GLOBAL ENVIRONMENT

A Journal of Transdisciplinary History
No. 15.2 · 2022

GLOBAL ENVIRONMENT

A Journal of Transdisciplinary History
No. 15.2 – 2022

Editors in chief Mauro Agnoletti and Gabriella Corona

Historicising Entanglements: Science, Technology and Socio-Ecological Change in the Postcolonial Anthropocene

Edited by Evelien de Hoop, Aarthi Sridhar, Claiton Marcio da Silva and Erik van der Vleuten

GLOBAL ENVIRONMENT
A Journal of Transdisciplinary History

No. 15.2/2022

EDITED BY EVELIEN DE HOOP, AARTHI SRIDHAR, CLAITON MARCIO DA SILVA AND ERIK VAN DER VLEUTEN

EDITORS IN CHIEF/MAURO AGNOLETTI AND GABRIELLA CORONA

DEPUTY EDITOR/CLAUDIO DE MAJO

MANAGING EDITOR/ EMILIA DEL GIUDICE

ASSOCIATE EDITORS/GIACOMO BONAN AND VALERIO CARUSO

EDITORIAL BOARD/ ELISABETTA BINI, KATJA BRUISCH, JOHN DARGAVEL, SANDRO DUTRA E SILVA, GUILLERMO CASTRO HERRERA, POUL HOLM, SHEN HOU, FAISAL HUSAIN, PAUL R. JOSEPHSON, REBECCA KARIUKI, FRIDOLIN KRAUSMANN, VIMBAI CHAUMBA KWASHIRAI, TIMOTHY LECAIN, JINLONG LIU, CHRISTOF MAUCH, JOHN R. MCNEILL, REINALDO FUNES MONZOTE, WAPULUMUKA MULWAFU, SIMONE NERI SERNERI, WALTER PALMIERI, DESIRÉE QUAGLIAROTTI, LAJOS RACZ, KATIE RITSON, ANDREA F. SABA, SASHI SIVRAMKRISHNA, PETER SZABO, JULIA ADENEY THOMAS, LIESBETH VAN DE GRIFT

LEGALLY RESPONSIBLE DIRECTOR/STEFANO TESI

OWNER/GLOBAL ENVIRONMENT SOCIETY – VIA DEL PARCO GRIFEO 7 – 80121 NAPOLI – ITALY

PUBLISHER/THE WHITE HORSE PRESS, THE OLD VICARAGE, MAIN STREET, WINWICK, CAMBRIDGESHIRE PE28 5PN, UK. INSTRUCTIONS FOR AUTHORS MAY BE FOUND AT WWW.WHPRESS.CO.UK AND SUBMISSIONS SHOULD BE MADE USING THE JOURNAL'S ONLINE SUBMISSION SYSTEM AT WWW.WHP-JOURNALS.CO.UK

EDITING OFFICE/INSTITUTE OF MEDITERRANEAN STUDIES, NATIONAL RESEARCH COUNCIL, VIA GUGLIELMO SANFELICE, 8, 80134 NAPOLI – ITALY – TEL +39 081 6134086 – FAX +39 081 5796467 – E-MAIL: EMILIA.DELGIUDICE@CNR.IT

PRINTING/LIGHTNING SOURCE UK LTD, MILTON KEYNES

INDEXED/ABSTRACTED BY: CABI, CLARIVATE EMERGING SOURCES CITATION INDEX, EBSCO DISCOVERY, SCOPUS

SUBSCRIPTIONS/GLOBAL ENVIRONMENT IS PUBLISHED THREE TIMES PER YEAR. ANNUAL SUBSCRIPTION RATES (2022) £185/€231/$280 FOR INSTITUTIONS, OR £75/€88/$110 FOR INDIVIDUALS AT A PRIVATE ADDRESS. STUDENT, ESEH MEMBER AND ONLINE-ONLY RATES ARE AVAILABLE. TO SUBSCRIBE, CONTACT TURPIN DISTRIBUTION LTD. STRATTON BUSINESS PARK, PEGASUS DRIVE, BIGGLESWADE, BEDFORDSHIRE SG18 8QB, UK; EMAIL: WHITEHORSEPRESS@TURPIN-DISTRIBUTION.COM; ONLINE: HTTP://EBIZ.TURPIN-DISTRIBUTION.COM

COVER AND LAYOUT DESIGN/STEFANIA BONURA - GRAPHICS WEB & BOOKS
COVER IMAGE/ PROCESSED AND EDITED BY STEFANIA BONURA FROM A CREATIVE COMMONS PHOTO BY NAZARIZAL MOHAMMAD ON UNSPLASH

ISSN 1973-3739

EISSN 2053-7352

Contents

Historicising Entanglements: Science, Technology and Socio-Ecological Change in the Postcolonial Anthropocene

Abstracts

Sustainability Knowledge Politics: Southeast Asia, Europe and the Transregional History of Palm Oil Sustainability Research – Evelien de Hoop and Erik van der Vleuten

So far, the field of sustainability history has insufficiently addressed the tricky politics of academic sustainability knowledge making. In response, this paper studies how scientific research on palm oil sustainability, when defining sustainability problems and solutions, enacted a postcolonial politics of difference between Southeast Asia and Europe. Iterating between quantitative database queries (2,500+ sources) and close reading, we found that voices of scientists from both regions were amply represented in palm oil sustainability research, but presented different types of narratives. Research originating from Southeast Asia predominantly foregrounded situated problems originating, experienced and to be redressed within the region itself. By contrast, diverse strands of research led by scholars from Europe addressed universalised global sustainability problems for humanity, notably global deforestation and climate change. This research framed palm oil farmers in Southeast Asia as responsible for causing and solving such problems while attributing to European actors the responsibility of ensuring Southeast Asian actors' compliance with global sustainability standards through certification schemes. Critically, European actors were thereby acquitted of their own historical and future responsibilities, even though the latter had long deforested their own territories and contributed significantly more to climate change, played a pivotal role in establishing palm oil cultivation and trade, and constituted leading importers of soy in the twentieth century. To open up for more equitable and inclusive future sustainability imaginaries, we encourage historical research that studies, situates and unpacks diverse sustainability knowledges and narratives across the globe in a symmetrical manner.

keywords: *sustainability history, knowledge politics, palm oil, science and technology studies, mixed methods*

Bio-anthropophagy, or the Anthropocene in the Making: The Caboclo Peoples in the Construction of Modern Brazil (1889–1939) – Claiton Marcio da Silva and Claudio de Majo

This article analyses the historical trajectory of a southern Brazilian population emerging from the interbreeding of Amerindian, African and European peoples: the so-called caboclos. In particular, it focuses on their relationship with Brazilian institutions in the nation-building and modernisation processes between 1889 and 1945. Although caboclos constituted a considerable portion of the population of southern Brazil, because of their lifestyle, they were generally regarded as incapable of participating in the national developmental effort. As a result, they were forcefully assimilated through ethnic interbreeding and sanitation reforms. Reconstructing this historical process, this article adopts the term 'bio-anthropophagy', a concept describing the combination of anthropological and biological practices of persecution and appropriation in the region. First, it looks at the impact of racial theories promoted by national institutions during the nineteenth century that led to ethnic persecutions and forced interbreeding of caboclos. Second, it addresses the role played by the combination of eugenic theories and sanitation policies since the 1920s, leading to significant techno-environmental reforms in the region. While the combination of these bio-anthropophagic reforms progressively dismantled the caboclo way of life and their ecosystems, some of their environmental practices and values resurfaced in recent times with the emergence of environmentalism and agroecology in the region.

keywords: *bio-anthropophagy, caboclos, colonos, southern Brazilian frontier, sanitation*

The Expansion of the Railway and Environmental Changes: The Modern Configuration of the Argentine Pampas, c. 1870–1930 – Marcela França de Oliveira and Adrián Gustavo Zarrilli

One of the most striking transformation processes of the Anthropocene in Argentina is related to the occupation of the territory through agricultural activities and the arrival of the train from the mid-nineteenth century. The transformations of the Pampa biome are a typical case of socio-environmental transitions caused by the country's entry into the global market. At the basis of agricultural expansion through the agro-export model was the idea of an 'empty' territory. At the core of the Anthropocene is the homogenisation of environments, from the introduction of exotic fauna and flora, technologies, cultures and ideas (modernity). This process of homogenisation implies the destruction of the heterogeneity of native ecosystems. Considering aspects such as these, and considering socio-environmental analyses together with technological issues, our paper elucidates the peculiarity of Argentina's modernisation process in the context of the Anthropocene.

keywords: *Anthropocene, Argentine pampas, railway, environmental history*

Imagining the Nile, Making Modern Rivers: Knowledge and Power in Nineteenth Century Writing – Abeer Abazeed and Yasmine Hafez

The Nile River has featured prominently in both nationalist memoirs and foreigners' travelogues. This paper explores human interventions in the Nile, not in the physical changes in the landscape but rather in the imagination, discourses and knowledge production of the nineteenth century European and Ottoman Empires. We show how the emergence of the 'modern river' was made possible by two crucial strains of Nile imaginaries and knowledge. The paper examines writings by European travellers and nationalist writing by Egypt's modernist, Alī Mubārak. Through our analysis we show how the Nile was co-constituted by two principal story-telling ventures: European travelogues and Egyptian modernist writing.

keywords: *Nile, knowledge, Alī Mubārak, travelogues, imagination, natural resource, peasants (Fellahin)*

From National to Cosmopolitan Hydrocarbons Resource Space: Hydrocarbons, Transnational Politics and the State in Greece – Yannis Fotopoulos and Stathis Arapostathis

In this paper, we historicise the co-production of regional visions and governing practices for hydrocarbon explorations in the particular case of Greece. The paper aims to contribute a new understanding of state-building processes by studying how visions and infrastructures steered energy policies, (re-)configured hydrocarbon resource spaces and shaped technopolitical order in the Eastern Mediterranean. Chronologically, the storyline is divided into three distinct periods, in which visions and related practices shaped the hydrocarbon space: the first period in which the hydrocarbon space was constructed, the second period in which a non-commons truce was maintained to avoid conflict, and the final period in which a cosmopolitan common in the Eastern Mediterranean emerged.

keywords: *hydrocarbon resource space, statecraft, Mediterranean, Greece*

Catalysing Socio-Ecological Change: The Extraction and Processing of Edible Oils, 1910-1940 – Frank Veraart

This article argues that histories of global north and south are interconnected and inseparable parts of the same processes that shaped different environments. In the nineteenth and twentieth centuries, systematic science-based commodification attributed economic and use values to natural resources. This changed western perceptions of natural environments. The commodification of plant and animal oils led to global entanglements of European production and consumption with resource extraction sites in Africa, Asia and the Antarctic. These historical accounts are often written in national frames or focused on one commodity. This article explores the global in-

ter- and cross linkages with and between extraction regions. The historical distribution of sustainability gains and costs was continuously negotiated through building these global supply chains. I trace socio-technical changes from 1910 to 1940, when West European margarine industries constructed the entangled global resource supply chains. This article scrutinises the contestation, tensions and outcomes, revealing the conflicting values, interests and differences in power relations between indigenous actors and the global system entanglers active in Congo, Indonesia and the Antarctic. My analysis highlights the social and ecological changes in the entangled regions, and sketches the global economic, social and ecological trade-offs of these developments.

keywords: *entangled history, resource extraction, commodification, hydrogenation, catalysis, palm oil, margarine, Unilever, Netherlands, Norway, Congo, Indonesia, Antarctic, sustainability trade-offs*

Global Environment 15 (2022): 194–208

doi: 10.3197/ge.2022.150201

introduction

Historicising Entanglements: Science, Technology and Socio-Ecological Change in the Postcolonial Anthropocene

Evelien de Hoop, Aarthi Sridhar, Claiton Marcio da Silva and Erik van der Vleuten

This special issue focuses on connected histories of science, technology and socio-ecological change in what we call the 'postcolonial Anthropocene'. We used this term to guide the papers in this issue towards research questions that interrogate both human-nature relations and postcolonial relations, as entangled components of each inquiry. Of course, both constituent terms 'postcolonial' and 'Anthropocene' are contentious and much-debated, with diverse connotations and perceived implications to diverse readerships; using both together can be a risky business. We nevertheless chose to do so, because we felt that, both in historiography and in wider academic discourses, Anthropocene and postcolonial research perspectives have too often remained poorly connected – despite the growing number of scholars arguing that Anthropocene research must include postcolonial perspectives and *vice versa*. In this introductory essay, we begin by discussing specific lines of (postcolonial) Anthropocene scholarship we chose to connect to, before we specify this issue's overarching research questions and introduce the context and content of the individual papers.

The 'Anthropocene' and its critiques

It has been over two decades since Paul J. Crutzen and Eugene F. Stoermer proposed the term 'Anthropocene' for the current geological epoch in the International Geosphere-Biosphere Programme IGBP newsletter (and soon after in a famous article in *Nature*). The term, informally in use since at least the 1980s, was intended to emphasise the 'central role of mankind' as 'a powerful geological force' changing the 'systemic properties' of the planet and the atmosphere.[1] Today (at the time of writing) geologists are still debating whether to accept the Anthropocene as an official subdivision of geological time. Meanwhile humanities and social science scholars of many stripes have also massively engaged with the Human Epoch as a geological as well as a cultural notion, based on their own (inter)disciplinary perspectives and concerns. Amongst those perspectives, we would like to highlight that many have lauded 'the diagnosis of the Anthropocene' as a decisive acknowledgement of 'the public death of the modern understanding of Nature', whereafter humans can no longer be regarded as operating in isolation from the ecologies in which they live.[2] This insight

[1] P.J. Crutzen and E.F. Stoermer, 'The "Anthropocene"', *IGPB Newsletter* **41** (2000): 17–18; P.J. Crutzen, 'Geology of mankind', *Nature* **415** (51) (2002): 23. For a history, see H. Trischler, 'The Anthropocene: A challenge for the history of science, technology, and the environment', *NTM Journal of the History of Science, Technology and Medicine* **24** (3) (2016): 309–35.

[2] J. Lorimer, 'Multinatural geographies for the Anthropocene', *Progress in Human Geography* **36** (5): 593–612, at 606. Also, D. Chakrabarty, *The Climate of History in a Planetary Age* (Chicago and London: The University of Chicago Press, 2021); G. Caluya, 'Fragments for a postcolonial critique of the Anthropocene: invasion biology and environmental security', in J. Frawley and I. McCalman (eds), *Rethinking Invasion Ecologies from the Environmental Humanities* (London: Routledge, 2014); A.S. Mathews, 'Anthropology and the Anthropocene: criticisms, experiments, and collaborations', *Annual Review of Anthropology* **49** (2020): 67–82; B. Latour, 'Anthropology at the time of the Anthropocene: A personal view of what is to be studied', in M. Brightman and J. Lewis (eds), *The Anthropology of Sustainability* (New York: Palgrave Macmillan, 2017), pp. 35–49; J. Lorimer, 'The Anthropo-scene: A guide for the perplexed', *Social Studies of Science* **47** (1) (2017):117–42. T.J. LeCain, 'Against the Anthropocene: a Neo-materialist perspective', *International Journal for History, Culture and Modernity* **3** (2015): 1–28.

inspired scholars to rethink interrelations between histories of science, technology and the environment.[3] It also fostered, or resonated with, diverse initiatives towards collaboration across the natural sciences, social sciences and humanities to develop new knowledges informing the mitigation of the Anthropocene's ecological challenges – including new historiographical knowledges.[4]

However, and crucially, the proliferating use of the term Anthropocene has also met with substantial critique. We would like to emphasise two related critiques that are widely shared among historians, anthropologists and geographers. First, concerning human relations, natural science-initiated accounts of the Anthropocene have been much criticised for depoliticising history by presenting 'history as a contest between the human species as a whole and the planet, with societies as ignorant and passive masses who can only be guided by scientists and saved by green technologies', as Bonneuil and Fressoz bluntly phrased it.[5] Research that universalises human agency tends to obscure differential human experiences, responsibilities and politics – some scholars therefore call such research an 'anti-politics machine'.[6] Second, concerning human-nature relations, the critique

[3] Trischler, 'The Anthropocene', 312.

[4] R. Costanza et al., 'Sustainability or collapse: what can we learn from integrating the history of humans and the rest of nature?', *AMBIO: A Journal of the Human Environment* **36** (7) (2007): 522–27; E. Russell, *Evolutionary History: Uniting History and Biology to Understand Life on Earth* (Cambridge: Cambridge University Press, 2011); J.L. Caradonna (ed.), *Routledge Handbook of the History of Sustainability* (New York, NY: Routledge, 2018); S. Sörlin, 'Reform and responsibility – the climate of history in times of transformation', *Historisk tidsskrift* **97** (1) (2018): 7–23.

[5] C. Bonneuil and J.-B. Fressoz, *The Shock of the Anthropocene. The Earth, History and Us* (London and New York: Verso, 2016), p. 13.

[6] E.W. Krauss, 'Anthropology in the Anthropocene: sustainable development, climate change and interdisciplinary research', in H. Greschke and J. Tischler (eds), *Grounding Global Climate Change* (New York: Springer 2015), pp. 59–76; L. Ogden et al., 'The politics of Earth stewardship in the uneven Anthropocene', in R. Rozzi et al. (eds), *Earth Stewardship. Linking Ecology and Ethics in Theory and Practice* (New York: Springer 2015), pp. 137–57; J. Hope, 'The anti-politics of sustainable development: Environmental critique from assemblage thinking in Bolivia', *Transactions of the Institute of British Geographers* **46** (1) (2021): 208–22.

is that omnipresent *modernist* uses of the term Anthropocene do not transcend the nature-society dualism at all, but instead enact, reproduce and amplify human exceptionalism. Implicitly and often quite explicitly, such modernist Anthropocene scholarship attributes to 'humankind' the position of primal Earth-changer and, as a consequence, Earth stewardship to repair environmental harm done in the 'Human Epoch'. Such unabashed anthropocentrism also echoes in historiographical debate of the Anthropocene; for example, the *History Manifesto* endorsed calls for (long-term) histories to assists humans in their role as responsible Earth managers – and was fiercely criticised by others arguing that such human exceptionalist thinking is part of the problem rather than the solution.[7] Either way, the combination of over-emphasising and universalising human agency obscures how change on Earth emerges from complex, connected and situated interactions between a wide variety of human and non-human agents, and that such change may be distributed unequally across the earth. The world is not a 'human species act', as the term Anthropocene may portray it to be.[8]

These critiques elicited many responses. One prominent line has been to develop a range of alternative terms to the notion of

The classic is J. Ferguson, *The Anti-politics Machine: 'Development', Depoliticization and Bureaucratic Power in Lesotho* (Chicago: Chicago University Press, 1990).

[7] J. Guldi and D. Armitage, *The History Manifesto* (Cambridge, Ma: Cambridge University Press, 2014), p. 69; Z.B. Simon, 'History manifested: making sense of unprecedented change', *European Review of History* **22** (5) (2015): 819–34; Z.B. Simon, *The Epochal Event: Transformations in the Entangled Human, Technological, and Natural Worlds* (London: Palgrave MacMillan, 2020).

[8] D. Haraway et al., 'Anthropologists are talking – about the Anthropocene', *Ethnos. Journal of Anthropology* **81** (3) (2016): 535–64, p. 539. Also: D. Chandler, 'The transvaluation of critique in the Anthropocene', *Global Society* **33** (1): 26-44; Chakrabarty, *The Climate of History in a Planetary Age*; D. Haraway, 'Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making kin', *Environmental Humanities* **6** (2015): 159–65; B. Latour, *Down to Earth: Politics in the New Climatic Regime* (Cambridge: Polity Press, 2018); A. Malm and A. Hornborg, 'The geology of mankind? A critique of the Anthropocene narrative', *The Anthropocene Review* **1** (1) (2014): 62–69; A. Blok and G.B. Jensen, 'The Anthropocene event in social theory: On ways of problematizing nonhuman materiality differently', *The Sociological Review* **67** (6) (2019): 1195–211.

the Anthropocene, which explicitly invite scrutiny of human and multispecies differential politics, including postcolonial relations. To mention but a few: the notion of *Capitalocene* presents, in the words of Moore, the world as a 'multi-species assemblage, a world-ecology of capital, power, and nature'.[9] The term *Plantationocene* takes inspiration from the study of colonial plantation systems and refers to the radical simplification of previously diverse living systems and their relocation elsewhere, and thereby producing life for value extraction. The Wasteocene concept invites historians to scrutinise the embodied stratigraphy of power and toxicity with special attention to subaltern human and more-than-human communities; the notion of the Soyacene invites study of how soybean has mediated human and non-human lives especially in the last fifty years.[10] Notions such as *Chthulucene* (derived from the Greek word *chthon* meaning earth) and *Planthroposcene* refer not to critical analysis of historical epochs, but to an ongoing attempt to deliberately shift the terms of encounter with Anthropocene-type-of-concerns for future modes of multispecies engagement.[11] Note that these are only some of the alternative 'Big Words' that have been proposed recently to guide research on today's major social and environmental challenges in more critical and sensitive directions. Still, as observed by Haraway, the use of such terms comes with the risk of creating a Theory

[9] J.W. Moore, *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism* (Oakland: PM Press, 2016).

[10] D. Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham, NC: Duke University Press, 2016); M. Armiero, *Wasteocene: Stories from the Global Dump* (Cambridge: Cambridge University Press, 2021); C.M. da Silva and C. de Majo 'Towards the soyacene: Narratives for an environmental history of soy in Latin America's Southern Cone', *Historia Ambiental Latinoamericana y Caribeña* **11** (1) (2021): 329–56.

[11] Haraway, 'Anthropocene, Capitalocene, Plantationocene, Chthulucene'; J. Davis et al., 'Anthropocene, Capitalocene, … Plantationocene? A manifesto for ecological justice in an age of global crises', *Geography Compass* **13** (5) (2019): e12438; B. Latour et al., 'Anthropologists are talking – about capitalism, ecology, and apocalypse', *Ethnos* **83** (3) (2018): 587–606. N. Myers, 'From the Anthropocene to the Planthroposcene: Designing gardens for plant/people involution', *History and Anthropology* **28** (3) (2017): 297–301.

of Everything at the expense of empirical study that takes historical contingency, specificity and situatedness seriously.[12]

Understanding socio-ecological entanglements in the postcolonial Anthropocene

This latter observation leads us to literatures highlighting and studying the historical, spatial, social and material situatedness of specific socio-ecological entanglements and changes, most notably historical and postcolonial Science and Technology Studies (STS).[13] As such, this special issue approaches humans as diverse beings who are co-constituted by and act together with the (social, material, ecological) environments in which they live.[14] This entanglement

[12] Haraway et al., 'Anthropologists are talking – about the Anthropocene', 550 and 651; C. Bos et al, 'Steering with big words: Articulating ideographs in research programs', *Journal of Responsible Innovation* **1** (2) (2014): 151–70.

[13] S. Harding (ed.), *The Postcolonial Science and Technology Studies Reader* (Durham, NC: Duke University Press, 2011); J. Law and W. Y. Lin, 'Provincializing STS: Postcoloniality, symmetry, and method', *East Asian Science, Technology and Society* **11** (2) (2017): 211–27; A. Kumar et al. (eds), *Dilemmas of Energy Transitions in the Global South* (New York: Routledge, 2021); Ute Hasenörl, 'Histories of technology and the environment in post/colonial Africa: Reflections on the field', *Histories* **1** (3)(2021): 122–44; J. van der Straeten, 'The rhythms behind change. Historiography and the temporality of non-Western technological landscapes', *Technikgeschichte* **88** (2) (2021): 191–96.

[14] Note also that in his 'Postcolonial Studies and the Challenge of Climate Change', Chakrabarty speaks of the postcolonial 'view of the human as the same everywhere ... endowed with … anthropological difference'. This has received criticism from within postcolonial scholarship, and we follow the latter – work which recognises the emergence of difference without making the assumption of universality being hidden behind difference (e.g. D. Boscov-Ellen, 'Whose universalism? Dipesh Chakrabarty and the Anthropocene', *Capitalism Nature Socialism* **31** (1): 70–83; G. Caluya, 'Fragments for a postcolonial critique of the Anthropocene: invasion biology and environmental security', in J. Frawley and I. McCalman (eds), *Rethinking Invasion Ecologies from the Environmental Humanities* (London: Routledge, 2014); G. Jack, 'Advancing postcolonial approaches in critical diversity studies', in R. Bendi et al. (eds), *The Oxford Handbook of Diversity in Organizations* (Oxford:

has implications not only for our understanding of humans, their agency and power imbalances in the Anthropocene, but also for our understanding of what constitutes these humans' material and ecological 'environments'. It means we do not approach such environments as singular, not a 'One-World world' as geological and other natural sciences studying the Anthropocene would have it,[15]

Oxford University Press, 2015)). Postcolonial theorists' conceptualisation of human beings and their agency as being co-constituted by the environments in which they live draws upon both (older) STS work, such as actor-network theory (B. Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (New York: Oxford University Press, 2005)) and on more recent new materialist work which has been spurred in part by the challenge of the Anthropocene (A.F. Conty, 'The Politics of nature: New materialist responses to the Anthropocene', *Theory, Culture and Society* **35** (7–8) (2018): 73–96). See, for example, the notion of trans-corporeality proposed by feminist critical theorist Alaimo, denoting that 'the human is always intermeshed with the more-than-human world, ... ultimately inseparable from "the environment"' (S. Alaimo, *Bodily Natures: Science, Environment, and the Material Self* (Bloomington, IN: Indiana University Press, 2010), p. 2).

