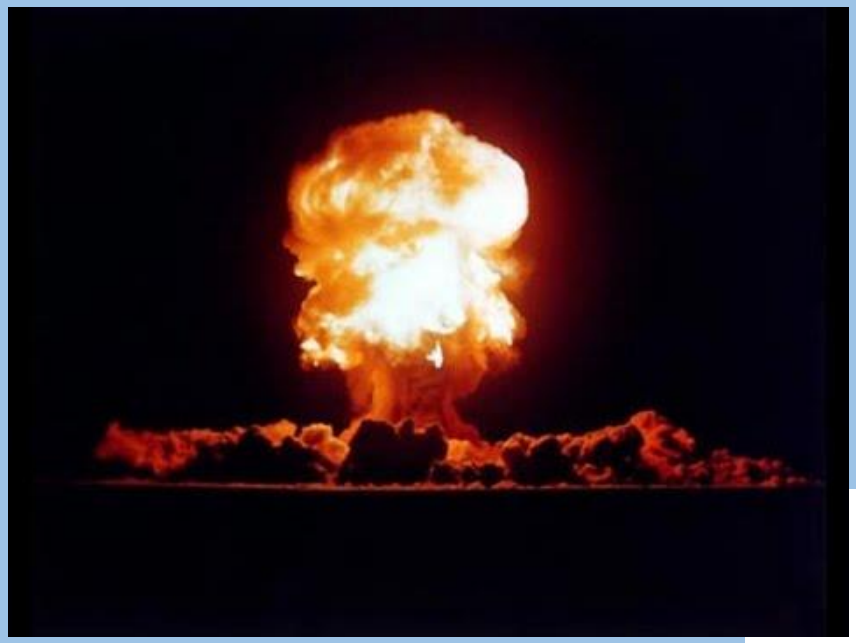
Humans as exceptional beings and the threat to wilderness

Mark Fisher, 8 October 2015
Wildland Research Institute

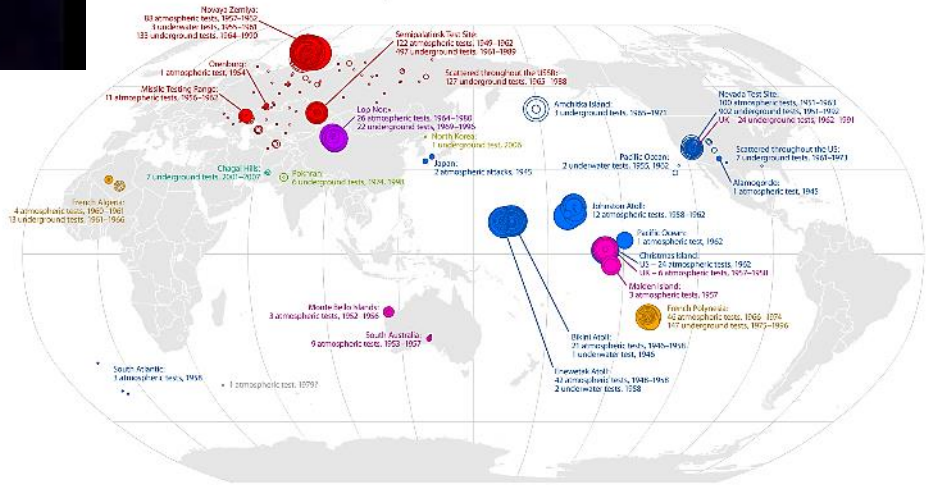
GEOG 3180

Question:

IS THE HUMAN SPECIES PART OF NATURE?



Nuclear Explosions since 1945



Country:	Year of first detonation:	Number of detonations: atmospheric	underground	underwater
United States	1945	206	912	5
USSR	1949	223	756	3
United Kingdom	1952	21	24	
France	1960	50	160	
China	1964	22	26	
Israel?	1967 ?			
India	1974		6	
South Africa?	1979 ?	1 ?		
Pakistan	1998		7	
North Korea	2006		1	

not all data is artlidat, and some locations are approximate, data source: http://www.johnstonsarchive.net/nuclear/tests

Each explosion is represented by a circle.
Many of these circles overlap.

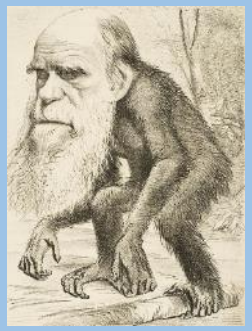
Filled circles are atmospheric detonations

Hollow circles are underground or underwater tests

The size of each circle represents the yield of the blast.
The scale is not linear:

more than 20 megatons
2.5 – 5.1 megatons
160–320 kilotons
less than 15 kilotons

Time line of evolutionary advance



What sets the human species apart:

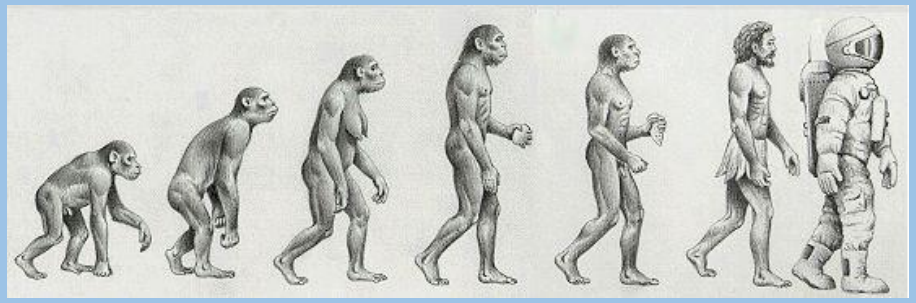
- fully **opposable thumbs** (capable of touching all fingers) allowing **"power"** and **"precision" grips** and the first **shaped tools ~ 1.8 mya**

- domestication of fire ~ 400 kya

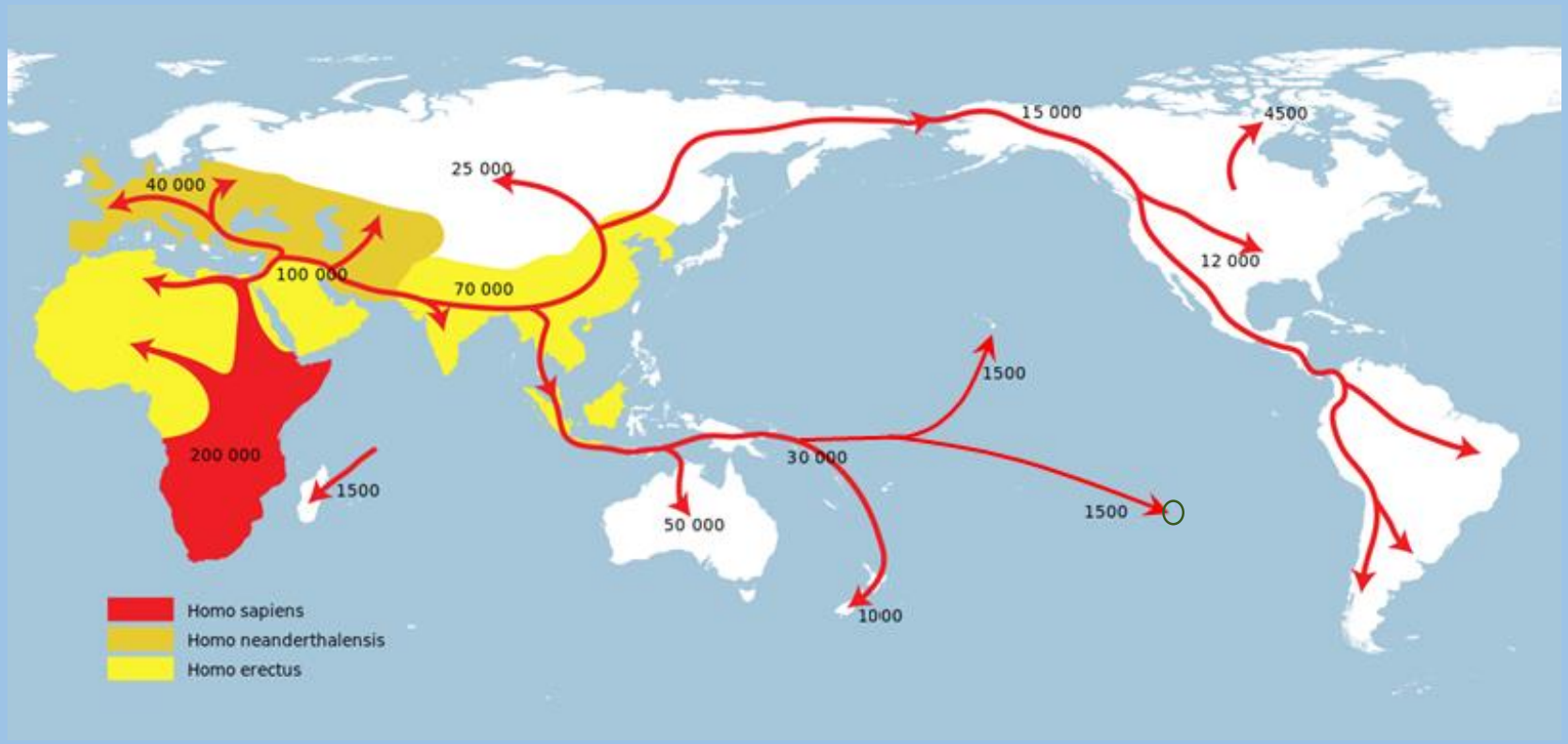
- vocalisation, cognitive ability and **spoken language** arise with origin of **"anatomically modern humans" ~ 200 kya**

