to the effect that early modern Europe was running into a severe environmental crisis. This does not seem to be true for England or the Low Countries; it appears to result from generalising the experience of marginal northern areas like Denmark and Scotland, and abstracts away from trade as a substitute for a lack of resources in any one place. That neglect is unlikely to persuade the economist or economic historian.

The regions dealt with are mainly Europe (especially England and Holland), North America and East Asia. Because I know it best, I investigate aspects of the environmental history of southern England in greatest detail, while later chapters deal with Europe's expansion, Colonial America and the United States, and East Asia. Full historical data about habitats and wildlife are almost never available for these regions but it is possible to discern differences between trends and cycles in their experience. The observations cited are drawn from as wide a range of sources as possible. In the absence of solid bodies of data, casting the net widely is the best guard against mistaking outlying observations as representing the whole picture. Employing miscellaneous sources also suggests connections that are easily overlooked when relying on narrower and more conventional texts. I do not accept the purist historian's position that everything must be based on primary sources. The scope of the coverage would make that physically impossible. There would be little point in anybody writing if secondary work could never be put to use. Published books and articles contain material that other scholars have sought out and in which they have digested their original researches. Certainly much depends on the questions asked and the models employed. It goes almost without saying that secondary publications have to be read critically, but then so do raw documents.

American material brings to the fore the vexed issue of how unexploited that continent was before white settlement and how reliable are assertions that the indigenous population lived harmlessly alongside nature. East Asia permits an exploration of the way in which biological items can be so much more intensively exploited all around the world when a new region becomes rich — before its traditional uses of natural products have melted away in favour of manufactured goods. Similar impacts occurred during Western economic growth, as can be seen from the contents of nineteenth-century London markets, but the impulse has largely faded in the West. Admittedly, Asian demand for ivory, dietary luxuries and aphrodisiacs is probably not

the region's major impact. That is more likely to result from its extensive agricultural and mining schemes in Africa, but little information about their ecological effects has so far filtered into the Western literature.

The book comes up to present times in several places, at greatest length with respect to recent price spikes, the 'farmland grab' in less-developed countries, and the prospects for feeding the world in general. I pay special attention to the stupendous agricultural revolution in Brazil, where soaring grain output has come from areas of dry scrubland rather than the clearances of tropical forest which every newspaper vaunts. As mentioned, the environmental consequences of agricultural intensification on the scale that will be needed to feed the world are not yet clear in any of the big developing regions (chiefly in Latin America and Africa). The prospects do not look comforting, although the gloomier forecasts have a ring of exaggeration. Alarm about 'food security', or rather insecurity, has clearly been overplayed to date, paralleling the familiar lines whereby negative features of environmental change almost inevitably get the billing and positive ones are suppressed. Many problems are less ecological than political — not that this is a guarantee of satisfactory outcomes. Retreat into Trade Protection is a worry and would guarantee unhappy consequences.

At the end I revert to narrower issues of environmental conservation. The final section treats the English case and once again rejects the a- or anti-historical attitude of some conservationists and ecologists. This attitude is exposed where habitats and the associated organisms depend on long-standing, 'traditional' means of managing land and fisheries. I argue that certain of these practices, which are vanishing before our eyes, deserve to be maintained on grounds of cultural history, and indeed would be maintained for that reason in some other countries. No blanket defence of 'tradition' is mounted; witness my objection to the destructiveness of 'traditional' blood sports. But a careful judgement might be made in favour of a few localities where traditional practices preserve specific ecosystems. Unfortunately we live in an era when the legal mind has taken over and compliance with bureaucratic regulations seems to matter more than real functions. I hope that by dwelling on the topic this book may bring about a few reappraisals.

Eric L. Jones

April 2013

ACKNOWLEDGEMENTS

My acknowledgements will be extremely brief when they might be extremely long. Having been a naturalist my entire life, all around the world, I have met and learned from hundreds, maybe thousands, of kind people. Naming them all would be out of the question but I thank them here collectively and gratefully. I will content myself with acknowledging individually a handful of key debts, some of them very old and able to be paid only when the individuals have already left this life. Thus I express my heartfelt gratitude to my geography master, the late Bill Dreghorn, and my naturalist friends the late Colin Tubbs and the late Lew Lewis. Among the living I thank especially John Anderson and Mike Tarrant in Australia and Cliff Irish and Patrick Dillon in England. All of them have been fun to be with in the field and the study or at any rate the pub. John Anderson has also displayed his customary generosity and shrewdness in reading the whole manuscript. So has my wife, Sylvia, who has helped to edit it, as well as coping with the family stresses incurred during the writing of yet another book.

