Weathering climate change in eastern Africa: Archaeological insights on the current climate crisis

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ARCC

MAEASaM
Mapping Africa's Endangered Archaeological Sites and Monuments

Synopsis

The African continent is likely to suffer some of the severest direct impacts arising from ongoing global climate heating and managing resources, natural environments and future economic development will require changes in policy and strategy.

Less predictable environmental conditions add to the complexity for future economic development, food security, socio-political functioning, human health and biodiversity.

Existing conservation and sustainable development policies reflect societal decisions made with different environmental knowledge and social values and rules.

Reformulating land management policy requires synthesis and new deep-time information on historical climates, land cover, and land use and settlement dynamics.

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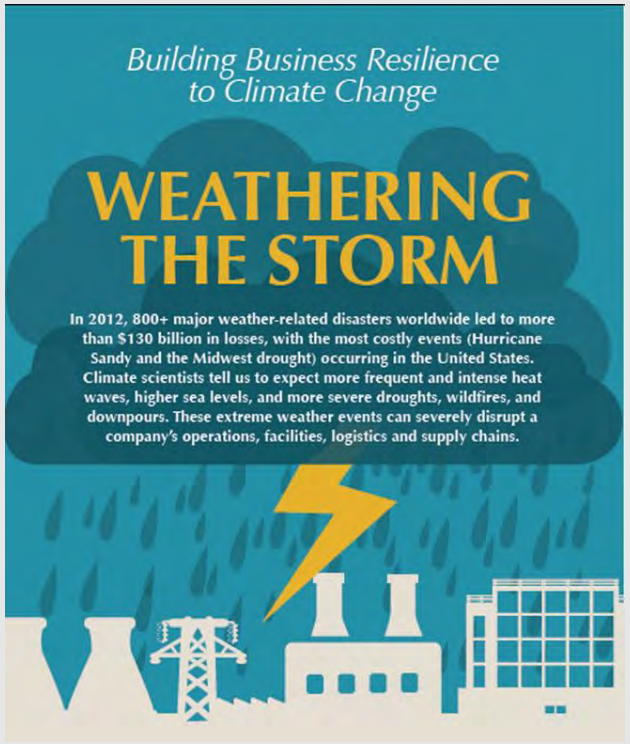
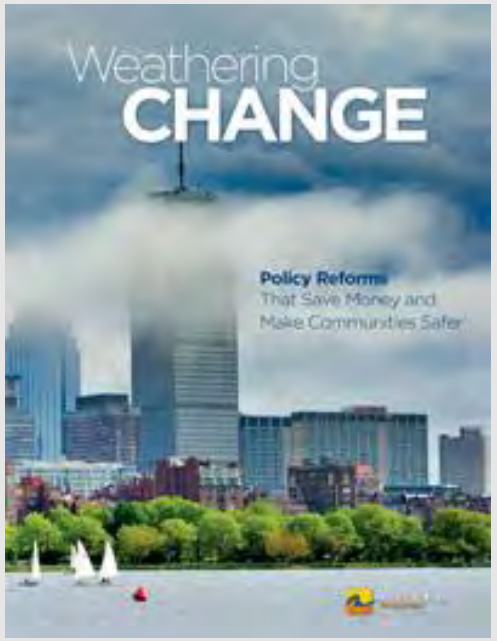
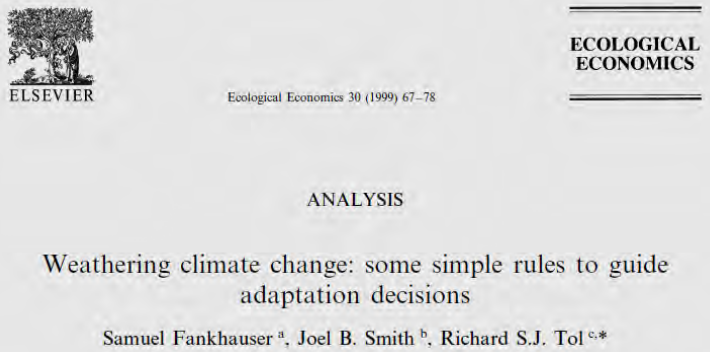
A Modern Environmental Anxiety







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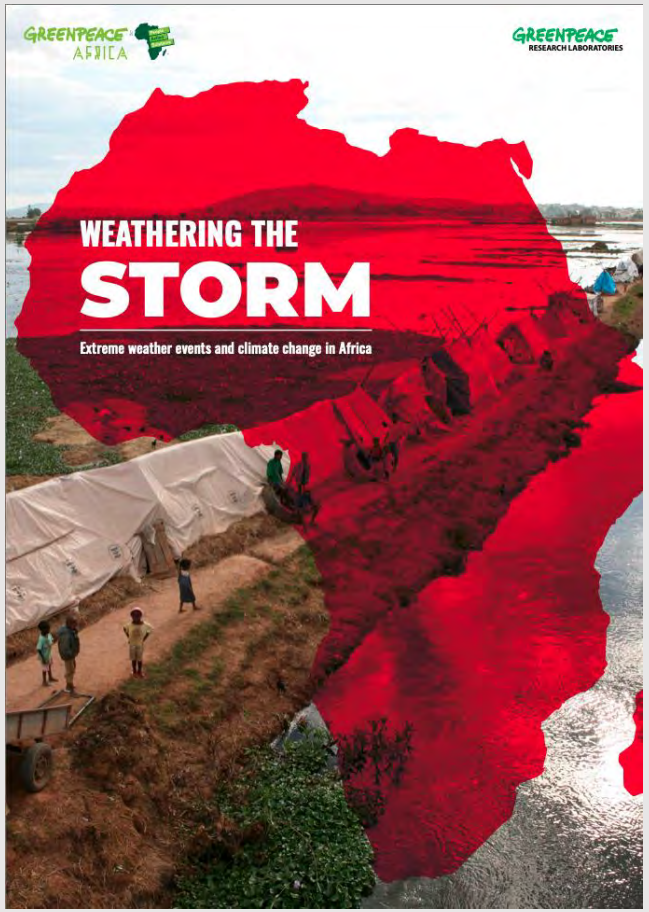
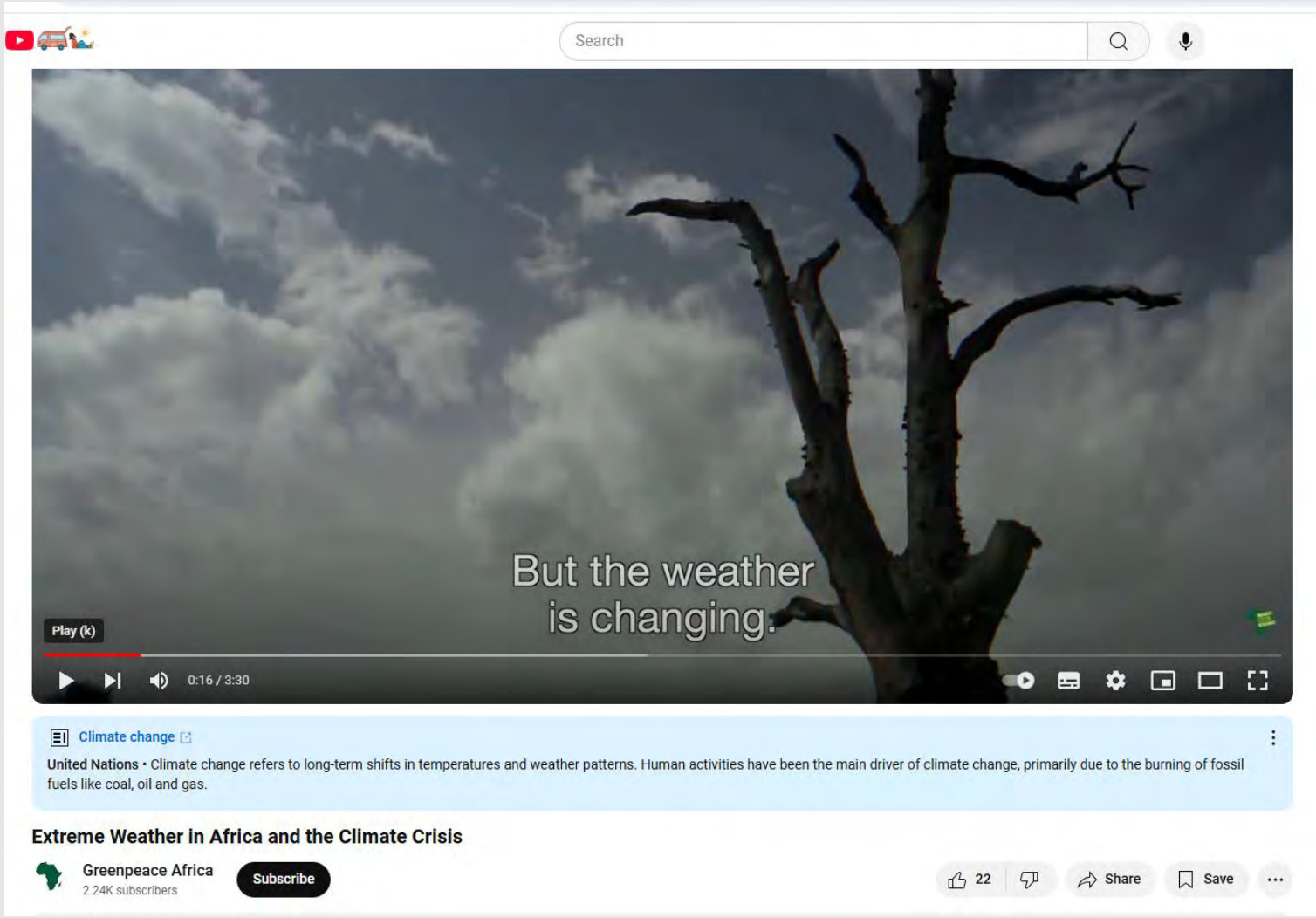
Greenpeace Video: Extreme Weather in Africa and the Climate Crisis





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https://www.youtube.com/watch?app=desktop&v=Cp_UaZMeyCs

What's the Difference Between Climate and Weather?