[15] M. De La Cadena and M. Blaser, *A World of Many Worlds* (Durham, NC: Duke University Press, 2018). This One-World world has been critiqued for creating a colonial divide between 'those who function within the OWW from those who insist on other ways of bringing a world into being, or "worlding"' (A. Escobar, 'Thinking-feeling with the Earth: Territorial struggles and the ontological dimension of the epistemologies of the South', *Revista de Antropología Iberoamericana* **11** (1) (2016): 11–32, at 21). Indeed, scholarship on indigenous protests against extractivism, such as Australian Aboriginal resistance to drilling (D. Danowski and E. de Castro, *The Ends of the World* (Cambridge, UK and Malden, Ma: Polity Press, 2016)) or Meswaki and Sioux resistance to the Dakota Access Pipeline (G. Giuliani, *Monsters, Catastrophes and the Anthropocene; A Postcolonial Critique* (Abingdon, Oxon and New York, NY: Routledge, 2021)) has powerfully brought the power and relevance of a plurality of locally-situated and (often) non-anthropocentric cosmologies to the fore, and contrasted these with those enacted through extractivist approaches. Other ways of worlding have not only been identified in scholarship on resistance against extractivism, but of course also in, amongst others, work on Indigenous worldviews on ecology and American Indian cosmologies, and on non-modern philosophies of life such as Buen Vivier. See, amongst many others, J.M. Beijer, 'Beyond hegemonic state(ment)s of Nature. Indigenous knowledge and non-state possibilities in international relations', in C. Geeta and S. Nair (eds), *Power, Postcolonialism and International Relations. Reading Race, Gender and Class* (London: Routledge, 2002).

but as multiple and possibly inequitable, arising together with the imaginations and practices of the humans who live in them. Indeed, and critically, understanding both humans and their environments as co-constituting each other helps to bring (post)colonial power relations and inequalities in the shaping of sited human-environment relationships to the fore. This resulted in the following question that guided the investigations of the papers published in this special issue: *which human-environment constellations emerged at the site(s) studied, how did they relate to one another, and what inequalities were embedded therein?*

Second, we approach this process of co-constitution in (post) colonial worlds as transnationally entangled.[16] In particular, the papers in this special issue take the lead from two bodies of historical work in which such transnational entanglements feature particularly prominently, namely *histories of relations* and *relational histories*. The former constitute historical investigations of connections and relations between different sites and the ways in which these relations and sited socio-ecological dynamics co-constituted each other.[17] These histories of relations predominantly approach diverse sites' histories from the perspective of a common logic (and, despite claims to the contrary, not seldom a European or global North-inspired one), and their attentiveness to multi-sited historical diversity has therefore been limited. In contrast, relational and connected histories investigate how regional histories may be at once highly geographically distant, diverse, specific and situated, yet neverthe-

[16] A. Blunt and C. McEwan, *Postcolonial Geographies* (London and New York: Continuum, 2002).

[17] R. Wenzlhuemer, *Doing Global History: An Introduction in 6 Concepts* (London and New York: Bloomsbury, 2020). On infrastructure, supply chain, and commodity circulation histories see e.g., A. Johnson, 'Europe without borders: Environmental and global history in a world after continents', *Contemporary European History* **31** (1) (2022): 129–41; L. Marques, 'Commodity chains and the global environmental history of the colonial Americas', *Esboços: histórias em contextos globais* **28** (49) (2021): 640–97; P. Högselius et al., *Europe's Infrastructure Transition: Economy, War, Nature* (London: Palgrave MacMillan, 2016).

less develop in mutual interaction.[18] Such work may explicitly move against the archival grain, deconstructing the dominant narratives of archives and contemporary historical 'sources' that scholars use and contrasting these with the narratives of a wide diversity of voices.[19] In both types of histories, relations are established through the travels of a wide variety of entities; in line with this issue's grounding in postcolonial STS we particularly focus on (expert and lay) knowledges and technologies as phenomena that connect and co-construct geographically dispersed and locally situated socio-ecological histories. This resulted in the second question that guided the investigations of the papers published in this special issue: *what roles did science and technology, which often travelled between diverse locations across the globe, play in the emergence of and inequalities embedded in the diverse human-environment constellations identified in response to the first question?*

Contributions to this special issue

Crutzen and Stoermer offered the term 'Anthropocene' in order to inspire and empower the development of 'a world-wide accepted strategy leading to sustainability of ecosystems against human induced stresses'; such 'great future tasks of mankind' in their words required intensive research efforts and the 'wise application of the knowledge thus acquired'.[20] Critiquing such calls and research for their universalisation of humanity and the obscuring of differential experiences, responsibilities and politics, this special issue has sought to study situated and diverse engagements with socio-ecological

[18] See S. Subrahmaniam, *Europe's India. Words, People, Empires, 1500–1800* (Harvard: Harvard University Press, 2017).

[19] A.L. Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton and Oxford: Princeton University Press, 2009). We consider this important, amongst others, in view of providing room to diverse ways of understanding and living in today's world(s), cf. A. *Escobar, Designs for the Pluriverse Radical Interdependence, Autonomy, and the Making of Worlds* (Durham: Duke University Press, 2018).

[20] Crutzen and Stoermer, 'The "Anthropocene"', 18.

change, guided by the two questions raised in the foregoing paragraphs.[21] This effort has resulted in the following papers.

First, de Hoop and van der Vleuten study how human-environment constellations were variously articulated in scientific knowledge on palm oil sustainability in Southeast Asia and Europe since 1980. They ask how such research enacted a postcolonial politics of difference between Southeast Asia and Europe with regard to defining 'sustainability' problems and solutions. They observe that palm oil sustainability research originating from Southeast Asia foregrounded problems experienced and to be redressed within the region itself. By contrast, diverse strands of research lead by scholars from Europe variously framed migrant, smallholder and large-scale palm oil farmers in Southeast Asia as primarily responsible for causing and solving 'global sustainability problems', notably global deforestation and climate change. This 'global sustainability' discourse by and large acquitted European actors and markets from such responsibilities – even though these had long deforested their own territories, had played a major role in establishing palm oil cultivation,

[21] The initiative sprang from a workshop in Lisbon in Autumn 2019, organised in the context of the Tensions of Europe programme *Technology and Societal Challenges 1850–2050* and its 'Technology, environment and resources' working group. For the broader programme: E. van der Vleuten, 'Technology, societal challenges, and global sustainability history', *Icon* **24** (2018): 34–52; E. van der Vleuten, 'History and technology in an age of grand challenges: Raising questions', *Technology and Culture* **61**(1): 260–71. For the 'Technology, environment and resources' working group: M. Heymann et al. 'Challenging Europe: Technology, environment, and the quest for resource security', *Technology and Culture* **61** (1) (2020): 282–94; O. Sparenberg and M. Heymann (eds), 'Resource challenges and constructions of scarcity in the 19th and 20th centuries', Special Issue in *European Review of History* **27** (1–2) (2020): 243–369; C. Kehrt and J. Martin (eds), 'Reconfiguring nature: Resource security and the limits of expert knowledge', *Global Environment* **13** (3) (2020): 512–658; A. Åberg and F. Veraart (eds), 'Creating, capturing and circulating commodities: The technology and politics of material resource flows, from the 19th century to the present', Special section in *The Extractive Industries and Society* **7** (1) (2020): 1–67; J. Daheur (ed.), 'Extractive Peripheries in Europe: Quest for Resources and Changing Environments (Fifteenth-Twentieth Centuries)', Special issue of *Global Environment* **15** (1) (2022): 7–147.

trade and use, and had constituted prime markets for most of the twentieth century.

Next, da Silva and de Majo's study of Southern Brazilian traditional populations known as Caboclos shows how a relationship of mutual dependence between people and their forests had been built up over centuries. This 'bio-anthropophagic' relationship changed dramatically when a new wave of settlers advanced westward in the early twentieth century, creating new human-environment constellations based on governments' and settlers' ideas about both the forest and its traditional populations. These ideas were prominently informed by the travels of both racial and eugenic theories and associated sanitation policies. Thus followed a rearrangement of the exploitation of natural materials – such as yerba mate or herbal medicines – based on new hierarchies. Local populations survived through astute strategies of incorporating exogenous values, giving rise to deep inequalities with respect to the ability to both materially and ontologically define one's one way of life.

Also located in South America, França de Oliveira and Zarilli's contribution analyses how the transformation of the Argentine pampas into an area of large-scale cattle farming went hand in hand with profound environmental, economic and demographic transformations. This included the incorporation of over forty million hectares of pampas into market-based agriculture and cattle-farming; the introduction of new animal and plant species as well as a range of modern agricultural technologies; new economic models of farming; and a substantial increase in the number of people living in the area. This paper demonstrates how these changes were mediated not only by the introduction of cattle and the early establishment of farms in the area in the sixteenth century, but also by transportation infrastructures whereby railroads connected the pampas to Argentina's ports, reconfiguring the landscape.

Next, Abazeed and Hafez investigate how cultural discourse co-constructed the Nile as a 'modern river' through an analysis of imaginaries and knowledges of rivers as represented in two different sets of writing: Egyptian renaissance writing by modernist Alī Mubārak, who hybridised a European education into his nationalist develop-

ment visions, and a set of travelogue diaries of orientalist European travelers writing for European audiences. Both cultural traditions harnessed modernist ideas, but did so in situated ways, using different vantage points, to remake the free-flowing River Nile and its people into a modern 'hybrid entity' drawing in multiple cultural and natural attributes.

Fotopoulos and Araposthatis highlight how explorations of hydrocarbons, regional visions and governing practices were historically co-constructed in the Eastern Mediterranean, with implications for who has access to Greece's hydrocarbons. They argue that European and North American expertise on hydrocarbon explorations as well as various foreign exploration technologies and infrastructures were critical to encoding these power constellations in regional hydrocarbon development.

The final paper of the issue represents the tradition of investigating histories of relations and connections rather than relational histories: Veraart investigates how the development and travels of catalysis technologies, which enabled the production of margarine from a diversity of oils and fats, gave rise to a variety of new human-environment constellations at different sites across the world, through putative supply chain relations forged in colonisation contexts across Congo, the Dutch Indies and the Antarctic, between 1910 and 1940.

Acknowledgements

This special issue springs from the inspiring workshop on 'Resources, Infrastructures and the Anthropocene: Dialogues between the Global-North and the Global-South', organised at the Universidade NOVA de Lisboa in 2019. We are particularly indebted to the workshop participants for vivid, critical and inspiring contributions and debate. We also thank the organizers and funders of the workshop: the *Centro Interuniversitário de História das Ciências e da Tecnologia*, the Dutch research council NWO's internationalising humanities program GREASE (nr. IG.18.036), the Danish Council

for Independent Research's research network programme EurReS, and the Foundation for the History of Technology SHT.

Evelien de Hoop is based at the transdisciplinary Athena Institute (Vrije Universiteit Amsterdam, NL). With a background in Science and Technology Studies, she works with scholars from diverse disciplines and societal stakeholders to address contemporary health and sustainability challenges. Empirical foci include Indian farmers' engagements with biofuels, sustainable Dutch countrysides, and inclusive food systems in deprived urban areas. She mobilises research on the historical and transnational entanglements of contemporary challenges, with a particular focus on knowledge politics, to render her contemporary work historically-sensitive and pluralise ways of thinking about the future.

Email: e.de.hoop@vu.nl

Aarthi Sridhar is one of the founder trustees of Dakshin Foundation and is pursuing a Ph.D. from the University of Amsterdam on a historical sociology of fisheries science in India. Her academic interests centre on historical and contemporary socio-legal studies, Science and Technology Studies, and sociological approaches to knowledge and expertise. Her empirical focal areas are coastal and marine environments, resource politics, maritime infrastructures and practices of environmental norms and justice. She enjoys collaborative projects and has worked with diverse disciplinary teams on writing projects, documentary films, technical websites, field manuals and other learning material on the subject of marine environments and people.

Email: aarthi77@gmail.com

Claiton Marcio da Silva is Associate Professor at the Federal University of the Southern Frontier (UFFS), Santa Catarina, Brazil and CNPq Productivity Researcher. He began studying the modernisation of Brazilian agriculture in 2002, completing his MA in history at the Federal University of Santa Catarina (UFSC) with a thesis on rural youth in Southern Brazil. At Casa de Oswaldo Cruz (COC/Fiocruz), his doctoral dissertation explored the role of Nelson Rockefeller's American International Association for Economic and Social Development (AIA) in introducing the US extension service model in Latin America. Recently, he has been exploring the global environmental history of soybeans and its impacts for traditional populations in the Global South.

Email: claiton@uffs.edu.br

Erik van der Vleuten teaches at Eindhoven University of Technology and researches the connected histories of technology and socioecological change in an infrastructured world. Earlier works include: *Europe's Infrastructure Transition: Economy, War, Nature* (2015, with Per Högselius and Arne Kaijser) and *Engineering the Future, Understanding the Past: A Social History of Technology* (2017, with Ruth Oldenziel and Mila Davids). His current research and education focus on diverse and contested sustainability histories and futures of distant-yet-connected regions across the globe.

Email: e.b.a.v.d.vleuten@tue.nl

Sustainability Knowledge Politics: Southeast Asia, Europe and the Transregional History of Palm Oil Sustainability Research

Evelien de Hoop and Erik van der Vleuten

The field of sustainability history, which only gained traction recently despite pioneering work since the early 1990s, attracts our sympathies but also raises major historiographical points of concern.[1] We appreciate how the emergent field invites historians of different stripes to engage head-on with today's omnipresent debates , particularly in the global North, about sustainable futures, including

Global Environment 15 (2022): 209–245

doi: 10.3197/ge.2022.150202

policy programmes such as the UN Sustainable Development Goals and booming research fields such as sustainability transition studies. Historical studies of sustainability transitions, energy transitions and urban mobility transitions, for example, have recently argued that these debates urgently need robust historical knowledge, contextualisation and critical reflection on their identification of problems, their causes and solution pathways.[2] Doing so would enable ways of thinking about pathways for the future that challenge and stretch beyond today's dominant imaginaries.[3] We also appreciate how, in engaging with these debates, sustainability history explicitly positions itself as interdisciplinary history: if we may take the *Routledge Handbook of Sustainability History* (2018) as a benchmark, the field seeks to exploit its 'broad' sustainability concept to research 'complex interactions' between highly diverse economic, social and environmental sustainability issues often studied separately in economic, social and environmental history, thereby addressing important yet often overlooked dynamics in the historical shaping and emergent futures of our contemporary world-in-crisis.[4]

However, the emergent field also raises major historiographical concerns. Two features in particular are at odds with the postcolo-

[1] J.L. Caradonna, 'The historiography of sustainability: An emergent subfield', *Economic- and Ecohistory* **11** (11) (2015): 7–18.

[2] S. Arapostathis and P. Pearson, 'How history matters for the governance of sociotechnical transitions', *Environmental Innovation and Societal Transitions* **32** (2019): 1–6; R. Fouquet and P. Pearson, 'Past and prospective energy transitions: Insights from history", *Energy Policy* **50** (2012): 1–7; U. Hasenöhrl and J.-H. Meyer, 'The energy challenge in historical perspective', *Technology and Culture* **61** (1) (2020): 295–306; F. Schipper, M. Emanuel, R. Oldenziel, 'Sustainable urban mobility in the present, past, and future', *Technology and Culture* **61** (1) (2020): 307–317.

[3] E. de Hoop and S. Arora, 'Material meanings: 'Waste' as a performative category of land in colonial India', *Journal of Historical Geography* **55**: 82–92; R. Bendor et al., 'Looking backward to the future: On past-facing approaches to futuring', *Futures* **125** (2021): 1–12.

[4] J.L. Caradonna (ed.), *Routledge Handbook of the History of Sustainability* (London: Routledge, 2018); E. van der Vleuten, 'Technology, societal challenges, and global sustainability history', *Icon* **24** (2018): 34–52.

nial Anthropocene sensitivities explored in this special journal issue.[5] First, sustainability history has scarcely addressed how diverse sustainability challenges across the globe may interact in inequitable ways. Social science sustainability studies have begun to conceptualise and study sustainability interactions across continents through all sorts of 'sustainability telecouplings'.[6] By contrast, sustainability history – as the recent Handbook acknowledges – has predominantly focused on either rather generic histories of sustainability ideas and social movements, or on situated sustainability histories in (mostly) nationally or locally delineated societies.[7] The former insufficiently address specific, diverse and unequitable histories across the globe; the latter tend to exogenise and black-box developments elsewhere. Bridging the gap between the global/generic and the local/specific in sustainability history is long overdue.[8]

This concern is aggravated by a second problem. In our view,

[5] E. de Hoop et al., 'Historicising entanglements: Science, technology and socio-ecological change in the postcolonial Anthropocene', *Global Environment. A Journal of Transdisciplinary History* **15** (2) (2022): 194–208.

[6] J. Liu et al., 'Framing sustainability in a telecoupled world', *Ecology and Society* **18** (2) (2013); C. Friis and J.Ø. Nielsen (eds), *Telecoupling: Exploring Land-Use Change in a Globalised World* (London: Palgrave Macmillan, 2019).

[7] Caradonna, *Routledge Handbook*, p. 12. Pivotal works in the former tradition: U. Grober, *Sustainability: A Cultural History* (Cambridge: UIT Cambridge Ltd, 2012); J.L. Caradonna, *Sustainability: A History* (New York: Oxford University Press, 2014); P. Warde, *The Invention of Sustainability: Nature and Destiny, c. 1500–1870* (Cambridge: Cambridge University Press, 2018). Examples of the latter: H. Lintsen et al., *Well-Being, Sustainability and Social Development. The Netherlands 1850–2050* (Gewerbestrasse: Springer, 2018); and most contributions to M. Emanuel, F. Schipper and R. Oldenziel (eds), *A U-Turn to the Future: Sustainable Urban Mobility since 1850* (New York: Berghahn, 2020).

[8] G. Massard-Guilbaud, 'From the history of sources and sectors to the history of systems and transitions. How the history of energy has been written in France and beyond', *Journal of Energy History* **1** (2018); F. Veraart, J.-P. Smits and E. van der Vleuten, 'Connected by oil: a framework to analyze the connected sustainability histories of the Niger and Rhine Deltas, 1950–2015', *The Extractive Industries and Society* **7** (1) (2020): 50–67; F. Haalboom, 'Oceans and landless farms: Linking Southern and Northern shadow places of industrial livestock (1954–1975)', *Environment and History* (Online First 2020).

sustainability history has insufficiently addressed the highly politicised character of the concept of sustainability and, by extension, the field of sustainability history itself. To be sure, virtually all sustainability history authors acknowledge the political pertinence of their research, either pledging unwavering support to making the world more sustainable or urging for critical historiographical reflection on policy making's linearities, teleologies and blind spots. But they have scarcely studied the politics of sustainability knowledge-making itself: scholarly choices of which and whose (sustainability) problems, causes and solutions to study make some issues visible (and potentially actionable and governable), while obscuring others. Which and whose meanings, concerns and responsibilities were historically prioritised and sidelined in sustainability research? Who was, implicitly or explicitly, made responsible for the historical causing and future solving of sustainability challenges? Such questions on the knowledge politics of sustainability research are especially salient if we consider sustainability histories' transnational interconnections.[9] After all, the field of postcolonial history has amply shown how academic knowledge orders may configure inequitable transnational relations across the globe.[10]

If these two shortcomings are not adequately addressed, sustainability history risks (rightful) dismissal as yet another unreflective projection of 'Global North' concerns as global ones. In this study, we therefore address both problems in conjunction and do so for one of the most prominent controversies in contemporary global sustainability history: the controversy on palm oil sustainability. The economic history of palm oil tells us that, by 1970, the so-called Southeast Asian palm oil export cluster had ousted its West-African

[9] On knowledge politics research traditions: J.-P. Voß and R. Freeman (eds), *Knowing Governance: The Epistemic Construction of Political Order* (Gewerbestrasse: Springer, 2016), pp. 7–11; J.S. Jensen, M. Cashmore and P. Späth (eds), *The Politics of Urban Sustainability Transitions: Knowledge, Power and Governance* (London: Routledge, 2018).

[10] This is of course a large and varied literature. On epistemic differences, see e.g., Sanjay Krishnan, 'The place of India in postcolonial studies: Chatterjee, Chakrabarty, Spivak', *New Literary History* **40** (2) (2009): 265–80.

competitor on the global market, and that European actors and markets had been pivotal to this process (though European imports have since been overtaken by Indian and Chinese imports).[11] Existing research also tells us that actors from these two regions in particular have engaged in a political palm oil sustainability controversy that lasts to the present day. A telling example is the narrative frame that advocates for Southeast Asia's 'right to development' against 'neo-colonial' green European NGOs and protectionist EU politicians' concern for 'sustainability' that ignores Europe's own history of deforestation, carbon emissions and biodiversity loss.[12] In this historical and political context, this paper investigates how academic research on palm oil sustainability has variously enacted what is historically problematic about palm oil and by whom this is to be redressed in present and future, with particular focus on how such research has (re)configured relations in and between Southeast Asia and Europe from roughly the 1970s to the 2010s. First, we discuss a strategy to investigate global historical knowledge politics of palm oil sustainability research; next we empirically explore what sorts of insights this approach can yield.

Connected histories and mixed methods

Studying how palm oil sustainability research configured relations within and between two distant regions, Southeast Asia and Europe, is neither self-evident nor unproblematic for two reasons. The first pertains to the historiographical use of regions as spatial research categories; the second to studying a vast body of scientific

[11] V. Giacomin, 'The transformation of the global palm oil cluster: Dynamics of cluster competition between Africa and Southeast Asia (c. 1900–1970)', *Journal of Global History* **13** (3) (2018): 374–98; Id., 'The emergence of an export cluster: Traders and palm oil in early twentieth-century Southeast Asia', *Enterprise & Society* **19** (2) (2018): 272–308.

[12] O. Pye and J. Bhattacharya (eds), *The Palm Oil Controversy in Southeast Asia: A Transnational Perspective* (Singapore: Institute of Southeast Asian Studies, 2013), p. 3.

palm oil literature in which not all relevant voices may be equally represented. Let us briefly discuss both issues.

To sensitively investigate transregional palm oil sustainability knowledge politics, we draw on the connected history approach to global history. For over two decades, connected history has sought to transcend the gap between the generic patterns of 'globalisation history' and what Sanjay Subrahmanyam called the 'methodological fragmentationalism' of area studies – a task akin to the first challenge to sustainability history that we identified above.[13] It did so by studying how the diverse and specific histories of distant regions nevertheless developed in mutual interaction through all sorts of connections. The historiography and anthropology of such connections, too, has long dismissed assertions of deterministic and unifying influences, and instead made the frictional encounters of 'connectors' and 'that which was connected' an open-ended research question.[14] Given our research questions and case study, we focus on the question of how relations between particularly Southeast Asia and Europe ('the connected') were mediated by palm oil knowledge infrastructure and the palm oil sustainability research that it hosted (a pivotal 'connector', next to trade and finance).

While connected history thus conceptualised transregional history, it also warned against essentialising regions such as 'Asia' or 'Europe' as singular universals. It builds on, but also critiques, early post-

[13] S. Subrahmanyam, 'Connected histories: Notes towards a reconfiguration of early modern Eurasia', *Modern Asian Studies* **31** (3) (1997): 735–62, at 745. Also: C. Douki and P. Minard, 'Global history, connected histories: A shift of historiographical scale?', *Revue d'histoire moderne et contemporaine* **54/4** (5) (2007): 7–21; S. Conrad, *What is Global History?* (Princeton: Princeton University Press, 2016). Compare the 'relational history' of A. Epple, 'Calling for a practice turn in global history: Practices as drivers of globalization/s', *History and Theory* **57** (3) (2018): 390–407.

[14] R. Wenzlhuemer, 'Connections in global history', *Comparativ* **29** (2) (2019): 106–21. Also: A.T. Lowenhaupt, *Friction: An Ethnography of Global Connection* (Princeton: Princeton University Press, 2011); G. Hecht, *Being Nuclear: Africans and the Global Uranium Trade* (Cambridge MA: The MIT Press, 2012); P. Högselius, A. Kaijser and E. Van der Vleuten, *Europe's Infrastructure Transition: Economy, War, Nature* (London: Palgrave Macmillan, 2015).

colonial studies in the footsteps of Edward Said and others: the early study of academic knowledge orders that undergirded power relations between distant regions was criticised for reproducing monolithic and ahistorical us-them binaries ('the West' producing knowledge to represent and dominate 'the rest'). To avoid this pitfall, connected history authors emphasised the plurality of connections within and between regions. Indeed, whether and how the 'unevenly connected pluralities' that we habitually call 'regions' can become meaningful objects of historiographical knowledge is considered a research question that should not be presupposed but asked to source.[15] In our palm oil case, we therefore made efforts not to assume, but to critically assess, whether and how our sources configured transregional politics of difference between Southeast Asia and Europe.

This leads us to the second issue, which is how to deal with the sources involved. Historically studying the vast academic literature on palm oil and palm oil sustainability is tricky in several ways. To engage these abundant sources meaningfully, we draw on digital history insights. First, we follow the suggestion to use hybrid, mixed-method research strategies combining big data analysis and 'distant reading' with close reading.[16] To sensibly tease out the knowledge orders (re)produced in this literature in its entirety as well as in specific publications, we iteratively alternated between zooming out and zooming in: 'zooming in' here denotes close reading and interpretation of specific publications, while 'zooming out' refers to consulting the scientific publication database Scopus and its analytics functions

[15] S. Schaffer, 'Origins and barriers: Reflections on Subrahmanyam', *Modern Asian Studies* **50** (1) (2016): 52–60, at 52; S. Subrahmanyam, *Europe's India: Words, People, Empires, 1500–1800* (Cambridge MA: Harvard University Press, 2017), pp. xi–xii; I. Chatterjee, 'Connected histories and the dream of decolonial history', *South Asia: Journal of South Asian Studies* **41** (1) (2018): 69–86; E. van der Vleuten and T. Feys, 'Borders and frontiers in global and transnational history', *Journal of Modern European History* **14** (1) (2016): 29–34. On (post) Saïdian approaches: D.M. Varisco, *Reading Orientalism: Said and the Unsaid*, 2nd edition (Seattle, WA: University of Washington Press, 2017).

[16] G. Zaagsma, 'On digital history', *BMGN-Low Countries Historical Review* **128** (4) (2013): 3–29.

to make quantitative observations for large numbers of sources. We pragmatically selected the Scopus database because it holds significantly more records than Web of Science and provides more analytical possibilities than Google Scholar.