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INTRODUCTION

The land that was once productive of fever and ague, now scarce yields to any in broad England in the weight of its golden harvest. The entomologist is the only person who has cause to lament the change, and he, loyal and patriotic subject as he is, must not repine at even the disappearance of the Large Copper Butterfly, in the face of such vast and magnificent advantages.

Rev. F. O. Morris, on the draining of Whittlesea Mere in 1851

Views of the human impact on nature divide sharply. One school alludes to the benefits of economic growth, the other dwells on cutting nature's carpet into pieces. The economist, Sir John Hicks, refers to the modern world as experiencing a 'secular boom', but the biologist Marston Bates calls it a 'drunken spree'. The world was made by both forces. This book recognises that the environment seems reduced to ill-used fragments yet insists that exploiting natural resources has brought unprecedented gains in well-being: growing population, rising life expectancy and rising standards of living, all of them (amazingly enough) at the same time.

Sections of the conservation community disparage the achievements. Here is the environmental activist, Paul Kingsnorth, on saving the rainforest: 'It was enough to say that it was a home of hundreds of thousands of other species, and that to raze to it to the ground for the sake of toilet paper or soybeans was self-evidently criminal'.¹ Producing toilet paper and soybeans is not a worthy task? To be fair, Kingsnorth does go on to say that destroying old English apple orchards because we want the land for biofuels or housing estates 'is equally, obviously wrong', for less materialistic reasons, because it would be 'a loss to English culture.' Biofuel and houses are unworthy goals too? It would be pleasant to be able to retain wild nature, continue wholesale with quaint, old-fashioned modes of production and still secure a high standard of living — but we cannot achieve

everything at once. The three cannot be maximised simultaneously; growth needs to consume resources and a price has to be paid.

The assumption that we can have abundance without environmental cost is commonplace, sometimes expressed directly, more often by implication. It is easy to find pleas for the conservation of nature that lack any sympathy for human welfare. Thus, waxing regretful about the extinction of the black-veined white butterfly, the entomologist, Vere Temple, referred to its former site at Muswell Hill, London, as 'then green country, now a hideous wilderness of brick and stone'.ⁱⁱ Housing for the masses is another bad thing? Town and country planning is often crass but the choices that have to be made are not made easier by the 'stop the world' rhetoric of environmentalists.

Naturalists are rarely as open-minded as was F. O. Morris, quoted in the heading to this chapter about producing bread instead of butterflies. Nor are they as even-handed as Atholl Anderson when describing the human occupation of Pacific islands: 'Yet, if this was ecodisaster measured by the loss of island avifaunas, in particular, it was at the same time a kind of "ecotriumph" measured by the success of human colonization'.ⁱⁱⁱ Other environmentalists seem resentful about the evidence that welfare is improving while (they assert) ecosystem services are degrading.^{iv} The most eminent of biologists may side with the people haters, as when the zoologist, Richard Dawkins, says of the thylacine or Tasmanian tiger, 'maybe they were pests to humans, but humans were bigger pests to them; now there are no thylacines left and a *considerable surplus* of humans... Stop Press: for what may, if verified, be wonderful news, see article by A. M. Douglas...' Consulting the article, we find that it does not describe the reduction in the human population of Tasmania for which Dawkins seems to hanker but a possible rediscovery of the thylacine in West Australia!^v

In the literature of conservation, economics is sometimes dismissed point blank. Where so many individual biologists are concerned, not quite all can be tarred with this brush and one can speak only about tendencies in opinion. Nevertheless, too many make a habit of rejecting economics out of hand, although it is seldom clear which school of economic thought they are targeting or whether they are denying altogether that we live in a world where resources are finite and choices must be made. Every so often, the reader of otherwise interesting books on nature is brought up short by some silly remark. In *Where Have All the Birds Gone?* John Terborgh illustrates the point.^{vi} He declares without qualification that economists consider only short-term profits and ignore the long term — he is writing

about developing a cattle industry in the Brazilian Amazon — and speaks of ‘responsible’ accounting that would place a weight on the future equal to that on the present. But it would not be ‘responsible’ to select a discount rate equating present and future values.