Aftermath of Cyclone Idai, Mozambique, 2019
(Denis Onyodi: IFRC/DRK/Climate Centre)

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The difference between climate and weather is 'a measure of time' (Gutro 2017)

The characteristics of a particular climate are determined by 'averaging' weather, usually across a period of 30 years (IPCC 2014, 120).

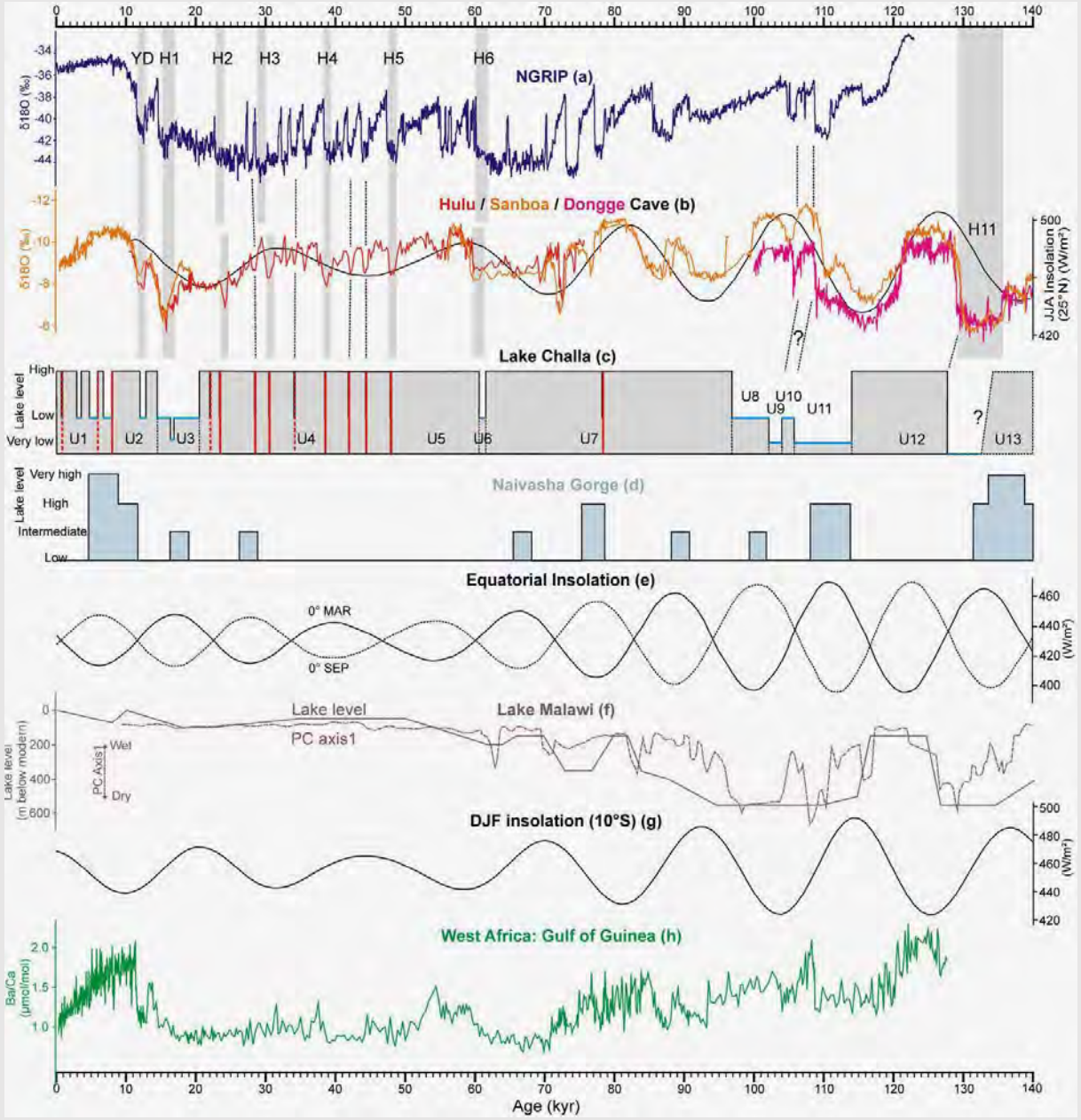
Extreme weather events and their manifestation in forms such as widespread flooding or prolonged water shortages are very effective in making its effects immediately experiential.

BUT they also help to obscure the longer-term processes that have given rise to an increased frequency of such events and which make ongoing climate change a 'long threat' (Dickinson 2009) akin to other 'slower emergencies'.

Weather is the lens through which human relationships with climate are most easily mediated (Hulme 2008)

Epistemic Distancing

Diagrams such as these are intended to illustrate the evidence for long-term changes in global and regional climates as reconstructed from different kinds of proxy, as a result of fluctuations in the sun's energy reaching the Earth.



They work effectively as a form of scientific communication for a relatively small number of specialists.

Like other glyphic languages they take time to learn.

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Source: Moernaut et al. 2010 *Earth & Planetary Science Letters* 290

Embodied and Practical Knowledge

By attending to the sensory experiences of weather, there is an opportunity to draw attention to climate vulnerabilities, make climate change easier to comprehend, and make distant futures more immediate (Rooney 2019)

Weather, like climate, has histories and possible futures and current weather events all have their origins in the cumulative emissions of the past and present

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Yields Down By A Third

Lived Reality of Sea Level Rise, Saloum Delta, Tanzania

“We have experienced one of the lowest crop yields in our history this year. Imagine - one hectare hardly gives you 20 bags of rice these days, whereas we used to get up to 30 bags of rice before,” said 76-year-old Swaleh Jongo, a farmer in Nyamisati. “This is caused by none other than salt water, which is harming our crops.”

Move into other areas have brought farmers into conflict with WWF and the State – seeking to conserve the mangrove system, and promote biofuel production

Salty soils drive Tanzanian farmers into forest reserve

Source: Thomson Reuters Foundation - Tue, 31 Jan 2012 10:14 GMT

Author: **Kizito Makoye**

More news from our correspondents

MORE ON ADAPTING TO CLIMATE CHANGE | MORE ON FORESTS | MORE ON EXTREME WEATHER

“These days nobody goes there because when you plant rice, seedlings die from shortage of water and poor soils,” Saidi Ali

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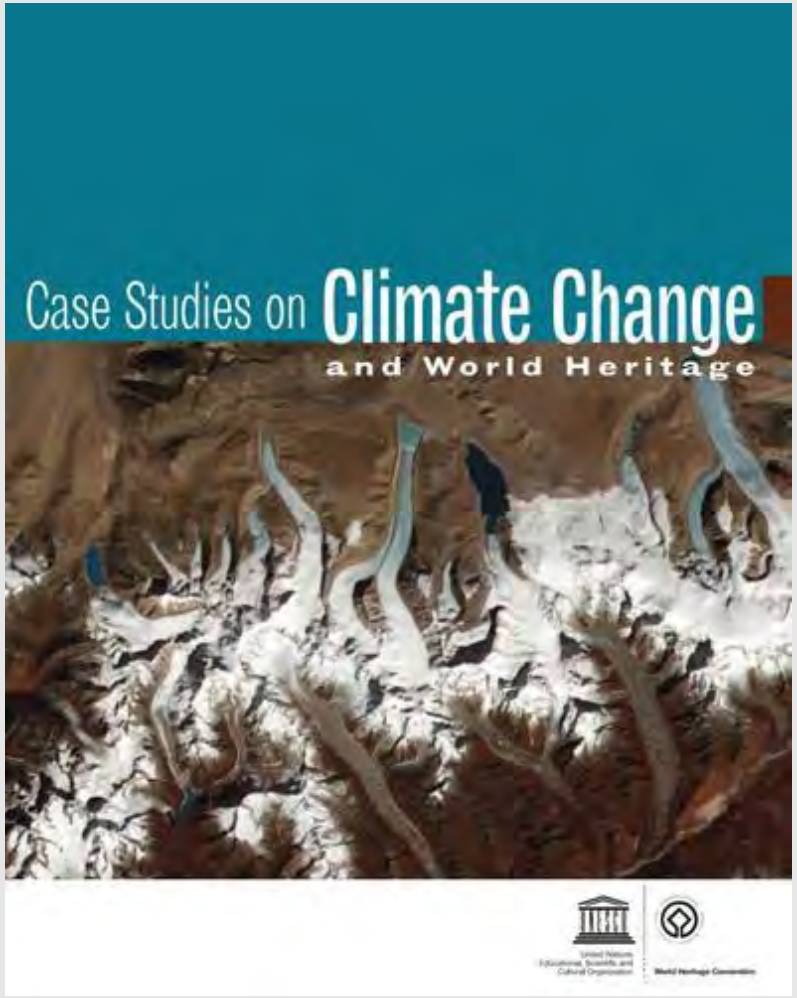
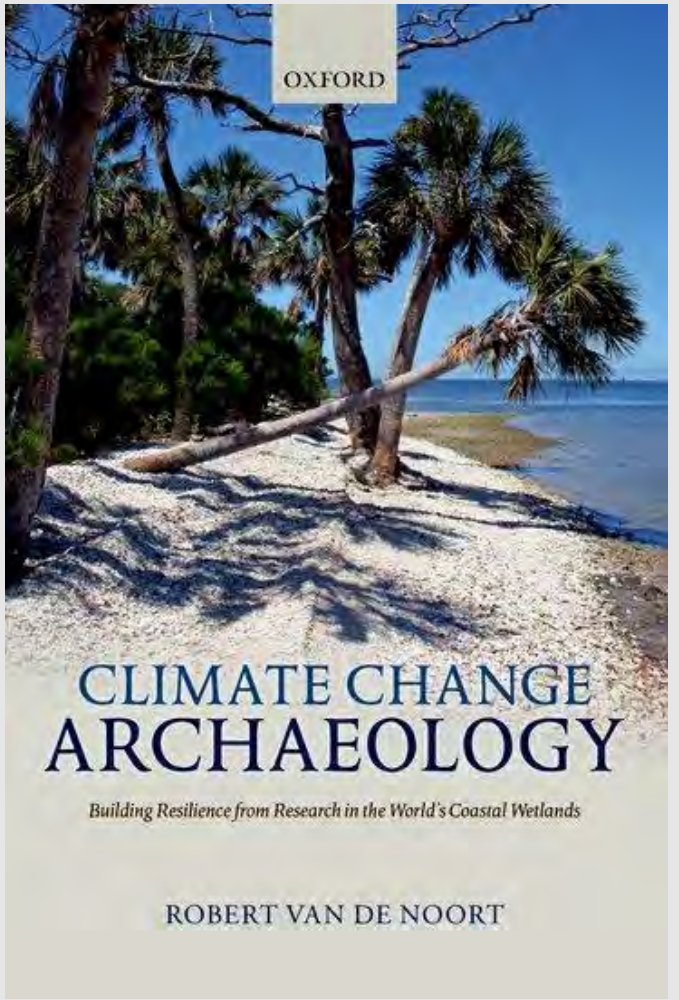
Archaeology In, Of, and For the Anthropocene