- tools and technologies take off (fish hooks, buttons, and bone needles) **~ 50 kya**

- agriculture ~ 6-7 kya



The global takeover by modern humans



Often argued that **"wilderness without humans"** has not existed in recent history, but many islands have only been **settled for 3,000 years or less**:

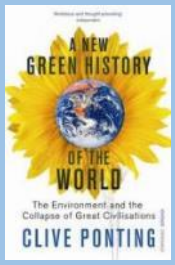
- ≤ 3,000 ya – Tonga and Samoa
- ≤ 2,000 ya – Easter Island, Hawaii, Marquesas, Madagascar
- ≤ 1,000 ya – Iceland, New Zealand
- ≤ 500 ya - Ascension, Chagos, Diego Garcia, Falklands, Macquarie Island

The lesson of Easter Island

Easter Island in the Pacific Ocean is 2,000 miles off the west coast of South America:
- 150 square miles colonised 1,500 ya by 20-30 Polynesians
- **densely wooded island** with poor soil, only 30 species of vegetation, no mammals, a little water in the calderas of extinct volcano
- diet mainly **restricted to food they had brought with them** - chickens and sweet potatoes – **other staples failed to grow**
- developed **ritual and ceremonial culture** of erecting stone monuments for ancestor worship
- 600 statues erected, moved several miles from quarry **by felling trees and using the trunks as rollers**
- population peaked in about 1550 at 7,000

First-recorded **European contact with the island in 1722**
- only 3,000 malnourished people living in **primitive conditions** (caves) engaged in perpetual warfare and resorting to **cannibalism to supplement meagre food supplies**
- **massive environmental degradation** brought on by **deforestation** of the whole island: **soil erosion** leading to mineral leaching and decline in crops; **loss of wood** for tools, building huts and canoes; loss of paper mulberry tree used to make fishing nets and cloth
- complex society had collapsed, **trapped on an island of environmental limitations and pressure**

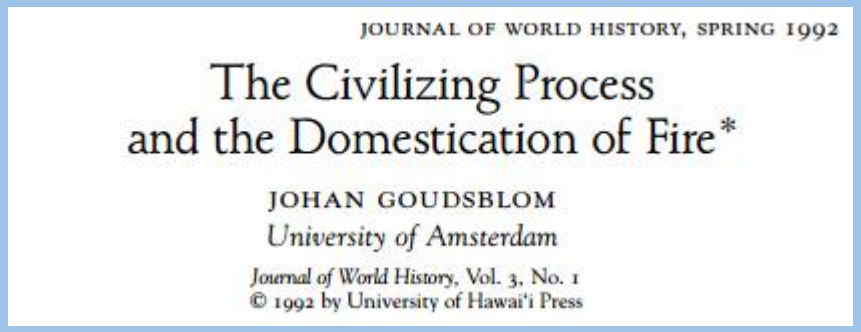
"Like Easter Island the earth has only limited resources to support human society and all its demands. Like the islanders, the human population has no practical means for escape"



Question:

WHAT WERE THE TIPPING POINTS IN HUMAN DOMINATION OF NATURE?

The domestication of fire and then plant and animal species



JOURNAL OF WORLD HISTORY, SPRING 1992

The Civilizing Process and the Domestication of Fire*

JOHAN GOUDSBLOM

University of Amsterdam

Journal of World History, Vol. 3, No. 1

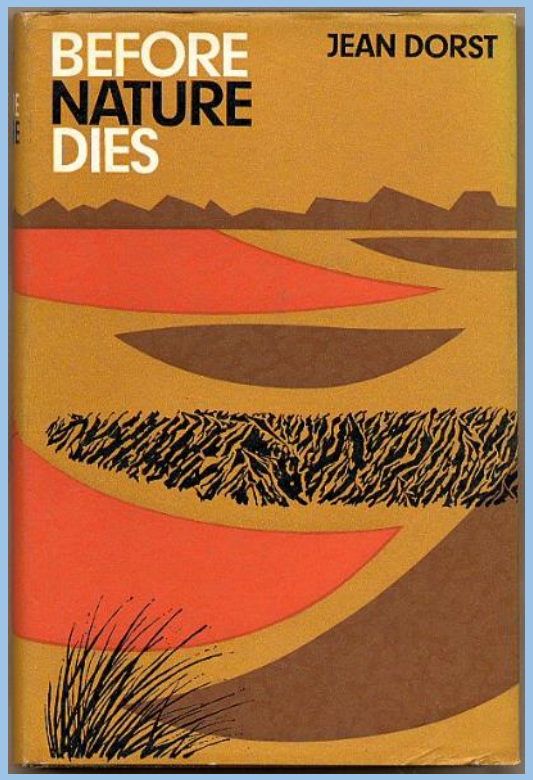
"Fire is destructive, irreversible, purposeless and self-generating"

*"There was no instinct specifically directing people to care for fire; it was a **cultural mutation**, requiring a **civilizing process**"*

- **land cleared** by fire drove **wild animals** from **refuge**, making them easier to hunt, and **grasses and shrubs** would spring up in the **open spaces** where more wild animals would come
- as well as **cooking**, fire gave **protection** against **cold** and **darkness**, and kept **predators** away
- comfort and security of **fire** was a **social activity**, a focus of **group life,** enhancing **communication** and **solidarity**
- learning to control fire involved **foresight**, **cooperation**, and **discipline** in the tasks of **gathering fuel**, **keeping it dry**, and **feeding the fire**
- taming fire is a **domestication**, a **tending, guarding** and **exploitation** of a **natural resource**, a difference in behaviour and power increasingly moulded by cultural standards, and which **set us apart from other species**
- extending **care and control** over other natural resources was a natural progression, by **selecting plants and animals**, feeding, cultivating and protecting against competing species and parasites, created **high concentrations of plants and animals for food** and products, supporting growth in human numbers

Goudsblom says the use and control of fire may have initiated the **second great ecological transformation** of the earth – **plant and animal domestication** - giving it a significance way beyond the mere burning of vegetation for hunting. It was an **integral part of civilising and civilisation**

Man's assault on nature



Dorst, J. (1970) Before Nature Dies. Collins, London
A 1970 translation of Jean Dorst's record, in two parts, of how the human species has transformed (**Yesterday**) and is continuing to transform (**To-day)** the earth's surface and its wild nature

- a professor of zoology in Paris, he set out to **"sketch the principal ravages of man since the era of the discoveries, with particular emphasis on birds and mammals"**
- traces **"man's assault on nature"** by continents, listing them in the **"chronological order of their devastation"**

Dorst, J. (1965)
Avant que nature meure, pour une écologie politique.
Delachaux et Niestlé

"Human beings have always exerted a far greater influence on their habitat than any other species of animal and, even in the remote past, they upset the balance of nature to their own detriment"

The indictment in “Before nature dies”

Man could not be **“a simple element in a truly natural habitat once he has crossed a certain threshold of civilization”**

“As the earth in its primitive state is not adapted to our expansion, man must shackle it to fulfil human destiny. In order to satisfy our elementary needs, especially for food, we have to transform certain habitats to increase their productivity directly or indirectly”

Human species made use of a great force for destruction **“a weapon whose power was out of proportion to his feeble technical skill: namely fire……Thus primitive man already possessed a weapon of sufficient power to modify natural habitats, opening the way to accelerated erosion and devastation”**

He gave a contemporary caution about the scale of the impact of Aboriginal hunting activities when they **“may set fire to 30 or 50 square miles of savanna in order to catch or locate their prey”**

Tipping point for the extent of human influence was the arrival of pastoralism, a transformation from hunter and berry-gatherer to shepherd and farmer

“The impact of shepherds on their habitats was far more extensive than that of the hunters. It consisted essentially in a regression of closed habitats (forests) and an increase of open ones (savannas, steppes)”

The pastoral economy set up **domesticated animals** in competition with their **wild ancestors**, leading to the loss of the latter in their native state as they were **subsumed into domestication**

“Farmers also set fires after a hasty clearing of the fields; so the two worked together to destroy the forest and replace it by open habitats. The landscape was thus completely transformed, erosion accelerated, and rivers and even the climate affected”

The transformation of habitats in this way was made worse because **“man often tends to increase the number of domestic animals, causing overgrazing with disastrous consequences to the balance of both the soil and the biological communities”**

He gave the contemporary example of the **overgrazing** that results from **pastoral societies** like the Masai of East Africa, where cattle are not just food but a **symbol of wealth and power** as well

Actions needed “before nature dies”

Against the backdrop of disaster he recorded, including the **extinction** of hundreds of forms of birds and animals, the abuse of pesticides, and pollution of land, sea and air, Dorst believed that we had to continue with the **“setting up of natural reserves under public control, where it is forbidden to modify habitats or to disturb flora and fauna in any way. Nature is thus left to herself”**

There also had to be a **“reconciliation of man and nature”** so that there was a **rational use of the land and sea**. He set out conditions, such as **“only lands with a definite agricultural potential should be converted into fields and pasture. Too often, men have tried to utilise poor marginal soils, which have quickly become permanently degraded”**