Bjorn Lomborg finds similarly unsatisfactory statements made about the rate of extinction by the biologists Paul Ehrlich and Jared Diamond.^{vii} They assert they know for certain we are in an extinction crisis and no research is needed into the actual rate of species loss in order to proclaim this ‘fact’ to sceptical economists. They are in effect asking society for a blank cheque to prevent a catastrophe whose imminence they trumpet without supporting data. Meanwhile they accuse economists of advocating unlimited human population growth. Maybe there is an economist, or even a handful of them, who do advocate this: the profession is a broad church. But I have never met one nor read of any. Advocacy that may seem to promote this goal will almost always be found not to be doing so at all, though, before Corporate Social Responsibility became fashionable, businessmen could be found making aggressive, profit-is-all, pronouncements.^{viii}

Laymen, including biologists, may shudder at the idea of economics and blame the subject for the kaleidoscope of social ills that is always exercising contributors to the media. The prominent biologist, Peter Raven, goes beyond the extreme when he declares that, ‘perhaps the most serious single academic problem in the world is the training of economists’.^{ix} His complaint seems to be that economists ignore considerations which biologists insist are crucial. Yet the biologists scarcely put their case in testable form. Nor do they distinguish between economists’ advice and the actions of politicians. This confusion is what follows when natural science is captured by ideology. The stance of economics, a little logic and a handful of principles should clarify debate.

A dislike of being told that actions have costs seems to lie behind rejections of any need for economic analysis. The prejudice is reversed by those environmentalists who ‘know’ full well that human actions do have costs and that these costs are too great for the global ecosystem to bear. The fault, they think, is what sub-Marxian terminology would call the ‘privileging’ of our own species. Costs are taken to be something imposed by humanity, never something imposed on it. Works on biodiversity are prone to assign an infinite value to other forms of life, whatever the burden on people poorer than the writers. To attribute more value to humans than to other organisms is rejected as ‘species-ism’. The reader must decide whether he or she really puts the survival of, say, yellow fever and human babies on

the same footing. This cannot be shrugged off as a cheap taunt until it is decided where the line should be drawn; no economy can function if each and every population of all species has to be preserved.

Debate in these agonistic terms is fruitless. Arguing with individuals for whom environmentalism is both career ladder and substitute religion gets nowhere since their position is based on self-interest and faith, not science. The real-world balance will have to lie more on the side of people than naturalists would like — more than I like as a lifelong naturalist myself. We simply do not live in a world of infinite resources and what is needed is a calculus of choice that enables decisions to be taken which are sensitive to the relative costs. Since the costs *are* relative there is no point in the gibe that this reduces environmental values to pounds, shillings and pence — of course it does. What alternative has the same comparability? As Julian Simon and Aaron Wildavsky note, policy making is not made easier by environmentalists asserting in one and the same breath that conservation is good for the survival of humanity and demanding limitations on human existence because we are bad for other species. They find these contradictory sentiments expressed by the most influential biologists, such as Jared Diamond.^x The most thoughtful discussion of economics from a biologist that I have come across is by Steve Nicholls but even he suggests that economists promote totally free markets and ends by applauding restrictions on consumption without explaining how this might work and what the consequences might be for well-being and the distribution of income.^{xi}

Besides celebrating greater material well-being and accepting some part of its inevitable downside, we ought to take into account what I have called 'revealed biodiversity'. Economic growth means that more and more people acquire the leisure and wherewithal to 'consume' the natural world. They can afford books, cameras, binoculars, telescopes and travel. The real prices of this equipment have been falling for a long time now. Revealed biodiversity does not refer to the variety or absolute number of species physically present, but to the chance of enjoying the spectacles that do remain, like (say) the increasing number of humpback whales. Opportunities like that count in the eyes of ordinary observers. Bishop Berkeley's famous tree in the quad may as well not be there for people who cannot travel to see it. Experiencing the splendours of the outdoors through television is no substitute for tiny experiences of one's own. In England, television means that a generation of children is withdrawing, or being withdrawn, from the countryside.^{xii}

Boundless opportunities still exist. Wealth makes the mass enjoyment of nature possible, besides endowing the conservation movement with nature reserves and employing unheard-of numbers of people as wardens, professional naturalists and (let it be said) conservation bureaucrats. This point may be missed by writers on the topic, who have had great opportunities themselves and are concerned about their continued access to remote places and extreme rarities: the cloud forest syndrome. Natural history was once the hobby of people seeking solitude — it was part of my own inspiration. We may dislike having to take our place in lines of telescope-wielding twitchers but exclusiveness is neither a generous attitude of mind nor any longer a feasible one.

The suggestion that humanity is better off as a result of its affluence and the new technologies of communication and transportation will scarcely weigh with anyone disposed to think that all species are of equal value. They will fear that little will be left for the newly prosperous to watch. What then will more leisure and greater mobility be worth? Will all that remains be flies, sparrows and rats, creeping around the weedy bombsites of human occupation? But even if such fears were justified they would be far from the attitudes of dispassionate scientists who find as much of interest in backyard weeds as in the orchids of the cloud forest. In any case, the approach places too much emphasis on the concreteness of species, the definition of which is uncertain at the margin.