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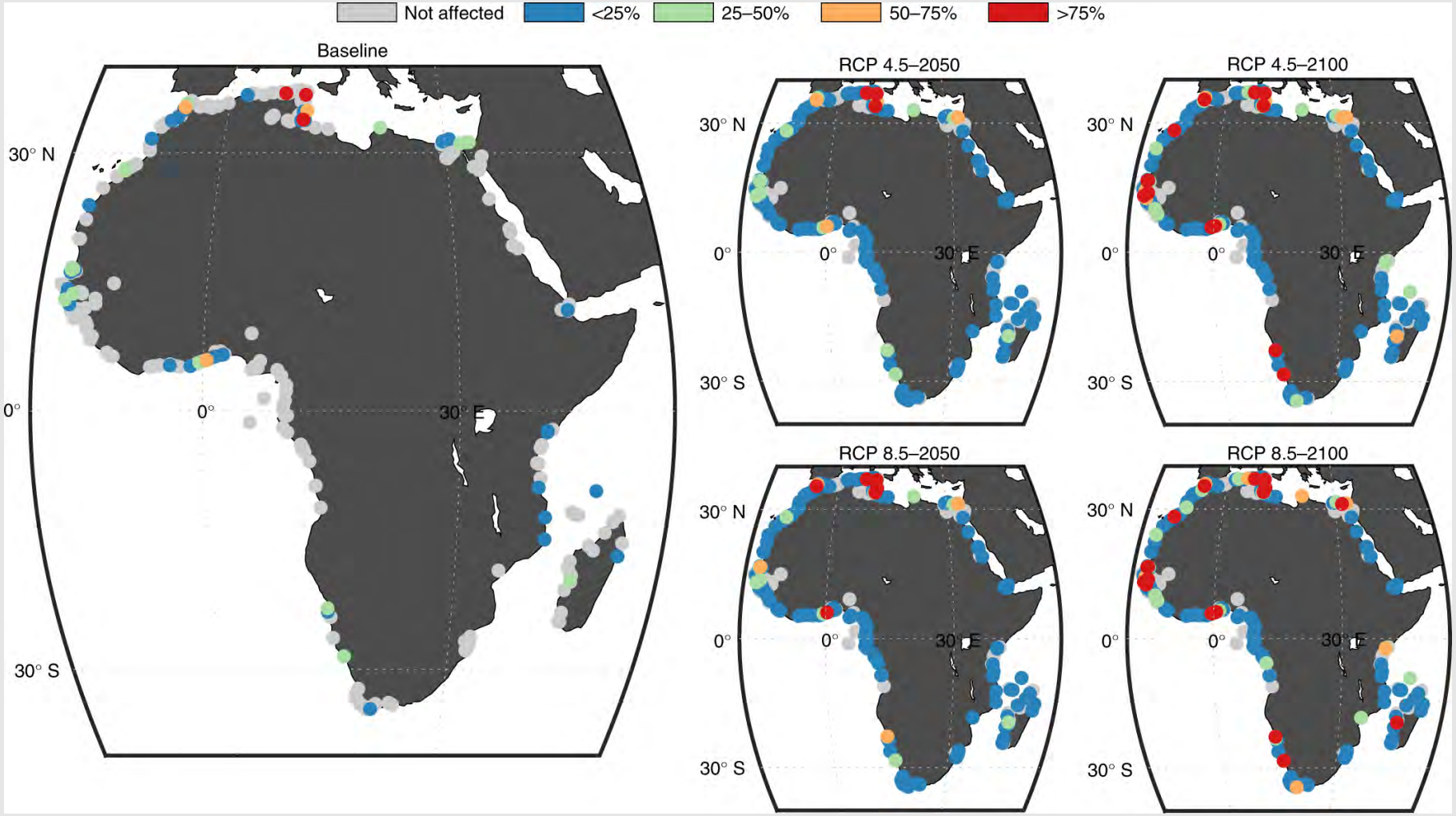
Assessing Risk to Coastal Heritage From Projected Sea Level Rise

56 of the 284 identified sites are currently exposed to 1-in-100-year coastal extreme events including coastal erosion and flooding

By 2050 the number of sites threatened by coastal extreme events are expected to more than triple



Source: Vousdoukas et al. 2022 *Nature Climate Change* 12, Fig 1

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Maps of AHS affected by the 100-year coastal extreme event during the baseline period and under different models for 2050 and 2100. Colours refer to proportion of site exposed to risk: Grey – None Blue <25% Green 25-50% Orange 50-75% and Red >75%

Lothagam-Lokam, Lake Turkana, Northern Kenya

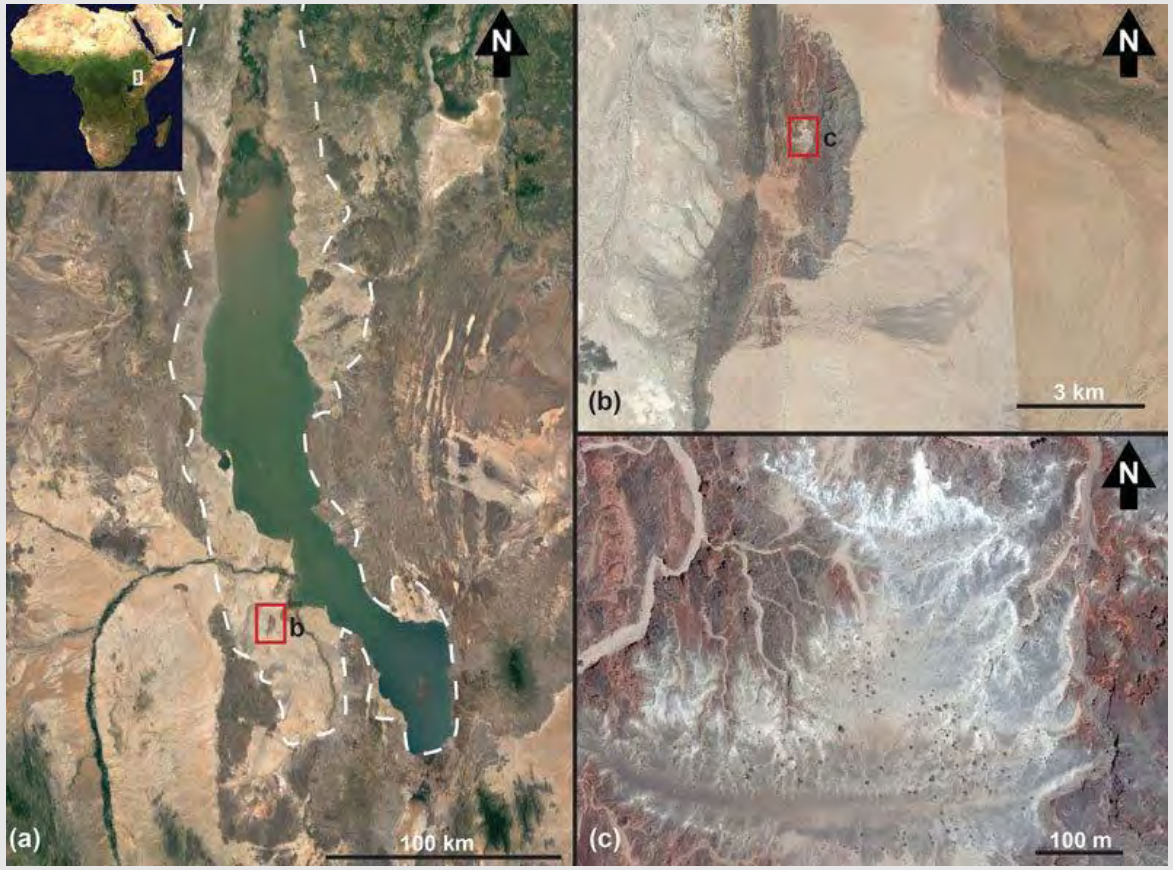

Photo Credits: Steven Goldstein; Goldstein et al. 2017 *Antiquity* 91 Project Gallery DOI: 10.15184/aqy.2017.215

New surveys have identified over 30 areas where early Holocene human remains have been exposed due to increased erosion resulting from modern climate change.