Digital history insights also urge us to contextualise and examine which and whose voices are represented in digital datasets. This is particularly relevant given our research questions: from a postcolonial critique perspective as well as a scientometrics perspective, we might expect an overrepresentation of authors affiliated with European research institutions defining palm oil sustainability issues in Southeast Asia, and an underrepresentation of 'research produced in non-Western countries, non-English language research, and research from the arts, humanities, and social sciences', as one prominent scientometric commentator recently phrased it.[17]

Quantitative analysis of our datasets cannot reveal knowledge politics at work, but it does allow for a rough check on the spatial distribution of author affiliations. Scopus holds about 27,000 English-language publications on palm oil (that is, practically speaking, featuring 'palm' and 'oil' in the title, abstract or keywords) since 1884, and some 2,500 publications on palm oil combined with the term sustainability since 1980.[18] Compared to these numbers, Scopus-listed publications in German, French and Bahasa seem marginal, as does a literature in Bahasa that exists outside Scopus.[19]

Our affiliation-check showed a strong presence of voices affiliated with Global North-based as well as with Global South-based

[17] J. Tennant, 'Web of Science and Scopus are not global databases of knowledge', *European Science Editing* 46 (2020): e51987. Also: P. Mongeon and A. Paul-Hus, 'The journal coverage of Web of Science and Scopus: A comparative analysis', *Scientometrics* **106** (2016): 213–28.

[18] www.scopus.com search string 1: TITLE-ABS-KEY (palm AND oil): 27,270 results. Search string 2 TITLE-ABS-KEY (palm AND oil AND sustainab*): 2,500 results, (consulted 25 Jan. 2021).

[19] 'Palmöl' and 'Huile de Palme' returned under 40 Scopus records each since 1840. 'Minyak sawit' resulted in 208 Scopus records since 2006, and 1,000 records in a Google Scholar search on Harzing's Publish & Perish (last consulted 11 Feb. 2021). Only English-language records were close-read.

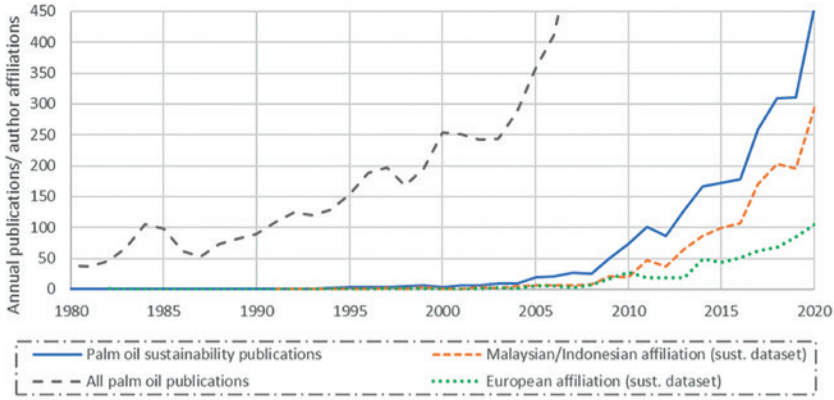
research institutes in palm oil sustainability research. For the smaller Scopus dataset on palm oil sustainability, some 42 per cent of nearly 3,500 contributing authors with known affiliations were affiliated with a research institute in Malaysia or Indonesia. Approximately 25 per cent were affiliated with a research institute in Europe or North America. Institutes such as the *Universiti Putra Malaysia* and *Universiti Teknologi Malaysia*, and sponsors such as the Malaysian Ministry of Education, topped their respective lists; the first research institute outside Southeast Asia (Wageningen University & Research, the Netherlands) only ranked #8 in number of author affiliations. The dataset's Global North–South distribution, if we may use those tricky terms for the purpose at hand, does not display major changes through time: before 2005, a third of the publications originated from Europe or North America, and this percentage decreased slightly thereafter. The spatial distribution of the larger dataset of all 27,000 palm oil publications was not fundamentally different.[20]

The temporal distribution of publications in these Scopus datasets is much more uneven. Annual palm oil publications grew from dozens per year during the 1970s and 1980s, to about a hundred per year throughout the 1990s, to thousands per year during the past few years. Specific publications on palm oil 'sustainability' display a comparable temporal distribution: annual publication numbers were low (under ten) before 2005, then grew to hundreds throughout the 2010s (Figure 1). The implication for our inquiry was that for the period prior to 2005, we needed to complement analysis of the palm oil sustainability dataset with records from the larger dataset in order to contextualise tentative findings.

This leads us, finally, to a word about our research procedure. The empirical findings presented in the next sections result from multiple zooming-out zooming-in iterations. Exploratory quantitative

[20] In the dataset of 27,000, Malaysian and Nigerian author affiliations topped the table with jointly 35% of 555 known affiliations in 663 records in the 1980s. Overall the Global North–South distribution was about 50/50. In 2020, Malaysian and Indonesian affiliations topped the table with 44% of 4,223 known author affiliations in 2,905 records.

Figure 1. Spatio-temporal distribution in Scopus publications on palm oil sustainability 1980–2020



Source: www.scopus.com search string 2: TITLE-ABS-KEY (palm AND oil AND sustainab*) (consulted 25 January 2021).

database queries combined with explorative reading of hundreds of abstracts across time provided tentative insights into the chronological, spatial and thematic dynamics of palm oil sustainability research. Subsequent, more targeted, dataset queries helped identify specific sets of publications for close-reading: We analysed these either in chronological order, or – in case of excessively large numbers of records – in order of citation scores. Of course, citation scores are a contested indicator, and overlook alternative, less-frequently cited, lines of argumentation and investigation. We therefore complemented the analysis by seeking publications on palm oil in less-frequently cited fields to identify their key lines of investigation. We used a data extraction form to systematically record findings about each selected publication concerning articulations of (a) research aim; (b) the palm oil practice studied; (c) sustainability challenges; (d) problem ownership; (e) solution(s); (f) who would need to change which practices to achieve solution(s); (g) inter-, intra- and extra-regional spatial categories; and (h) authors' disciplinary and geographical affiliations.

We continued processing additional publications until reaching a saturation point where additional readings no longer added significant insights. These data extraction forms formed the basis for identifying historical patterns, which were then further articulated through additional database queries and close reading.

The following section discusses our empirical findings for the period when palm oil sustainability research slowly emerged; next follows a discussion of the accelerated growth period from 2005 onward.

Early palm oil sustainability research, 1970–2004

By the 1970s, when the Southeast Asian export cluster had definitively ousted the West African 'palm belt', a palm oil research infrastructure had long been established.[21] Indeed, the global economic history of palm oil tells us that scientific research had played a major role in the competition and collaboration between the two export clusters. Already by the mid-1920s, West-African colonial officials and agronomists had observed that research and innovation gave Malaysian and Indonesian palm oil a productivity and quality advantage: the agricultural experimental station AVROS on Java and the Serdang Agricultural Department in Malaya, amongst others, studied plant breeding and pathology, oil press mechanisation, laboratory quality control and more. The Kuala Lumpur-based Incorporated Society of Planters and its journal disseminated findings to plantations. In response, West African agronomists built their own research infrastructure. Over time, however, West-African postcolo-

[21] Giacomin, 'The transformation of the global palm oil cluster'; Id., 'The emergence of an export cluster'; F. Veraart, 'Catalysing socio-ecological change: the extraction and processing of edible oils, 1910–1940', *Global Environment. A Journal of Transdisciplinary History* **15** (2) (2022). For intra-Asian transnational palm oil historiography, see J.H. Drabble and K.T. Joseph, 'A note on "Agricultural History" of Peninsular Malaysia: Contributions from Indonesia by K.T. Joseph [with Response]', *Journal of the Malaysian Branch of the Royal Asiatic Society* **82** (1) (2009): 113–19.

nial turmoil (notably in Nigeria) and Southeast Asian scientific employee attraction policies (especially in Malaysia) had driven many researchers eastward, helping seal the Southeast Asian export cluster's dominance. This historical legacy aligns with the strong presence of Southeast Asian institutes in palm oil research that we noted in the previous section.

Did such transregional politics also emerge within academic knowledge on palm oil 'sustainability'? Our datasets allow for several observations on the early years of such research. With regard to *when* palm oil sustainability research emerged, we observe that very few publications explicitly and prominently discussed the 'sustainability' of palm oil at all in this early period. Our Scopus query merely returned about sixty publications explicitly studying 'palm oil' in relation to 'sustainability' (that is, using these terms in their title, abstract or keywords) out of over 3,600 publications on palm oil in 1970–2004. Among these publications, sustainability research was absent in the 1970s, sparse between 1980 and 1993 (a mere five records), and thereafter gained a slightly more structural presence. Sustainability-related terms like 'habitat', 'ecology', 'nature' or 'environment' were used *either* equally marginally, or in irrelevant meanings ('the nature of the problem'), or referred to themes we already identified in our dataset.[22] Apparently sustainability talk made very slow headway in palm oil research – even after the 1987 Brundtland report and the 1992 Rio Declaration on Environment and Development had supposedly sparked worldwide attention for 'sustainable development'.

Early palm oil research thus marginalised sustainability issues to the advantage of other themes. A superficial probe of the Scopus dataset of all palm oil publications for the 1970s alone (227 records) suggests that agricultural, chemical and, to a lesser extent, medi-

[22] Scopus search (16 Feb. 2021) TITLE-ABS-KEY (palm AND oil) AND PUBYEAR AFT 1969 AND PUBYEAR BEF 2005: 3,643 records. Combined with 'sustainab*' (61), 'biodiversity' (20), 'habitat' (31), 'Climate Change' (13), 'ecolog*' (52), 'Nature' (93), 'forest*' (166), 'pollution' (101), 'waste' (233), 'environment*' (225).

cal science research overwhelmingly dominated the scene. Though disciplinary categories often overlapped in specific publications, a pattern is clearly discernible. Agricultural research focused mostly on improving palm oil cultivation and yields through the study of e.g., soil nutrients, pollination, tree growth, fruit bearing productivity, tree health, pest control and so on. Chemical research mostly focused on processing – palm fruit milling, crude oil refining and processes in the food and oleochemical industries. Health studies discussed a rather broad variety of human health problems or remedies that related to palm oil intakes or palm oil plantation labour. Most research focused on tropical areas where cultivation, most processing and part of the usage took place. Discussions of nutrition, health and opportunities for oleochemical industries referred to European and North American contexts as well.

When palm oil 'sustainability' research emerged, it latched itself onto these existing research lines. Most palm oil sustainability publications in our dataset addressed 'sustainability' in relation to palm oil *cultivation* in 'tropical climates', and to a lesser degree in relation to processing and use. The limited number of records allows for close examination of what and whose 'sustainability' issues were highlighted in each publication.

Concerning palm oil cultivation, our bottom-up examination revealed an overall pattern featuring two prominent sustainability discourses, which performed partly converging, partly diverging, knowledge politics. On one hand, most publications addressed indigenous agricultural problems and solutions in specific regions or countries (in Malaysia and Indonesia but also the Amazon and Cerrados in Brazil, the Adja Plateau in South Benin, Southern Nigeria, Colombia etc). The authors usually worked at research institutions in these same countries, sometimes collaborating with foreign researchers. We therefore identify this research line as a 'domestic sustainability' narrative. In these publications, the term 'sustainable' predominantly referred to sustaining agricultural activity, notably smallholder palm oil cultivation and small ruminant farming. These activities faced problems of soil nutrient exhaustion, low productivity and insufficient farmer family or community income. 'More

sustainability' accordingly meant improving the organic matter balance (e.g. by integrated palm oil and ruminant farming where palm waste served as animal fodder) and increasing 'technology uptake' to boost yields and generate predictable incomes.[23] In Malaysia, the global palm oil export leader, 'sustainability' also referred to sustaining palm oil sector growth in the national economy: in anticipation of future labour and land shortages, research and innovation were deemed crucial to increase yields and sustain the flow of the country's 'green gold' to downstream domestic refining and oleochemical processing industries.[24] A different but telling example of this 'the environment sustains economic activity' discourse is that palm oil plantations unexpectedly proved attractive to pythons and therefore, according to the researchers, boosted the long-term 'sustainability' of the commercial snake leather trade (from Northern Sumatra to Australia in this case).[25]

On the other hand, palm oil cultivation research affiliated with research institutes in high-income countries or international organisations tended to foreground how economic activity threatened universalised 'global' environmental concerns. Endangered ecosystems in turn threatened – in equally universalised wording – 'human welfare' and 'human needs'. We therefore identify this research line as a 'global problems' narrative. These publications drew their problem definitions directly from Global North agencies and international organisations such as the Food and Agriculture Organisation, the World Bank, the 1992 UN Rio Conference, or the

[23] V. Koudokpon, J.H.A.M. Brouwers, M.N. Versteeg and A. Budelman, 'Priority setting in research for sustainable land use: The case of the Adja Plateau, Benin', *Agroforestry systems* **26** (2) (1994): 101–22; C.U.B Pinheiro and J.M.F. Frazão, 'Integral processing of babassu palm fruits: Village level production in Maranhão, Brazil', *Economic botany* **49** (1) (1995): 31–39.

[24] G.K.A Parveez et al., 'Transgenic oil palm: Production and projection', *Biochemical Society Transactions* **28** (6) (2000): 969–72; J. Othman, M.H. Alias and M. Jusoh, 'Sustainability of growth in the Malaysian oil palm farm subsector', *Journal of International Food & Agribusiness Marketing* **16** (2) (2004): 85–101.

[25] R. Shine, H.P.S. Ambariyanto and Mumpuni, 'Ecological attributes of two commercially-harvested python species in northern Sumatra', *Journal of Herpetology* **33** (2) (1999): 249–57.

International Tropical Timber Organization. The first palm oil sustainability publication in our dataset illustrates the way of thinking that later authors followed: John Spears (1980) was introduced to readers of the FAO forestry journal *Unasylva* as a World Bank Forestry Adviser (though expressing 'personal views'). Spears discussed how to combine sustainable farming and forestry for diverse crops including the oil palm in Malaysia. He drew his problem definition from 'environmental agencies' in the United States and FAO global deforestation estimates, which suggested that the bulk of tropical forest ecosystems would be 'irreversibly lost' by the mid-twenty-first century unless trends were reversed. Spears was explicit about where the problem resided ('tropical developing countries') and what and who would suffer from the problem: the victims were 'genetic diversity' and overall 'human welfare', which would suffer from loss of drugs and medicines available from tropical woody plants.[26] Late 1990s authors would add climate change to the list of global problems, highlighting that rainforests and peat bogs constitute important carbon sinks (for which they cited the 1992 Rio Declaration and Conventions as their source).[27]

Spears and his successors were also univocal about who was responsible for causing and solving these global problems. For all crops combined (and palm oil was considered exemplary), the 'root cause' was the slash and burn tactics of some 200 million migrant subsistence farmers practising 'shifting agriculture'. This definition of the problem cause prefigured the proposed solution: subsistence farmers should move from 'extensive' shifting agriculture to 'intensive' smallholder plantations. They should abandon migratory life for stable settler communities and employ techno-scientific tools to establish

[26] J.S. Spears, 'Can farming and forestry coexist in the tropics', *Unasylva* **32** (128) (1980): 2–12.

[27] R. Härdter, W.Y. Chow and O.S. Hock, 'Intensive plantation cropping, a source of sustainable food and energy production in the tropical rain forest areas in southeast Asia', *Forest Ecology and Management* **91** (1) (1997): 93–102; M.N. Salleh, 'Sustainability: The panacea for our forestry ills?', *Journal of Sustainable Forestry* **4** (3–4) (1997): 33–43; W. Gerritsma and M. Wessel, 'Oil palm: Domestication achieved?', *NJAS Wageningen Journal of Life Sciences* **45** (4) (1997): 463–75.

sustainable agriculture 'in harmony with tropical ecosystems'. In this socio-ecological imaginary, palm oil plantations were cast as sustainable solutions, not the sustainability problem cause that they became in some later research (see below). Furthermore, this 'Global problems' discourse also presented Global South governments as bearing key responsibilities: according to the authors, these should organise plantation support services (e.g. fertiliser and seeds provision, agricultural research, feeder roads, marketing outlets) and introduce forest protection measures. The plantation support services and environmental plans for biotic reserves of the Malaysian government counted as exemplary best practice.[28] Global North markets and actors (users, traders, investors) were remarkably and utterly absent in discussions about who was responsible for causing and solving sustainability problems. The exception was scientists raising awareness and producing relevant knowledge. Even powerful players such as the World Bank, in Spears' words, 'can only be marginal … the main impetus must come from within the developing countries themselves'.[29]

Despite their differences, the 'domestic sustainability' and 'global problems' narratives converged in equating 'more sustainability' with introducing intensive palm oil cultivation for most of this early period. In tropical reforestation programmes, palm oil plantations were even heralded as 'the best possible substitutes for the rain forest i.e., intensive tree crop plantation that is both economically attractive and environmentally sound'. [30] However, at the turn of the millennium several publications started casting large plantations as the *source* of, not the solution to, sustainability problems. This reversal had been brewing in the 1990s: landscape ecology studies had suggested that in West Kalimantan, the supposed 'root cause' of shifting agriculture had lower environmental impacts than plantations.[31]

[28] J.A.N. Wallis, *Intensified Systems of Farming in the Tropics and Subtropics* (Washington, DC: World Bank,1997).

[29] Spears, 'Can farming and forestry coexist', 14.

[30] Härdter et al., 'Intensive plantation cropping', 94.

[31] D.L. Peart and D.R.M. Leighton, 'The impact of shifting cultivation on a rainforest landscape in West Kalimantan: Spatial and temporal dynamics', *Landscape Ecology* **13** (3): 135–48

Studies of the 1997 'Southeast Asian haze crisis' further shifted the 'root cause' label towards large palm oil companies burning forest not only because it was the cheapest and fastest way to clear land but also to forcibly acquire land from local smallholders who refused to sell – supported by (especially Indonesian) government policies for boosting plywood and palm oil exports.[32] By the time the Roundtable for Sustainable Palm Oil (RSPO) and its voluntary certification scheme were established (see next section), the sustainability knowledge politics of palm oil cultivation were certainly in motion.

We conclude this section with some brief observations on sustainability research addressing palm oil processing and use. These, too, adhere to the two dominant discourses identified above. As for processing, a number of early palm oil sustainability publications discussed sustainability in terms of local pollution by palm oil mills and crude oil refineries. These studies adhered to the 'domestic sustainability' narrative and were dominated by Malaysian authors. By the late 1990s, several publications concluded that Malaysian government regulations (e.g. mandatory Environment Impact reports) and innovation (e.g. ponding systems) had by and large solved these environmental pollution problems, and had thereby made the palm oil sector 'sustainable' – a remarkable consensus in the light of later debates that we discuss in the next section.[33] Also note that an additional query of the dataset containing all palm oil publications revealed a substantial body of Malaysian palm oil mill pollution research from the mid 1970s; this research line used the term 'sustainability' only incidentally. Oil mill pollution was much more important to domestic actors than our source selection based on the search term 'sustainability' would suggest.

Concerning palm oil uses, some research focused on using palm oil as fuel: The 'sustainable production of fuels and chemicals from

[32] M.A. Kasmo, 'The Southeast Asian haze crisis: Lesson to be learned', *WIT Transactions on Ecology and the Environment* **64** (2003):1263–71; U. Scholz, 'Oil pest in the rainforest?', *Geographische Rundschau* **56** (11) (2004): 10–17.

[33] S. Gurmit, 'The Malaysian oil palm industry,' *Industry and Environment* **22** (2–3) (1999): 45–48, at 45; A.R. Abdullah, 'Environmental pollution in Malaysia', *TRAC Trends in Analytical Chemistry* **14** (5) (1995): 191–98.

plants' referred to substituting fossil oil with a renewable source to prevent the worldwide collapse of civilisation (sic!).[34] Such research clearly inscribed itself in the 'global problems' narrative. Similar to the case of palm oil milling pollution, there was also a larger body of Malaysian research on domestic energy produced from palm oil waste ('soft energy', 'alternative energy' or 'renewable energy') that was only incidentally labelled as 'sustainability' research – at least until the Malaysian government introduced renewable energy policies in the new millennium.[35] Such research resonated with the 'domestic sustainability' narrative. Research on domestic Malaysian use of plantation waste in pulp and paper industries also resonated with this narrative, equating sustainability with 'sustainable resource use' and making the domestic paper industry self-sufficient.

Finally, palm oil consumption was addressed in nutrition and health research. Research that explicitly uses the term 'sustainability' adhered to the 'global problems' narrative and focused on the 'global development problem' of child mortality in 'developing countries'. Red palm oil consumption counted as a cheap and viable solution to the problem of vitamin A deficiencies and associated diseases. Crude palm oil contains fifteen times the carotene content of carrots and could be added to baking industry products if taste issues could be solved. Researchers contributing to this field were scattered across the globe and employed 'sustainability' in the sense of palm oil being 'generally available and not subjected to acute seasonal shortages'.[36]

Our scoping of the broader palm oil literature revealed two oth-

[34] M. Seibert et al., 'Fuel and chemical co-production from tree crops', *Biomass* **9** (1) (1986): 49–66.

[35] W.K. Keong, 'Soft energy from palm oil and its wastes', *Agricultural Wastes* **3** (3) (1981): 191–200. TITLE-ABS-KEY ('palm oil') AND PUBYEAR < 005 searched for 'energy' (231 records), 'diesel' (71), 'fuel' (105); 'biofuel' (16). (Search date: 3 March 2021).

[36] E.F Amoaful, 'Planning a national food-based strategy for sustainable control of vitamin A deficiency in Ghana', *Food and Nutrition Bulletin* **22** 4 (2001): 361–65; N. Scrimshaw, 'Nutritional potential of red palm oil for combating vitamin A deficiency', *Food and Nutrition Bulletin* **21** (2) (2000): 195–201.

er substantial strands of health research outside the palm oil 'sustainability' dataset that nevertheless deserve mentioning. Whereas research on palm oil plantation workers health (e.g., parasitic and bacterial infections) resonated with the domestic sustainability narrative, a large body of research on tropical oils and cardiovascular disease echoed the global problems discourse. The latter research strand studied the hypothesis that saturated fatty acids in 'edible tropical oils' (notably including palm oil) increase cardiovascular disease risks of 'man' or 'humans'. Even though such risks indeed apply in both the Global North and South, this research clearly echoed North American and European concerns and researchers in this historical context. The hypothesis itself was greatly promoted through research sponsored by the American Soybean Association, which also petitioned US politicians to halt imports of 'unhealthy' foreign competitors to its domestic soy produce. The hypothesis was contested and later rejected by research that found no adverse health effects. Today the tropical oils controversy is known as an instance of misusing science for commercial purposes.[37]

The growth and consolidation of palm oil sustainability research, 2005–2016

We have seen that palm oil sustainability research was slow in the making, even though the 1987 Brundtland report and especially the 1992 Rio Declaration and its Biodiversity and Climate Change Conventions had created a sustainability buzz in the international policy scene and problematised tropical deforestation. And yet, palm oil sustainability research only started booming from 2005 and especially since 2008. Global palm oil production and consumption had increased vastly by then. Also, transnational NGOs had prominently voiced concerns about palm oil's biodiversity impacts,

[37] D.J. McNamara, 'Palm oil and health: A case of manipulated perception and misuse of science', *Journal of the American College of Nutrition* **29** (3 Suppl) (2010): 240S–244S; J.O. Osaretin, S. Ofori and O. Maduka, 'Palm oil and the heart: A review', *World Journal of Cardiology* **7** (3) (2015): 144–49.

particularly in Europe. In response, the World Wildlife Fund for Nature (WWF) and major palm oil buyers and retailers (e.g. Unilever and the Malaysian Palm Oil Association) jointly set up the Roundtable of Sustainable Palm Oil (RSPO) in 2004, a transnational governance mechanism that operates on the basis of a voluntary sustainability certification.[38] And in the context of European energy policy, in 2009 the EU renewable energy directive (EU RED) set sustainability criteria and 'sustainable' biodiesel blending requirements for European automobile fuels.

Our inquiry of this period focused on three datasets: (1) research on palm oil sustainability published between 2005 and 2007, when research on palm oil sustainability first started growing (68 documents); (2) research on palm oil sustainability relating explicitly to Southeast Asia, Malaysia or Indonesia published between 2008 and 2016 (343 documents); and (3) research on palm oil sustainability relating explicitly to Europe, the Netherlands, France, Germany and/or the UK published between 2008 and 2016 (63 documents, of which one-third also related explicitly to Southeast Asia). All titles and abstracts were analysed. In-depth reading of full publications was performed until we reached saturation, resulting in analysing all publications published between 2005 and 2007; the 100 most-cited publications from the 2008–2016 Asia dataset; and the thirty most-cited for the 2008–2016 Europe dataset). In addition, we explicitly looked for counter-voices among less-frequently cited publications in each dataset.

This inductive procedure led us to identify four major thematic lines of palm oil sustainability research for this period: research on Malaysia's oil palm biomass abundance and associated pollution, on the sustainability impacts of cultivating palm oil, on governing palm oil cultivation (predominantly RSPO-focused), and on biofuels for Europe. Cutting across these research strands, we observe that authors scarcely blamed specific actors for the sustainability problems at hand explicitly. Instead, the attribution of blame now became rather

[38] O. Pye, 'The biofuel connection – transnational activism and the palm oil boom', *The Journal of Peasant Studies* **37** (4) (2010): 851–74.

implicit in the problems and solutions articulated, as our discussion below shows. Let us briefly discuss these four research strands.