A contrary point has been vigorously put: that the mass extinction of species does not really matter. Calculations by Robert May, once the U.K. government's chief scientist, and another Oxford ecologist, Sean Nee, show that 80% of the underlying tree of life would persist even with a 95% species loss. About 1,500 species of birds may perhaps become extinct within a few decades but the group as a whole will flourish because birds are adaptable and thrive in man-made habitats. Their biomass, if not their variety, will continue to do well. And the fearful estimates of species loss have been challenged as too high.

The United States Supreme Court found in 1978 that the intention of the Endangered Species Act (1973) was to halt extinctions at any cost. But attempting to preserve every species is impossibly expensive and cannot confidently be left in the hands of government agencies. The issue caught public attention because of the cost of the effort at saving the snail darter (a fish from Tennessee). Not every endangered species could receive such lavish treatment. A Senate 'God Committee' had to be formed to pick and choose among them — and meanwhile the snail darter was found in

more places than anticipated. The goal of preventing the extinction of any organism at all is unrealistic: the effort (which failed) to save the dusky seaside sparrow cost virtually the whole of the \$1.3 million appropriated for acquiring reserves. Furthermore it could be argued that we seldom know enough about habitat requirements to judge exactly where money should be spent. Ecology is a relatively young science and has tended to take things as it finds them, without paying much attention to what the past may tell us about fluctuations in the natural world, even when the data do run far enough back in time to separate cycle from trend.

PROCESSES

An episode where desperately needed historical data were lacking was the alarm in the late twentieth century about the damage wrought to coral reefs by population explosions of the crown-of-thorns starfish. This struck at the Great Barrier Reef, which is important to Australia's tourist industry. The ecological interactions are complicated but it turns out the species has erupted periodically on the Great Barrier Reef, the suggestion being that the cycle occurs once every 400 years.^{xiii} About the same time, there was hand-wringing about the die-back of the eel-grass, *Zostera*, in Westernport, a large tidal bay near Melbourne.^{xiv} Eel-grass is an important shelter for fish and crustaceans, and is grazed by birds. This die-back, too, seems not to have been a once-and-for-all plunge into the abyss of extinction but to be cyclical, as it also seems to have been in Chesapeake Bay in the United States and the Solent in England.

The situation in the Solent with respect to *Zostera* was investigated by that indefatigable ecological historian, Colin Tubbs.^{xv} He found that the plant had been abundant before about 1930 and traced observations as far back as that great romantic landscape writer of the late eighteenth century, Rev. William Gilpin, whose parish at Boldre in the New Forest lay close to the Solent. But about 1930, a 'wasting disease' hit *Zostera* beds on both sides of the Atlantic. Fishermen, naturalists and observers who simply resented change in the environment were upset by this and assumed they were seeing an entirely novel threat of extinction for the plant. Yet after the 1950s recovery began and since then has been considerable in some parts of the Solent.

A little ecological history thus helps to temper knee-jerk responses to environmental change. It controls assumptions that the environment was

always 'there' in a fixed form until disrupted by the hand of modern man. That unhistorical attitude sanctions attempts at preserving, recovering or recreating species that may have flourished only in the recent past. A piece of woodland at East Blean, Kent, is said 'always' to have been coppiced for pulp wood for a paper mill in Sittingbourne.^{xvi} When the mill closed during the recession of the 1980s, coppicing ceased. The sunny glades hitherto filled with cow-wheat were swamped by tree growth, closing out the colony of a butterfly, the heath fritillary, which depended on the cow-wheat. The loss of butterflies that are intolerant of shade is a familiar outcome when coppicing ceases.

The heath fritillary has become one of the country's rarest butterflies. Unfortunate though its loss is at East Blean, it is unlikely 'always' to have been present in numbers. Indeed 'always' can be guaranteed to be wrong. Historically speaking, coppicing was a fairly recent practice, though it became widespread and is of great interest in its own right. The website for the history of the Sittingbourne mill says that the first paper-maker was mentioned only in 1708. If paper-making was responsible for creating the habitat for heath fritillaries, what was their status before then? Perhaps the glades of the previous wood-pasture environment had suited them and coppice was a lucky substitute. There is no fixed, unchanging fauna and flora whose loss we should lament. From the conservation standpoint, as large a variety of habitats and habitat-forming processes as possible is desirable. This is a form of insurance when our predictions are so uncertain. In addition, all processes of change offer experiments or opportunities for study; playing favourites among species ought to be beside the point.