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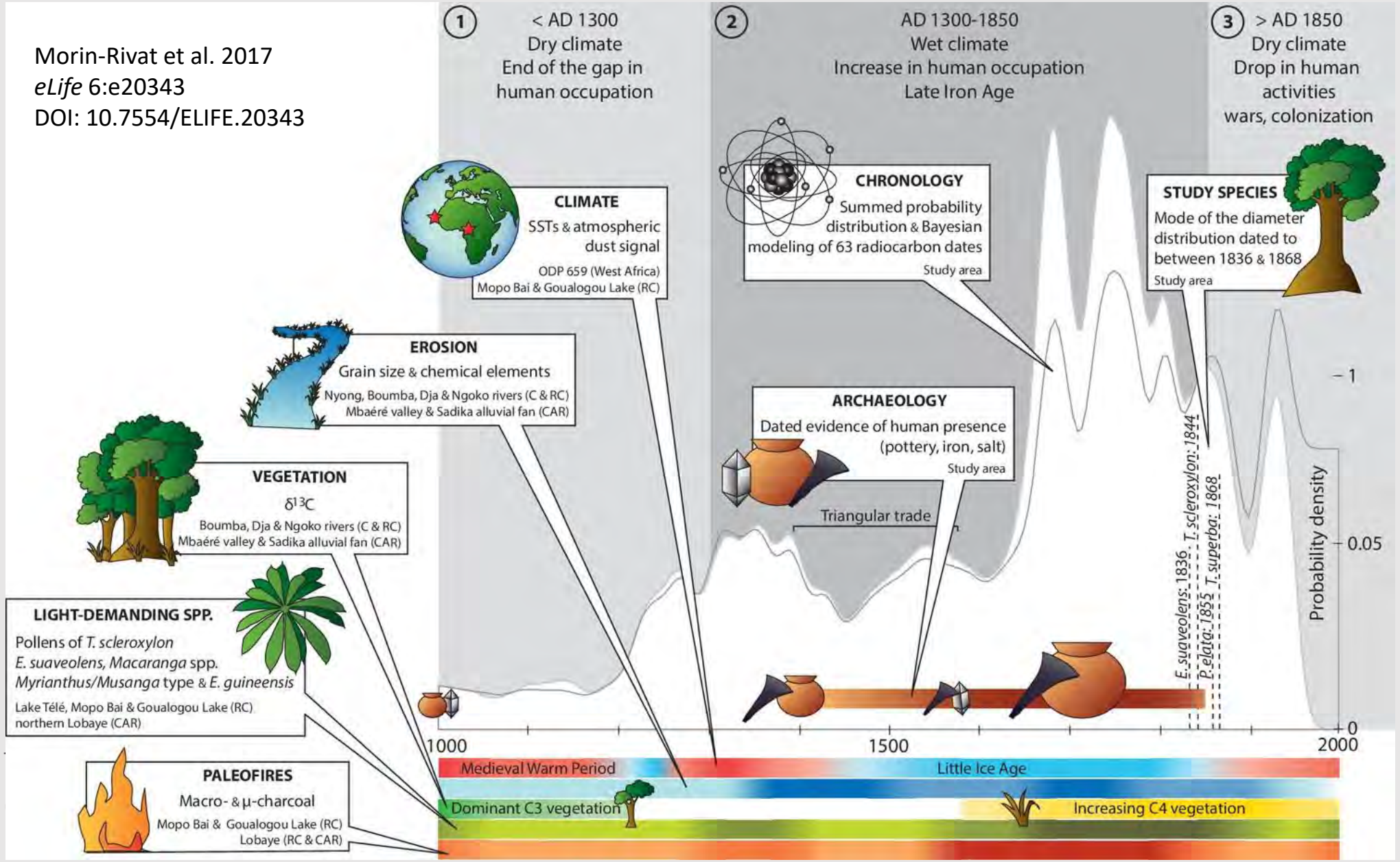
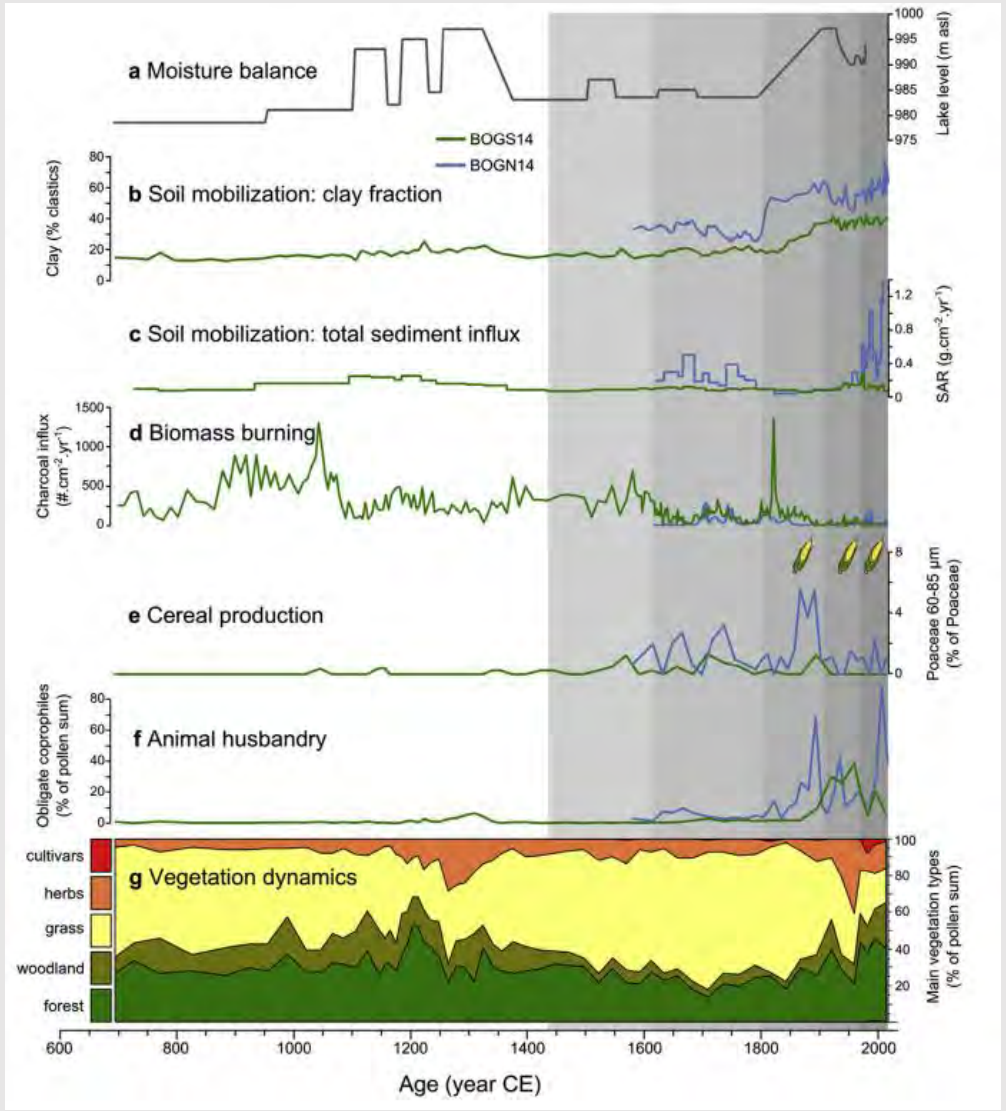
Deep History of the Central African Rainforest

Morin-Rivat et al. 2017
eLife 6:e20343
DOI: 10.7554/ELIFE.20343



Lake Bogoria Palaeo-Record



First phase: limited human influence pre

Third phase: increased animal husbandry, and modification of the fire regime attested from the mid

Fifth phase: return of wetter climate and reduction of crop agriculture mid

1500 CE **1830s CE**

1430 CE **17th century** **19th century**

Second phase: expanding agricultural activity and landscape clearing from ca 1500 CE

Fourth phase: the establishment of irrigation agriculture from the 1830s CE

Ravenstein 1891

© Royal Geographical Society (with IBG)

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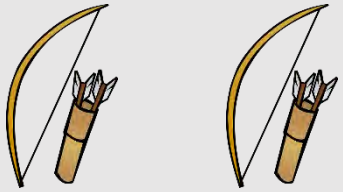
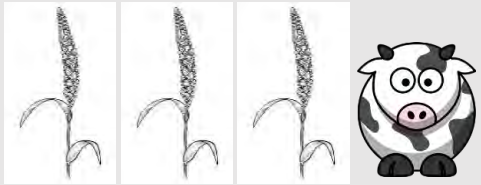
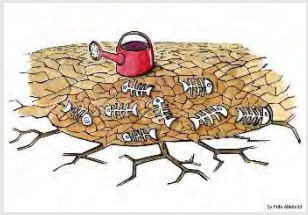
Geert van der Plaas et al. 2019 *Quaternary Science Reviews* 218; Petek & Lane 2017 *World Archaeology* 49

Courtesy Nik Petek-Sargeant	Pastoral Iron Age	Sub-continental drought c.1780-1820	c. 1820-1910	c. 1910-1930s
Settlement type	 ?	?		
Main subsistence				
Archaeological record	 ?	??		
Lake				
Climate/weather				

Archaeology and Agenda 2030

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Long-term human-environment relationships; examples of sustainable and /or resilient livelihood systems; examples of practices that enhance biodiversity; enhanced knowledge about complex causes of degradation, biodiversity loss, food inequalities etc.

Goal 12. Ensure sustainable consumption and production patterns

Demonstrate the entangled nature of existing patterns of consumption and production, their environmental 'footprints' and deep histories; provide examples of other ways of living, shaped by philosophies of 'sufficiency'