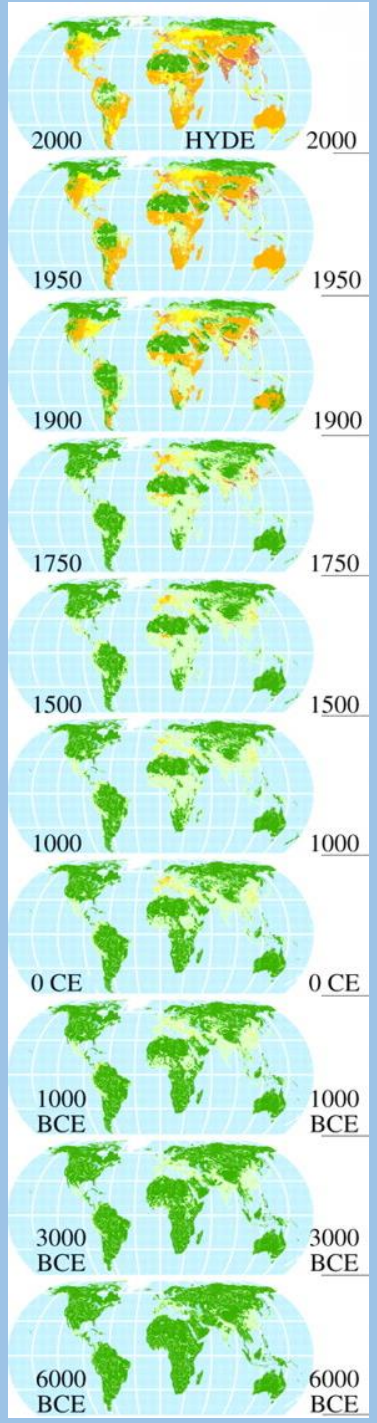
He was aware of the pressures on nature arising from **overpopulation**, noting that it had taken **600,000 years to reach 3 billion**, and then giving the accurate prediction (in 1960s) that this would **double in only 35 years**

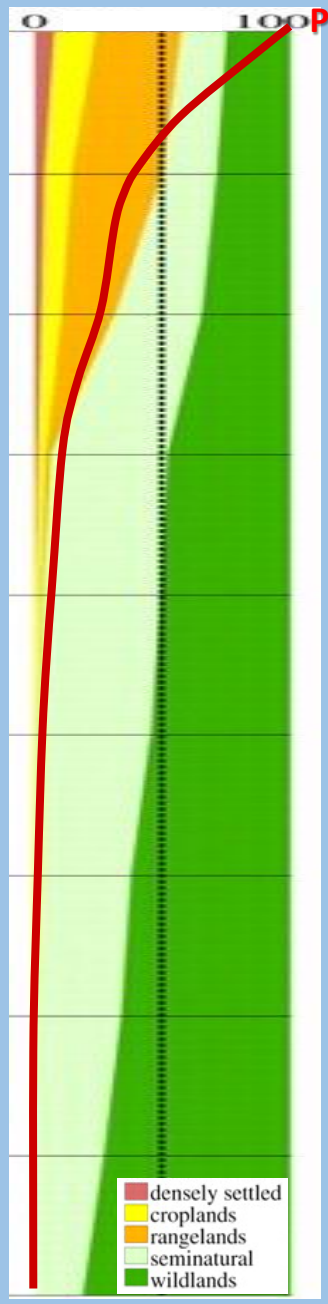
He attributes this to the human species having **succeeded in overcoming threats to life** through **hygiene and medicine** – he could also have listed our avoidance (mostly) of being predated – and concluding that a **limitation on human fertility** is thus **“no more unnatural than vaccination and treatment of diseases by antibiotics”**

Question:

HOW DID THE HUMAN SPECIES TRANSFORM THE WORLD?

Anthropogenic transformation of terrestrial biosphere





PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A

Phil. Trans. R. Soc. A (2011) **369**, 1010–1035
doi:10.1098/rsta.2010.0331

Anthropogenic transformation of the terrestrial biosphere

By Erle C. Ellis*

8,000 ya

- human **land use** was **low intensity** but **highly extensive**
- humans at very low population in a **wildland matrix**

8000ya – 1000ya

- gradual **rise in population** accompanied by **increase in semi-natural land** (used land) and steeper **decrease in wildlands** (unused land)

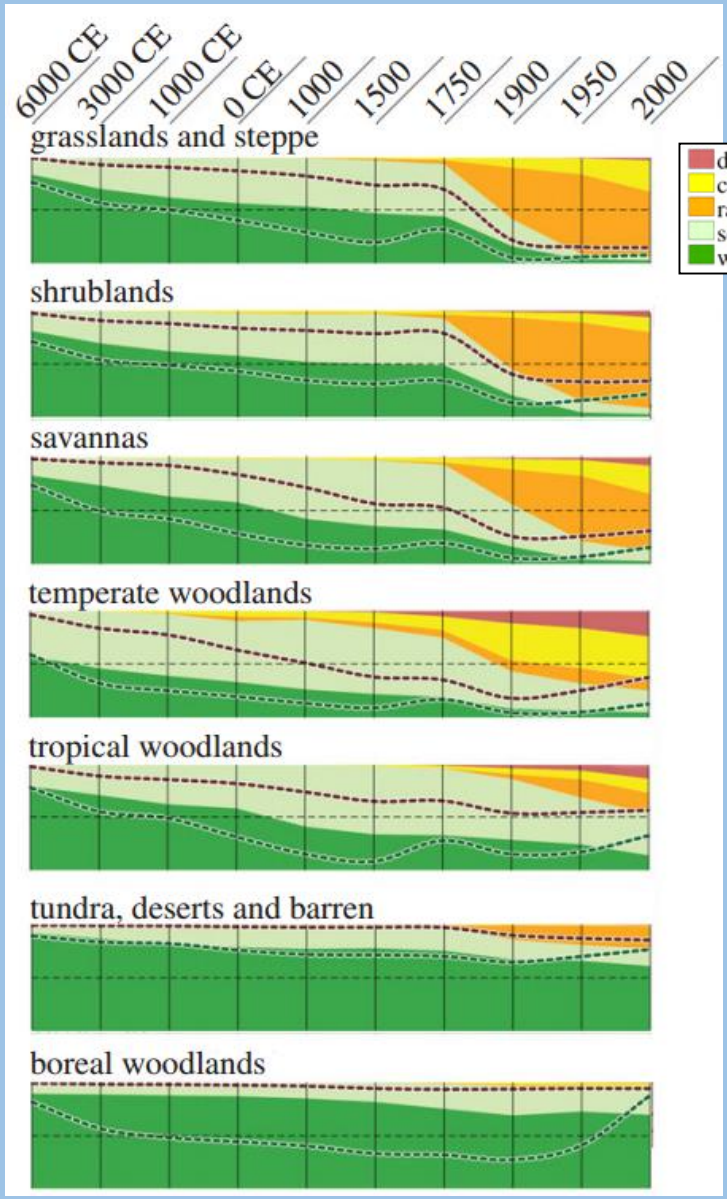
~500ya

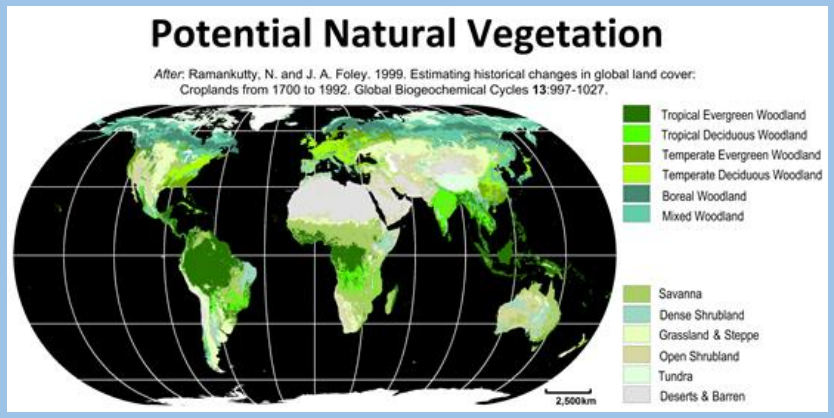
- **intensity of land use accelerates** from 16th century along with **steeper population rise** - **wildlands** on a continual fall

Today

- **matrix** is **transformed land** with a massively increased human population and just **"small islands"** of wildlands

Exploitability of biomes and anthropogenic land transformation





- transformation is greatest where the biome **has better soils** and **more easily** and **more productively exploited**

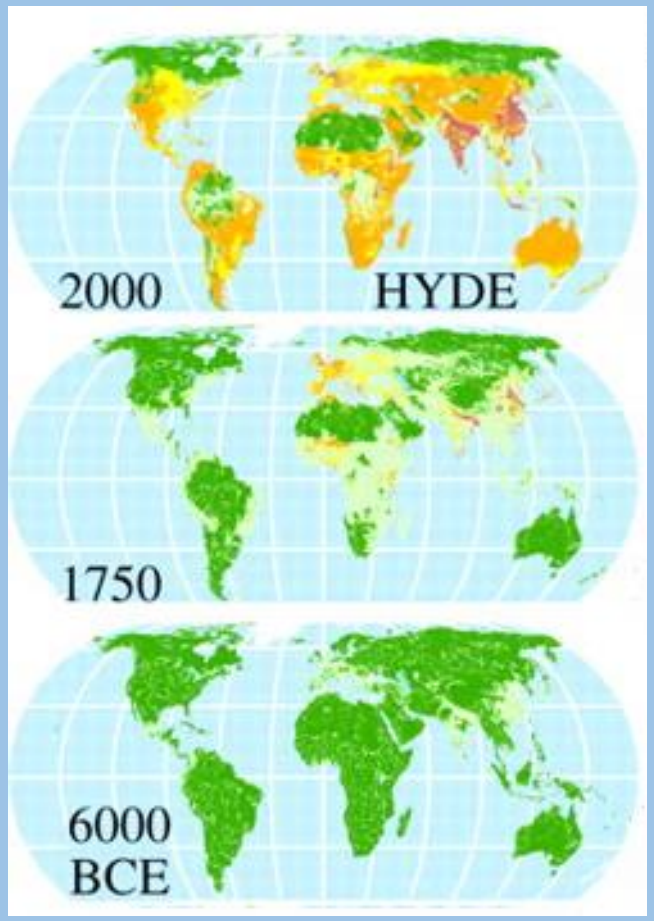
- openings in **temperate woodlands** cleared by **hunter gatherer**s in the Mesolithic to **increase prey**