The contingent element in the numbers and distribution of organisms of all types in habitats influenced by man should be kept in mind. Apart from fluctuations arising from natural causes, such as the weather, and the almost unpredictable knock-on effects of inter-specific competition, habitats tend to be unstable. Even in the largest cities, human action creates fresh habitats, and it has been suggested that the additions made to fauna and flora in the course of transforming the American continent represent a net gain.^{xvii} In the oceans, it can be seen that waste from the North Atlantic fisheries was responsible for the spread and growing numbers of fulmars, the history of which was meticulously documented by James Fisher. In a couple of centuries, fulmars prospected and colonised over 2,300 miles, right from Grimsey, Iceland, to Sussex. The offal from whaling ships that entered northern waters in the seventeenth century started the spread, and when the right whale was fished out, waste from trawlers took over. The fulmar

is not alone as an anthropogenic species — in the plant world I would instance gorse.^{xviii} Plenty of examples are matters of record and doubtless others await their historians.

The negative effects of hunting are more prominently reported. Reports have a habit of being skewed in favour of the losses. The extinction of the great auk is infinitely better known than the increase of the fulmar, despite the fact that the latter was 'the most spectacular and continuous spread of any wild bird known — apart from the colonisations of the starling and sparrow that were started by human introduction.'^{xix} The rush to judgement that the human influence is necessarily malign is unwise. In longer perspective, it is better thought of as a source of disequilibria, a speeding up of the processes of disturbance. Although observers are unforgiving about what they perceive as upsets to familiar arrangements during their own lifetimes, habitats and distributions tend to settle down over the years. In his unfashionably positive view of humanity's future, Rene Dubos refers to the wonderful harmony in many parts of Europe as a result of what has been called the 'wooing of the earth'.^{xx} Dubos grew up in the Ile de France; I grew up in Hampshire and agree with him about the disciplined charm that can be reflected in humanised landscapes. Like the architectural harmony of townscapes, it can be an unintended consequence of juxtaposing diverse elements.

More general points include how enormous the human impact has been, how impossible to reverse in most cases, and yet how liveable are the sometimes depauperate ecosystems that have resulted. People who are not especially interested in nature show a considerable tolerance for environments less rich in natural variety than those their forebears knew. Humanised landscapes have proved quite stable and contain the added interest and aesthetic pleasures of parks, gardens, buildings and other artefacts; with these many people are content. Nature was long regarded as unappealing and hostile by those who had to live cheek by jowl with it, Gilpin's enthusiasm for wild scenery at the end of the eighteenth century being the first sign of altered opinion. The change came first among the well-to-do who could afford to travel to the Lake District or the Scottish Highlands. The opportunities are much wider now.

Enthusiasts for nature are more numerous today than ever, but a majority of people in the developed countries, school teachers among them, are no longer able to identify common birds or flowers. Modern populations have unprecedented chances to enjoy nature but those without a special taste for it are detached from the countryside as never before. Related to this,

the use of maps is retreating in favour of SatNav systems in cars, a form of self-imposed de-skilling especially lamentable in the United Kingdom, where the Ordnance Survey produces such elegant maps crammed with historical and other information. University lecturers in the field sciences lament how few freshmen possess the taxonomic skills that were once the gateway to subjects like botany. An Oxford geologist told me that undergraduates positively loathe fieldwork, preferring computer modelling. From the strictly scientific point of view this may be acceptable, though the lack of curiosity bodes ill. If these are the traits of university people, at least it becomes understandable that the mass of the population is content with what is called the 'Crete Scenario', meaning heavily used landscapes with limited natural variety, provided only that they sense wild places still exist 'out there' and their children may see exotic creatures in the zoo.

Whether traditional field work in ecology will long persist is questionable. The United States Congress has funded NEON (National Ecological Observatory Network) at a cost equivalent to that of a space probe.^{xxi} It bids to turn ecology into Big Science, like other sciences that now generate vast amounts of data to be processed by computer. A total of 15,000 sensors placed in each of 20 domains, together with aerial surveys, will collect 500 types of data, amounting to 200 terabytes per annum. This is four times that which was collected in the first twenty years of operating the Hubble telescope. The days of field glasses and butterfly nets may be numbered, says the *Economist*. Students of ecology are likely to turn from field work to crunching data. Whether this will result in more original findings per dollar expended than traditional research like that at Wytham Woods ('Oxford's Outdoor Laboratory') remains to be seen, as does the impact on recruiting the idiosyncratic characters and original minds of the students that ecology has hitherto attracted.^{xxii} Either way, the sub-discipline of terrestrial ecological history is likely to languish as a poor relation, characterised by a few intensive studies and vague 'global' essays amidst a mass of fairly haphazard findings.