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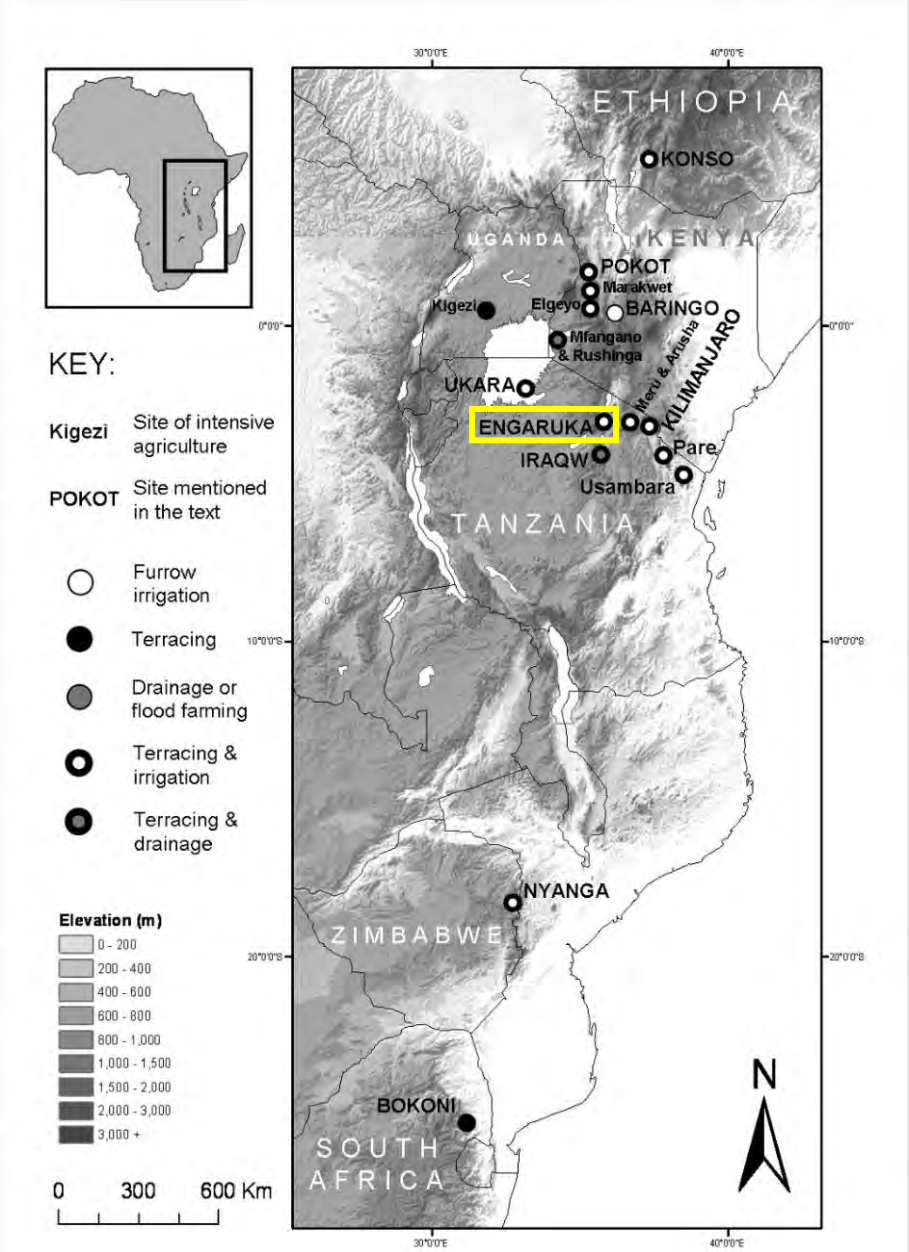
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Very much as Goal 2; provide deeper time perspectives on ecological baselines; challenge stereotypes based on 'colonial' environmental narratives; concrete examples of how variables increase or reduce vulnerability

Precolonial Intensive Agriculture



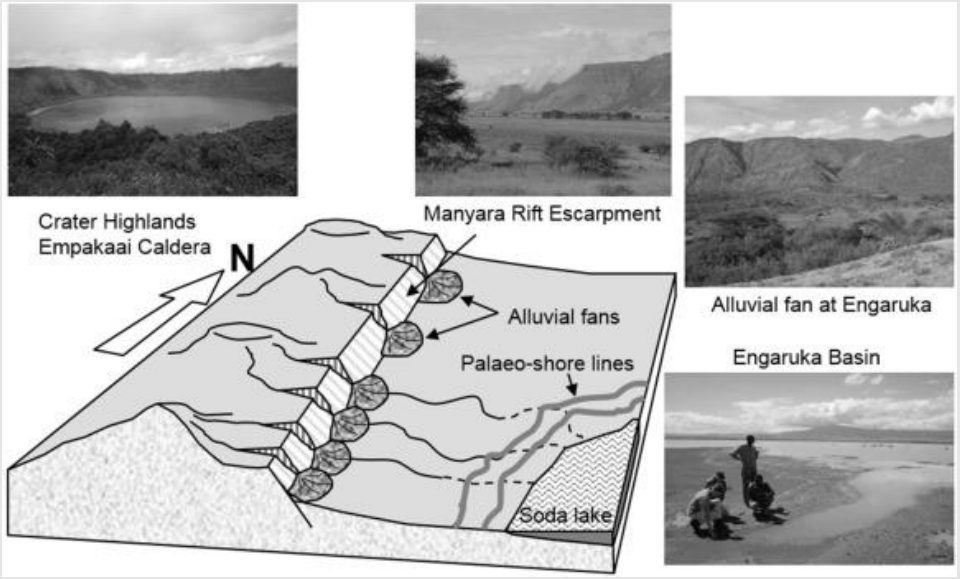
Konso: extant system, origins ca. 1500 CE

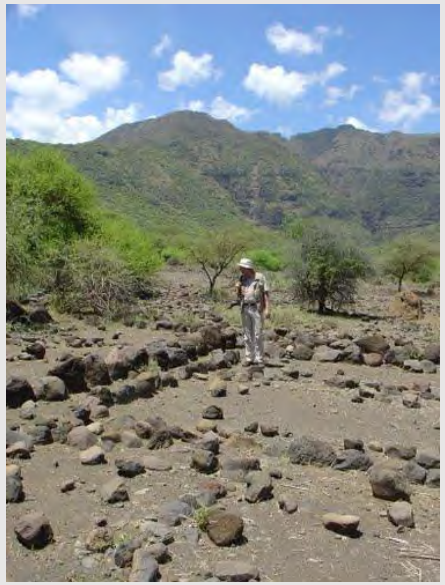
Engaruka: abandoned system, ca. 1350-1750 CE

Bokoni: abandoned system, ca. 1650-1880 CE

Map & image credits: Daryl Stump

Engaruka was Occupied for Over 400 Years
Does this make it an example of sustainable agriculture?





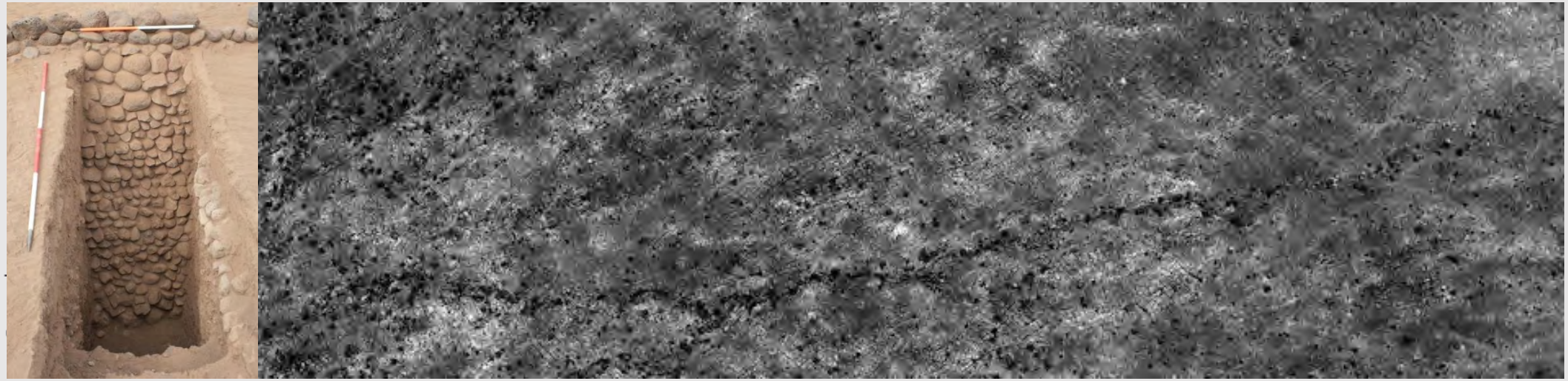
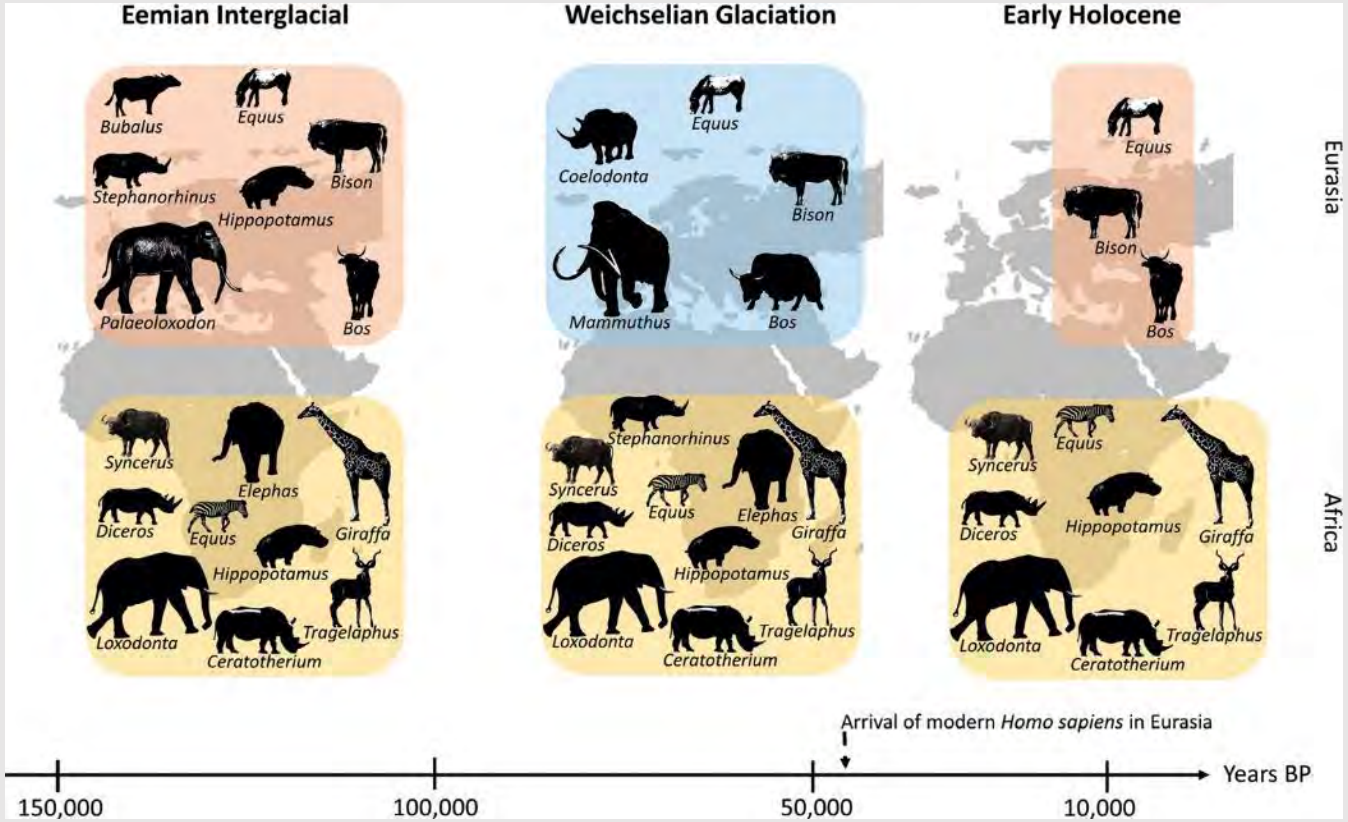