Malaysia's polluting oil palm biomass: promises and problems

The question of what to do with the abundant and polluting presence of oil palm biomass that remained once oil had been extracted from the fruits remained a key research theme during the 2005–2016 period, particularly among chemical engineers based at Malaysian research institutes. Although some had declared the problem of water pollution from oil palm mills to be 'solved' in 1995, the problem turned out to be rather persistent.[39]

This body of research presented oil mill pollution as an ecological problem in itself, or as a threat to local rivers' ecologies and to those who depend on these rivers. These studies typically presented the non-use of palm oil biomass waste (i.e., for renewable energy, building materials and fermentation media) as a missed opportunity for Malaysia's economy and for the mitigation of greenhouse gas emissions. As such, residual biomass was positioned as *the* obstruction to creating an ecologically and economically sustainable Malaysian palm oil industry capable of supplying the global palm oil market.[40] These studies thus investigated how to turn palm oil waste into bio-energy, building materials and fermentation media, and to how to render the respective industries in which these are used more sustainable.[41] The tone was not univocally positive – this research (which included only a small number of publications by European

[39] See above.

[40] This is voiced most clearly and explicitly by T.Y. Wu et al., 'A holistic approach to managing palm oil mill effluent (POME)', *Biotechnology Advances* **27** (1) (2009): 40–52.

[41] S.-H. Kong et al., 'Biochar from oil palm biomass: A review of its potential and challenges', *Renewable and Sustainable Energy Reviews* **39** (2014): 729–39. M.K. Lam and K.T. Lee, 'Renewable and sustainable bioenergies production from palm oil mill effluent (POME): Win–win strategies toward better environmental protection', *Biotechnology Advances* **29** (1) (2011): 124–41.

scholars) regularly observed that Malaysia's oil palm biomass-based industries remained small and fragmented.[42] Either way, this research called upon Malaysia's government to produce supportive policies and R&D funding, but did not issue recommendations for actors outside Malaysia. In its articulation of problems, solutions, and responsibilities, it echoed the domestic sustainability discourse that we identified in the previous section.

'Impacts' of palm oil cultivation

A second research line also flourished: environmental scientists based at institutes in the global North, often in collaboration with (rarely first!) authors based in the global South, massively investigated the 'impacts' of palm oil cultivation. The actor-term 'impact' reflected a unidirectional causal understanding of the relationship between palm oil cultivation practices and socio-ecological and socio-economic dynamics in production areas (as opposed to, for example, studying this relationship in terms of 'mutual shaping' or 'co-construction'). In contrast to 'domestic sustainability' research that targeted oil palm biomass pollution and waste as the main sustainability challenge, this scholarship presented the accumulated global ecological effects of tropical land use change following palm oil cultivation as the main concern.[43]

As such, this work represents a continuation of the 'global problems' discourse identified during the previous period. Much effort went into mapping and modelling palm oil-induced land use change

[42] M.S. Umar, P. Jennings and T. Urmee, 'Generating renewable energy from oil palm biomass in Malaysia', *Biomass and Bioenergy* **62** (2014): 37–46; Id., 'Sustainable electricity generation from oil palm biomass wastes in Malaysia', *Energy* **67** (2014): 496–505. U.E. Hansen and I. Nygaard, 'Sustainable energy transitions in emerging economies: The formation of a palm oil biomass waste-to-energy niche in Malaysia 1990–2011', *Energy Policy* **66** (2014): 666–76.

[43] V. Subramaniam et al., 'Life cycle assessment of the production of crude palm oil (Part 3)', *Journal of Oil Palm Research* **22** (2010): 895–903; S.B. Hansen et al., 'Trends in global palm oil sustainability research', *Journal of Cleaner Production* **100** (2015): 140–49.

at specific locations as well as aggregated scales, and into quantifying the effects thereof on the familiar ecological problems that were presented as 'global' – rising greenhouse gas levels in the atmosphere and biodiversity decline, the latter caused by the destruction of ecosystems and species habitats.[44] Based thereon, most publications argued for 'better' (that is, informed by their scientific findings) and stricter land-use planning and certification standards, and for the development of methods to repair damage already done (such as reforestation). Scholars for example modelled how much expansion of 'sustainable' palm oil plantations would still be possible if these scientific recommendations were put into practice.[45]

While doing so, this research and its recommendations typically continued to ignore, and thus render comparatively invisible, the diversity of Indonesian and Malaysian perspectives and politics regarding land use and desirable development pathways. Moreover, by conceptualising global problems as being singularly caused by palm oil cultivation, these studies trained all attention on how to change cultivation practices and ignored the role of e.g. the global agricultural commodities trade and its sustainability implications – this latter subject only attracted a handful of studies.[46] And so, even when these 'global problem' studies made recommendations to (European) demand-side policy actors, they proposed policies that did not require demand-side actors to reduce trade or consumption. Instead, they foregrounded certification, commodity roundtables, moratoria and

[44] Mapping land use change: e.g., B. Wicke et al., 'Exploring land use changes and the role of palm oil production in Indonesia and Malaysia', *Land Use Policy* **28** (1) (2011): 193–206. Biodiversity assessment: e.g., D.S. Wilcove and L.P. Koh, 'Addressing the threats to biodiversity from oil-palm agriculture', *Biodiversity and Conservation* **19** (4) (2010): 999–1007.

[45] E. Sumarga and L. Hein, 'Mapping ecosystem services for land use planning, the case of Central Kalimantan', *Environmental Management* **54** (1) (2014): 84–97; D. Afriyanti, C. Kroeze and A. Saad, 'Indonesia palm oil production without deforestation and peat conversion by 2050', *Science of the Total Environment* **557–558** (2016): 562–70; J. Pirker et al., 'What are the limits to oil palm expansion?', *Global Environmental Change* **40** (2016): 73–81.

[46] A. Chaudhary and T. Kastner, 'Land use biodiversity impacts embodied in international food trade', *Global Environmental Change* **38** (2016): 195–204.

zero-deforestation pledges that primarily required changes of practices by production-site actors. As before, scholars predominantly based at global North research institutes by-and-large displaced the responsibility for addressing 'global' problems away from those who trade and consume palm oil towards those who cultivate palm oil; they usually did so implicitly, and rarely engaged in discussions of whose interests their recommendations might or might not serve.[47]

Zooming in on the main 'culprit' of palm oil producers, our sources stressed that, during the 2000s, the most rapid expansion of oil palm cultivation took place among smallholders. Global problems research accordingly studied the effects of smallholder cultivation practices on socio-economic and ecological parameters.[48] This knowledge was presented as useful to inform 'better' local land-use planning and to develop and stimulate the use of more ecologically-friendly cultivation methods. Scholars argued and lamented that smallholders' farm-level decision-making prioritised economic profitability over ecological balance, and suggested developing (local, national and global) policy-instruments that would render these eco-friendly choices economically profitable for smallholders – as per the researchers' and planners' definitions of profitability.[49]

Finally, we did identify several critical counter voices to this dominant 'global problems' narrative. For example, comparatively few studies actually investigated, rather than predefined, smallholders' socio-economic priorities. Such research showed how smallholder preferences for cultivation methods in e.g. Sarawak, Malaysia were

[47] R. Tsujino et al., 'History of forest loss and degradation in Indonesia', *Land Use Policy* **57** (2016): 335–47.

[48] J.S.H. Lee et al., 'Oil Palm smallholder yields and incomes constrained by harvesting practices and type of smallholder management in Indonesia', *Agronomy for Sustainable Development* **34** (2) (2014): 501–13. J.J. Kessler et al., 'Biodiversity and socioeconomic impacts of selected agro-commodity production systems', *The Journal of Environment & Development* **16** (2) (2007): 131–60.

[49] J. Drescher et al., 'Ecological and socio-economic functions across tropical land use systems after rainforest conversion', *Philosophical Transactions of the Royal Society B: Biological Sciences* **371** (1694) (2016): 20150275; Y. Clough et al., 'Land-use choices follow profitability at the expense of ecological functions in Indonesian smallholder landscapes', *Nature Communications* **7** (1) (2016): 13137.

shaped by the political balancing of interests of a wide variety of stakeholders – an insight often missed in top-down global problems research.[50] Also the Malaysian domestic sustainability research that we discussed above can be interpreted as a counter voice to much of the 'global problems' literature; rather than starting from the understanding that palm oil cultivation has undesirable global sustainability implications and needs to be improved, these publications posited that palm oil cultivation in Malaysia is sustainable thanks to proper land management and technological innovation allowing for highly productive plantations (although from the perspective of 'global problems' research conventions, the empirical evidence-base to make such claims tends to be rather limited).[51]

Governing palm oil

In the context of rising societal and academic concern with the 'impacts' outlined in the previous section, scholars affiliated with global North institutes, sometimes collaborating with global South-based authors, also massively engaged in the study of the governance of palm oil (un)sustainability as an important topic in its own right. This work focused almost exclusively on the transnational Roundtable for Sustainable Palm Oil (RSPO) certification scheme, established in 2004 by the World Wildlife Fund in collaboration with key palm oil producers and traders.[52] Up until today, this initiative claims to seek reduction of palm oil-induced deforestation and to protect both workers' and landowners' rights, while its critics have

[50] R. Soda, Y. Kato and J. Hon, 'The diversity of small-scale oil palm cultivation in Sarawak, Malaysia', *The Geographical Journal* **182** (4) (12016): 353–63.

[51] Y. Basiron, 'Palm oil production through sustainable plantations', *European Journal of Lipid Science and Technology* **109** (4) (2007): 289–95; Lam and Lee, 'Renewable and sustainable bioenergies'.

[52] As an exception, the following paper compares the effectiveness of Indonesia's, Malaysia's and Thailand's domestic governance of the palm oil sector: I. Mukherjee and B. Sovacool, 'Palm-oil based biofuels and sustainability in southeast Asia: A review of Indonesia, Malaysia, and Thailand', *Renewable and Sustainable Energy Reviews* **37** (2014): 1–12.

argued that the RSPO primarily serves to safeguard the palm oil industries' reputation.[53]

Research on the RSPO's ecological performance usually followed the global problems discourse: it typically sought to assess the scheme's (lack of) effect on reducing the identified 'global' sustainability impacts of palm oil cultivation. It often found that overall success has been limited, and in response recommended more precise and/or stringent and/or diverse (i.e. with different provisions to protect different kinds of native vegetation) certification criteria, combined with improved monitoring and compliance measures.[54] To achieve cultivator compliance with RSPO priorities, this research for example suggested to better align RSPO ambitions with cultivators' interests (i.e. by offering more financial compensation); reducing the leeway for interpreting the agreed-upon sustainability criteria; developing external compliance control systems; integrating certification criteria in the socio-politico-legal context of the country of production (that is, adapting to Indonesia's 'underdeveloped state capacity' and 'lack of accountability among state officials' as some researchers phrased it); and financially supporting local bodies of government.[55]

In addition, several authors suggested recommending a wider set of interventions that better took into account local cultivator needs.[56] Moving away from the idea that efficient and large–scale plantations pave the way towards a more sustainable palm oil industry, such research for example argued that smallholders' long-term compliance

[53] https://www.rspo.org/about (accessed 22 March 2021). Pye, 'The biofuel connection'.

[54] R.D. Garrett et al., 'Assessing the potential additionality of certification by the round table on responsible soybeans and the roundtable on sustainable palm oil', *Environmental Research Letters* **11** (4) (2016): 045003.

[55] D. Ruysschaert and D. Salles, 'Towards global voluntary standards: questioning the effectiveness in attaining conservation goals', *Ecological Economics* **107** (2014): 438–46; J. Mccarthy and Z. Zen, 'Regulating the oil palm boom: Assessing the effectiveness of environmental governance approaches to agro-industrial pollution in Indonesia', *Law and Policy* **32** (1) (2009): 153–79.

[56] P. Oosterveer et al., 'Global sustainability standards and food security: Exploring unintended effects of voluntary certification in palm oil', *Global Food Security* **3** (3–4) (2014): 220–26.

required a better balancing of 'the ethical aspects of sustainability' with the 'interests of the (*Southern*) farmers' [emphasis added].[57] Such research also studied how to make the certification scheme more accessible to smallholders – not by adapting the scheme's sustainability criteria (as these were to be set by the Roundtable members), but by providing smallholders with adequate administrative support.[58]

By comparison, research that questioned the 'normative superiority' underpinnings of RSPO certification remained scarce. RSPO legitimacy often was upheld even by studies that demonstrated the scheme's failure to safeguard landowners' and labourers' rights. The same applies to work that critiqued the scheme's reliance on modernist notions of evidence that eclipse local cultivators' epistemologies and governance practices.[59] In our search for (less frequently cited) counter voices to this dominant RSPO acceptance-in-principle, we only found a handful of studies that questioned the scheme's overall legitimacy. Such work agued, among others, that the RSPO certification scheme served to *depoliticise* labour and resource politics at sites of cultivation, consumption at the other end of transcontinental supply chains, and privileged consumers' interests over distant producers' interests, and to *greenwash* the present organisation of the palm oil sector.[60]

[57] N.K. Hidayat, P. Glasbergen and A. Offermans, 'Sustainability certification and palm oil smallholders' livelihood: A comparison between scheme smallholders and independent smallholders in Indonesia', *International Food and Agribusiness Management Review* **18** (3) (2015): 25–48.

[58] C. Brandi et al., 'Sustainability standards for palm oil: Challenges for smallholder certification under the RSPO', *The Journal of Environment & Development* **24** (3) (2015): 292–314.

[59] Mccarthy and Zen, 'Regulating the oil palm boom'; L. Silva-Castañeda, 'A forest of evidence: Third-party certification and multiple forms of proof—a case study of oil palm plantations in Indonesia', *Agriculture and Human Values* **29** (3) (2012): 361–70.

[60] M. Pichler, 'Legal dispossession: State strategies and selectivities in the expansion of Indonesian palm oil and agrofuel production', *Development and Change* **46** (3) (2015): 508–33; R.K. Larsen et al., 'Towards "hybrid accountability" in EU biofuels policy? Community grievances and competing water claims in the Central Kalimantan oil palm sector', *Geoforum* **54** (2014): 295–305. O. Pye, 'Deconstructing the roundtable on sustainable palm oil', in Arnaud Kaba (ed.), *The Oil Palm Complex* (Singapore: National University of Singapore Press, 2016), pp. 409–11.

Interestingly, from 2014 onward, a small band of scholars based at global North research institutes focussed on the Indonesian Sustainable Palm Oil (ISPO) scheme, launched by the Indonesian government in 2011. This research line presented the ISPO as an Indonesian government response to the RSPO, presenting 'Southern Standards' for sustainability in an attempt to regain control over the domestic palm oil industry as well as global palm oil market developments: the Indonesian government considers the palm oil industry as being of major importance for the national economy.[61] The authors considered these 'Southern Standards' as a weak alternative to the RSPO, because they were arguably less stringent and less detailed. Accordingly, they called for studies to assess and compare the ISPO's environmental 'impacts' to those achieved by the RSPO: which of the two performed better at addressing the global problems of climate change and reduced biodiversity? Concerned with the ISPOs potential ineffectiveness while highlighting the importance of taking the Indonesian governments' take on the RSPO seriously, this work recommended that public authorities from palm oil producing countries (from the global South) more prominently participate in the RSPO Roundtable.[62]

As critical readers investigating the knowledge politics manifest in palm oil sustainability research, we observe that RSPO research, even if it brings in so-called 'Southern' perspectives, still reproduced key features of the global problems discourse on palm oil sustainability: this research still situates the prime causes and solutions for global sustainability problems in places of palm oil production. The possible role(s) of 'unsustainable' industries, lifestyles and policies

[61] G. Schouten and V. Bitzer, 'The emergence of southern standards in agricultural value chains: A new trend in sustainability governance?', *Ecological Economics* **120** (2015): 175–84; O. Hospes, 'Marking the success or end of global multi-stakeholder governance? The rise of national sustainability standards in Indonesia and Brazil for palm oil and soy', *Agriculture and Human Values* **31** (3) (2014): 425–37; A. Wijaya and P. Glasbergen, 'Toward a new scenario in agricultural sustainability certification? The response of the Indonesian National Government to private certification', *The Journal of Environment & Development* **25** (2) (2016): 219–46.

[62] Hospes, 'Marking the Success'.

in the global North were by and large left out of the equation. As a result, while at least some European researchers studied how to include what they termed 'Southern' perspectives and representatives in implicitly Northern debates on how to change Southern stakeholder practices, the reverse question was scarcely addressed in our sources – that is, the question of how perspectives and actors from both North and South could help address the rather persistent sustainability challenges in Europe and North America.

Biofuels for Europe

Finally, researchers across the globe investigated the (un)sustainability of using palm oil for biodiesel in Europe (56 publications out of no less than 7,218 publications combining the terms 'palm oil' and 'sustainab*' with 'biodiesel', 'biofuel', 'bio-fuel' or 'bio-diesel' between 2008 and 2016). Issues that figured prominently in wider societal and academic debates on the EU biofuel policy, such as the food versus fuel controversy, are by and large absent in this dataset, surprisingly.[63] Instead we found that the vast majority of studies in this dataset investigated the global environmental impact, once again following the global problems discourse outlined above. However, this literature did not focus on palm oil cultivation, but took the palm oil biodiesel lifecycle as its unit of analysis. It typically compared palm oil biofuel sustainability impacts to impacts of biodiesels based on other feedstocks, such as rapeseed, sugarcane or organic waste.[64] Based on such comparisons, researchers, especially those based at institutes in palm oil cultivating countries, often claimed that biodiesel from palm oil performed better than biodiesel produced from European rapeseed.[65]

[63] Pye, 'The biofuel connection'; Lam and Lee, 'Renewable and sustainable bioenergies'.

[64] S. de Vries et al., 'Resource use efficiency and environmental performance of nine major biofuel crops, processed by first-generation conversion techniques', *Biomass and Bioenergy* **34** (5) (2010): 588–601.

[65] K.F. Yee et al., 'Life cycle assessment of palm biodiesel: revealing facts and benefits for sustainability', *Applied Energy* **86** (2009): S189–96.

This lifecycle approach resonates with the 2009 EU Renewable Energy Directive's (EU RED) sustainability criteria, which sought to ensure that the transition from fossil fuel to biodiesel met the sustainability objectives of the EU RED. Similar to the foregoing strands of investigation, voices raising the possibility of not using biodiesel at all remained comparatively silent. The great majority of publications by scholars from across the globe set out to benchmark the environmental impacts of (palm oil-based) biodiesel lifecycles against EU RED criteria, so as to investigate or demonstrate how a particular biodiesel production process could meet – or be made to meet – the criteria.[66] Others assessed the EU RED sustainability criteria themselves: were these appropriate, considering the environmental impacts of biodiesel lifecycles measured in practice?[67]

Similar to the case of the RSPO literature, again we identified less frequently-cited counter voices challenging the dominant trend. Incidentally, researchers did challenge the normative desirability and rationality of the EU RED sustainability criteria and the capacity of its policy instruments to reduce emissions inside Europe.[68] Another study produced data in support of Malaysia's attempts to set its own biodiesel sustainability standard.[69] Iterating between arguments in specific papers and queries of the entire data set leads us to conclude, however, that these were once again exceptions that help put the dominant pattern into perspective.

[66] H H.J. Cho, 'Life-cycle greenhouse gas emissions and energy balances of a biodiesel production from palm fatty acid distillate (PFAD)', *Applied Energy* **111** (2013): 479–88.

[67] G. Pehnelt and C. Vietze, 'Recalculating GHG emissions saving of palm oil biodiesel', *Environment, Development and Sustainability* **15** (2013): 429–79.

[68] A. Pols, 'The rationality of biofuel certification: A critical examination of EU biofuel policy', *Journal of Agricultural and Environmental Ethics* **28** (4) (2015): 667–81.

[69] C.J. Verbanic, 'Biodiesel fuels – Panacea or Pandora's Box', *Fuels and Lubes International* **13** (4) (2007): 32–34.

Conclusions

Critically researching the diverse and differentially enacted social and environmental challenges of our times requires transcending several scholarly boundaries at once: temporal, spatial and disciplinary divides, as well as the divide between research and politics.[70] The field of sustainability history is especially geared to transcending disciplinary (economic–social–environmental) and temporal (past–present–future) boundaries, but hitherto has insufficiently interrogated questions of inequitable global sustainability narratives and entanglements between academic research and politics. We addressed both omissions simultaneously by studying the global knowledge politics of academic sustainability research for the controversial case of palm oil, with particular focus on Europe–Southeast Asia relations. We would like to conclude this paper with some observations on our mixed-methods approach – transcending methodological boundaries is also part of the exercise – as well as the empirical insights that it helped produce.

Our mixed-methods approach, we feel, facilitated meaningful analysis of vast amounts of sources through careful iterations between scientific database queries, scanning abstracts and close-reading of full publications. These iterations proved crucial to understanding the knowledge politics at play in expected, but also unexpected, ways: the transregional politics of palm oil sustainability research were not configured by inequalities in the number of research contributions between authors with European and Southeast Asian research affiliations (which contradicts the dominant pattern in most fields of research).[71] Instead, systematic and important transregional asymmetries played out within the different lines of investigation that our approach helped identify (which we discuss below).

Also pertaining to our research approach, we argued that it was

[70] E. van der Vleuten, 'History and technology in an Age of "Grand Challenges": Raising questions', *Technology and Culture* **61** (1) (2020): 260–71.

[71] Q. Gui, C. Lui and D. Du, 'Globalization of science and international scientific collaboration: a network perspective', *Geoforum* **105** (2019): 1–12.

crucial to avoid *a priori* regional essentialism while investigating transregional politics of difference between Southeast Asia and Europe in palm oil research. Instead, we studied whether and how our sources used such regional spatial categories such as 'Southeast Asia' or 'Europe' – which the sources rarely did. Other spatial categories dominated the scene both descriptively and normatively/politically: research on palm oil production and processing spatially delineated its research object most often descriptively, as located in specific countries or micro-regions (The Malaysian Jenka triangle, West-Kalimantan, the Brazilian Cerrados, the Adja Plateau in South Benin, Southern Nigeria, etc). We also found much research guided by blatant and normative universals of 'global' issues affecting 'all of humanity' or pitching 'developing countries' or 'Southern' situations and perspectives against 'developed' or (implicitly) Northern perspectives; such research was usually affiliated with European, North American or Australian research institutes or international organisations. However, we also looked beyond how historical actors themselves articulated their spatial units of analysis or concern, and identified less obvious, but not less important, Southeast Asian-European politics of difference at work in the sources analysed.

This leads us to the sort of empirical insights on global sustainability knowledge politics that our approach brought to the fore. We identified two different and politically-charged discourses that dominated palm oil sustainability research throughout the period under investigation. On the one hand, we encountered (micro) regional and national studies of sites of palm oil production that focused on the direct and locally tangible economic and ecological sustainability gains and challenges of setting up plantations, reducing oil milling pollution and avoiding unproductive waste of biomass residues. In this 'domestic sustainability' research line, domestic (local, micro-regional, national) problems were usually addressed by domestic researchers (though regularly collaborating internationally), and this research usually suggested solutions to domestic actors. In its early days this research line was thematically and geographically diverse; however, from 2005 onward, when the

palm oil sustainability research boom ignited, it was increasingly dominated by Malaysian research on Malaysia's palm oil biomass waste challenges.

On the other hand, a 'global problems' research line was predominantly affiliated with and led by research institutes in Europe and the United States and international organisations. This research line is not uniquely voiced by actors based in the global North, however: such work is not uncommonly conducted in collaboration with researchers with a 'global South' research affiliation. This work typically homed in on the 'global problems' of biodiversity loss and, later, rising atmospheric greenhouse gas concentrations caused by deforestation at palm oil production sites. Today, this research line's problem statements resonate with geologists' take on the Anthropocene and sustainability scientists' work as represented through for example the Future Earth programme.[72] Such 'global problems'-oriented palm oil research (often but not exclusively performed by environmental scientists) tended to place chief responsibility for causing and solving global problems in palm oil production sites; the role for European and North American actors was chiefly to produce knowledge, including – after 2004 – knowledge about the governance of 'global problems' through instruments that claimed equally 'global' validity, most prominently the Roundtable for Sustainable Palm Oil. This contentious instrument enabled palm oil actors across the world to meddle in the domestic affairs of palm oil producing countries that were seen as the 'global problem' causers; academic research subsequently studied compliance, effectivity and justice issues related to these interventions.

While these two discourses did not speak of Southeast Asia versus Europe, their implicit and sometimes explicit (especially in the early days of this research line) definitions of problems, solutions and responsibilities did configure an asymmetrical relationship between

[72] W. Steffen, P. Crutzen and J. McNeill, 'The Anthropocene: Are humans now overwhelming the great forces of nature?', *Ambio* **36** (8) (2007): 9; S. van der Hel, 'Science for change: A survey on the normative and political dimensions of global sustainability research', *Global Environmental Change* **52** (2018): 248–58.

the regions. We observe that 'global problems' research by-and-large ignored 'domestic sustainability' research – it was all but oblivious to issues such as water pollution by palm oil mills, for example. Conversely, the latter did repeatedly refer to the former – to the extent that it affected domestic affairs and export concerns.