ECOLOGICAL REARRANGEMENTS

An original intention for this book was to set against one another historical instances of loss and gain in the natural world. But after compiling long, long lists of examples on both fronts, this appeared futile. What could the baseline be and how might the relative costs and benefits be compared in

more than an indicative fashion, given the absence of a metric like market price — and for that data are largely missing. The world is already a ‘witless menagerie’ in which species from here are inextricably mingled with ones from there. Conceivably, habitats in the most remote places may be preserved intact, though ‘intact’ is historically doubtful term given that much even of the Amazonian rainforest grows on land once cleared for farming. Most of the earth is occupied by syncretic ecosystems resulting from innumerable human interventions, deliberate and unintended.

The classic paper is by Peter Vitousek on the ‘Human Domination of Earth’s Ecosystems’. He indicates that domination is almost complete.^{xxiii} Beware, however, his technically correct conclusion that about one-quarter of all bird species have been driven to extinction; it may give a misleading impression. Modern readers have been conditioned to expect that such a statement must refer to Europe’s expansion overseas, involving massive agricultural reclamation in the less-developed countries. But the lion’s share of the losses occurred in prehistory, as the result of pre-European colonisation in the Pacific islands: in the process 20% of the worldwide avifauna was lost, the majority being flightless rails confined to specific islands.^{xxiv} Human action definitely — but not easily assimilated to a narrative dwelling on the supposed ills of European colonialism. Island ecosystems were particularly vulnerable to fire-stick assaults on their vegetation and the introduction of predator species. Two wrongs do not make a right, yet the remaining 5% of the stock of birds rendered extinct in the great land-masses seems small by comparison, given the extent, duration and ferocity of colonial occupation. A reason for this has been the staggered nature of forest clearances, leaving reservoirs of different species able to recolonize affected areas.^{xxv}

The land surface of much of the earth has been remade, with all this implies for plant and animal communities. Plain as a pikestaff in urban areas, the effect is more subtle in the countryside, where present arrangements are readily taken at face value. When the cycle of fertility transfers is considered, the continual remodelling effect of urban markets, for example, makes itself clear. Thames barges brought straw and feedstuffs for London’s large horse population, besides food for humans. Dung from the horses was spread on market gardens in Middlesex, the crops grown were consumed by London’s inhabitants, and their excreta were voided down the Thames.^{xxvi} In the long term, the effect was to extract fertility from the supplying districts, such as Essex, although they eventually received some offset from an unlikely source, the import of guano (seabird droppings) from Peru.

The wheels of fertility transfer were complicated, overlapping, and ultimately global.

Fertility cycles may be found everywhere. English parishes are usually most fertile in the gardens around the church, where manure was continually brought in, and in nearby fields where for many centuries sheep were folded at night after being grazed on more distant grassland. Outer parts of a parish lost fertility and it is no accident that it is on their fringes are the farms with names like Starveall. The intense significance of fertility for crop growing is also shown by the typical clause in farm leases forbidding tenants from ploughing up old pasture. Similarly, the brickmaking leases common in Middlesex required the occupiers to remove the topsoil and replace it after completing their work.^{xxvii} In recent times, the opposite concern manifests itself: when artificial fertilisers are (too) freely applied on farmland, waterways can become eutrophic, that is to say covered with a scum of algae that live on the excess nutrients. Interactions were and are endless.

What might be called deeper history provides a record of clearance, massive deforestation, land drainage and transfers around the world of innumerable species of animal and plant. The process has recurred over millennia, slow or fast, and included the great translocations like those that created the neo-Europes, to whose reformulated biology Alfred Crosby drew such fruitful attention.^{xxviii} Overawing though the overseas expansion of the European peoples and their 'living entourages' was, it was only a particularly vigorous episode in the series of overlapping colonisations by human societies as far back as one cares to look. Common practice was to start by trying to acclimatise species from the colonists' homeland and to end by introducing or creating the conditions for fresh organisms in numberless variety.

All over the world, there has been trading in animal parts for ornamentation and other uses, and the collecting of eggs for food.^{xxix} The unbridled destruction of egrets, terns and grebes for plumes and other adornments of women's hats, to suit the Western fashion industry, spurred early moves to organise bird protection. Plumes were sinuous and sexy and the market for them was so big it seems almost unsurprising that consignments of plumes were the most valuable part of the cargo that went down with the *Titanic* in 1912. In a familiar sequence from the 'lucky dip' gathering of wild resources to growing them deliberately, feathers acquired by hunting were supplemented by ostrich feathers farmed in South Africa, whence they were presumably difficult to fetch during the First World War. The

‘feather crash’ of late winter, 1914, killed the trade.^{xxx} There was also a change in fashion away from ornamented hats, though the precise chronology and which effect predominated is unclear; they probably reinforced one another. In Britain, the Plume Act of 1921 helped to suppress any resumption.