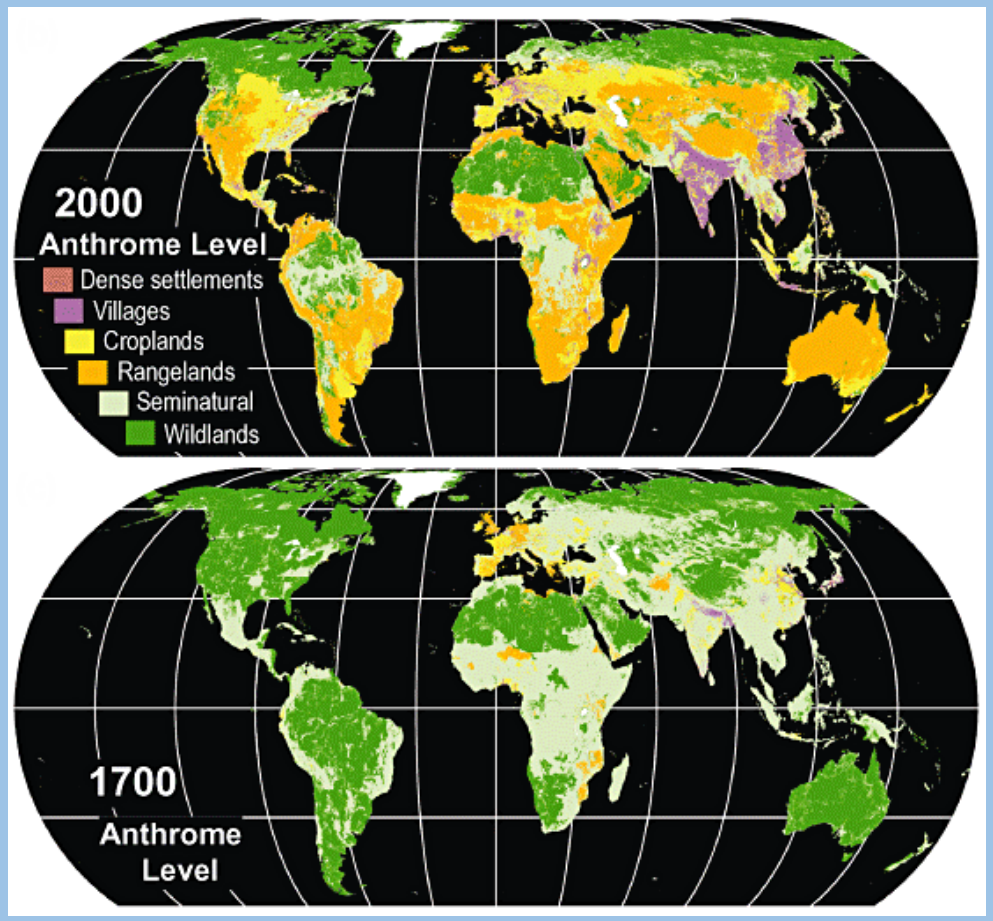
- **agriculture** developed first in **grasslands and steppes** of Middle East 11,000 ya

- agriculture spread west across Europe during the Neolithic, reaching **Britain ~ 6,500 ya** and after the submergence of Dogger Land (land bridge to Europe)

- arrival of agriculture **accelerated woodland clearance**

Geographical asymmetry in global transformation

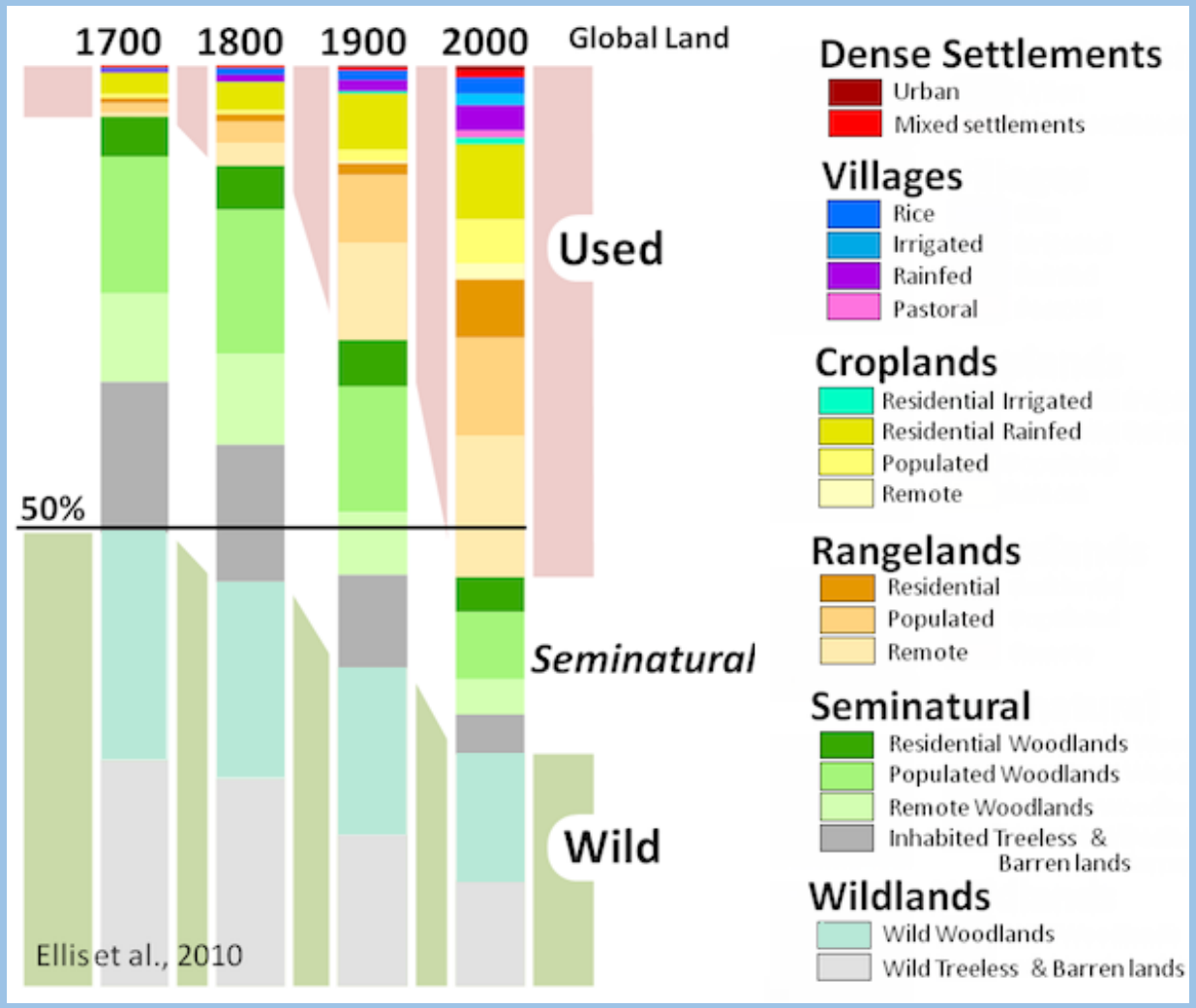




Europe, central Africa and Asia were at the **leading edge in global transformation**

Colonisation from **Europe**, bringing **agriculture**, resulted in **accelerated transformation** in the Americas and Australasia

Acceleration in transformation from the 18th century



- **settlements distribute** and land use **diversifies** as **global population** takes off

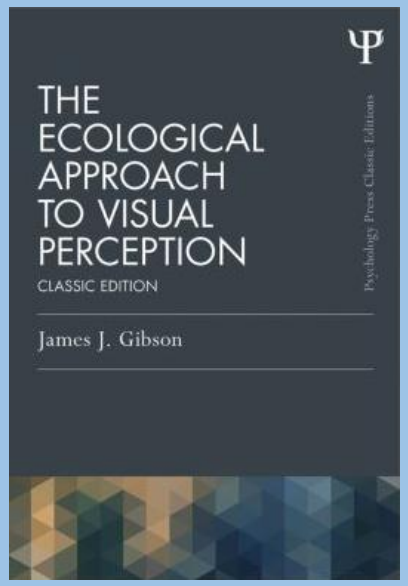
- **remote, uninhabited** and **wild** land declines, turning into **semi-natural** land

- **EXTENSIVELY USED** land (semi-natural) turns into **INTENSIVELY USED** land (rangelands, croplands, settlements)

Wild → **Semi-natural** → **Used**

The continuum of land transformation

We know why humans have transformed the earth….