Both discourses amplify and neglect some voices at the expense of others, but here we would like to dwell on the 'global problems' discourse that dominates much governance thinking in scholarship and practice today. Historical inquiry of global sustainability knowledge politics, we have shown, can help identify (rather than unreflectively reproduce) projections of European, North American, and international organisations' concerns as 'global' and 'all-humanity' ones, and how these projections reduce the visibility of a broader plurality of perspectives on sustainability. Indeed, if the study of knowledge politics includes identifying which and whose histories, experiences and concerns are foregrounded and sidelined in academic knowledge production, and thereby made more or less visible and 'governable', then we must conclude that European and North American 'global' palm oil unsustainability knowledge is geared towards a particularly postcolonial mode of governing the future of palm oil's sustainability challenges, namely transnational voluntary certification. The framing 'palm oil cultivation creates global sustainability problems that damage everyone's well-being' legitimises 'global' governance practices by private actors targeting the behavior of palm oil producers in the global South through e.g. the RSPO. Furthermore, this research's focus on cultivation and processing as the root cause of global problems renders palm oil production visible and governable but not palm oil trade, marketing or use. And this 'global problem' discourse co-emerged with an asymmetrically-applied set of normative judgements that can similarly be characterised as postcolonial, since these resonate with colonial powers' engagements with their colonies: actors involved in palm oil production are cast as primarily interested in socio-economic wellbeing, and much less in the ecological concerns that both scholars and societal actors on the so-called international scene claim to be concerned with. This leaves out of the equation

how Europe and North America continue to import and economically profit from large amounts of palm oil, as well as ecological impacts produced more generally *in* the global North in past (e.g., large-scale deforestation) and present (e.g., greenhouse gas emissions). To illustrate the major inequalities in ecological impact produced by different actors' practices across the globe: recent research indicates that the richest ten per cent of the population has been responsible for 52 per cent of the cumulative CO_2 emissions between 1990 and 2015, while the poorest fifty per cent were responsible for only seven per cent.[73]

Such omissions, we argue, critically shape the ways in palm oil futures are (not) envisioned. To open up more inclusive pathways for the future that challenge and stretch beyond dominant imaginaries from the global North, we encourage historical research into diverse 'global South' sustainability knowledges and narratives, and empirical studies that address and analyse sustainability knowledges and narratives in the 'global North' – which, if one looks beyond universalistic frames such as the global problems discourse identified in this paper, also turn out to be diverse, contradictory, and contested.[74] In addition, we observe that scholarly enactments of 'global problems' are underpinned by the dominance of specific reductionistic forms of academic knowledge production, notably grounded in (post)positivist epistemologies and modern development discourses. We would like to conclude by suggesting that an epistemic decolonisation of palm oil sustainability research is critical to develop more inclusive palm oil futures that take diverse stakeholders' perspectives and politics seriously. Such decolonisation cannot do without closer

[73] T. Gore, 'Confronting carbon inequality: Putting climate justice at the heart of the COVID-19 recovery', *Oxfam Media Briefing*, 21 September 2020.

[74] E. van der Vleuten and E. de Hoop, 'Crisis narratives from the Dutch Soyacene: Regional sustainability hi/stories at sites of soy consumption', in C.M. da Silva, C. de Majo, A. Zarrili (eds), *The Age of the Soybean: An Environmental History of the Soyacene during the Great Acceleration* (Cambridge: The White Horse Press, 2022 in press); E. van der Vleuten, 'Unpacking "Eurocentric" technology discourses "back home": Technology and societal challenges in Western Europe', in L. Perez et al. (eds), *A Global History of Technology* (Turnhout: Brepols, in press).

examination of the diverse ontologies, epistemologies and methodologies in play in academic research.[75]

Acknowledgements

We thank the team of authors and editors of this special issue, masters students Cyrill Schumm (Utrecht University) and Hidde Markx (Vrije Universiteit Amsterdam) and students on the course Modern Societies in Transition (Eindhoven University of Technology) for encouragement and feedback on our ideas and earlier versions of this paper. All choices and errors remain our full responsibility. We also thank the participants in the workshop 'Resources, Infrastructures and the Anthropocene: Dialogues between the Global-North and the Global-South', hosted by the Universidade NOVA de Lisboa (18–20 September 2019) and co-financed by the Dutch Research Council NWO Internationalizing Humanities program GREASE (IG.18.036).

[75] V. Mitova, 'Decolonising knowledge here and now', *Philosophical Papers* **49** (2) (2020): 191–212.

Evelien de Hoop is based at the transdisciplinary Athena Institute (Vrije Universiteit Amsterdam, NL). With a background in Science and Technology Studies, she works with scholars from diverse disciplines and societal stakeholders to address contemporary health and sustainability challenges. Empirical foci include Indian farmers' engagements with biofuels, sustainable Dutch countrysides, and inclusive food systems in deprived urban areas. She mobilises research on the historical and transnational entanglements of contemporary challenges, with a particular focus on knowledge politics, to render her contemporary work historically-sensitive and pluralise ways of thinking about the future.

Email: e.de.hoop@vu.nl

Erik van der Vleuten teaches at Eindhoven University of Technology and researches the connected histories of technology and socioecological change in an infrastructured world. Earlier works include: *Europe's Infrastructure Transition: Economy, War, Nature* (2015, with Per Högselius and Arne Kaijser) and *Engineering the Future, Understanding the Past: A Social History of Technology* (2017, with Ruth Oldenziel and Mila Davids). His current research and education focus on diverse and contested sustainability histories and futures of distant-yet-connected regions across the globe.

Email: e.b.a.v.d.vleuten@tue.nl

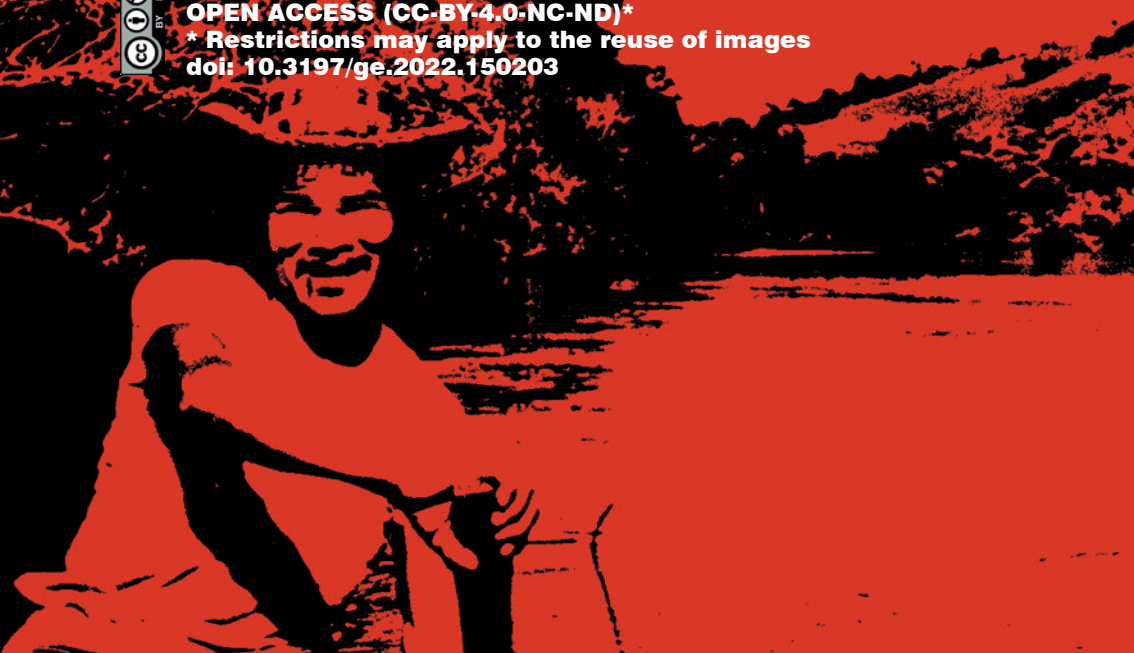
Bio-anthropophagy, or the Anthropocene in the Making: the Caboclo Peoples in the Construction of Modern Brazil (1889–1939)

Claiton Marcio da Silva and Claudio de Majo

Only anthropophagy unites us. Socially. Economically. Philosophically. The unique law of the world. Masked expression of all individualisms, of all collectivisms. Of all religions. Of all peace treaties. Tupi, or not Tupi, that is the question.
[…]
Oswald de Andrade
In Piratininga.
Year 374 since the Swallowing of Bishop Sardinha.[1]

Global Environment 15 (2022): 246–272

doi: 10.3197/ge.2022.150203



In his seminal 1928 Cannibalistic Manifesto (*Manifesto Antropofágico*), ironically dated *Year 374 since the Swallowing of Bishop Sardinha*, a deed allegedly carried out by the indigenous tribe *Caetés*, Oswald de Andrade poked fun at antiquated European traditions. His account strived to look at the funny side of the dilemma facing the young Brazilian nation, a steaming melting pot of European, African and Amerindian ethnic groups and cultural traditions that 'needed to be devoured and used as an energy source for new creations'.[2] Whereas some of his contemporaries argued about the importance of whitening the nation's ethnic profile, Andrade and other modernists considered the encounter between different ethnic groups enriching.[3] In a political context of widespread prejudice and persecution, intellectuals such as Andrade looked for the redemption of racial minorities, exalting the potential of mixed populations. However, while this argument gained ground in national discourse after the rise of the sanitation movement, in practical terms, several mixed groups continued to be targeted by radical political reforms during the first half of the twentieth century. Sustained by sanitation theories, modernist reformists argued for the need to tame and civilise untamed environments, dismantling several rural populations' traditional way of life to improve their livelihoods according to European standards.

This article analyses the historical trajectory of a southern Brazilian population emerging from the interbreeding of Amerindian, African and European peoples: the so-called *caboclos*. In particular, it focuses on their relationship with Brazilian institutions in the context of the nation-building and state modernisation processes that invested the country between 1889 and 1939. This eminently rural society mainly lived by subsistence practices in close relation

[1] Oswald de Andrade, 'Manifesto Antropofago', *Revista de Antropofagia* **1** (1928): 3 and 7.

[2] M. Foster, 'Manifestos', in D. Balderston, M. Gonzalez and A.M. Lopez (eds), *Encyclopaedia of Contemporary Latin American and Caribbean Cultures,* Volume 1 A-D (New York and London: Routledge, 2000), p. 902.

[3] N. Stepan, 'Eugenia no Brasil, 1917–1940', in G. Hochman and D. Armus (eds), *Cuidar, controlar, curar: ensaios históricos sobre saúde e doença na América Latina e Caribe* (Rio de Janeiro: Editora FIOCRUZ, 2004), pp. 330–91.

to the southern Brazilian subtropical environment – what Antônio Cândido has defined as 'vital and social minimum'.[4] Their different notion of life and social organisation produced frictions with the European immigrants who settled in southern Brazil from the first decades of the nineteenth century, as their very existence clashed with the country's modernising agenda. Although *caboclos* constituted a considerable portion of the population of southern Brazil during the nineteenth century, they were generally regarded as lazy, ignorant and disconnected from the modern world. As a result, they were considered virtually incapable of actively participating in the national developmental effort.[5]

Several studies on the expansion of the Latin American agricultural frontier have discussed the oppressive practices enacted on indigenous people by European colonisers and nation-states.[6] In recent times, historical studies have shown how the creation of plantations all over the Global South has crucially shaped the destinies of indigenous societies, and how several flora and fauna species were assimilated as natural assets.[7] An endemic racial matrix also characterised these historical processes. In several instances, the destruction of wildlife territories was associated with ethnic persecution and forced

[4] The idea of 'minimum' defines the condition of physical and social subsistence of asociety, constantly striving at the limits between hunger and anomie. See A. Cândido, *Os parceiros do Rio Bonito* (São Paulo: Duas Cidades, 1971). Also see L.C. Jackson, 'A tradição esquecida: estudo sobre a sociologia de Antonio Candido', *Revista brasileira de Ciências Sociais* **16** (47) (2001): 127–40.

[5] M.A.B. da Silva, *Caboclos e colonos: encontros, ocupação e conflitos nas matas do Rio Grande do Sul (1850–1889)* (Curitiba: Prismas, 2016), pp. 153–54.

[6] See, for example, J. de Souza Martins *Fronteira: a degradação do outro nos confins do humano* (São Paulo: Contexto, 1997). Also see L. Tombini Wittmann, *Atos do contato: histórias do povo indígena Xokleng no Vale do Itajaí/SC (1850–1926)* (Doctoral Dissertation in History at State University of Campinas (SP), 2005).

[7] See, for example, A. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge: Cambridge University Press, 1986). Also see M. Gerhardt, 'Colonização, natureza e erva-mate no Paraguai: 1880–1920', in J.A. Drummond, J.L. de Andrade Franco, S. Dutra e Silva and V. da Silva Braz (eds), *História Ambiental: natureza, sociedade, fronteiras*, vol. 3 (Rio de Janeiro: Garamond, 2020), pp. 353–76.

cultural assimilation. These included policies of enforced Christianisation, resettlement and eviction from historically inhabited lands. Just as importantly, the creation of monocultures in several of these territories went hand in hand with processes of bio-piracy, as European settlers incorporated traditional ecological knowledge to optimise production. Perhaps the most crucial example all over the southern American subtropics includes the extraction of the so-called *erva mate* (*Ilex Paraguariensis*, literally *mate* weed) initially utilised by Guarani people in the regions of the current frontier territories between Brazil, Argentina and Paraguay. Since the nineteenth century, this weed was harvested by the forceful labour of *caboclos* and exported to European countries such as England. Between the late 1880s and early 1930s, this process caused the marginalisation of local indigenous groups while at the same time promoting the region's economic integration and the rise of extractive elites in the Brazilian states of Paraná, Santa Catarina and Rio Grande do Sul.[8]

By reconstructing the historical process that led to the forceful assimilation of *caboclo* people in the southern Brazilian frontier, this article adopts the term 'bio-anthropophagy', a concept that describes the combination of cultural and biological practices of persecution and appropriation that took place in the region. Both anthropological and biological elements of the syncretic *caboclo* culture were indeed literally ingested by an ambitious political agenda combining nation-building processes with daring agricultural targets to be accomplished through scientific and technological fixes.[9] Consequently, just as much

[8] See R.F.G.D. de Melo and C.A. Brighenti, 'Memórias e documentos do povo Guarani Paranaense na construção da Itaipu', *RELACult - Revista Latino-Americana de Estudos em Cultura e Sociedade* **6** (2020): 1–15. See also C.A. Brighenti, *Estrangeiros na Própria Terra: Presença Guarani e Estados Nacionais* (Florianopolis/Chapecó: ARGOS/EdUFS, 2010).

[9] In a similar vein, Tiago Saraiva has recently suggested that the notion of anthropophagy defended by modernist reformers of this time is 'part of a continuum of historical practices' able to subsume social, economic and biological spheres of existence. As Saraiva demonstrates in his history of orange plantations in the state of São Paulo, the assimilation of human practices and non-human qualities by an ambitious reformist state suggests the potential of this concept to 'write new global histories of science and technology'. See T. Saraiva, 'Anthropophagy and

as the *caboclos* became considered an ethnically defective culture to reform and improve, their traditional crops and animals were deemed genetic material that needed to be 'improved' or erased. Overall, in the southern Brazilian frontier, state functionaries, European farmers and traders progressively devoured the socio-ecological world that had resulted from centuries of coevolutionary processes between different human groups and their ecological realm.

On the other hand, the term bio-anthropophagy also strives to overcome historical narratives depicting colonial and postcolonial encounters between different human groups as a monolithic process. Over the years, environmental history has found meaningful connections with colonial history and postcolonial theory, displaying the inherent link between ecological and cultural processes at the core of European colonialism.[10] While such a topic still possesses enormous potential, a historically informed perspective should not omit the unique results produced by the encounters of different civilisations.[11] The example of *caboclos* differs from conventional colo-

sadness: cloning citrus in São Paulo in the Plantationocene era', *History and Technology* **34** (1) (2018): 89–99; and E.V. de Castro, *Metafísicas canibais. Elementos para uma antropologia pós-estrutural* (São Paulo: UBU/N-1 edições, 2018).

[10] See, for example, A. Crosby, *The Columbian Exchange*: *Biological and Cultural Consequences of 1492* (Westport: Greenwood Press, 1972) and *Ecological Imperialism*; W. Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983); R.H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and The Origins of Environmentalism 1600–1860* (Cambridge: Cambridge University Press, 1995). and *Ecology, Climate and Empire: Colonialism and Global Environmental History, 1400–1940* (Cambridge: The White Horse Press, 1997); J.F. Richards, *The Unending Frontier: An Environmental History of the Early Modern World* (Berkeley: University of California Press, 2003); L. Hollsten, 'Controlling nature and transforming landscapes in the early modern Caribbean', *Global Environment* **1** (2008): 80–113.

[11] See, for example, J. Carney, *Black Rice: The African Origins of Rice Cultivation in the Americas* (Cambridge MA: Harvard University Press, 2002); J. Carney and R. Rosomoff, *In the Shadow of Slavery: Africa's Botanical Legacy in the Atlantic World* (Berkeley: University of California Press, 2009); A. Sluyter, *Black Ranching Frontiers: African Cattle Herders of the Atlantic World 1500–1900* (New Haven: Yale University Press, 2012); J. Carey and B. Silverstein, 'Thinking with and beyond settler colonial studies: New histories after the postcolonial', *Postco-*

nialist narratives, demonstrating how a subaltern population facing extermination managed to negotiate its survival through a form of biocultural hybridism. Although *caboclo* people were forcefully assimilated in the texture of western society, they also devoured the exogenous cultural elements that guaranteed them a diverse lifestyle before the arrival of European *colonos*. Confronting violent policies of massacre, eviction and forced labour, their resistance strategies consisted in indoctrinating their antagonist populations with practices linked to agroforestry techniques or medicinal practices.

This article describes this process of assimilation in two different moments. First, it looks at the impact of racial theories promoted by national institutions during the nineteenth century – aimed at whitening the Brazilian race – that led to ethnic persecutions and forced interbreeding. Second, it addresses the role of the combination of eugenic and sanitation theories since the 1920s, which explicitly targeted the environments these people inhabited, determining major ecological transformations in the region. The combination of these bio-anthropophagic reforms managed to unravel the *caboclo* way of life and their ecosystem resulting from centuries of interactions with other species. However, some of the ecological practices and values resurfaced in recent times, concurrently with the emergence of environmentalism and agroecology.

Anatomy of the subtropical *caboclo*

Although nowadays the ethnocentric meaning of the term *caboclo* is often criticised, it is mainly used in respect of the heterogeneous ethnic group that originated in the subtropical rainforests in the frontier regions between southern Brazil, Argentina, Uruguay and Paraguay.[12] Today *caboclo* societies proudly share common val-

lonial Studies **23** (1) (2020): 1–20; C. de Majo, 'Creole ecologies, feral customs: A coevolutionary history of buccaneering in Hispaniola during the seventeenth century', *Historia Ambiental Latinoamericana Y Caribeña (HALAC)* **12** (1) (2022): 353–87.

[12] Several authors have recently revaluated the negative connotation of the

ues, such as solidarity, fearlessness, popular religiosity and honour.[13] Historically, *caboclos* originated from the violent miscegenation of Portuguese/Spanish conquerors and indigenous people during the colonial era (1500–1822). Initially known as *mamelucos*, different crossbred groups received several definitions, such as *sertanejos*, *caipiras*, *caiçaras* or *caboclos*, depending on the bioregion where they originated – an example reminiscent of the notion of *mestizos* or *creoles* in the Spanish Americas. The cross-frontier identity, tying Brazil, Argentina and Paraguay, emerged from the migratory policies stimulated by the extraction of *erva mate*. These led Argentinean and Brazilian traders to hire poor Paraguayan workers to harvest their territories. These people were either former African slaves, *caboclos* and indigenous people from Guarani and Kaingang tribes, collectively known under the deprecatory term of '*macacos-gambás*' or orphans of Paraguayan war (1860–65) and their descendants, known as *brutos selvajes*. They inhabited riverine territories and forests of the southern frontier, occupying large areas in the western regions of the Brazilian states of Paraná, Santa Catarina, and Rio Grande do Sul.[14] These were mainly untamed forests or abandoned territories broadly known as *sertão*, where these multi-ethnic groups could establish subsistence farming practices. Thus, far from constituting a unified social group, the term *caboclo* primarily refers to the relation

term *caboclo*. Until the 1980s, common socio-regional memory attributed a racialised connotation to the term. However, since then, academic debates have reinstated it as a term defining a traditional native group with distinctive social organisation, material practices, familiar structures and religiosity. See P.P. Machado, *Lideranças do Contestado: a formação e a atuação das chefias caboclas (1912–1916)* (Campinas: Unicamp, 2004); A. Renk, *A luta da erva: um ofício étnico da nação brasileira no oeste catarinense* (Chapecó: Grifos, 1998) and J. Poli, 'Caboclo: pioneirismo e marginalização', in *CEOM, Para uma história do Oeste Catarinense: 10 anos de CEOM*, ed. Centro de Memória do Oeste Catarinense, pp. 149–87 (Chapecó: UNOESC, 1995).

[13] Renk, *A luta da erva*.

[14] See A.M. Myskiw, 'Santa Cruz: um bandido nada social na história do Oeste do Paraná', in H.J. da Rocha (ed.), *Étnicos, milenários e bandidos: história dos movimentos sociais no Sul do Brasil (séculos XIX–XX)* (Passo Fundo: Acervus, 2020), p. 311.

between foreign immigrants and different groups of poor Brazilians who inhabited either the forest or scattered rural settlements. Several encounters further enriched this already heterogeneous ensemble.[15] In subtropical Brazil, their semi-nomad settlement initially took place along the Troop Trail, which transported cattle from Argentina and the Brazilian South towards the interior of São Paulo.

Subsequently, this southern population scattered around rural regions as landless farmworkers and in woodland areas, where they lived a semi-nomad lifestyle. In this context, they explored a large portion of the Atlantic rainforest, a luxuriant and bio-diverse ecosystem dominated by araucaria pine trees (*Araucaria Araucana* and *Araucaria Angustifolia*) which played an essential role in developing their subsistence practices. The forests' pine groves, stretching for almost 2,000 kilometres, constituted a vital source of nourishment for these populations. Their nuts – known as *pinhões* – contain essential nutrients, such as carbohydrates, essential fats, minerals, antioxidant vitamins from the B-complex, calcium, zinc, phosphorus and magnesium.[16] This thriving ecosystem also sheltered a heterogeneous population of bird and small mammal species. Among them, it is worth noting lowland pacas (*Cuniculus paca*), Central American agouti (*Dasyprocta punctata*), collared peccary (*Pecari tajacu*) and white-lipped peccary (*Tayassu pecari*).[17]

[15] Myskiw reminds us that, from the end of the nineteenth century, during the harvest of yerba mate in the western state of Paraná, Paraguayans were seen as *Guarani* indigenous people by *Kaingang* indigenous people. The historical disputes between these two ethnic groups resulted in a conflict linked to the harvesting of *erva mate*. Moreover, the settlement policies promoted by the Brazilian state during the mid-nineteenth century forcefully relocated both *Kaigangs* and *Guarani* people to marginal territories, together with less numerous groups such as *Xetá*. See Myskiw, 'Santa Cruz', p. 311.

[16] On the nutritive characteristics of *pinhões*, see R.C.B. de Godoy, R. Deliza, M. de Fátima de Oliveira Negre and G.G. dos Santos, 'Cosumidor de pinhão: hábitos, atributos de importância e percepção', *Brazilian Journal of Forestry Reseach* **36** (2018): e201801655. On their historical role, see S.B. de Holanda, *Caminhos e fronteiras* (São Paulo, Companhia das Letras, 1994), p. 58.

[17] D.J. Valentini, *Da cidade santa à corte celeste: memórias de sertanejos e a Guerra do Contestado* (Chapecó: Argos, 2016).

On the other hand, these complex environments also profited from the dynamics generated by anthropogenic actions. The advancement of pioneer pine species is historically related to the migration of indigenous people along the continent and to their forest practices, tracing back to at least 1,400 years ago.[18] The *caboclo* societies documented between the nineteenth and twentieth century relied on a series of subsistence activities typical of indigenous peoples, such as hunting, fishing and farming yerba mate. European-borne agricultural activities complemented them, most notably the rearing of hogs in semi-feral conditions.[19] During the nineteenth century, animal husbandry reached the region as part of the imperial campaigns that aimed to explore the country's remotest western territories and preserve its frontiers against antagonistic nations. In this context, the Brazilian crown started a forced settlement of indigenous peoples in reserves and inaugurated the first rancher farms.[20] Moreover, by the end of the nineteenth century, the national state established military-sponsored colonies based on regional subsistence agriculture. These mainly included descendants of Portuguese colonisers, indigenous peoples and enslaved Africans.[21]

As a result, for the subtropical *caboclos,* private property and industrial agriculture were never an option. Instead, this population primarily cultivated small subsistence crops, carried out collective animal farming practices, gathered fruits and farmed yerba mate.[22]

[18] See M. Robinson, J.G. De Souza, S.Y. Maezumi, M. Cárdenas, L. Pessenda, K. Prufer, R. Corteletti, D. Scunderlick, F.E. Mayle, P. De Blasis and J. Iriarte, 'Uncoupling human and climate drivers of late Holocene vegetation change in southern Brazil', *Scientific Reports* **8** (7800) (2018).

[19] S.P. Moretto and M. Brandt, 'Das pequenas produções à agroindústria: suinocultura e transformações na paisagem rural em Chapecó, SC', *Tempo e Argumento* **11** (26) (2019): 229–54.

[20] W. D'Angelis, 'Para uma história dos índios do Oeste Catarinense', *Cadernos do CEOM* **19** (23) (2014): 254–343.

[21] A.M. Myskiw, *A fronteira como destino de viagem: a colônia militar de Foz do Iguaçú (1888–1907)* (Doctoral Dissertation in History at Federal Fluminense University, 2009), p. 245.

[22] M. Brandt and N.J. de Campos, 'Uso comum da terra e práticas associativistas da população cabocla do planalto catarinense', *Geosul* **23** (45) (2008): 43–64.

Although one should not indulge in romanticising their rather ecological lifestyle, they managed their lands and forests through a system of essential coexistence with several animal and vegetal species, such as fish, hogs,and medicinal plants.[23] The ensemble of these customary practices generated the so-called *caboclo* landscape. While their slash-and-burn agricultural practices left a mark on the local rainforests, they also allowed several families to make a living without creating major environmental imbalances. An essential element of their multispecies ecosystem was the division between 'planting lands' and 'farming lands'.[24] The former were centred upon corn farming combined with beans and sometimes with pumpkins and watermelons. The latter were enclosed with the timber cut from tree trunks and fertilised with ashes. The low intensity of these practices and the land rotation system allowed cleared soils to rest and the forests to regenerate.[25] Complementarily, the *caboclos* used farming lands for rearing cattle and hogs in the forest. Hog farming practices followed a sophisticated calendar adapted to the forest's natural cycles. Several fruits complemented their diets during the spring and summer seasons, while *pinh*ões and corn sustained them during the autumnal and winter seasons.[26] This well-rooted lifestyle was progressively shaken by the settlement of European immigrants since the late nineteenth century – Italian, German and Polish descendants who epitomised the Brazilian state's ambitious modernisation plans.