Image credits:
Daryl Stump

Rethinking Culture – Nature Binaries

- The deep-time fossil record of the continent indicates tens of millennia of human-animal-environment co-existence and interaction
- These deep histories attest to the high degrees of ecological mutualism and biocultural evolution
- Cumulatively, such interactions have given rise to processes of 'landscape domestication' shaped by combinations of intended and unintended consequences of human action and the activities and responses of other species



On all continents – *with the exception of Africa* – megafauna extinction events were directly related with the arrival / increase in modern human activities in these region

In Africa, most of the Pleistocene megafauna species diversity still exists today

Zeller & Göttert 2021 *Vertebrate Zoology* 71, Fig. 3

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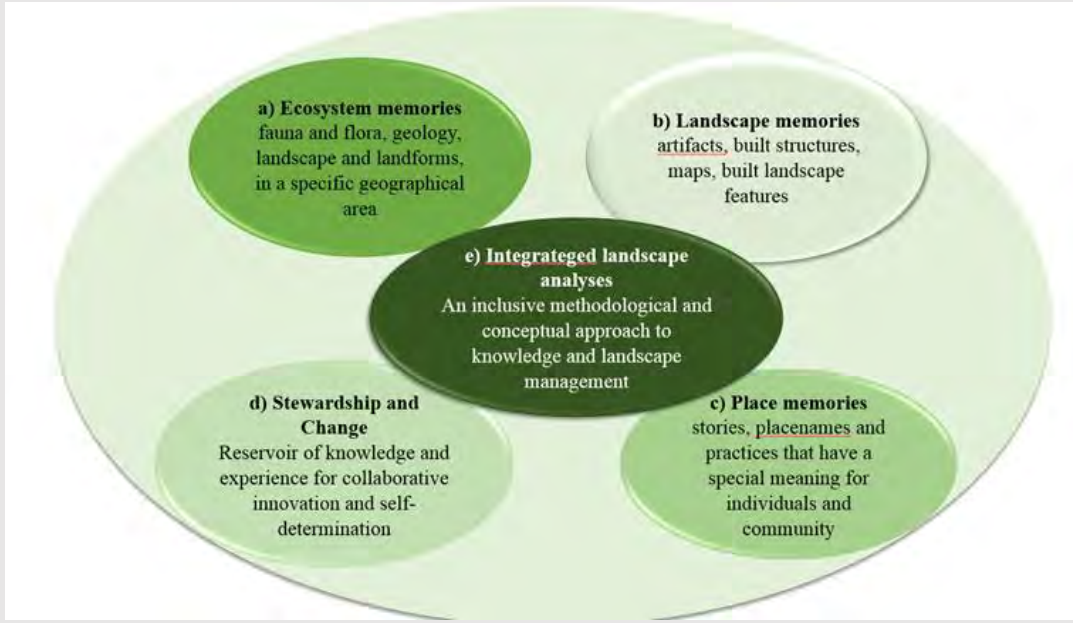
Biocultural Heritage Conceptual Framing

The natural–cultural components of human–environment interactions including knowledge, practices and innovation

Gavin et al. 2015: ‘knowledge, innovations, and practices of indigenous and local communities that are collectively held and inextricably linked to, and shaped by, the socioecological context of communities’.

Ecosystem Memories: practices and outcomes operating on larger or deep-time scales
Landscape Memories: smaller scale materialised human practices and ways of organising landscapes and their outcomes
Place Memories: local narratives, place names and signs of earlier or continuing practices whose significance is under constant debate and re-negotiation both locally and with external actors
Stewardship and Change: conceptualisation and transfer of knowledge pertaining to landscape management, collaborative innovation and self-determination



Ekblom & Lindholm 2019 *Anthropocene* 25

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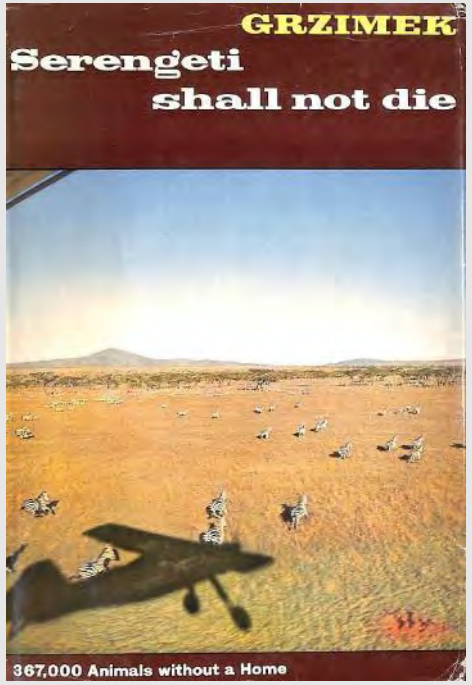
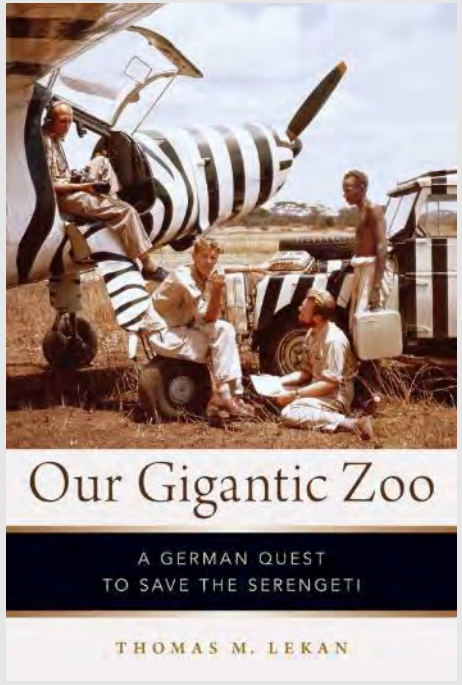
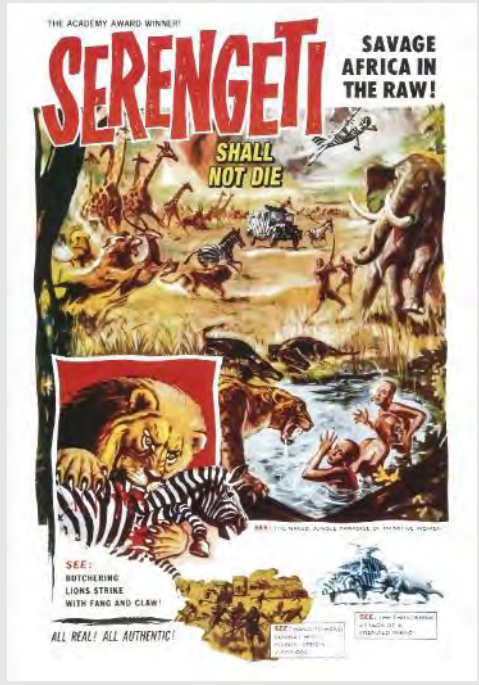
Creation of National Parks and Other Protected Areas in Colonial Era

Landscape View of the Serengeti, 1929

© Walter Mittelholzer, https://library.ethz.ch/







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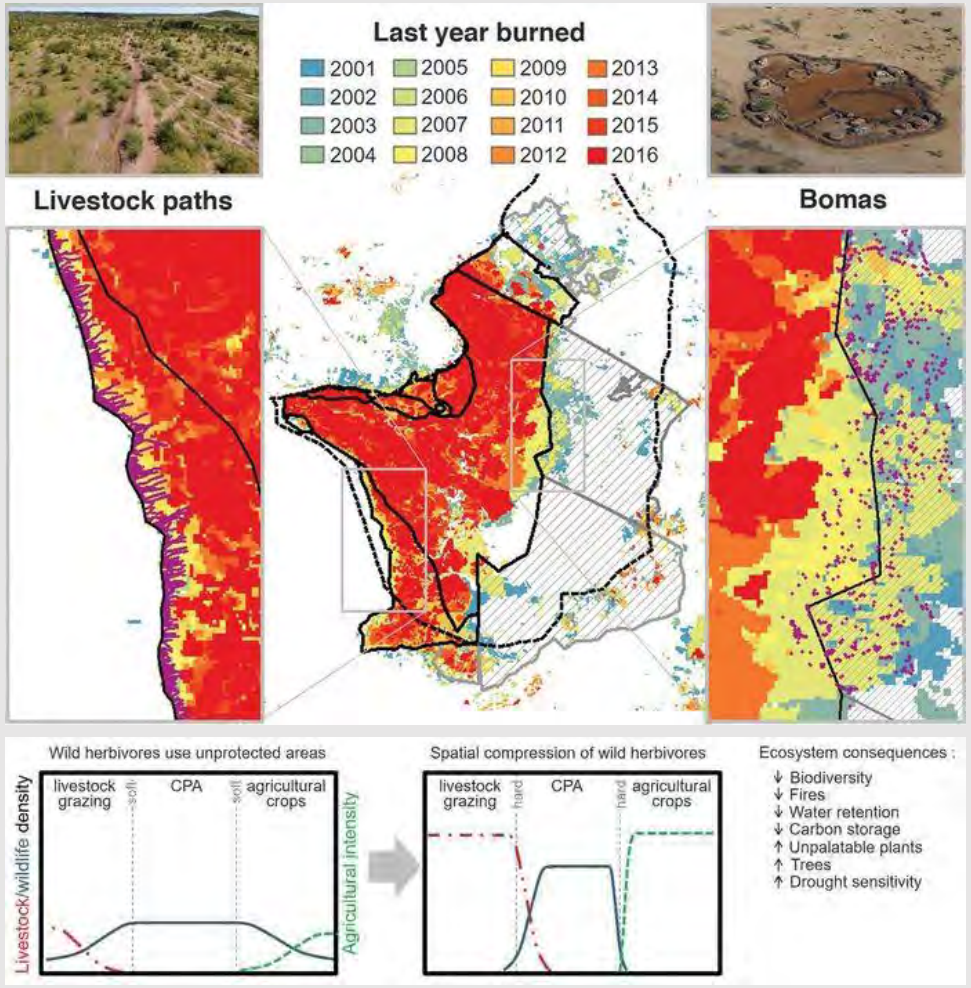
Contrasting Narratives of a Landscape History – from sober reporting on personal motivations to critical history and sensationalised marketing – that all overlook the deeper histories of human-environmental relations that shaped much of what Bernhard Grzimek aspired to protect.