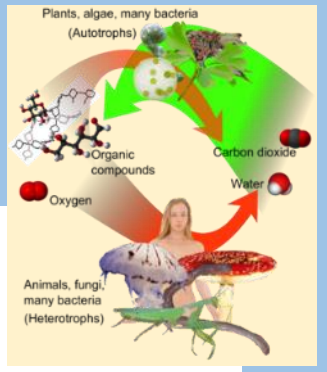


Gibson, J.J. (1979) The Ecological Approach to Visual Perception. Boston: Houghton Mifflin Chapter 8 THE THEORY OF AFFORDANCES

"Why has man changed the shapes and substances of his environment? To change what it affords him. He has made more available what benefits him and less pressing what injures him. In making life easier for himself, of course, he has made life harder for most of the other animals. Over the millennia, he has made it easier for himself to get food, easier to keep warm, easier to see at night, easier to get about, and easier to train his offspring"

…… but what is a contemporary measure of the impact?

Changes in global biomass – plants and animals



Photosynthesis is the most important **energy conversion** on Earth because life is carbon-based. Without **phytomass** (plant tissues) as food for herbivores there would be no other life except for algae and some bacteria

Harvesting the Biosphere: The Human Impact

VACLAV SMIL

POPULATION AND DEVELOPMENT REVIEW 37(4): 613–636 (DECEMBER 2011)

TABLE 1 Some important long-term global trends

Year	Population (million)	Energy use (GJ/capita)	Global phytomass stock (Gt C)
5000 bp	20	<3	>1,000
0	200	<5	1,000
1000	300	<10	900
1800	900	23	750
1900	1,600	27	660
2000	6,100	75	550

- **human phytomass harvest** for **food** and **raw materials** (wood, fibers, pulp) and energy (fuelwood, charcoal, straw)
- history of **anthropogenic destruction** of standing **phytomass** (deforestation, conversion of other ecosystems to croplands, pastures, settlements, and industrial uses)
- global **phytomass** on a **sliding decline** over the **Holocene,** then **halving** over the **last millennia** and **human population** exploded

TABLE 2 Global anthropomass and zoomass of wild and domesticated animals, 1900 and 2000 (Mt C)

Year	Humans	Wild terrestrial mammals	Elephants	Domesticated animals	Cattle
1900	13	10	3.0	35	23
2000	55	5	0.3	120	80

NOTE: Estimates shown are the best approximations of global totals; those for the anthropomass and the zoomass of domesticated animals and cattle in 2000 are relatively the most accurate.

- losses of **wild zoomass** (wild mammals and elephants) over last century coupled with the expansion of **anthropomass** (humans) and the **mass** of **domesticated animals** and **cattle**

Implications, concerns, and possibilities

What do these efforts to quantify the human exploitation of the biosphere tell us? I would argue that the comparisons of changing biomass stocks are particularly revealing as they record the unprecedented domination by a single species and its associated domesticated zoomass. Barring a severe pandemic or a global thermonuclear war, this new reality cannot be reversed rapidly, and it creates an unprecedented demand for the products of photosynthesis.

*"comparisons of **changing biomass stocks** are particularly revealing as they record the **unprecedented domination by a single species and its associated domesticated zoomass**"*

Human appropriation of the primary production of the earth

Table 2. Breakdown of global HANPP in the year 2000 to land-use classes

Land use category	NPP_0, gC/m²/yr	NPP_{act}, gC/m²/yr	HANPP on this area, %	Contribution to total HANPP, %
Cropping	611	397	83.5	49.8
Grazing land	486	433	19.4	28.5
Forestry	720	720	6.6	10.6
Infrastructure areas	586	221	73.0	3.7
Wilderness	229	229	None	0.0
Global average or total	502	454	22.1	92.7*

*The remaining 7.3% are caused by human-induced fires (see Table 1).

PNAS

Quantifying and mapping the human appropriation of net primary production in earth's terrestrial ecosystems

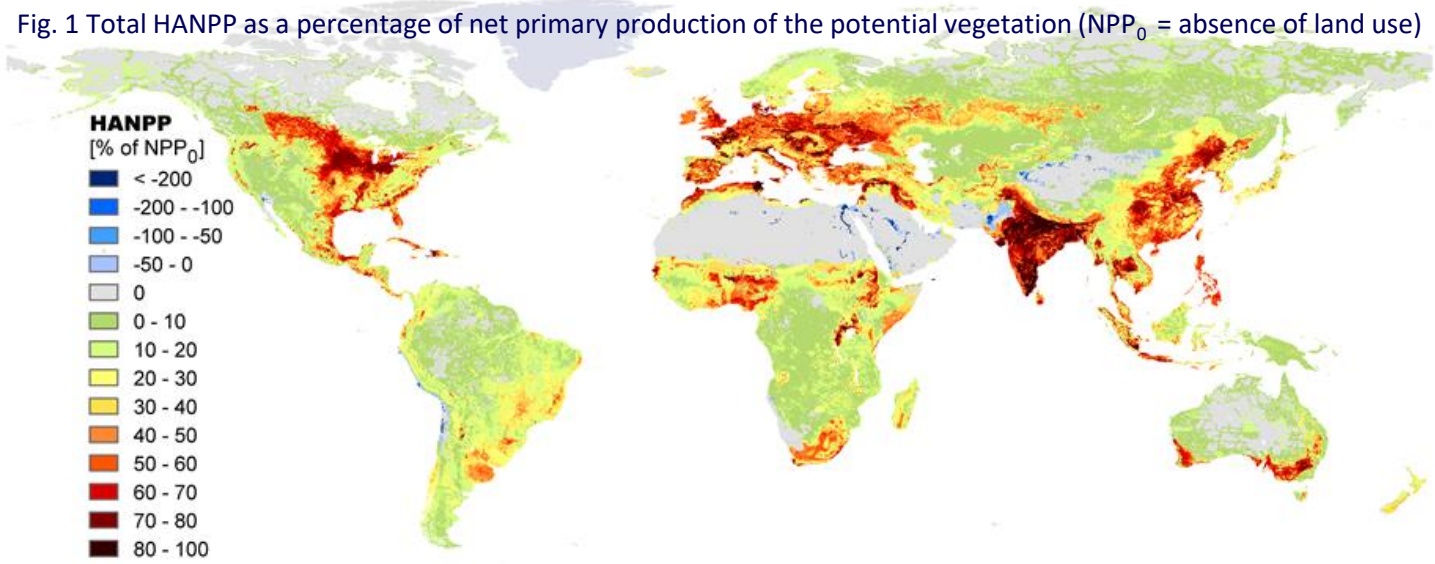
Helmut Haberl*†, K. Heinz Erb*, Fridolin Krausmann*, Veronika Gaube*, Alberte Bondeau‡, Christoph Plutzar§, Simone Gingrich*, Wolfgang Lucht‡, and Marina Fischer-Kowalski*

12942–12947 | PNAS | July 31, 2007 | vol. 104 | no. 31 www.pnas.org/cgi/doi/10.1073/pnas.0704243104

- **Human appropriation of net primary production** (HANPP) defined as **effect of harvest**, and productivity changes induced by land use, on the **potential availability** of the **products of photosynthesis** (vegetation) in ecosystems
- results based on statistics from the Food and Agriculture Organization for biomass harvest on cropland and forests – wilderness productivity based on Sanderson's map and a dynamic global vegetation model – **NO harvest in wilderness!**

*"The map presented in Fig. 1 show where on earth, and how strongly, **humans alter ecological energy flows**, thus **localizing** the **intensity** of **human domination of ecosystems**"*

Fig. 1 Total HANPP as a percentage of net primary production of the potential vegetation (NPP_0 = absence of land use)



*"The results presented above demonstrate that a **remarkable share of global NPP** is used to satisfy the needs and wants of **just one species on earth**, thus indicating the **extent of human use of earth's resources**"*

Inexorable rise in human use of earth's resources

*"**HANPP** provides a useful measure of **human intervention into the biosphere**. The **productive capacity** of land is appropriated by **harvesting** or **burning biomass** and by converting **natural ecosystems to managed lands with lower productivity**"*

PNAS

Global human appropriation of net primary production doubled in the 20th century

Fridolin Krausmann[a,1], Karl-Heinz Erb[a], Simone Gingrich[a], Helmut Haberl[a], Alberte Bondeau[b,c], Veronika Gaube[a], Christian Lauk[a], Christoph Plutzar[a], and Timothy D. Searchinger[d]

[a]Institute of Social Ecology Vienna, Alpen-Adria University, A-1070 Vienna, Austria; [b]Mediterranean Institute of Biodiversity and Ecology (IMBE), Aix-Marseille University, Centre National de la Recherche Scientifique (CNRS) - Institut de Recherche pour le Développement (IRD) - Université d'Avignon Pays du Vaucluse (UAPV), F-13545 Aix-en-Provence Cedex 04, France; [c]Potsdam Institute of Climate Impact Research, D-14412 Potsdam, Germany; and [d]Woodrow Wilson School of Public and International Affairs, Princeton University, Princeton, NJ 08544

10324–10329 | PNAS | June 18, 2013 | vol. 110 | no. 25 www.pnas.org/cgi/doi/10.1073/pnas.1211349110

Trends from 1910 to 2005:
- **human** population grew **fourfold**
- **economic** output grew **17-fold**
- global HANPP **doubled**