[23] C. M. da Silva, S. P. Moretto and D. Valentini, 'Né indigeni, né discendenti degli europei: i *cablocos* dell'America subtropicale da subalterni a modello di *Buen Vivir* alternativo (1890–2019)', *Diacronie. Studi di Storia Contemporanea* **44** (4) (2020): 152–75.

[24] Moretto and Brandt, 'Das pequenas produções', 232; Renk, *A luta da erva*.

[25] da Silva et al., 'Né indigeni, né discendenti degli europei', 170–73.

[26] See M. Brandt, 'Criação de porcos 'á solta' na floresta ombrófila mista de Santa Catarina: paisagem e uso comum da terra', *História (São Paulo*) **34** (1) (2015): 303–22; da Silva et al., 'Né indigeni, né discendenti degli europei', 170–73.

Ethnic assimilation

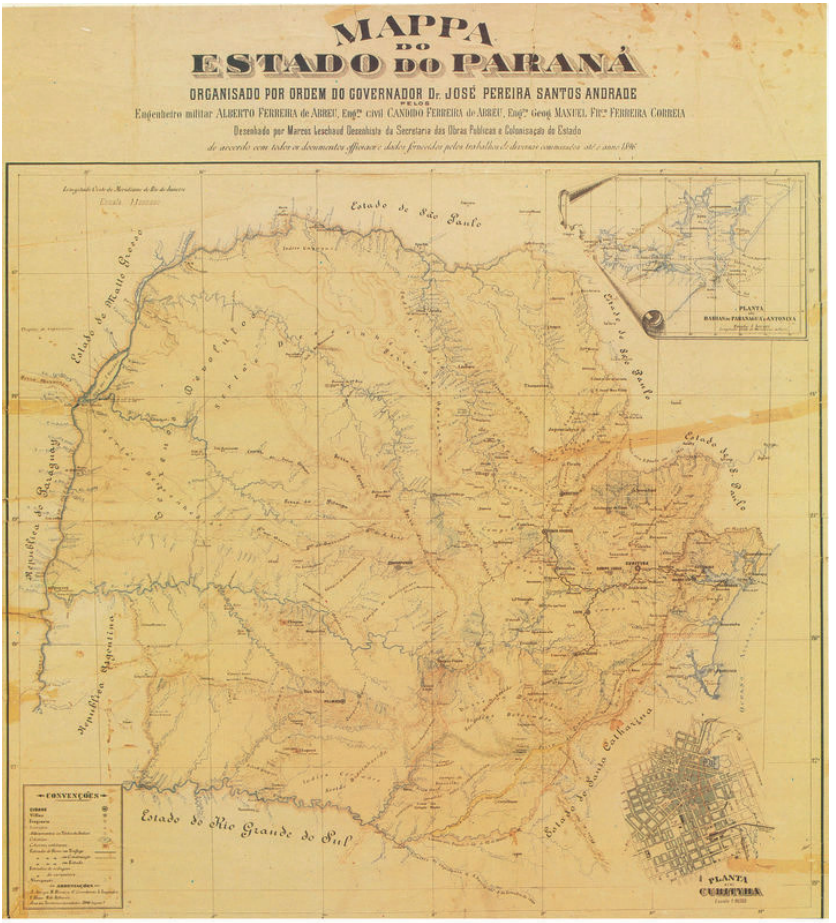
Despite their nuanced identity condensing some of the nation's most distinctive anthropological and cultural features, *caboclo* communities never enjoyed the appreciation of Brazilian authorities, both on account of their rather 'unproductive' lifestyle and due to the government's fear of losing the frontier lands contested by Argentina (*fronteiriças*).[27] After coming to terms with their rival nation in 1890, the governments of southern Brazilian states sought to incentivise the internal migration of European descendants. As a result, groups of *colonos* originally from Germany, Italy and Poland, who had first established in the southernmost state of Rio Grande do Sul in 1824 and later in Santa Catarina (1829) and Paraná (the 1880s), began to march towards frontier territories occupied by Brazilian *caboclos*. Although they came from different parts of Europe, in the eyes of the Brazilian political elite, they embodied a set of social values centred on private property and the notion of hard labour that starkly contrasted those of the rural Brazilian populations of the time. Encouraged by national authorities to widely occupy the state's 'empty' territories, they pushed themselves to inner regions contested with Argentina. In this context, they scattered over large forest areas. Such a policy also functioned to begin the whitening process. In the Brazilian South, the idea of whitening the race went hand in hand with the concept of *vazio demográfico* (literally, 'demographic emptiness'), a concept formulated by Brazilian political elites to justify the colonisation of territories inhabited by indigenous and *caboclo* groups. Equally important, it fulfilled the country's aim to improve the nation's ethnic profile while at the same time taming several bioregions sparsely inhabited by indigenous people and *caboclos*.[28]

European immigrants experienced this migratory process as an epic accomplishment. They were forced to confront an unknown environment, brimming with dangerous wildlife species – from large preda-

[27] P. Zarth, J.C. Radin and D.J. Valentini, *História da Fronteira Sul* (Porto Alegre/Chapecó, Letra & Vida/Editora da UFFS, 2015).

[28] See Zarth et al., *História da Fronteira Sul*.

Map 1. The State of Paraná depicted in an 1896 Map by Alberto Ferreiro de Abreu, Cândido Ferreira de Abreu, Manuel Francisco Ferreira Correia (eds).



The drawing was realised by Marcos Leschaud, official draughtsman of the Secretariat of Public Works and Colonisation of the Paraná state. The state's territories right above the word 'Sul' (South) portray the region still as an 'unknown wilderness' to local authorities. After the end of the Contestado War (1912–1916), this region became part of the state of Santa Catarina.
Source: Museum of Paraná *(Museu Paranaense)*. Available at: https://www.museuparanaense.pr.gov.br/Pagina/Mapas.

tor animals to deadly mosquitoes. Harsh subtropical climatic patterns added up to forest dangers. Humid summers and cold winters shaped the sturdy complexion of European immigrants. While, until the early nineteenth century, the Brazilian state had used mixed people to occupy the contested border territories with Argentina, from the 1910s, regional elites ruled in favour of a migratory policy aimed at favouring the dispersal of European-born *colonos*.[29] The rise of white colonisers in the region implied the systematic persecution of this ethnic minority through (more) violent means. While European *colonos* often murdered *caboclo* men in cold blood, they assimilated women and children in the frontier's developing social texture – the former forced to marry white settlers and the latter destined to domestic work in white households. More specifically, in rural areas of the Brazilian South, traders and economic elites promoted the so-called *correrias* – that is, the invasion of indigenous hamlets to 'lasso' women and children. After forced abduction, neo-European *colonos* would drag their 'prey' to their settlements and subject them to torture to 'educate' women to marriage and children to work in their households.[30] Although it was not the only instance of ethnic persecution, the lassoing of women and children epitomised the bio-anthropophagic practices adopted in southern Brazil to 'tame' *caboclo* populations. Forced miscegenation was the core practice adopted by regional elites to accomplish the double aim of controlling the Brazilian frontier while at the same time progressively whitening the nation's racial profile. Moreover, from the late nineteenth century, the weed farmers that promoted the colonisation of the Paraná River along the frontier between Argentina and Brazil created prostitution houses and forced *caboclo* women and children

[29] After the Contestado War (1912–1916), the government of Santa Catarina incentivised the migration of second and third generation European *colonos*, originally settled in the neighbouring state of Rio Grande do Sul, to occupy the western part of Santa Catarina. This policy in turn intensified land disputes among indigenous peoples, *caboclos* and *colonos*. See A.A. Werland, *Disputas e ocupação do espaço no oeste catarinense* (Chapecó: Argos, 2006); and J.C. Radin, *Representações da colonização* (Chapecó: Argos, 2009).

[30] C.S. Wolff, *Mulheres da floresta: outras tantas histórias* (Campinas: Unicamp, 1999).

Figures 1–2. Standing on the left, Leonarda Gomes and Jacob Klauz. Leonarda, a caboclo woman, was born in the region of the Santa Catarina Plateau. In this region, marriages were often arranged between settlers of European origin and caboclo or indigenous women, who saw marriage as an opportunity for survival, as some of the women or children of the region were lassoed by Brazilian traders to be sold to single immigrants, a frequent practice of forced interbreeding. On the right, their son, Guilherme Klauz, and his wife Emília Correia dos Santos.

Source: Rosângela Carmínia Pascotto Andrioli, private collection.

into sex labour, intending to attract local workers.[31] Ultimately, forced evictions, deliberate murders and cultural and biological discrimination led to the idea of the *caboclos* as an undesired ethnic minority, parasitically occupying untamed territories along the national frontier.

While government officials and settlers pushed these squatter

[31] Myskiw, 'Santa Cruz', 311.

groups towards wastelands, their resilience and adaptability to the local environment allowed them to build relatively stable livelihoods at the margins. *Caboclo* hunting and fishing techniques and their knowledge of medicinal herbs and seeds appropriated for local soils guaranteed them an advantage over European settlers and ensured their survival. Paradoxically, although European people sought the help of *caboclo* communities for medicines and rituals during the first colonisation decades, they also forced them into hard labour, evicted them from their lands and urged interbreeding through forced marriage.

Sanitation, eugenics and the modernist 'redemption'

As the *caboclo* people began to recede into the remotest forest territories, Brazil was experiencing massive urban sprawl, with the rise of megacities such as São Paulo and Rio de Janeiro, built by the national coffee elite. Urban growth went hand in hand with rural modernisation processes powered by modern techniques and practices of measuring, quantifying and transforming wild environments. Converting forest areas into coffee plantations promoting urban centres' rapid modernisation and industrialisation. As pointed out by Gilberto Hochman, between 1910 and 1920, the Brazilian sanitation movement endeavoured to redefine the boundaries between inland and the coasts as well as rural and urban spaces. These policies followed what sanitarians of the time deemed the nation's key problem – public health. The national sanitation movement relentlessly defended the idea of taming the environment of these disease-ridden and politically precarious territories to improve local citizens' livelihoods. Doctors and sanitarians convinced national political elites that the inland areas were closer than they thought, through an intensive public opinion campaign. For example, doctor and writer Afrânio Peixoto observed in 1918 that tropical fevers were also prevalent in the national capital of Rio de Janeiro, where it was possible to see public school kids 'chattering their teeth with the

shivering of seizures'.[32] This rural sanitation drive had significant political consequences, laying the foundations for the first public health initiatives of national scope from the 1920s.[33]

Promoting sanitation policies was historically related to medicinal-anthropological theories that overcame traditional whitening notions. Although the American eugenic movement reached Brazil and the rest of Latin America from the late 1910s, the broad influence of Catholicism and the attachment of Brazilian intellectuals to French culture mitigated its impact. The latter was responsible for influencing national eugenic theories marked by neo-Lamarckian evolutionism. According to the latter, environmental circumstances could be more impactful on human characteristics than the genetic factors maintained by the more radical Mendelian eugenicists.[34] Although in practical terms, both schools of thought saw Brazilian minorities as broadly 'ignorant, diseased, and full of vice', they mainly reproduced two different political views on Brazil's future.[35] The former, supported by intellectuals such as Raimundo Nina Rodrigues, leaned more towards racial determinism, defending national projects relying on European migration. The latter, represented by Edgard Roquette-Pinto, argued that crossbreed people were organically and racially viable. Effective nation-building depended on the combination of education and sanitation policies.[36]

Therefore, from the early twentieth century, Brazilian people were

[32] A. Peixoto, 'Discurso pronunciado no banquete oferecido ao prof. Miguel Pereira, em 19 de maio de 1918', in P. Leão et al., *Afrânio versus Afrânio* (Niterói: Tipografia Jeronimo Silva, 1922), pp. 29–37. For an analysis of this sentence in relation to sanitation, see G. Hochman, 'Logo ali, no final da avenida: Os sertões redefinidos pelo movimento sanitarista da Primeira República', *História, Ciências, Saúde-Manguinhos* **5** (10) (1998): 217–35. See also N.T. Lima, 'Missões civilizatórias da República e interpretação do Brasil', *História, Ciências, Saúde-Manguinhos* **5** (10) (1998): 163–93.

[33] Hochman, 'Logo ali, no final da avenida', 217.

[34] V.S. de Souza, 'Brazilian eugenics and its international connections: an analysis based on the controversies between Renato Kehl and Edgard Roquette-Pinto, 1920–1930', *História, Ciências, Saúde – Manguinhos* **23** (1) (2016): 1–18.

[35] Stepan, 'Eugenia no Brazil', 126.

[36] Souza, 'Brazilian eugenics and its international connections', 2.

not considered a nation of degenerates by race. Instead, the main problem seemed to lie in the country's inhospitable environments that needed to be tamed and healed. Scientists and intellectuals from different backgrounds saw Brazil as a 'melting pot in reverse', generated by the encounter between people of different backgrounds and a wild environment.[37] It was precisely this fateful combination of cultural and environmental factors that had created marginalised groups such as *sertanejos, caboclos*, or *caipiras*. As subsistence peasants did not express particular interest in technological and economic progress and lived at the margins of society, politicians and intellectuals considered these populations the embodiment of this anti-modern distortion. However, according to the urban-industrial elite from the country's east coast, it would be possible to 'rescue' the *caboclos* through science, technology and effective institutional policies – changing humans and nature through a technoscientific approach.

Influential writer Monteiro Lobato reflected this trending idea in his 1918 short story 'The Resurrection of [caboclo/caipira] Jeca Tatu' ('Jeca Tatu, a resurreição'). He argued that *caboclos* would equal or even overcome European immigrants in farming progress if only they complied with sanitation recommendations.[38] While the Bra-

[37] Perhaps the best reflection of this vision is provided by Euclides da Cunha's image of a Hercules-Quasimodo from his famous novel *Os Sertões*, written in 1902. The Brazilian author uses this evocative image to describe the marginalised and racially mixed *Canudo* population inhabiting the backlands of rural Bahia, skilfully conveying the sense of mythological strength and heroism of these people living at the margins of society, while at the same time describing their weaknesses and deformity caused by a precarious existence. See M.C. Maio, R. Wegner and V.S. de Souza, 'Race, science, and social Thought in 20th-century Brazil', in *Oxford Research Encyclopedia of Latin American History* (2021): https://oxfordre.com/latinamericanhistory/view/10.1093/acrefore/9780199366439.001.0001/acrefore-9780199366439-e-850 (accessed 23 March 2022)

[38] In a previous short story, 'Old Plague' ('Velha Praga', 1914), Lobato had explicitly condemned *caboclos* due to their racial composition. However, his ideas changed after reading the Penna-Neiva report, a scientific-ethnographic work elaborated by two doctors from the Oswaldo Cruz Institute, Belisário Penna and Arthur Neiva, who travelled through the Brazilian northeastern states of Bahia,

zilian mixed bio-social experiment would initially lead to undesirable effects, according to Lobato, there was potential for individual redemption and national recovery, stemming from education and physical improvement. Such confidence in social regeneration was expressed in the statement that 'Jeca wasn't born that way, he became so.' Nevertheless, Jeca was able to redeem himself from the 'biological and climatic inevitabilities' of his birth environment through hard work and the flexibility typical of the Brazilian character.[39] Lobato's short story epitomised the sanitation movement's somewhat optimistic ambitions towards improving the nation's social and economic conditions. The widespread misery and unproductiveness of Brazilian rural populations were not caused by their mixed racial profile but by their precarious host environments. State interventions could fix this distortion through effective amelioration policies.[40] Following this new perspective, ideas of environmental determinism began to replace racial theories as the main obstacle standing between the improvement of livelihoods and backwardness. The same notion of anthropophagy described by Andrade was considered the result of clashes between Europeans and indigenous Brazilian tribes, acting in a hostile environment, which fed on different organic matters,

Pernambuco, Piauí e Goiás for nine months in 1912. The text was very influential in constructing the self-image of Brazil as a country significantly divided between coastal and rural regions. These stood as two opposite poles of progress and civilisation. According to the authors, only a nationally induced reformist effort promoting sanitation policies in these neglected regions would bring to economic, social and moral redemption to the Brazilian nation. See A. Neiva and B. Penna, 'Viagem científica pelo norte da Bahia, sudoeste de Pernambuco, sul do Piauí e de norte a sul de Goiás', *Memórias do Instituto Oswaldo Cruz* **8** (30) (1916): 74–224. Also see N.T. Lima, 'Uma brasiliana médica: o Brasil Central na expedição científica de Arthur Neiva e Belisário Penna e na viagem ao Tocantins de Julio Paternostro', *História, Ciências, Saúde-Manguinhos* **16** (1) (2009): 229–48.

[39] E.A.G. Wolfe, *Melancholy Encounter: Lasar Segall and Brazilian Modernism, 1924–1933* (Ph.D. Dissertation in Art History, University of Texas at Austin, 2005), p. 341.

[40] See N.T. Lima and G. Hochman, 'Condenado pela raça, absolvido pela medicina: o Brasil descoberto pelo movimento sanitarista da Primeira República', in M.C. Maio and R.V. Santos (eds), *Raça, ciência e sociedade* (Rio de Janeiro: FIOCRUZ, 1996), p. 23.

including humans.[41] Colonisation in this phase featured a series of technical activities resembling state policies. Just as highlighted by James Scott, everything was there: urban planning, projects for rural settlement, land administration and agricultural policies, as well as violent processes of land grabbing and territorial disenfranchisement.[42] However, while intellectuals promoted a civilising effort to tame the nation's wildest territories at the national level, southern Brazilian elites took these ideas to the next level. Rather than simply draining swamps, they aimed to cut down the rainforest and export its timber down the Uruguay River to the ports of Montevideo and Buenos Aires. Instead of guaranteeing a better lifestyle for the local population, they aimed to deprive them of their primary source of livelihood, assimilating their environments into the bio-anthropophagic dream of building a subtropical neo-Europe.[43]

Ecological assimilation

The abandonment of several wild regions became a concern for both national and local authorities. Perhaps more worryingly, several settler communities who decided to stay lived in almost complete isolation from 'civilisation'. Such a condition led to syncretic encounters with the *caboclo* way of life. During the late nineteenth and early twentieth century of Brazilian *colonisation*, the *caboclos* threatened the neo-European colonial experiment, embodying a different system of cultural values. One example is the growing number of woodlands commonly employed for hog farming that were privatised after the coming of railroad tracks from the first decades of the twentieth cen-

[41] See E. Domańska 'History, anthropogenic soil and unbecoming human', in S. Dube, S. Seth and A. Skaria (eds), *Dipesh Chakrabarty and the Global South Subaltern Studies, Postcolonial Perspectives, and the Anthropocene* (London/New York: Routledge, 2020), pp. 201–14.

[42] J. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998).

[43] Regarding the role of *caboclos* in the rafting, see Valentini, *Da cidade santa à corte celeste*, p. 256.

tury. The construction of the railroad system connecting São Paulo to Rio Grande do Sul intensified the settlement process, with several state companies beginning to measure and sell the lands. The clash between rising capitalism and traditional customs culminated with the outbreak of the Contestado War (1912–1916). This conflict opposed the national state with local landowners and railroad workers. The end of the war was a turning point for national modernisation policies, coinciding with the institutionalisation of private ownership and the large-scale commercialisation of timber extracted from Araucaria pines. In this context, *caboclo* communities became intruders par excellence: their native forests were surrounded by fences, and their semi-feral hog farming practices were progressively hindered by land enclosures and the introduction of new breeds.

Moreover, while the country's intellectuals and political elites had overcome racialised ideologies, the farmer class from southern Brazil continued to push for a civilising campaign of the Brazilian *sertões* (wilderness). As a result, during the first half of the twentieth century, the alliance between colonisation firms and state governments promoted the migration of thousands of families of European descendants who had settled in the 'old' German and Italian colonies of Rio Grande do Sul. Such a policy aimed to whiten the population while occupying frontier territories and 'Europeanise' the region.[44] The subtropical forest was regarded as a clear space and an enclave of progress and extractivism. Extensive farmlands and forest areas already declared federal property since the 1850 law (*lei de Terras*) were quickly mapped by topographers. Later these were officially transformed into colonial lots measuring about 24 hectares each and sold to European immigrants.[45] The national government also installed customs, courts, schools, hospitals and other structures.

Historiographical debates agree that land and natural resources disputes were responsible for the demise of *caboclo* societies. With the colonisation of frontier lands between Brazil, Argentina and Paraguay, southern Brazilian states began to employ the *caboclo*

[44] da Silva et al., 'Né indigeni, né discendenti degli europei', 170–73.
[45] Ibid.

Figures 3–4. Judge Antônio Selistre de Campos in Chapecó (state of Santa Catarina) between the 1930s and 1940s. The left picture goes back to the 1930s when araucaria pine groves dominated the territory. In contrast, in the left photo from the 1940s, traditional modernist architectural city planning models pioneered by Le Corbusier already emerge in the landscape (a main avenue in the middle and a network of secondary roads). The forest cover has already significantly reduced due to the construction sprawl.

Source: Memory Centre of Western Santa Catarina (*Centro de Memória do Oeste de Santa Catarina – CEOM/Unochapecó*).

workforce in several undesirable tasks. These included pruning *erva mate*, slash and burn agriculture, timber extraction and transportation and crop growing in large farms.[46] Between the mid-1940s and the early 1970s, *caboclo* workers transported timber from the Uruguay River at the border between southern Brazil and Argentina to the Prata River to reach the port of Buenos Aires. The timber was then shipped to Europe as part of the Marshall Plan.[47] While these

[46] Renk, *A luta da erva*.

[47] On the rafters' memories, see D.J. Valentini, 'Tropeiros, ervateiros e balsei-

deeds still permeate the region's social memory, *caboclos*' traditional subsistence practices 'redeem' this population in the country's public memory, especially in political and intellectual sectors. Indeed, until the 1970s, the southern Brazilian frontier was partially abandoned by national elites. The civilisation attempt that was meant to swallow local forests and ethnically assimilate local interracial groups had only partially succeeded. At the core of this unsatisfactory result lay neo-European farmers' poor knowledge of local soils, seed varieties, climatic patterns, fauna and flora species and forestry practices. The main local agricultural activities still primarily consisted of *caboclos*' traditional practices: slash and burn agriculture, plantation strategies, subsistence on forest products and the adoption of medical herbs.[48] Moreover, hospitals and schools had remained unfulfilled promises all over the region.[49]

From the 1970s, with the progressive agro-industrialisation of the region and the large-scale production of meat, dairy products and fats, *caboclos* constituted an essential workforce. In particular, as the familiar firms of European immigrant families developed, supported by state technical assistance and supply, *caboclo* people served as a critical low-cost source of labour working in precarious conditions. However, as the region's industrialisation progressed, social and cultural frontiers diminished. The groups of neo-Europeans that most struggled financially started serving as a low-cost workforce for the local agro-industry and were considered new *caboclos* (a process known as *acaboclamento*). Overall, the attempts to entirely replace a traditional local population with a white European class turned into a forced interdependence, a relation based on conflict and consensus. On the one hand, European immigrants needed *caboclo* populations to access local knowledge and survive in the region. On the other hand, *caboclo* and indigenous people negotiated their survival by transferring their traditions to European *colonos* and serving as

ros: memoráveis personagens da história do sertão catarinense', *Ágora: Revista de Divulgação Científica da Universidade do Contestado* **6** (1) (1999): 79–89.

[48] Id., *Da cidade santa à corte celeste*.

[49] Ibid.

a workforce. The poorest European *colonos* were even regarded as *caboclos* given their lower position on the labour chain.

Bioanthropophagy, or the Anthropocene in the making

Within a few decades, the *caboclos*' sophisticated way of life was quickly swallowed up by the developmental pressures of an ambitious modern nation, epitomised by hard-driven white farmers of European ancestry. However, not all these settlement experiences were successful: several European immigrants would fail in their colonisation attempts. Enjoying poor support from either colonisation companies or state governments, they would return to their original settlements in Rio Grande do Sul – a relatively common event between the 1960s and 1980s. Until the early twentieth century, and even more significantly after the neo-European colonisation, complex coexistence mechanisms between humans and non-humans characterised the ecological texture of the southern Brazilian frontier. In the wake of European colonisation, a relentless bioanthropophagic process took place in the region, altering the natural and cultural fabric of the southern Brazilian frontier. Gradually, the plain straight lines of roads and railway tracks drawn by modernist engineers swallowed up the forest and rural environments resulting from centuries of coexistence and coevolution. In a relatively short time, these ecologically luxuriant hinterland territories were transformed by a geometrical reform that reflected the civilising drive, sublimated by a national utilitarian vision. In southern Brazil, what James Scott has defined as a 'gardening state', promoting modernisation attempts, was especially observable in the subtropical hinterlands with the systematic dissolution of the *caboclo* lifestyle.[50] In this context, bioanthropophagy was not

[50] James Scott's scholarly research has been most centred in providing examples of how high modernism truly failed in achieving its initial goal of improving the human condition. His work is essential to understand the entanglements between the national state and its agents, ideals of quantification, schemes of simplification and social impact. Concerning the notion of 'gardener state', a metaphor original-

limited to the imposition of a modern way of life upon these traditional communities, but constituted an eminently biological process. Monocultures of corn, wheat and beans replaced several endemic flora and fauna species, and the local araucaria rainforest disappeared. Moreover, hogs and chickens experienced sophisticated processes of interbreeding, blending with endemic species.