External Population Growth and Settlement Expansion Are Increasing Pressures on Ecosystem Integrity



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Journal of Biogeography

Full Access

Expansion of human settlement in Kenya's Maasai Mara: what future for pastoralism and wildlife?

Richard H. Lamprey ✉ Robin S. Reid

First published: 07 May 2004 | https://doi.org/10.1111/j.1365-2699.2004.01062.x | Citations: 160

Journal of Zoology ZSL

Full Access

Dynamics of Mara–Serengeti ungulates in relation to land use changes

J. O. Ogutu, H.-P. Piepho, H. T. Dublin, N. Bhola, R. S. Reid

First published: 20 April 2009 | https://doi.org/10.1111/j.1469-7998.2008.00536.x | Citations: 108

Science

Cross-boundary human impacts compromise the Serengeti-Mara ecosystem

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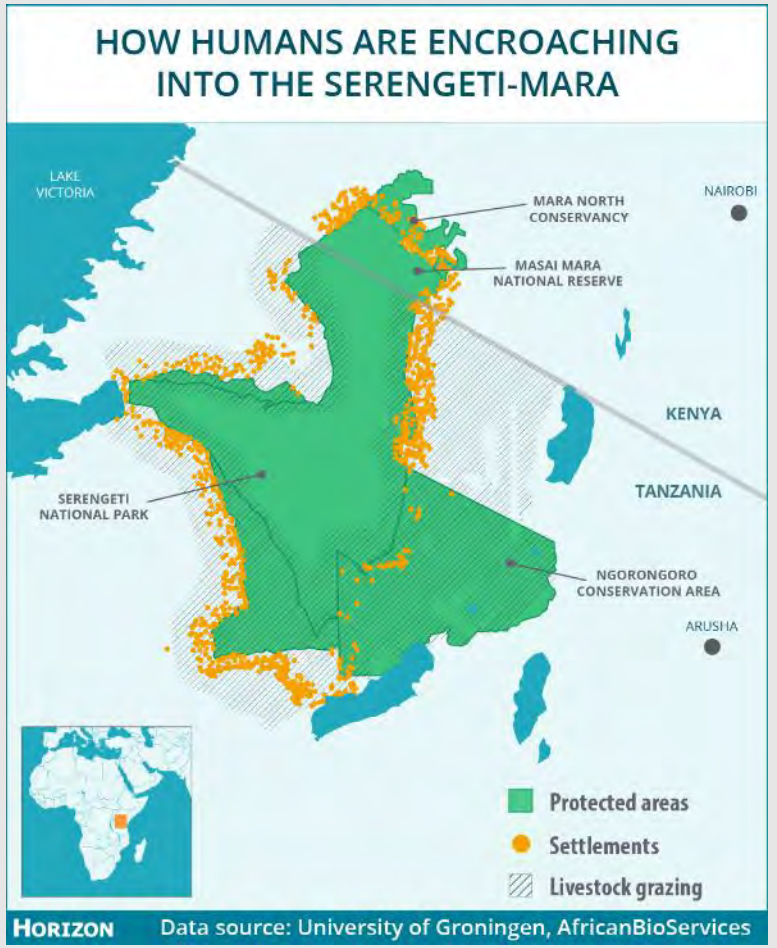
nature › scientific reports › articles › article

Open Access | Published: 25 January 2017

Fencing bodes a rapid collapse of the unique Greater Mara ecosystem

Mette Løvschal ✉, Peder Klith Bøcher, Jeppe Pilgaard, Irene Amoke, Alice Odingo, Aggrey Thuo & Jens-Christian Svenning

Scientific Reports 7, Article number: 41450 (2017) | Cite this article



https://ec.europa.eu/research-and-innovation/en/horizon-magazine/human-wildlife-conflict-threatens-protected-reserves-east-africa

A Return To Forced Relocation

Global development

'It's becoming a war zone': Tanzania's Maasai speak out on 'forced' removals

Communities in Ngorongoro say government is shutting down vital services to remove them from ancestral lands to expand lucrative game reserves

Supported by

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About this content

Jess Craig in Ngorongoro conservation area

Mon 16 Jan 2023 06.00 GMT

Maasai women and children from Ngorongoro hold a prayer meeting on Tanzania's border with Kenya, to which thousands have fled. Photograph: Daniel Irungu/EPA-EFE/Shutterstock

https://www.theguardian.com/global-development/2023/jan/16/tanzania-maasai-speak-out-on-forced-removals

LE MONDE *diplomatique*

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April 2023

'THE GOVERNMENT ONLY LIKE US AS A TOURIST ASSET'

Tanzania forces the Maasai from their land to make way for trophy hunters and tourists

I used to live here. These are the graves of my ancestors. They've given my land to people who've been relocated. I can't come here any more

Lukas Simeon

https://mondediplo.com/2023/04/08masai

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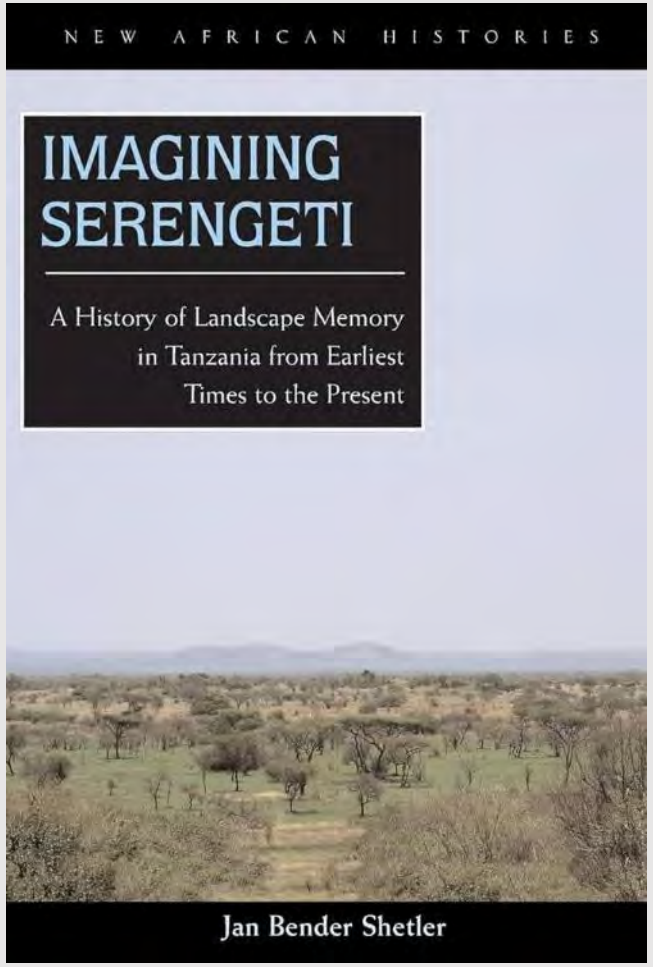
Recovering Precolonial Settlement and Land Use Histories