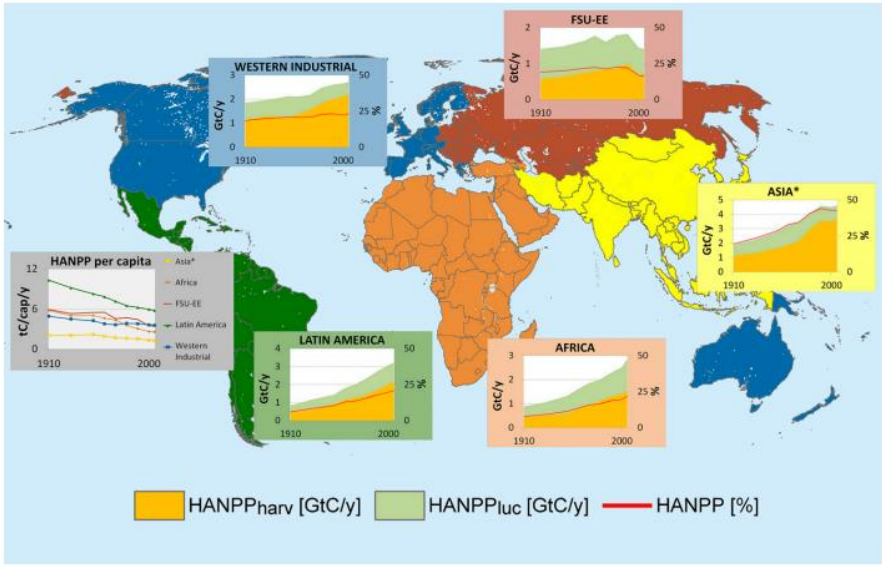
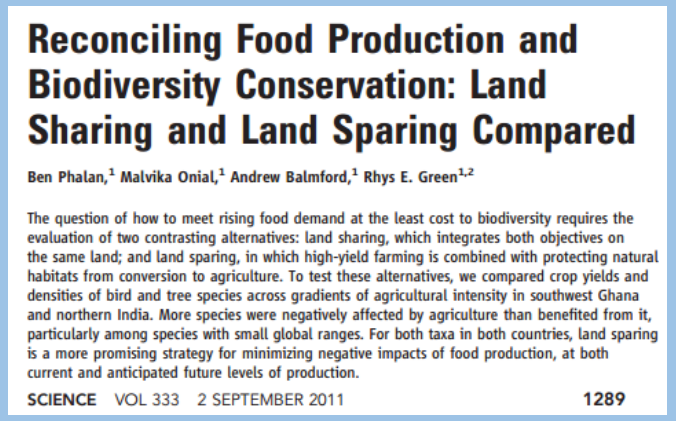


Fig. 3. Development of HANPP and HANPP per capita from 1910 to 2005 in five world regions. HANPP (percent) measures HANPP as a percentage of the NPP of the potential vegetation, i.e., the vegetation assumed to exist in the absence of land use. Asia*, Asia excluding those countries which are part of the FSU-EE Region; FSU-EE, Former Soviet Union and Eastern Europe. See *SI Appendix* for definition of regions.

*"For the next few decades, a further **increase** in **global population** and **economic output** is expected, and they will **raise the demand** for more **biomass** to produce food, fiber, and fuel. Our analysis of historic trends has shown that considerable **efficiency gains** in the past have driven a **decoupling** of socio-economic growth and HANPP, but only relative **to population and GDP growth**. In **absolute terms, HANPP has continued to increase**. Overall, people have to a fair extent managed to improve the efficiency with which they generate their food and fiber needs, but even with these improvements, **the total tap on the world's plant production has roughly doubled and the ecological costs were considerable**"*

How do we mitigate human use of the earth's resources?



Reconciling Food Production and Biodiversity Conservation: Land Sharing and Land Sparing Compared

Ben Phalan,[1] Malvika Onial,[1] Andrew Balmford,[1] Rhys E. Green[1,2]

The question of how to meet rising food demand at the least cost to biodiversity requires the evaluation of two contrasting alternatives: land sharing, which integrates both objectives on the same land; and land sparing, in which high-yield farming is combined with protecting natural habitats from conversion to agriculture. To test these alternatives, we compared crop yields and densities of bird and tree species across gradients of agricultural intensity in southwest Ghana and northern India. More species were negatively affected by agriculture than benefited from it, particularly among species with small global ranges. For both taxa in both countries, land sparing is a more promising strategy for minimizing negative impacts of food production, at both current and anticipated future levels of production.

SCIENCE VOL 333 2 SEPTEMBER 2011 1289

Two potential ways forward:

Land sparing

- **separating** land for **conservation** from land for crops, with **high-yield farming** facilitating the **protection** of remaining **natural habitats** from **agricultural expansion**

Land sharing

- integrating **human activity** with **natural processes** for mutual benefit
- conservation and food production occur on the same land, using **wildlife-friendly farming methods**

LAND SPARING – decoupling human needs from wild nature


AN

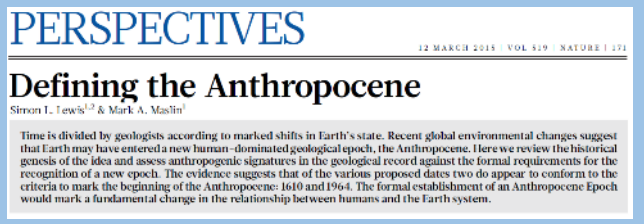
ECOMODERNIST

MANIFESTO

BY

APRIL 2015 • WWW.ECOMODERNISM.ORG

An Ecomodernist Manifesto April 2015


PERSPECTIVES

12 MARCH 2015 | VOL 519 | NATURE | 171

Defining the Anthropocene

Simon L. Lewis[1,2] & Mark A. Maslin[1]

Time is divided by geologists according to marked shifts in Earth's state. Recent global environmental changes suggest that Earth may have entered a new human-dominated geological epoch, the Anthropocene. Here we review the historical genesis of the idea and assess anthropogenic signatures in the geological record against the formal requirements for the recognition of a new epoch. The evidence suggests that of the various proposed dates two do appear to conform to the criteria to mark the beginning of the Anthropocene: 1610 and 1964. The formal establishment of an Anthropocene Epoch would mark a fundamental change in the relationship between humans and the Earth system.

The magnitude, variety and longevity of **human-induced changes**, including land surface transformation and changing composition of the atmosphere, led to the suggestion that we should refer to the present as the **Anthropocene** instead of the Holocene. The authors of the **Manifesto** are adherents to the **Anthropocene**

- affirm that **humanity must shrink its impacts** on the environment to make **more room for nature**
- **reject** that **human societies must harmonize with nature** to avoid economic and ecological collapse
- **do not believe** that **natural systems will be protected** or enhanced by the **expansion of humankind's dependence upon them for sustenance and well-being**
- believe that **agricultural intensification for land-sparing is key to protecting wild nature**
- see a **decoupling of human welfare from environmental impacts** through knowledge and technology used to **intensify farming, energy extraction, forestry, and settlement** so that they **use less land and interfere less with the natural world**
- intensification will require a sustained **commitment to technological progress** and the continuing evolution of social, economic, and political institutions alongside those changes

Accelerated decoupling alone will not be enough to ensure more wild nature. There must still be a conservation politics and a wilderness movement to demand more wild nature for aesthetic and spiritual reasons. Along with decoupling humankind's material needs from nature, establishing an enduring commitment to preserve wilderness, biodiversity, and a mosaic of beautiful landscapes will require a deeper emotional connection to them.

LAND SHARING – traditional knowledge and harmonising with nature

Kakadu National Park in Australia was the first as an ethnological reserve

Welcome to Kakadu National Park

Culture

Kakadu is considered a living cultural landscape. The traditional owners Bininj Mungguy have lived on and cared for this country for more than 50,000 years. Their deep spiritual connection to the land dates back to the Creation and has always been an important part of the Kakadu story.

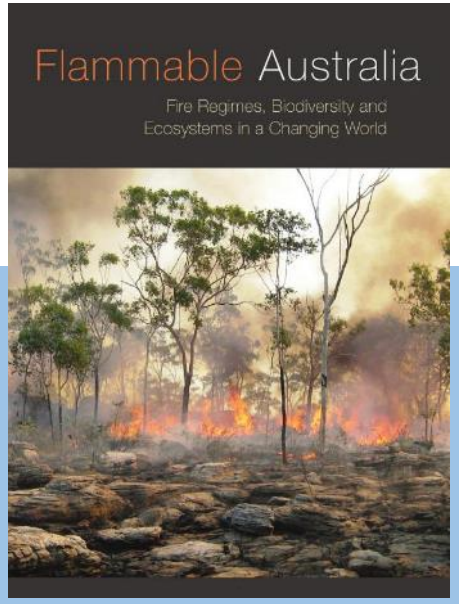
Park management

Kakadu is Aboriginal land. Our people have kept it healthy for thousands of years. Today, we work hand-in-hand with Parks Australia to manage Kakadu, using a mix of traditional ways and modern science.

Conserving Kakadu

Before the arrival of non-Aboriginal people, Bininj/Mungguy managed their country with fire.

Fires were lit all year round, although mostly in the early dry season. They were lit for many reasons: to make travelling easier, to flush out animals when hunting, to protect food resources such as yams from later fires, to clear around camp sites, to signal to others, and to fulfil spiritual and cultural obligations. These burning practices had the effect of promoting suitable habitats for a range of different plants and animals.