On the other hand, as national efforts progressively assimilated this population through ethnic and environmental means, the livelihoods of both *caboclos* and *colonos* gradually intertwined, leading to a process of mutual contamination. Moreover, *caboclos*' traditional subsistence practices 'redeemed' this population in the country's public memory, especially in political and intellectual sectors. Since the early 2000s, after about thirty years of neo-liberal economic policies in Latin America (1973–2003), traditional populations began to enjoy more institutional consideration and support, and their practices regained momentum.[51] These came to the fore in debates on the bio-cultural knowledge of plant farming and tending in the southern Brazilian frontier. Whilst *caboclos* had been racially 'forgiven' and 'absolved' by science during the first republic (1889–1930), their official redemption emerged through the romanticisation of their traditional farming practices from the early 2000s. As an example, the idea of subsistence practices aimed at producing a 'vital minimum', crop rotation systems and polyculture associated with a poor labour force served as a purpose for the agro-political project sponsored by radical social movements such as the controversial Brazilian Landless Workers' Movement (MST).

ly created by philosopher Zygmunt Baumann, Scott describes how the invention of scientific forestry during the late eighteenth century was used 'as a metaphor for the forms of knowledge and manipulation characteristic of large institutions with sharply defined interests, of which the state is perhaps the outstanding example'. By emphasising 'how simplification, legibility and manipulation operate in forest management', Scott explores 'how a similar optic is applied by the modern state to urban planning, rural settlement, land administration and agriculture'. See J. Scott, 'State simplifications. Nature, space and people', *The Journal of Political Philosophy* **3** (3) (1995): 191.

[51] Silva et al., 'Né indigeni, né discendenti degli europei'.

Moreover, university programmes and associations of impoverished farmers created agroecology programmes seeking models of agricultural development alternative to agribusiness.[52] Overall, the heritage of *caboclos* survives through the multiple modern forms in which their traditional knowledge and practices are reproduced and mediated. Although monoculture still dominates today's agricultural landscape, traditional farming practices are returning in impoverished suburban semi-rural areas. The cultural, ethnic and environmental intertwinement between *caboclos* and neo-Europeans continues to be expressed by the intermingling of fallow lands and paved roads, tall buildings and shacks, native plant species and introduced genetically modified crops.

As a historical process, the Anthropocene emerged from several interspecies alliances that worked to consolidate human prominence in the ecological food chain. By altering processes of biological reproduction through species selection and intensive monocultures, humankind has changed the eco-biosphere to an unprecedented extent, allowing the global population to reach unprecedented numbers and fuelling what is today understood as a global climatic and ecological crisis. When this process accelerated to an unparalleled extent after World War II through the so-called Great Acceleration, the world began to bear significant signs of anthropogenic impact, culminating a process ongoing at least since the so-called Columbian Exchange.[53]

[52] An example is constituted by the Federal University of the Southern Frontier (UFFS), established since 2010 with six different campuses in the southernmost Brazilian states of western Paraná, western Santa Catarina and western Rio Grande do Sul, precisely the regions discussed in this narrative. The campus of western Paraná (Laranjeiras do Sul) offers degrees in agronomy with a particular emphasis on agroecology as well as a master's degree in Agroecology and Rural Sustainable Development. Moreover, the campuses of Chapecó (Santa Catarina), Erechim and Cerro Largo (Rio Grande do Sul) offer degrees in agronomy with a particular emphasis on agroecology.

[53] On the Great Acceleration, see J.R. McNeill and P. Engelke, *The Great Acceleration: An Environmental History of the Anthropocene Since 1945* (Cambridge MA: Belknap Press, 2014). On the impact of the Columbian Exchange in the making of the Anthropocene, see S.L. Lewis and M.M. Maslin, *The Human Planet: How We Created the Anthropocene* (London: Pelican Press, 2018).

In southern Brazil, the Anthropocene found a breeding ground in an ambitious federal government's reformist plans to tame and conquer local forest as the first step of a national modernisation plan. By representing a unique example of an interbred society surviving through agroforestry, the *caboclos* constituted an obstacle to progress.

Consequently, they were swallowed by a modern nation in the making, craving biological resources and human labour. On the other hand, they found ways to resist and assimilate modernity to survive. The *caboclos'* example does not stand alone. As environmental history continues to reinterpret historical events through the theoretical lenses of high modernism, biopolitics and environtech, similar stories will continue to emerge, displaying new examples of bio-anthropophagy. As we strive to find solutions to the most pressing environmental issues of our time, bio-anthropophagy continues to constitute a distinctive socio-biological trend. It does so by assimilating human groups, taming biological species and, ultimately, uniting us all. Socially. Economically. Philosophically. Environmentally.

Acknowledgements

The authors would like to thank Rosângela Carmínia Pascotto Andrioli and the CEOM/Unichapecó for allowing the publication of their images. We also thank Evelien de Hoop, Erik van der Vleuten, Aarthi Sridhar and Ana França for commenting on previous drafts of the text. This research is part of the project *A Era da Soja* (The Age of Soybeans), financed by the Brazilian National Council for Scientific and Technological Development (CNPq). Claiton Marcio da Silva thanks CNPq, UFFS and FAPES for assistance with Open Access Funding. During this research, Claiton Marcio da Silva received a CNPq productivity research fellowship (Processo 307082/2019-9), while Claudio de Majo received funding from the Leibniz Institute of European History (IEG) and the Amerika-Institut (LMU Munich).

Claiton Marcio da Silva is Associate Professor at the Federal University of the Southern Frontier (UFFS), Santa Catarina, Brazil and CNPq Productivity Researcher. He began studying the modernisation of Brazilian agriculture in 2002, completing his MA in history at the Federal University of Santa Catarina (UFSC) with a thesis on rural youth in Southern Brazil. At Casa de Oswaldo Cruz (COC/Fiocruz), his doctoral dissertation explored the role of Nelson Rockefeller's American International Association for Economic and Social Development (AIA) in introducing the US extension service model in Latin America. Recently, he has been exploring the global environmental history of soybeans and its impacts for traditional populations in the Global South.

Email: claiton@uffs.edu.br

Claudio de Majo is a Ph.D. candidate at the Rachel Carson Center for Environment and Society (Ludwig-Maximilians University, Munich). He has carried out research with the University of Naples L'Orientale, the Institute for Housing and Urban Development Studies at Erasmus University of Rotterdam, the University of Utrecht and the Federal University of Minas Gerais, Belo Horizonte (Brazil). His main research interests include global environmental history, the environmental history of Europe and Latin America, and the relation between the commons and ecology. He is also interested in cutting-edge methodologies such as evolutionary history and neo-materialism. He is deputy editor of *Global Environment* and founding member of the American Studies academic journal *JAmIT*!

Email: claudio.demajo@rcc.lmu.de

The Expansion of the Railway and Environmental Changes: The Modern Configuration of the Argentine Pampas, c. 1870–1930

Ana Marcela França de Oliveira and Adrián Gustavo Zarrilli

The occupation of South American territories during the colonial period was marked, to a great extent, by a complexity of factors, such as conflicts, socioeconomic policies, overlapping and absorption of cultures, and the entry of new technologies. These factors greatly contributed to the configuration of the current landscapes in these regions.

In the Argentine pampas, two events sig-

Global Environment 15 (2022): 273–297

doi: 10.3197/ge.2022.150204

nificantly contributed to the landscape transformations taking place up to the beginning of the twentieth century: 1) the entry of cattle and the establishment of farms from the sixteenth century; and 2) the arrival of the railroad at the end of the nineteenth century. Such events effectively altered the landscape of this region, including its biophysical and cultural attributes. Buenos Aires province and its area of influence (the so-called 'Litoral') was, during the seventeenth and eighteenth centuries, an unimportant region in the context of the Spain's large commercial flows – mainly of precious metals – which had their epicentre in Peru and Mexico. This context began to change slowly at the end of the eighteenth century, with the growing importance of the cattle industry, and in the second half of the nineteenth century, already in the independent period, with the expansion of the railways.

The modernisation process of the Argentine pampas, starting in the mid-nineteenth century, implied profound environmental, economic and demographic transformations. These changes were largely based on the expansion of the internal borders (the so-called 'Conquest of the Desert') by the newly formed National State. Through a rapid process of privatisation of public land, sixty million hectares were transformed by the production of agricultural goods aimed at export markets, the incorporation of technology, and the arrival of hundreds of thousands of European immigrants.

In this paper, landscape changes are analysed as socio-ecological transformations in the pampean space, and in particular the changes caused by the advent of the railway. For this purpose, environment and culture are considered agents of equal strength of action in the modernisation process. By making this analysis from the perspective of the altered biome, this process is cast as a promoter of heterogeneities in the Anthropocene Era. The place and time under analysis is the humid pampas, in the Province of Buenos Aires, Argentina, from the second half of the twentieth century to the 1930s.

Some theoretical considerations

The model of modernity based on capitalist exploitation of the land was adopted by the Argentine elite in their pursuit of economic and cultural development. To analyse the modernisation of the pampas, however, is to question the idea of modernisation itself. To think about it only as an idea of progress, development and production of capital on the territory is to ignore the action of modernity in socio-environmental dimensions; it is to apply a 'top-down' approach and not penetrate into the differences that distinguish the history of Latin American countries. In view of this caveat, it is necessary to re-think modernity from the inside out – that is, from the differences – in order to understand what modernity meant in peripheral nations such as Argentina.[1] In this way, the hegemonic model of knowledge production, imported from European scholars for centuries, is rearticulated so that socio-environmental and cultural differences may be highlighted and understood.

Arturo Escobar comments on the need to analyse different Latin American societies from the perspective of their differences:

> If we look ethnographically at what there is at the level of economic, ecological and cultural practices, we can read them not so much for what they have as a content of domination but for what they have as a content of difference. Therefore, we see that an articulation can emerge from difference and that these practices can be taken as a starting point for the reconstruction of worlds, the reconstruction of thoughts, of knowledge.[2]

Through a focus on differences, historical narratives develop beyond the discourse of domination and come to the rescue of the history of place. Along this path proposed by Escobar, the social and

[1] B. Sarlo, *Una modernidad periférica. Buenos Aires 1920–1930* (Buenos Aires: Siglo XXI, 2020); H. Cao and J. Vaca, 'Desarrollo regional en la Argentina: la centenaria vigencia de un patrón de asimetría territorial', *Revista Eure* **95** (2006): 95–111.

[2] M. Badaró, M. Carozzi, A. Escobar, C. Fonseca, A. Grimso, P. Semán, and G. Wilde. 'Conversaciones sobre la diferencia. Encuentro con Arturo Escobar', *Tabula Rasa* **15** (2011) 275–298, p. 282.

material reality of place shifts from the secondary role it is generally assigned when one thinks about globalisation.[3] We can thus use the basis of his proposal – focused on difference – to structure our studies on the Buenos Aires humid pampas, given that the differences produced in modernity originated in the conception of the world founded by Western civilisation.[4]

In this way, the socio-environmental constitution of the pampas gains prominence. From the historical transformations of the environment, the peculiarity (difference) of Argentine modernisation in relation to the hegemonic idea of modernity inaugurated by Europe becomes clear and is differentiated from contemporary processes in Latin America. When the environment is considered a key element in the process of Argentina's economic development towards global capitalism, the differences that define its history are exposed. An important fact in the pampas is that this process did not involve the explicit destruction of a biome or the annihilation of native populations, as it did in other regions of Latin America and even in marginal regions of the country – although there were already negative environmental effects and brutal treatment of native populations.[5]

In analysing the historical environmental process of the pampas, the complexity involved in the use of the term 'post-coloniality' becomes evident. If not properly contextualised, this term can obscure the local characteristics that constitute modernisation, which in the case of Latin America is complex and heterogeneous. In Argentina, and specifically in the pampas region, 'colonialism' in the politically independent stage meant a process of indirect assimilation of

[3] The author refers especially to the current processes of decolonisation of communities that raised awareness of the importance of their existence in the territories in which they live. The author deals with the differences especially in his studies of political ecology.

[4] E. Dussel, 'Europa, modernidade e eurocentrismo', *in*: E. Lander (ed.), *A colonialidade do saber: eurocentrismo e ciências sociais – perspectivas latino-americanas* (Buenos Aires: Clacso, 2005), pp. 24–33.

[5] At this time, the pampas territory was already dominated by the neo-European culture. The indigenous communities were practically annihilated or had moved to other regions.

European and especially British capitalist logic. Escobar considers place as a territory of difference, in which social actors, nature and culture assert themselves as heterogeneity in the face of hegemonic systems of domination. It is thus necessary to rethink the dynamics of modernity as a producer of heterogeneity, as a colonial difference produced by 'modernity–coloniality'[6] itself, which extends as post-coloniality.

In this way, we are interested in rethinking the process of post-colonialism, not as Europe acting 'on' Latin America but 'with' it.[7] In other words, Argentina also contributed to Europe's industrialisation process through agricultural production. Without this support, Europe would not have been able to achieve the desired modernity, either; without such past relations with Latin American nations, Europe would definitely be a different society.

The model of 'coloniality/modernisation' typical of the pampean region allows us to critically rethink and review a modern–colonial historical process that, in the case studied, assumes structures in keeping with Alfred Crosby's definition, the so-called 'Neo-Europes' (generally located in the temperate zones of the world). These regions did not behave like the traditional colonial models. The Neo-Europes became the world's food reserve, radically and definitively altering geopolitical relations.

> But in all these regions, giving them the colour and shape capable of persuading any sensible man to invest his capital and even the life of his entire family in some neo-European adventure, there was the common denominator of factors that perhaps should be called biogeographical.[8]

The difference of this occupation and development process in comparison with other South American nations is that Argentine

[6] Badaró, Carozzi, Escobar, Fonseca, Grimso, Semán, and Wilde 'Conversaciones sobre la diferencia', p. 284.

[7] R. Haesbaert, *Território e descolonialidade: sobre o giro (multi) territorial/de(s) colonial na América Latina* (Buenos Aires: CLACSO, 2021).

[8] A. Crosby, *Imperialismo ecológico: a expansão biológica da Europa 900–1900* (São Paulo: Companhia de Bolso, 2011), p. 17.

modernity took shape at an accelerated pace, in a territory with low native population density and centred in a specific region: the pampas. This achievement resulted from the combination of technologies, massive immigration, and the entry of exotic species of fauna and flora for domestication. In other words, this combination was unique in the continent, performed in the name of modernisation and solidification of the Argentinean National State. The hybrid dimension of this process is located within the configuration of modern Argentine capitalism, also embedded in a context of transformation of the global space.

From the mid-nineteenth century until World War I, the Argentine economy grew steadily, at a pace that accelerated from the 1880s onwards. The period 1880–1914 saw the greatest economic growth in the country. The trends that were already visible before 1880 ended up generating irregular but vigorous growth, oriented towards exports. This growth was endowed with an unusual dynamism, even when many of the peripheral regions of the world were witnessing processes in which exports constituted the engine of growth: between 1880 and 1914 the gross product per capita more than doubled; the total population quadrupled, rising from less than two million inhabitants at the beginning of the 1870s to more than eight million in 1914; and the annual growth rates between 1880 and 1914 were 34 per cent for population and between 2 and 2.5 per cent for GDP. Such singular growth is discussed throughout this text.

Environmental history and human work

For the most part in environmental history studies, the organic characteristics of space are understood together with the dimension of culture.[9] This is because much of what we call 'natural landscape'

[9] D. Worster, 'Para fazer História Ambiental', *Estudos Históricos* **4** (8) (1991):198–215; J. Pádua, 'As bases teóricas da história ambiental', *Estudos avançados* **24** (68) (2010): 81–101; R. Oliveira and R. Svorc, 'Uma dimensão cultural da paisagem: biogeografia e história ambiental das figueiras centenárias da mata atlântica' *GEOUSP – Espaço e Tempo* **32** (2012): 140–160.

is the result of agency and human work.[10] To think in this way is to keep humans and non-humans separate and not to consider how the constant interaction between them shapes places. Through the recognition that most landscapes include human labour, the environment we observe can be 'read' as an agglomeration of overlapping layers, where the processes of occupation and use of the territory are imprinted.

In this sense, considering a framed space as a domesticated landscape[11] opens a horizon for understanding the environment being studied, viewed as a product of humannonhuman interactions. Likewise, it expands the analysis of the spatialised object to its temporal dimension, to the historical process of societies based on occupation and use of natural resources. Constant change results in the material and immaterial attributes that shape the region under study. The landscape in its socio-ecological dimensions is suitable for perceiving the relationship between society and nature. In this way, the associated actions of the past and present are manifested in a place.[12]

In the process of modernisation, the Anthropocene has globalisation at its core, based on the advancement of a unified world economy centralised in the Global North. Resource use on a global scale is associated with the natural/cultural reconfiguration of the places explored. On the one hand, this trend generates the homogenisation of cultures and different ecosystems. On the other hand, the application of new technologies in diversified spaces, endowed with different cultural origins, reveals that in the expansive process of the Anthropocene, there is also the affirmation of differences. This contradiction generates the formation of exclusive cultures, based on the heterogeneity of their material and immaterial attributes.

[10] R. Williams, *Cultura e Materialismo* (São Paulo: Unesp, 2011), p. 104.

[11] C. Clement, 'Landscape domestication and archaeology', in *Encyclopedia of Global Archaeology* (New York: Springer, 2014), p. 4389.

[12] A.Y.C. Sarmiento, J.H.S. Gélvez and J.M. Téllez, 'Naturaleza y sociedad: relaciones y tendencias desde un enfoque eurocéntrico', *Luna Azul* **44** (2017): 348–371; G. Galafassi, 'Las preocupaciones por la relación Naturaleza-Sociedad. Ideas y teorías en los siglos XIX y XX. Una primera aproximación', *Theomai* **3** (2001): 1–9.

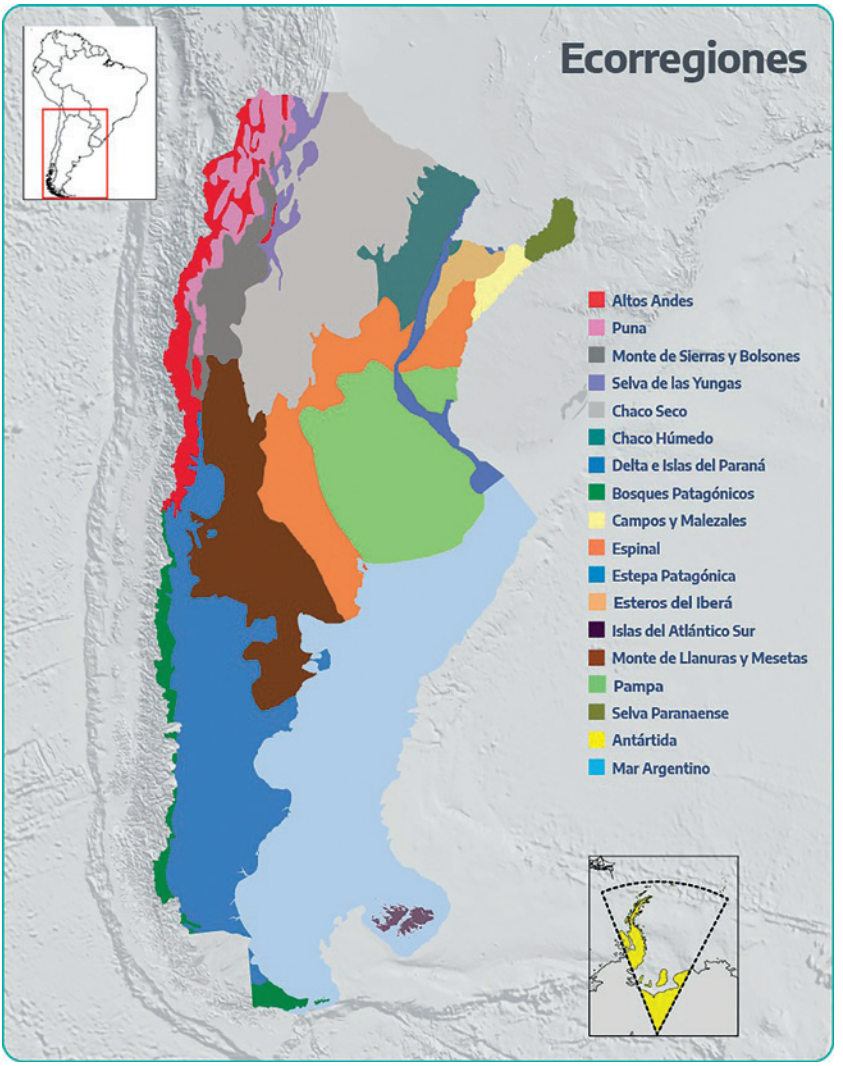
For environmental historians, the Anthropocene demands the integration of climate and ecological change with cultural, social and political changes. This idea is not entirely new. Classic works of environmental history, such as Alfred Crosby's 'Columbian Exchange' and William Cronon's 'Changes in the Land', both written decades before the Anthropocene existed as a concept, examine the historical effect of people on the environment and the historical relationship between people and nature.

The biome and the western occupation of the pampas

The pampas biome comprises an extensive plain of 398,966 square kilometres, located in the five agricultural provinces of Argentina: the southern half of Entre Ríos, the southeast of Córdoba, the south of Santa Fe, the northeast of La Pampa, and almost the entire province of Buenos Aires except for the extreme south. According to granulometry, the humidity regime and/or relief of the soils, the biome is divided into subregions. The so-called humid pampas is characterised by the presence of wetlands. Due to the size of the biome, it constitutes the most critical grassland ecosystem in Argentina (Figure 1).

The local climatic, topographic and edaphic conditions as well as the geographic location determine the distribution of various types of grassland that differ in vertical and horizontal structure and in the assemblage of species. The dominant vegetation is the grass steppe, and its species composition varies according to the characteristics of the local climate and the soil. The riverine zones are characterised by riparian forests; there may be gallery forests or riparian scrubs, and logging is performed in the river ravines and coastal ridges. These forested formations occupy a tiny fraction of the surface of the Pampas biome. In some areas, there are patches of introduced forests or neo-ecosystems formed by an arboreal stratum of exotics and lower strata of native species. The native flora of the pampas comprises about a thousand species of vascular plants.

Figure 1. Ecoregions (biomes) of Argentina.



Source: Ministry of Environment and Sustainable Development, Argentina.

Since the second half of the eighteenth century, even in the colonial period, the vegetation cover of much of the pampas biome has been affected by or replaced with livestock and agricultural activities. This process was driven by the strong expansion of cattle ranching across millions of hectares of herbaceous steppe without natural predators. Cattle ranching systematically grew to high value in world markets in the second half of the nineteenth century and remained that way for almost one hundred years. 'Due to the quality of its soils and the existence of herbaceous vegetation (which allows direct grazing of cattle without the need for dismantling), this region was occupied earlier and homogeneously.'[13] The pampas biome is therefore the oldest agricultural production area in Argentina.

In the late nineteenth century, much of the grassland was converted to crops or pastures, due to the prolonged and intensive use of livestock, agriculture and forestry. Towards the twentieth century, the conversion of natural areas to crops and managed pastures occurred at a high rate of change, in time and extent. What used to be a natural grassland matrix with crop patches was transformed, in broad sectors of the pampas biome, into a cropped matrix from which the natural grassland patches have gradually disappeared.[14]

Most of the pampas landscapes are marked today by the breadth of pasture for cattle and grain cultivation, by sets of *Eucalyptus*, and by the past presence of the railway, which started to cross the country in times of national rearrangement and economic development during the second half of the nineteenth century.

> For the new elite, rail transport was the most effective tool to consolidate the fragile national union and the reaffirmation of the authority of governments.

[13] J. Adamoli and P. Fernández, 'Expansión de la frontera agropecuaria en la Cuenca del Plata', in O. Sunkel and N Giglio (eds), *Estilos de desarrollo y medio ambiente en América Latina* (México: Fondo de Cultura Económica, 1980), p. 471.

[14] D. Medan, J.P. Torretta, K. Hodara et al., 'Effects of agriculture expansion and intensification on the vertebrate and invertebrate diversity in the Pampas of Argentina', *Biodiversity and Conservation* **20** (13) (2011): 3077–3100.

J. Morello, S. Matteucci and A. Rodríguez, *Ecorregiones y complejos ecosistemicos argentinos* (Buenos Aires: Orientación Gráfica Editora, 2012).

It was also a fundamental instrument to carry out the social and economic transformation that they considered a pressing necessity.[15]

Due to the flatness of its grasslands (*llanura*), the pampean region offered a favourable space for the expansion of the lines. The construction of large viaducts or tunnels connecting one town to another was not necessary. This characteristic, together with the good quality of the soils, favoured both the expansion of the railway system and the growth in the production of crops and livestock.

The railway

The expansion of the railway in Argentina started around 1850 and connected the towns (*pueblos*) and new colonies to the main ports. Many of the railway lines were drawn on already existing roads. Troops of beasts, stagecoaches, people and carriages had circulated on these roads. 'The railway was only the means that supplied the blood traction and created a true revolution in transport and, therefore, in the organisation of space. For this reason, its layout was not arbitrary, it had solid geographical bases.'[16] The development of this transport was related to the agro-export economic model based on agriculture and livestock production. At that time, it followed a radial scheme where the main lines converged on the city of Buenos Aires.

The investment in railways originated mostly in foreign capital until the network's nationalisation in the 1940s. Between 1870 and 1930, most of the railway network was built using British, French and Argentinian capital. This network was the tenth largest system in the world, consisting of about 47,000 kilometres of railway lines at the end of World War II[17] (Figure 2).

[15] M. López, 'La suma del capital privado y público en la construcción de las primeras líneas ferroviarias (1857–1886)', in M. López, J. Waddell and J. Martínez, *Historia del ferrocarril en Argentina* (Carapachay: Lenguage claro, 2016), p. 19

[16] J.A. Roccatagliata, *Los ferrocarriles en la Argentina* (Buenos Aires: Eudeba, 2012), p. 51.

[17] Ministerio de Educación/Universidad Tecnológica Nacional Facultad Re-

Figure 2. Map of the railway lines of the Argentine Republic. Gift for Kraft Guide subscribers, 1889.

Source: Archivo General de la Nación Argentina, Mapoteca II – 4.