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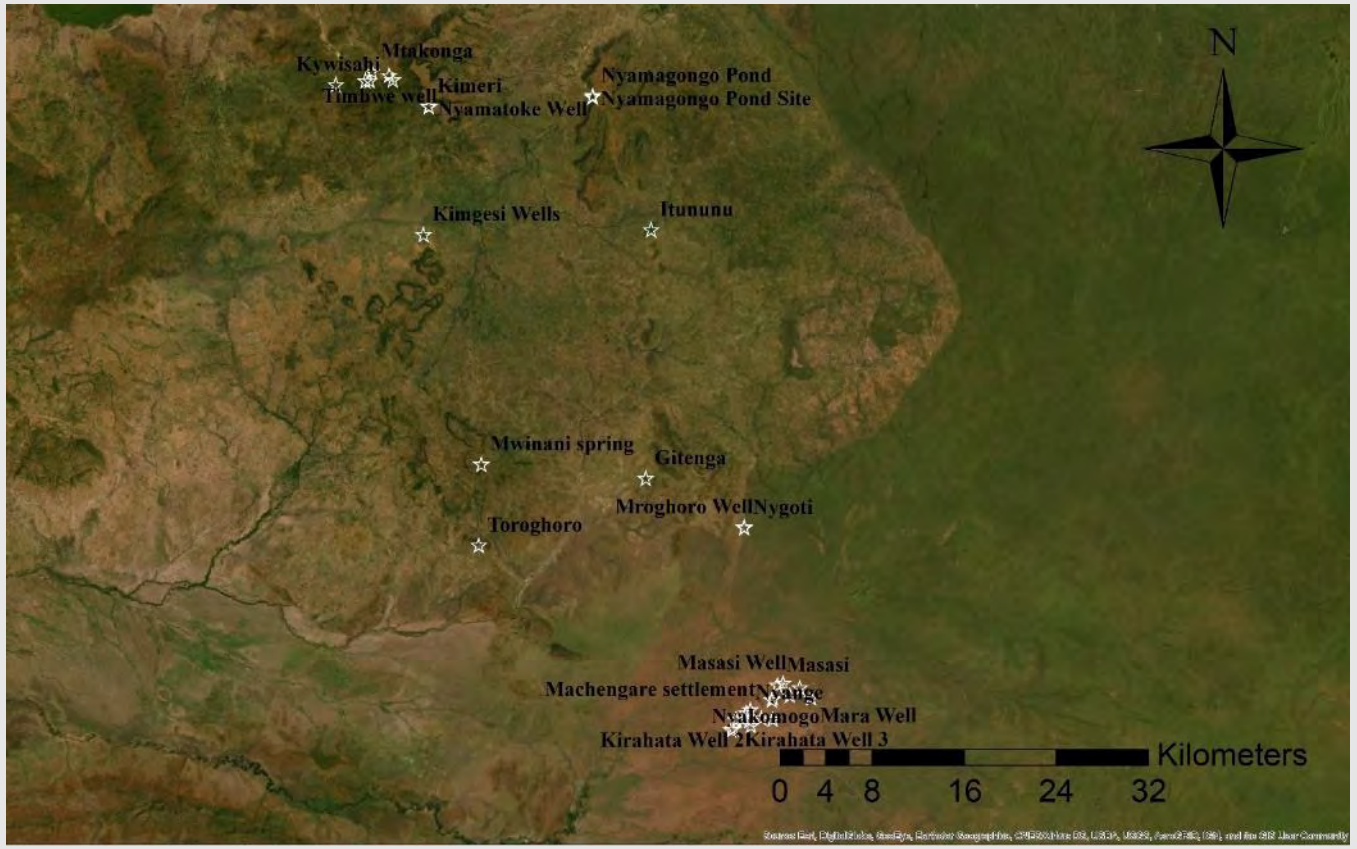
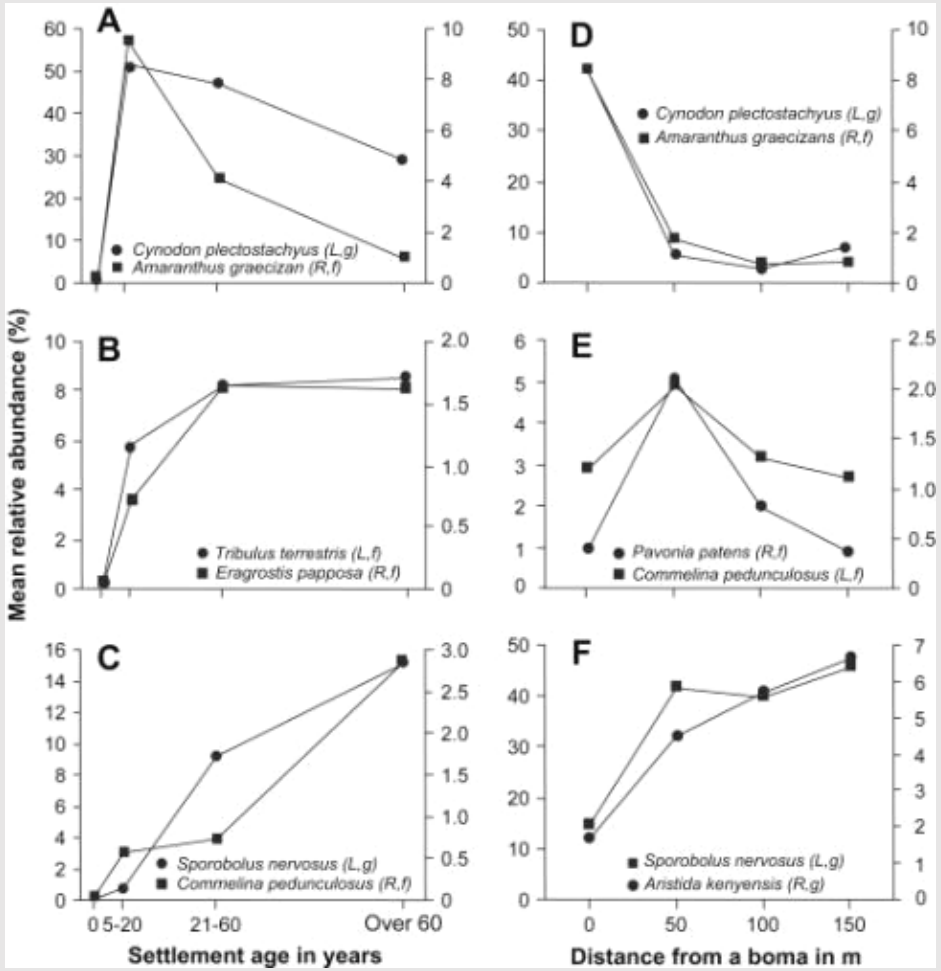


Aided by the oral histories collected by Shetler and local informants, recent archaeological surveys and test-excavations under the auspices of the *Adaptation and Resilience to Climate Change* project by Anna Shoemaker (2019 – Uppsala University) and Tom Biganagwa (2021-3 – University of Dar es Salaam, have greatly expanded understanding of the deep history of settlement in Western Serengeti.

Grave, Nyange

Clay pipe & glass trade beads, Robanda

Ecological Dynamics of Pastoralist Settlement and Mobility in a Savanna Landscape



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Muchiru et al. 2008, 2009 *Journal of Arid Environments* 72 & 73

Boles et al. 2019 *Human Ecology* 47, Fig. 6

Some Grazing Lawns May Be Of Much Greater Antiquity

LETTER

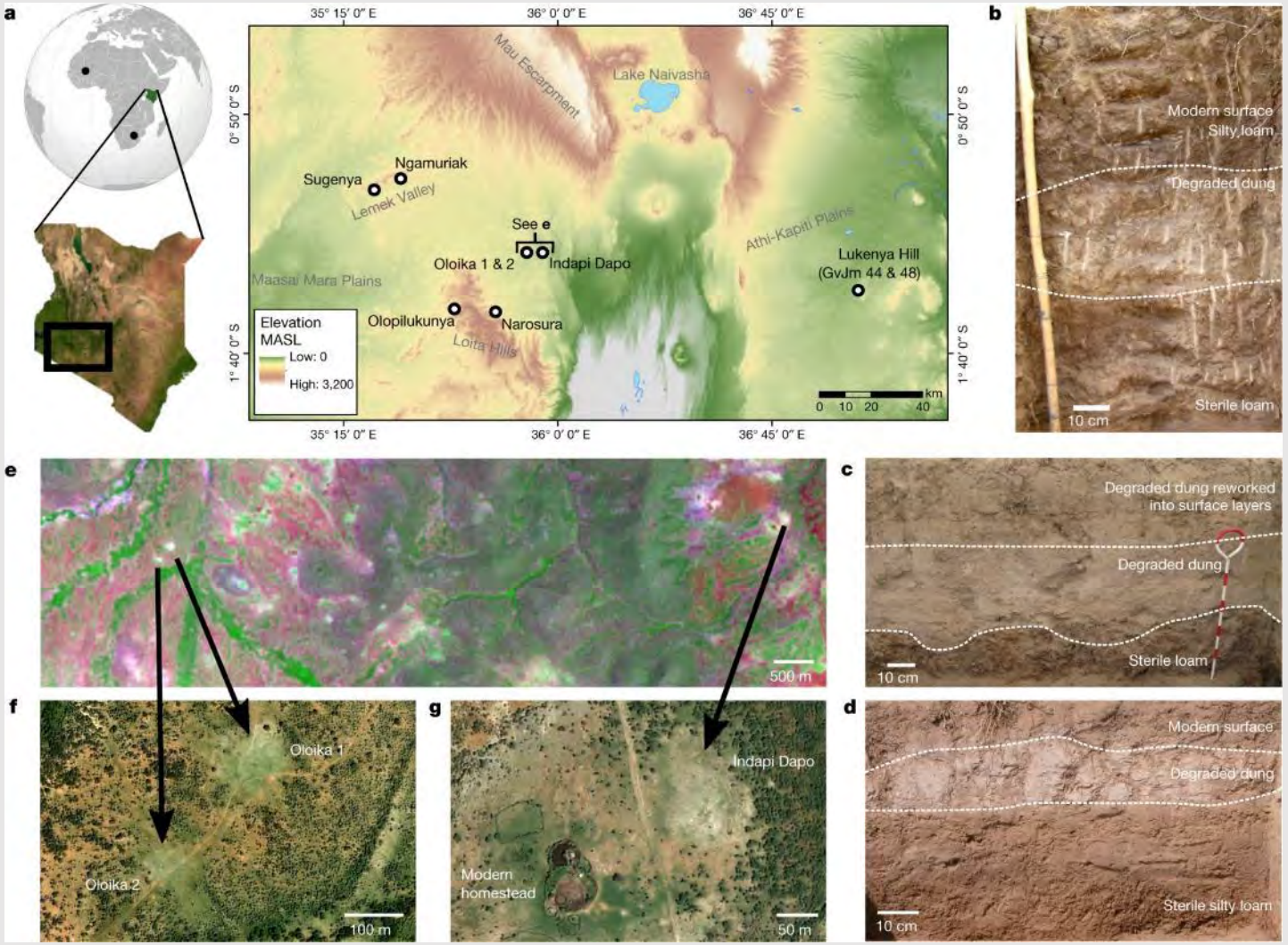
https://doi.org/10.1038/s41586-018-0456-9

Ancient herders enriched and restructured African grasslands

Fiona Marshall[1]*, Rachel E. B. Reid[1], Steven Goldstein[2], Michael Storozum[3], Andrew Wreschnig[4], Lorraine Hu[1], Purity Kiura[5], Ruth Shahack-Gross[6] & Stanley H. Ambrose[7]*

Marshall and colleagues argued that some grazing located in Narok and in the Athi River area near Lukenya Hill, southern Kenya may have formed during the Pastoral Neolithic, between 3,700 and 1,550 cal. yrs BP, and have remained open ever since

Attested by soil geochemistry, soil micromorphology and artefactual remains



Marshall et al. 2018. *Nature*, Fig. 1

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Working Across Disciplines

- Archaeologists are often described as ‘disciplinary magpies’ – we borrow a lot of theoretical perspectives from others
- We probably do not always understand exactly what those ‘glittering’ new ideas and theories are supposed to do
- We undoubtedly re-contextualise those things we do borrow

BUT … by ‘assembling’ these different theories we create a hybrid science that can (but does not always) effectively straddle the nature:culture divide

- The concept of ‘biocultural heritage’ did not originate within archaeology, but in many ways describes what we document
- We have an inherent ‘backward looking curiosity’ which makes Archaeology poorly suited to thinking about the future, however.
- What we bring to the table is a habit of being open to the knowledge and perspectives offered by other disciplines.

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- **Aligning datasets**: Challenges of temporal & spatial scale; different registers; conceptual disconnects; different frames of reference – Supplementary rather than an additive approach that exploits the tensions between different types of data
- **Integrative challenges**: Perceived lack of relevance