The more compelling effect of colonisation was to establish wide monocultures of crops, at least in the European diaspora, once it became possible to ship produce back to the ‘metropolis’ on a grand scale. Caught up in the transfer were species so well adapted to the monocultures that they became pests. Opportunistic local species joined in. Meanwhile native game animals (not to mention natives) were slaughtered to the brink of extinction or beyond, after which they were replaced by introductions. Livestock farming required introducing and breeding domestic animals in enormous numbers; by 1880 the hog population in the Middle West alone had reached 50 million.^{xxxi} The overall implications of these gigantic changes for resident species and the initial vegetative cover are scarcely calculable.

Natural resources have often been depicted as common property resources where the ‘tragedy of the commons’ unfolds — the theory is that there seems no reason for restraining oneself when others do not. This traduces the institutional creativity of our rustic ancestors. On farmland in long-settled countries there was seldom any ‘tragedy’; villagers successfully restricted each other’s use of common property. Their needs and energies burst out in other directions — they could act greedily towards wild species in which no one had specific rights. International merchants were prompted to behave likewise by the market expansion of Victorian times. In addition to direct assaults on the wild, developed countries reshaped their own ecologies by housing large numbers of pets. The growth of pet numbers was and is partly a function of rising real incomes, or rather the diminishing marginal utility of real income, as may be seen from the extravagant mollycoddling of pet dogs in China, where there was no tradition of keeping such a non-utilitarian animal. When pets are free to roam, as the enormous cat population is, the consequences for wildlife are tragic. Economic change, new technology, consumption habits and shifting fashion create astounding stewards of ecological ramifications.

Dubos cites Carl Sauer as observing that it is recent settlements which are worn out, not the lands of old civilisations, at least outside the semi-arid and arid zones. The regular rainfall of Western Europe, Japan and some other parts of Asia lets their soils recover easily and already by the mid-1970s Dubos was able to list other forms of recovery — of polluted lakes

and polluted air — brought about by environmental policies in a number of Western countries. Whether or not future challenges will also be resolved is an open question but historical experience in the West suggests they can be met, since in rich societies conservation is a consumption good.

History is full of instances of the translocation of species through many sorts of mechanism. Usually the press headlines losses in apocalyptic terms while recoveries appear only as snippets. Notwithstanding the cutting of wild land into smaller and smaller pieces and the decline of more species than can manage to recover, the situation is not quite as bleak as portrayed by alarmists blindly devoted to maximum biodiversity. Their view does not give enough credit to the growing incomes that support ‘revealed biodiversity’, nor does it admit the liveability of humanised landscapes once people and nature have reached new equilibria.

Such equilibria are of course temporary. Everything depends on how long is the period of observation. As Piet Nienhuis points out, ‘the term “native” is used for organisms which have been native to a particular geographical area in historical times. However, the concept of “historical times” is rarely defined.’^{xxxiii} It cannot be reiterated too often that changes are always poking their way in. A debate has erupted over the role and designation of invasive species, a category that has already given rise to the sub-discipline of invasion biology. ‘Alien’ species are accused of ousting natives and greatly reducing biodiversity — however, newcomers are usually omitted from the species count until they become naturalised in turn. The language used is emotive and designed to justify the often unavailing expense of campaigns to eradicate incomers. The most creative response has been Jackson Landers’ proposal to hunt and eat even the more exotic among them.^{xxxiii} There are cases where incomers have expanded fast, distorted existing ecosystems and imposed serious costs on forestry or water supplies. But so have eruptions of native species. Any rapid spread can be looked on as a disruptive technology that disturbs some prior equilibrium.

The baseline in such cases is seldom specified and justified, although it is openly stated in Australia, where the purity of the vegetation has become a fetish. The baseline there is set just before the contact period, the European arrival. The aim is a botanical ethnic cleansing meant to restore the vegetation of just before white settlement, as if aboriginal populations had not previously modified their environments. This chauvinistic policy leads to expensive efforts at plant extermination or restoration. In the United States, where in a fit of irony some state emblems are non-native flowers, policies like this have been deprecated, according to

Neyfakh, as 'ecological nationalism' and comparison has been made with the anti-immigration movement.^{xxxiv} Neyfakh goes so far as to assert that those who oppose invasion ecology are usually on the political right and oppose spending on conservation. This is as unproven as the claim that sceptics about global warming are in the pay of the oil companies! For the purposes of land management, each case needs to be considered on its merits and the agonistic tones of some literature avoided. A more persuasive contribution to the debate renders the wrangling irrelevant by urging that the distinction between native and non-native species is artificial, as well as unhelpful in a setting of syncretic and ever-altering ecosystems.^{xxxv}

Old-settled lands have had thousands of years to absorb interlopers, which tend to be much more disruptive in the less disturbed lands of recent settlement.^{xxxvi} Part of the reason is that invasive species find it easier to penetrate disturbed land, which is more a feature of areas of recent colonisation than of long-settled ones. Nienhuis notes that the inherent susceptibility of disturbed areas to invasions 'has become an accepted cultural-historic phenomenon.' The dimension of culture history is little explored in typical work on ecology.