PNAS

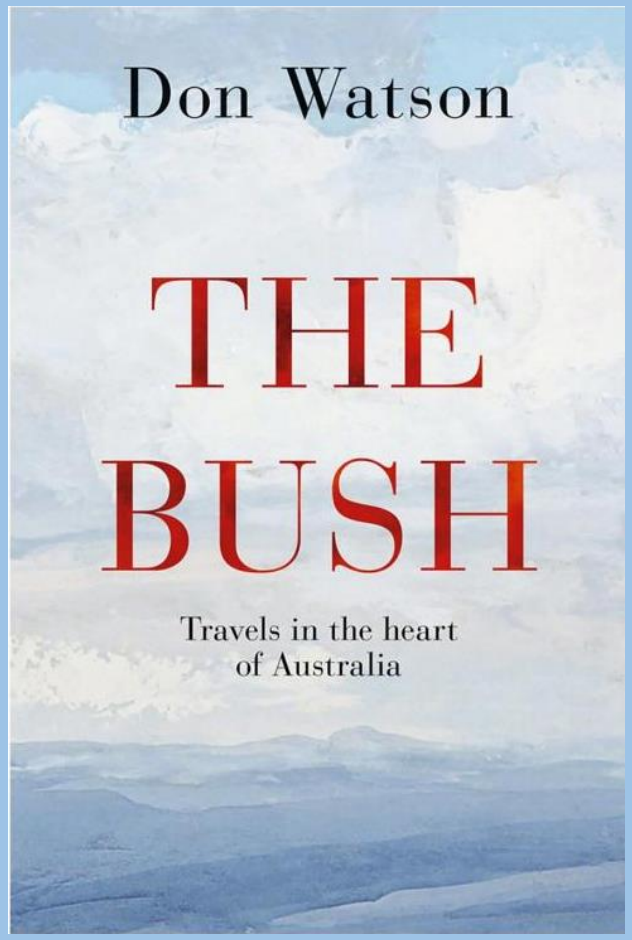
The "fire stick farming" hypothesis: Australian Aboriginal foraging strategies, biodiversity, and anthropogenic fire mosaics

R. Bliege Bird*†, D. W. Bird*, B. F. Codding*, C. H. Parker‡, and J. H. Jones*

*Department of Anthropology, 450 Serra Mall, Building 50, Stanford University, Stanford, CA 94305; and ‡Department of Anthropology, 270 South, 1400 East, Room 102, University of Utah, Salt Lake City, UT 84112-0060

14796–14801 | PNAS | September 30, 2008 | vol. 105 | no. 39 www.pnas.org/cgi/doi/10.1073/pnas.0804757105

Is traditional knowledge harmonisation with nature?



The Bush

Author: Don Watson

Penguin

Format: Hardback

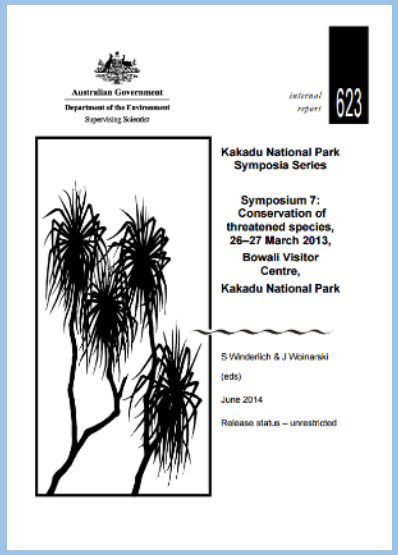
Published: 20 May 2015

Penguin Books Australia

The Australian bush is made of the effort to create and the effort to destroy. When people speak of Aborigines 'living in harmony' with their environment they mean these two forces were in some way reconciled. They neither sowed nor reaped, and had neither 'storehouse nor barn, and God feedeth them' – but God fed them only after their considerable manipulation of the land by elaborate and strict regimes of conservation, by substantial and ingenious building of weirs, fish traps, canals and aqueducts, by various forms of cultivation, planting, gardening and harvesting, and by relying on a storehouse of knowledge about the behaviour and properties of plants and animals. They lived in harmony with the environment, but only after bending it to suit their purposes.

*"They lived in **harmony** with the **environment**, but only after **bending it to their purposes**"*

Traditional knowledge a threat to wild nature


Australian Government
Department of the Environment
Supervising Scientist

internal report 623

Kakadu National Park Symposia Series

Symposium 7: Conservation of threatened species, 26–27 March 2013, Bowali Visitor Centre, Kakadu National Park

S Winderlich & J Woinarski (eds)

June 2014

Release status – unrestricted

8 Threatened terrestrial mammals of Kakadu National Park: which species?; how are they faring? and what needs to be done for them?

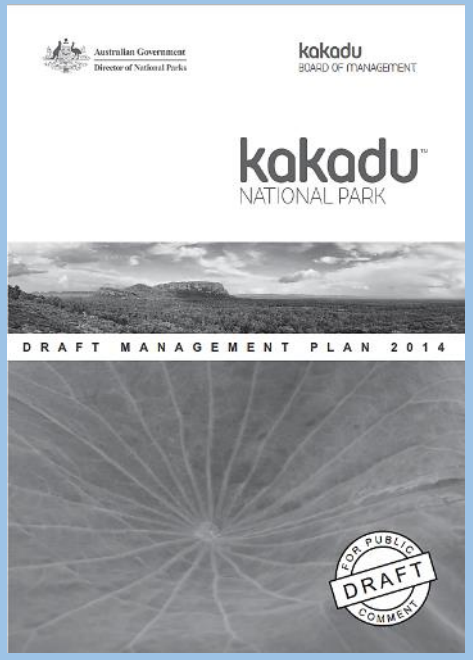
J Woinarski[1] & A. Fisher[2]


Brush-tailed Phascogale

- frequent extensive and high intensity fire is the main or a **major threat** for the loss of most of the species:

Northern Brush-tailed Phascogale, Fawn Antechinus, Northern Brush-tailed Possum, Brush-tailed Rabbit-rat, Black-footed Tree-rat, Pale Field-rat, Arnhem Rock-rat, and implicated in decline of the Northern Quoll and Nabarlek

- loss of large **hollow-bearing trees and/or shrubby understories** reduces **living and breeding niches** and leads to **greater predation** from feral cats



Notwithstanding such management, there is now compelling evidence that recent and current fire regimes are a major contributing factor to the decline of many plant and animal species in Kakadu (and elsewhere in northern Australia), and inappropriate fire regime is a major threat to many of Kakadu's threatened species and its threatened ecological community. Many threatened and declining species are associated with or dependent upon relatively long-unburnt areas and the current frequency of fires in some areas is resulting in a decline of suitable habitat. Long-unburnt patches provide the opportunity for tree and shrub regeneration. This contributes to habitat with plants of mixed age, which is important for wildlife. A lack of long-unburnt patches contributes to more uniform habitat.

Management issues

Fire regime

Many threatened and declining plant and animal species (and the threatened ecological community) are detrimentally affected by the current fire regime. More long-unburnt patches are needed to provide the opportunity for tree and shrub regeneration and contribute to habitat with plants of mixed age, which is important for wildlife.

Actions

5.3.23 Map important areas for threatened and significant species and threatened ecological communities, and ensure that management protects these areas from unsuitable fire regimes and implements appropriate regimes.

Wild ecology or the artefacts of a human ecology?

Quaternary Science Reviews 30 (2011) 28–46

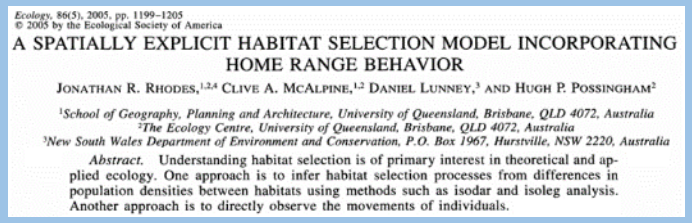
Contents lists available at ScienceDirect

Quaternary Science Reviews

journal homepage: www.elsevier.com/locate/quascirev

Late Quaternary fire regimes of Australasia

S.D. Mooney [a,*], S.P. Harrison [b], P.J. Bartlein [c], A.-L. Daniau [d], J. Stevenson [e], K.C. Brownlie [f], S. Buckman [f], M. Cupper [g], J. Luly [h], M. Black [a], E. Colhoun [i], D. D'Costa [j], J. Dodson [k], S. Haberle [e], G.S. Hope [e], P. Kershaw [l], C. Kenyon [m], M. McKenzie [i], N. Williams [n]



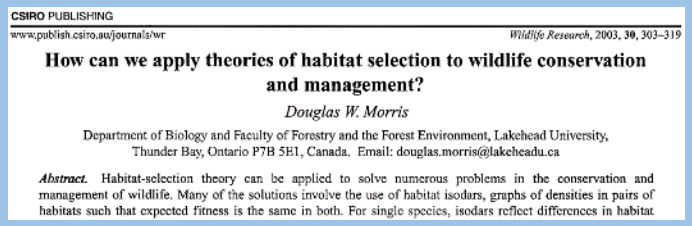
Ecology, 86(5), 2005, pp. 1199–1205
© 2005 by the Ecological Society of America

A SPATIALLY EXPLICIT HABITAT SELECTION MODEL INCORPORATING HOME RANGE BEHAVIOR

JONATHAN R. RHODES,[1,2,4] CLIVE A. MCALPINE,[1,2] DANIEL LUNNEY,[3] AND HUGH P. POSSINGHAM[2]

[1]*School of Geography, Planning and Architecture, University of Queensland, Brisbane, QLD 4072, Australia*
[2]*The Ecology Centre, University of Queensland, Brisbane, QLD 4072, Australia*
[3]*New South Wales Department of Environment and Conservation, P.O. Box 1967, Hurstville, NSW 2220, Australia*

Abstract. Understanding habitat selection is of primary interest in theoretical and applied ecology. One approach is to infer habitat selection processes from differences in population densities between habitats using methods such as isodar and isoleg analysis. Another approach is to directly observe the movements of individuals.



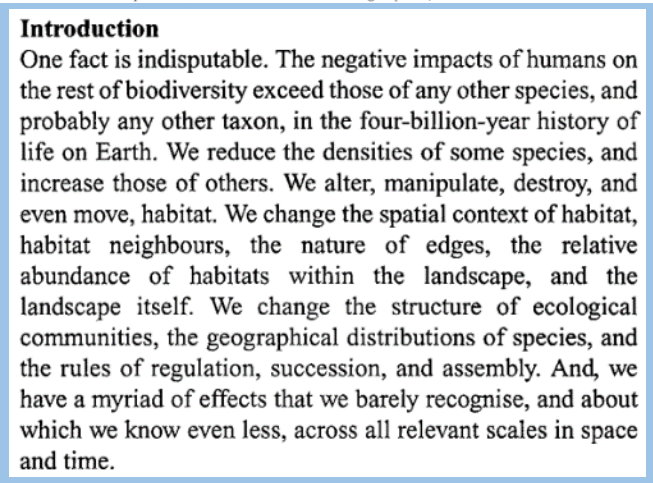
CSIRO PUBLISHING
www.publish.csiro.au/journals/wr *Wildlife Research*, 2003, **30**, 303–319

How can we apply theories of habitat selection to wildlife conservation and management?

Douglas W. Morris

Department of Biology and Faculty of Forestry and the Forest Environment, Lakehead University, Thunder Bay, Ontario P7B 5E1, Canada. Email: douglas.morris@lakeheadu.ca

Abstract. Habitat-selection theory can be applied to solve numerous problems in the conservation and management of wildlife. Many of the solutions involve the use of habitat isodars, graphs of densities in pairs of habitats such that expected fitness is the same in both. For single species, isodars reflect differences in habitat



Introduction

One fact is indisputable. The negative impacts of humans on the rest of biodiversity exceed those of any other species, and probably any other taxon, in the four-billion-year history of life on Earth. We reduce the densities of some species, and increase those of others. We alter, manipulate, destroy, and even move, habitat. We change the spatial context of habitat, habitat neighbours, the nature of edges, the relative abundance of habitats within the landscape, and the landscape itself. We change the structure of ecological communities, the geographical distributions of species, and the rules of regulation, succession, and assembly. And, we have a myriad of effects that we barely recognise, and about which we know even less, across all relevant scales in space and time.

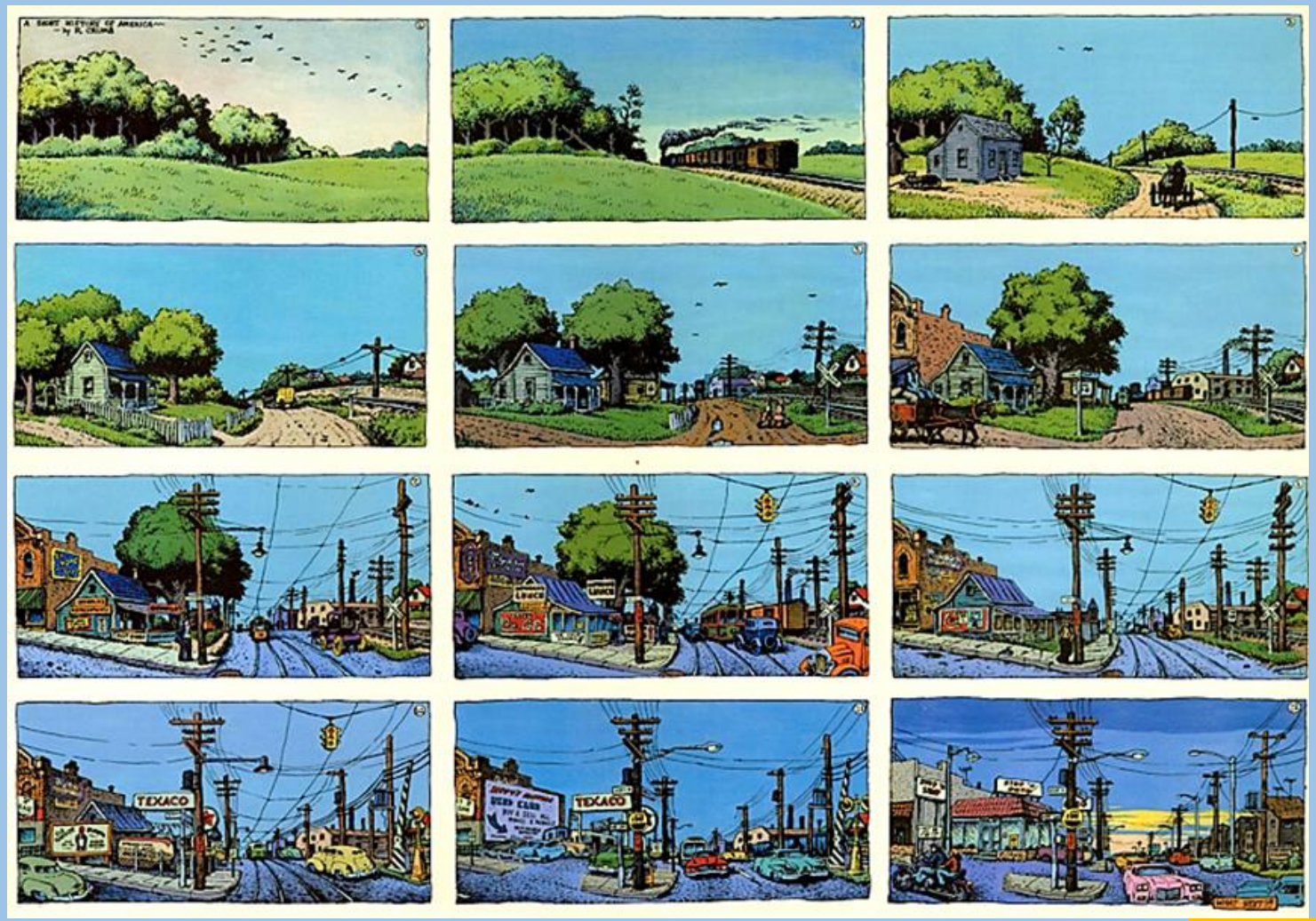
- **wildfires** sparked by lightning in Australia were at the **end of the dry season**, land was at its **most flammable** just before wet season
- wildfire since ~ 70,000 ya predominantly reflects **climate**, colder periods with less and warmer periods with more **biomass burning**
- after colonisation ~ 50,000 ya ago, Aboriginal people **altered that pattern**, developing **fire-stick** regimes, setting fires **early in the dry season** as the vegetation dried out sufficiently to burn

- could this study of **habitat selection** of koalas in Australia be reflecting an **artefact of a human ecology**, the movement of koalas modified in reaction to a **transformed landscape**?
- how **constrained** are koala because humans **have altered, manipulated, or destroyed** their wildlife habitat?

In introducing his theoretical paper on the importance of **habitat selection** to **wildlife conservation** and management, Professor Douglas Morris wanted to be very clear about what **human actions** have been. Because of those changes, we had to develop theories that predict the **consequences** of human actions on biological diversity, and contrast those predictions against the **predicted consequences of alternative actions**

"We alter, manipulate, destroy, and even move, habitat. We change the spatial context of habitat, habitat neighbours, the nature of edges, the relative abundance of habitats within the landscape, and the landscape itself"

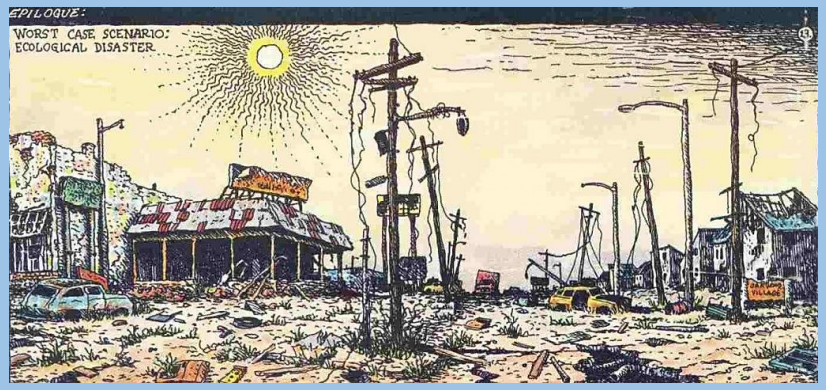
A Short History of America - Robert Crumb 1979



Drawn in 1979, it shows the rise of the **urban landscape** in America from the **wilderness**. Crumb later added three possible **future scenarios** to the question posed in the final panel **"What Next?"**

What next?

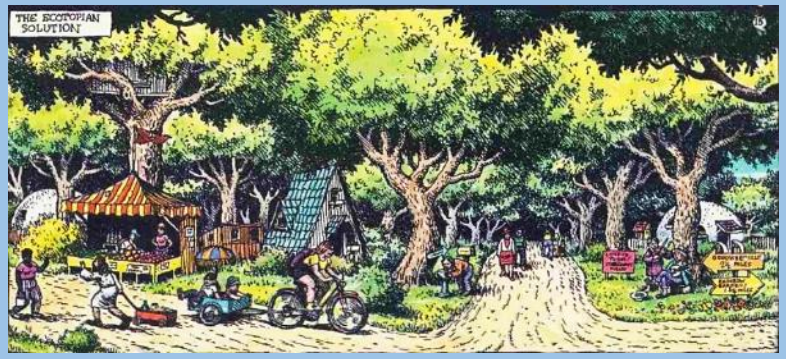
What next? – Epilogue to A Short History of America



Worst case scenario: ecological disaster

The fun future: techno-fix on the march!

The ecotopian solution



WHICH WOULD YOU CHOOSE – IS ONE INEVITABLE?