Better targeted efforts at conservation could provide ample opportunities for enjoying nature in the most densely settled countries, like England. Living as I do in part of that realm (the Cotswolds) heavily damaged by subsidised agriculture and from which the public is largely excluded by virtue of game preservation, I do not deny that environmental impoverishment may not persist or even worsen. It is a matter of political will. The remedy is curbing excesses and devoting a larger but not insupportable share of the gains of economic growth to the restoration of nature.

ENDNOTES

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ⁱⁱ V. Temple, *Butterflies and Moths in Britain* (London: Batsford, 1945), p. 13.

ⁱⁱⁱ A. Anderson, 'Faunal collapse, landscape change, and settlement history in Remote Oceania,' *World Archaeology*, **33** (3) (2002), p. 375.

^{iv} C. Raudsepp-Hearne *et al.*, 'Untangling the environmentalist's paradox: Why is human well-being increasing as ecosystem services degrade?' *BioScience*, **60** (2010), pp. 567–589.

^v R. Dawkins, *The Blind Watchmaker* (Harlow, Essex: Longman Scientific and Technical, 1986), p. 105, italics supplied; A. M. Douglas, *New Scientist*, 24 April 1986.

- ^{vi} J. Terborgh, *Where Have All the Birds Gone?* (Princeton: Princeton University Press, 1989), p. 181.
- ^{vii} B. Lomborg, *The Skeptical Environmentalist* (Cambridge: Cambridge University Press, 2001), p. 256.
- ^{viii} See, e.g., in S. Nicholls, *Paradise Found: Nature in America at the Time of Discovery* (Chicago: University of Chicago Press, 2009), p. 170.
- ^{ix} Quoted in J. L. Simon (ed.), *The State of Humanity* (Oxford: Basil Blackwell, 1995), p. 357.
- ^x *Ibid.*
- ^{xi} S. Nicholls, *Paradise Found*, especially, pp. 451–458.
- ^{xii} It is said that an Oxford dictionary for children has dropped words like ‘acorn’ as irrelevant to the present generation. I cannot bring myself to check, for fear it may be true.
- ^{xiii} L. Kaufman and K. Mallory (eds.), *The Last Extinction* (Cambridge, Massachusetts: The MIT Press, 1986), p. 21.
- ^{xiv} Despite its location east of Melbourne, Westernport was the westernmost point reached by the first explorers from Sydney.
- ^{xv} C. Tubbs, *The Ecology, Conservation and History of the Solent* (Chichester: Packard Publishing, 1999), pp. 116–126.
- ^{xvi} P. Barkham, *The Butterfly Isles* (London: Granta, 2010), p. 197.
- ^{xvii} R. S. R. Fitter, *London’s Natural History* (London: Collins New Naturalist, 1945); B. Gilbert, *Our Nature* (Lincoln, Nebraska: University of Nebraska Press, 1986), p. 42.
- ^{xviii} For gorse see E. L. Jones and C. R. Tubbs, ‘Vegetation of sites of previous cultivation in the new forest,’ *Nature*, **1988** (1963), pp. 977–978.
- ^{xix} J. Fisher, *The Shell Bird Book* (London: Ebury Press and Michael Joseph, 1966), p. 116.
- ^{xx} R. Dubos, *A God Within: A Positive View of Mankind’s Future* (London: Abacus, 1976), pp. 100ff.
- ^{xxi} *The Economist*, 25 August 2012.
- ^{xxii} See P. S. Savill *et al.*, *Wytham Woods: Oxford’s Ecological Laboratory* (Oxford: Oxford University Press, 2010).
- ^{xxiii} P. M. Vitousek, ‘Human domination of earth’s ecosystems,’ *Science*, **277** (1997), pp. 494–499.
- ^{xxiv} D. W. Steadman, ‘Prehistoric extinctions of Pacific birds: Biodiversity meets zooarchaeology,’ *Science*, **267** (1995), pp. 1123–1131.
- ^{xxv} S. Nicholls, *Paradise Found*, p. 150.
- ^{xxvi} M. Thick, *The Neat House Gardens: Early Market Gardening Around London* (Totnes: Prospect Books, 1998), pp. 101–103.
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