Two companies were most significant in Buenos Aires Province: Ferrocarril Oeste (FCO) and Buenos Aires Great Southern Railway, or Ferrocarril Sud (FCS), the latter being a British company. The FCO was promoted by a group of businessmen, merchants and politicians from Buenos Aires who were granted a concession by the provincial government.[18]

On 17 September 1853, the 'Society of the Iron Road from Buenos Aires to the West' was founded by a group of members of the Buenos Aires landowning bourgeoisie. Its network consisted of 22,000 to 24,000 varas, whose communications and transport would be carried out by locomotives (until then, communications had been performed by carts, galleys and couriers). Government authorisation was granted by a Provincial Law passed on 12 January 1854. Immediately afterwards, the professional services of an engineer (Guillermo Brogge), supervisors and specialised workers were hired from England. They began construction work the following year and finished it in 1857. The first ride was performed on a locomotive called *La Porteña,* built in the British workshops of The Railway Foundry, Leeds.

Officially, this first railway was inaugurated on 30 August 1857, in a ceremony presided over by Valentín Alsina, Governor of Buenos Aires, who made the maiden journey in the company of prominent personalities, such as Bartolomé Mitre, Domingo F. Sarmiento and Dalmacio Vélez Sársfield. *La Porteña* (acquired together with another machine named *La Argentina*) pulled two wagons, one for passengers and another for parcels. It was driven by the Italian engineer Alfonso Corazzi and the Allen brothers. The journey started at the station located where the Colón Theatre stands today and travelled westwards a distance of about ten kilometers to Flores, a locality on the outskirts of the city (Figure 3).

gional Haedo, *Breve Historia de los Ferrocarriles Argentinos, su construcción, su Destrucción, su Importancia y proyecto de Recuperación,* Cap. III, 2012, http://www.cin.edu.ar/descargas/asuntosacademicos/art.%2043/INGENIERIA%20FERROVIARIA/26-02-13%20Ferroviaria%20-%20Cap%20III.pdf (accessed 30 Oct. 2020).

[18] López, 'La suma del capital privado y público', p. 21

Figure 3. Inauguration of *Ferrocarril del Oeste* (29 August 1857). Painting by Eduardo Cerruti. Published in *Ilustración Histórica Argentina*, 9 July 1910.

Source: Archivo General de la Nación Argentina – Biblioteca, C-0994.

The early development of this new transport system was difficult and marked by plodding progress, mainly due to the Argentine political situation and the separation of the Province of Buenos Aires from the Confederation. However, in 1862, the first section of the Northern Railroad was inaugurated, its route reaching El Tigre in 1865. In the same year, the first section of FCS, as well as the FC Buenos Aires–Port of Ensenada, opened. By 1870, there was a notable advance in the construction of the lines. With the joint effort of FC Ensenada and FC del Norte, the Buenos Aires Central Station was built and inaugurated on 31 December 1872. It was also connected to the FCO and FCS networks.

While the FCO covered a large part of the western section of the province, the British company FCS expanded to the South, covering a large part of the humid pampas. The preservation and expansion of its

area of influence were essential to the efficient functioning of the company. In 1861, a bill was presented to the Legislature of Buenos Aires Province, requesting a concession to build an 'iron road' to the South, from Plaza Constitución to Chascomús. The bill was approved in the Session of 27 March 1862, and the provincial Government enacted the respective law on 27 May of the same year. The contract establishing the conditions for construction was signed on 12 June 1862, and the concession was granted to its initiator, Eduardo Lumb. To carry out the works, the British Society hired Samuel Morton Peto and E. Ladd Betts, from London. Betts tried to form a consortium with Argentine capital, but when he failed to do so, he embarked for London. There he created the Sociedad del Ferrocarril del Sud, whose statutes were approved on 24 December 1862. The original layout of the rails, Constitución–Chascomús, was modified by a Provincial Law on 28 August 1863, which ordered its extension to the town of Dolores.[19]

The laying of the line began on 7 March 1864, directed by the construction engineer Thomas Rumball. The first section (77 kilometres long), between Plaza Constitución and Jeppener stations, was authorised for public use on 14 August 1865; four months later, the remaining 36.41 kilometre stretch to the town of Chascomús was inaugurated. During the first five years of its operation, the FCS dedicated itself to consolidating this route, also building several intermediate stations towards the south of the province. The lines crossed the entire depressed plains, where the laying of the rails was technically easier. Seven years later, the arrival of the FCS (Dolores–Maipú–Ayacucho branch) at Tandil heralded the arrival of the trains at the heart of the mountain system (19 August 1883). Simultaneously, the extension from Azul to Olavarría made it possible to bypass the mountain barrier to advance even further south, with one objective: Bahía Blanca, a future railway-port hub, whose train station was opened on 1 May 1884. Two years later, another branch started from Maipú and reached Mar del Plata. The FCS thus joined the most significant points both in cargo and passenger traffic, estab-

[19] W. Rögind, *Historia del Ferrocarril Sud* (Buenos Aires: Establecimiento Gráfico Argentino, 1937).

lishing a network that would cover most of the southern province.

The impact of the railroad on space was significant. The physical characteristics of the pampas conditioned the laying of the tracks. The lines were laid on earth embankments, with almost no stone ballast, because rock was scarce in the region. The few existing rivers did not demand the construction of large bridges. It was, however, necessary to build many trenches, due to the cyclical periods of floods and droughts, especially in the depressed pampas (i.e. the wetland zone).

In addition to the railways, the presence of railway stations contributed to the landscape's transformation, both in the countryside and in towns and cities. Many of the countryside stations were built in the 'English' style. In general, they had similar characteristics: the gabled roof, the waiting room, the office of the chief and the assistant, the ticket office and a gallery that overlooked the main road. The station was surrounded by one or more houses and a water tank. This panorama, with the impact of the railroad on the landscape, was repeated throughout the pampas, affecting the structure and appearance of urban vegetation.

People

The arrival of the railroad in the agricultural areas brought economic development and triggered the formation of small towns, creating a new cultural/environmental configuration. Since the second half of the nineteenth century, aborigines (Araucanians and Querandíes) had been retreating towards the Patagonian regions, progressively losing their cultural and material distinctiveness. These people were nomads, hunter-gatherers or fishermen. The conflict and the attempted expulsion of the aborigines from this region had begun at the time of Spanish domination, with this area being a border permeable to exchanges, agreements and violence. In the 1860s, the process of expelling the aborigines from these territories intensified, culminating in the so-called 'Conquest of the Desert'. In this context, the Argentine National State finally subjected the indigenous

peoples to its power, disciplining or exterminating them. Since then, Europeans and Creoles (mestizos and descendants of Europeans) have been the largest population in this territory. Their activities were at first based on sheep farming, then cattle farming, and finally cattle farming associated with agriculture. The lands of Buenos Aires were sparsely occupied by ranches based on subsistence or agricultural activity for domestic consumption. The systematic occupation of the space of Buenos Aires became more effective at the end of the nineteenth century with agricultural colonisation. This process is closely related to Mediterranean European immigration and, to a lesser extent, internal migrations.

Argentina has a long and impressive history of immigration. Most of the European foreigners who came to the nation from the second half of the nineteenth century until around 1915 were Italian, Spanish or French; however, immigrants also came in smaller numbers from outside Western Europe.[20] The flow of European immigration during the years 1880 to 1914 was related to the policy that 'to govern is to populate', according to which settlement in fertile lands was fundamental to stimulating the country's modernisation process.

Even with a considerable proportion returning to their countries of origin, and reduced influx during the Great War, the arrival of foreigners in Argentina was massive. According to the Third National Census of 1914, the population of the province of Buenos Aires grew from 921,169 in 1895 (Second National Census) to 2,066,165 in 1914, accounting for a relative growth of 124.3 per cent.[21] The same document mentions the occupation of the Argentine plains in the mid-nineteenth century by immigrants devoted to agrarian activities, and its relationship with the expansion of the railroad: 'The railroads extend their arms of steel over immense plains, bringing life and civilisation everywhere.'[22] The railroad was understood

[20] M. Ceva, 'El ciclo de la inmigración europea', in H. Otero (ed.), *Historia de la Provincia de Buenos Aires,* Tomo I (Edhasa: Buenos Aires, 2012), pp. 309–337.

[21] República Argentina, Tercer Censo Nacional. Levantado el 1° de Junio de 1914, Buenos Aires, 2016, http://www.estadistica.ec.gba.gov.ar/dpe/Estadistica/censos/C1914-T1.pdf (accessed 30 Oct. 2020).

[22] Ibid., p. 84

as a facilitator of the exploitation of Argentine lands, in pursuit of the desired modernity ('civilisation'). Likewise, 'bringing life' can be understood as the occupation and use of the land through work, producing crops and livestock and resulting in economic growth and the modernisation of the country. The rail network would be the access road to the long extent of the nation and an important connection with the Global North, especially England, as shown by the presence of railway stations at ports. The document also comments on the migratory process as fundamental for the occupation of the land and the intention of 'undertaking the exploitation of our rich plains, which still seem deserted'.[23] This makes clear the idea of occupying the immense territory then seen as empty. The socio-environmental changes in the pampas were clearly one of the most significant and rapid processes of environmental transformation in Latin American history, associated with the capitalist modernisation of peripheral regions.

In this context, the railroad was a vital factor for the 'colonisation' and development of the country's agricultural areas. This means of communication and transport made it possible for family groups to settle in the countryside, contributed to the modernisation of farming methods, allowed the introduction of new breeds of cattle (Shorthorn, Hereford and Aberdeen Angus) and plant species for cultivation, and improved the prospects for agricultural exploitation.[24] The modern use of the pampas is thus closely related to the mobility of species, people and goods.

Many plans and laws were projected and voted in the second half of the nineteenth century for the creation of towns based on agricultural activity.[25] These new municipalities were planned in paral-

[23] Ibid.

[24] J. Schvarzer, A. Regalsky and T. Gómez, *Estudios sobre la historia de ferrocarriles argentinos 1857–1940* (Buenos Aires: Universidad de Buenos Aires, 2007); S.N. Grahl and F. Fucito, *Las normas de excepción al ordenamiento urbano y territorial: Relaciones de correspondencia entre los condicionantes históricos, geográficos y sociales* (PhD Thesis, National University of La Plata, 2008).

[25] Schvarzer, Regalsky and Gómez, *Estudios sobre la historia de ferrocarriles,* p. 20.

lel with the installation of the railway in the province. Agricultural colonies were created throughout the region, in part due to bills and laws. Most of these colonies were composed of European families, each of whom had access to and use rights for a plot of land (generally minifundia called *chacras*), on which they could begin a new life in South America. The internal migratory flow was likewise important in the formation of the colonies. The rails crossing the pampas gave rise to settlements in the plains, which also meant a radical transformation of the environment. Animals (livestock and poultry) and vegetable (grain) species, as well as ornamental and fruit plants, were produced extensively. The increase in population was intricately linked to an increase in production, and the rise of both required promoting mobility. In this way, Argentine modernity comprised both an advancement of technology and an increase in population.

An example of territorial occupation promoted by the arrival of the railroad is the city of Verónica, located in Punta Indio, Buenos Aires province. The formation of Verónica is linked to the subdivision of the lands of rancher Martín Tornquist at the beginning of the twentieth century. Tornquist intended to create a colony with an agricultural economic base. This region had been an area for cattle raising and grain production since colonial times, and in 1914, the rancher brought the railroad to his land in order to develop and urbanise it. Thus, the city of Verónica emerged from the station with the same name (Figure 4).

The arrival of the train was fundamental to the formation of this town because it guaranteed shipment of products to ports in Buenos Aires and La Plata. This is how the great opportunity was announced in one of the most important magazines of the time:

> An advantageous business for small capitalists, settlers, farmers, gardeners and ranchers. First-rate land for immediate cultivation. The most fertile agricultural region in Buenos Aires province, with an FCS station in the center of the colony and town, situated 137 kilometres from Buenos Aires and 85 from La Plata.[26]

[26] *Caras y caretas* (Buenos Aires), 13/3/1915, n.º 858, Biblioteca Nacional de España.

Figure 4. Verónica station, c. 1920.

Source: Museo Histórico de Punta Indio 'Eduardo Barés'.

The railway was built by the British company FCS, hired by Torquist. The line was closed in 1977. The city of Verónica currently has about 6,000 inhabitants, mostly of European descent, and livestock has been the main economic activity in the area. From the original ecosystems, there remains a remarkable natural reserve located between the associated coastlines and the strips of talas (*Celtis tala*, a tree species of the region) parallel to the coast. This is the Parque Costero del Sur, Biosphere Reserve – UNESCO.

The landscapes of the 'modern' pampas

Modernity in Argentina implied the transformation of its 'original nature' as part of the national project. 'Cutting' and redrawing the flatlands (*llanura*) with railway lines and populating this space were part of the modernisation and inclusion of peripheral areas. The intense flow of people and products resulted from the expansion of the railroad throughout the country. With internal flows, the export movement of agricultural production traced a wider geography, connecting the south with the north. In parallel with the growth of internal commercial flows, there was an increase in activities related to the international trade of resources. In this sense, the modernisation desired by the Argentine elite expanded the area of influence of the National State, while foreign capital expanded its dominions to the other side of the Atlantic. 'Cutting' the pampas with the train tracks meant reterritorialising an already colonised space. The development of the railway network promoted the expansion of Argentina's peripheral model of capitalist accumulation. In this sense, railway technology contributed to the construction of a new national cartography, connecting places, creating new ones, and permanently isolating others.

Undoubtedly, the Argentine nation followed an abstract linear perspective that led to the kind of progress envisaged at the time: the European model of society. The established railway network, the colonisation of the pampas and the export economy were part of the unidirectional imperialist idea that imagined the progress 'of all societies'. As Walter Mignolo has said, however, 'we are not modern':

> In this sense, 'Latin America' was fabricated as something displaced from modernity, a displacement that Latin American intellectuals and statesmen assumed and strove to become 'modern' as if 'modernity' were a point of arrival and not the justification of the coloniality of power.[27]

The coloniality of power, of being and of nature is a form of

[27] W. Mignolo apud C. Walsh, 'Las geopolíticas del conocimiento y colonialidad del poder. Entrevista a Walter Mignolo', *Polis* **1** (4) (2003): 1–27.

domination through the institution and naturalisation of the Eurocentric imaginary as the only way of relating to nature and the social world.[28] Modernity would thus be part of the civilising project present in coloniality, extended to the former colonies despite the end of colonialism. What was not part of the modernity project was isolated in the stereotypical vision of a primitive 'other' that belonged to a marginalised past.[29] The diversity of ethnic groups, cultures and community economies thus kept Latin American countries 'outside' the Western standard.

The Argentina of the late nineteenth century sought greater inclusion in the Western world through the idea of civilisation. By reproducing European scientific, technological and cultural standards, the Nation sought to separate itself from its colonial and indigenous past. This dynamic required the adaptation of the pampean plains to a rational and Western configuration of space. In other words, the Nation sought to position itself in the world through the international market. The coalition with the Global North not only stimulated exports but also favoured the progressive discourse of the Argentine elite, materialised by the occupation of the 'desert'. It meant erasing internal borders to build the National State. With the installation of the railway network, the 'conquered desert' could be adequately explored, and previously isolated places were connected with national and international centres. To this end, a profound transformation was required in the socio-environmental landscapes of the 'conquered' regions, redefining the space and its people.

Even so, Argentine modernity did not consist only of the entry of foreign capital and technologies – it included a mixture of pastizales (grasslands), humedales (wetlands), immigrants, native cultures, English cattle, *ñandu* (*Rhea pennata*), *Eucalyptus* and tala.

[28] V.C. Cruz, 'Geografia e pensamento descolonial: notas sobre um diálogo necessário para a renovação do pensamento crítico', in V.C. Cruz and D.A. Oliveira (eds), *Geografia e Giro descolonial: experiências, ideias e horizontes de renovação do pensamento crítico* (Rio de Janeiro: Letra capital, 2017), volume 1, pp. 15–36.

[29] A. Quijano, 'A colonialidade de poder, eurocentrismo e América Latina', in E. Lander (organizador), *A colonialidade do saber: eurocentrismo e ciências sociais latino-americanas* (Buenos Aires: CLACSO, 2005), pp. 117–142.

Settlement also required adaptation and acculturation by immigrant families. If, on the one hand, they brought with them their original material and immaterial culture, they also, on the other hand, had to adapt to the new environmental structure.

Conclusion

The geographical constitution of the Argentine pampas favoured the expansion of the National State through agricultural exploitation. Its fertile lands ensured the success of grain crops and cattle raising. In addition, the practically flat formation of the Buenos Aires pampas made railway expansion easy. Thus, the modernisation of Argentina resulted from an opportune combination of environment and technology. Such territory was already deeply socially and ecologically modified in the late nineteenth century, as we have noted. The process of homogenisation of the environment was, however, intensified by the massive arrival of immigrants and the domestication of exotic fauna and flora. Modernisation in the pampean region implied a process of environmental homogenisation, including substitution of the original herbaceous steppe with artificial grasses and then the incorporation of massive cereal crops in the last third of the nineteenth century. The pampean territory was westernised: exotic forage crops were cultivated to feed export cattle; large-scale cereal cultivation became widespread; and European labour traditions were introduced, according to the immigrants' perception of the world. In short, the space of a 'neo-Europe' was created. Moreover, native woods were logged for the construction of rural buildings and the railroad. Such species as quebracho (*Schinopsis spp.*), urunday (*Astronium balansae*) and guayacán (*Libidibia paraguariensis*) were heavily used for the manufacture of sleepers, causing brutal deforestation in northern Argentina, while tala was used for the construction of corrals and fences, and for providing shade for livestock. Furthermore, most of the montes (small forests) were felled in the nineteenth century for firewood, and they quickly disappeared.

The commercialisation of land in Buenos Aires up to 1930 caused

a profound transformation of the landscape and established a diverse dynamic that until then was unprecedented in the Argentine territory. The combination of ranching and modern agriculture triggered major economic, social and environmental changes, such as the incorporation of more than forty million hectares into the productive market, the integration of technology for cultivation, the introduction of new animal and plant species, the expansion of the agricultural frontier, notable population growth, the dramatic extension of railway networks, and the proliferation of industrial crops. Spurred by external demand, these factors promoted the rapid occupation of much of the La Plata Basin and contributed to a reduction of its former environmental heterogeneity.

The Argentine pampas offered its land, forests and rivers to the Global North, while the Global North offered its livestock and technologies, among many other exchanges. It was through these exchanges that the Argentine National State and the bases of the current pampean culture were built, among which 'el mate' (*Ilex Paraguariensis*, a Guarani herb for drinking) and 'el asado' (*churrasco* beef from English breeds) cannot be absent.

Thus, from the encounter between nature and technology, heterogeneous cultures are formed. Societies are built through – and not on – the biophysical world of which they are a part. When we focus on socio-environmental analyses, the originality of each Latin American nation thus shows heterogeneous cartography in the global world established by the Anthropocene.

Ana Marcela França de Oliveira is a post-doctoral fellow at CONICET (Argentina)/CEAR – Universidad Nacional de Quilmes (2018–2020). She completed her Ph.D. at the Institute of History at the Federal University of Rio de Janeiro (IF-UFRJ) in 2015, in the area of Social History, with emphases on environmental history and art history. She has a Masters degree in Social History of Culture from the Pontifical Catholic University of Rio de Janeiro (2009) and a specialisation in the History of Art and Architecture of Brazil (2005) from the same university. She did a sandwich Ph.D. at Birkbeck, University of London, UK (2014). She has experience in the field of history, working mainly on environmental history, history of art, heritage, Nature, landscape and travellers.

Email: anamarcelaf@hotmail.com

Adrián Gustavo Zarrilli holds a Ph.D. from the National University of La Plata). Zarrilli is a researcher at the National Council of Scientific and Technical Research and a professor at the National University of Quilmes and the National University of La Plata, Argentina. He is the director of the Center for Rural Studies of Argentina (UNQ) and the former president of the Latin American and Caribbean Society of Environmental History (SOLCHA). Previously, Zarrilli was a postdoctoral researcher at the Federal Rural University of Rio de Janeiro. He has published multiple books, book chapters and academic articles. His recent studies explore the expansion of industrial agriculture, driven mainly by the growth of soybean cultivation, which has produced some of the largest economic, social, demographic and environmental changes in the country's recent history. His research focuses on Latin American environmental history.

Email: azarrilli@unq.edu.ar

Imagining the Nile: knowledge – power nexus in the 19th century Anthropocene

Abeer R.Y. Abazeed and Yasmine Hafez

Setting the scene

What would the Nile be without any of its hydraulic infrastructures – the numerous networks of canals, the towering dams, the barrages? Was it at one time imagined the way we see it in the eighteenth century map (figure 1), as a free-flowing entity devoid of any barriers?

Global Environment 15 (2022): 298–321

doi: 10.3197/ge.2022.150205

Figure 1. Detail of Cairo by Piri Reis, circa 1730

Source: Kitāb-I Bahriyye. Walters Art Museum, MS W.658.305a, image CC BY. Available online at https://art.thewalters.org/detail/77733/the-city-of-cairo/ (accessed 30th March 2022).

Although such a vision might have been a reality of the Nile, it is only partial. The story is missing one integral element: the layered imaginations of the Nile, as represented in the form of multiple writings and travelogues from the nineteenth century onwards. There have been debates as to whether we can consider rivers as solely 'natural' in their essence or as 'artificial' due to humans' interventions.[1] Such dichotomous views are rather reductive and can no longer apply to the 'hybrid entities of the Anthropocene'.[2] Instead, we adopt a view of rivers as 'complex entanglements of artificial and natural forces – hybrid forms that are neither natural nor cultural, neither human nor nonhuman, neither social nor material, but confluences or mixtures of all these'.[3] Similarly, the study of the Anthropocene has been understood to be an analysis of the collision between 'natural forces and human forces'.[4] From this footing, we thus develop our understanding of modern rivers in the Anthropocene 'not simply as physical landscapes; they are cultural worlds as well, shaped at the interface between humans and nature'.[5]

In this paper, we use different means to understand and read the Anthropocene as layered 'human storytelling'[6] with and within nature, or an expression of 'powerful imagination',[7] or as Kelly refers to it, as 'anthropocenic consciousness'.[8] By doing so, we study the

[1] For discussions, see for example M. Edgeworth and J. Benjamin, 'What is a river? The Chicago River as hyperobject', in J.M. Kelly et al. (eds), *Rivers of the Anthropocene* (Oakland, CA: University of California Press, 2018), pp. 162–175.

[2] Ibid., p. 162.

[3] Ibid., p.163.

[4] Zalasiewicz et al., 'The new world of the Anthropocene', *Environmental Science and Technology* **44** (7) (2010): 2228–2231, p. 2231.

[5] Kelly, *Rivers of the Anthropocene*, pp. xv–xxv.

[7] C. Deane-Drummond, 'Rivers at the end of the end of Nature: Ethical trajectories of the Anthropocene grand narrative', in Kelly, *Rivers of the Anthropocene*, pp. 55–62.

[8] T. McHolm, Representational Challenges: Literatures of Environmental Justice in the Anthropocene (Ph.D. Thesis, University of Oregon, 2017), p. 17.

[9] This refers to the permanent changes to the earth that American and European elites were effecting by the early nineteen century, as supported by empirical evidence. J. Kelly, 'Anthropocenes: A fractured picture', in Kelly et al. (eds), *Rivers of the Anthropocene*, pp. 1–18.

Nile, the 'hybrid entity' comprising both the natural resource that it is, and the product of humans' storytelling, imaginations and consciousness through writings and travelogues.

In the nineteenth century, the Nile River in Egypt was perceived by political, capitalist and knowledge-making powers (namely Ottoman and European empires) as 'pristine nature' and/or 'ruined landscape', which was open for exploration and exploitation.[9] As such, Egyptian modernists and European explorers (e.g. archaeologists and travellers) produced incongruous knowledge about the Nile. On the one hand, the river was positioned in the land of civilisation(s) – Pharaonic, Coptic, Islamic or Hellenistic.[10] On the other hand, the river was ruined and surrounded by 'uncivilised' Egyptians, or at least illiterate and unskilled peasants.

This case study of the Nile River centrally examines the workings of power manifested in the knowledge produced about the agency of the Nile and the Egyptians. Kelly wrote:

> while individuals have the capacity to consciously effect change, our actions are limited by the contexts in which we find ourselves. Each of us is shaped by our material, socio-political and cultural worlds'[11].

Similarly, Celia Deane-Drummond argues that we need 'to consider the ways in which humans tell stories or narratives about river systems.[12]

Understanding rivers and the Anthropocene as entangled nature–culture storytelling enables us to read how nature is ingrained in human power dynamics. This perspective pushes us to analyse

[9] C. Hoffmann, 'Environmental determinism as Orientalism: The geo-political ecology of crisis in the Middle East', *Journal of Historical Sociology* **31** (1) (2018): 94–104, p. 96; D. Davis, 'Imperialism, orientalism, and the environment in the Middle East: History, policy, power, and practice', in D. Davis and E. Burke (eds), *Environmental Imaginaries of the Middle East and North Africa* (Athens: Ohio University Press, 2011), p. 13.

[10] K. Blouin, 'Beyond the Nile: Orientalism, environmental history, and ancient Egypt's Mareotide (northwestern Nile Delta)', *History Compass* **15** (10) (2017): 1–11; E. Said, *Orientalism* (New York: Vintage Books, 1979).

[11] Kelly, *Rivers of the Anthropocene*, p. xxiv.

[12] Deane-Drummond, 'Rivers at the end of the end of Nature', p. 55.

how writings on natural resources echoed human personal journeys and experiences.

We experimented with our approach by analysing two readings in juxtaposition and thinking how they might have converged to influence our understanding of the river. The first book is by the Egyptian modernist Alī Mubārak (1823–1893): *Nukhbat al-Fikr fī Tadbīr Nīl Miṣr* (*Elite Thoughts on Managing the Nile of Egypt*), written in Arabic in 1881.[13] The second book is a collection of Western travelogue diaries of visits to Egypt, named *A Nile Anthology: Travel Writing Through the Centuries.*[14] Alī Mubārak's book is written from the perspective of a scientific expert and was intended to be a source of reference for policymaking in modern terms. The travelogues were also written by prestigious intellectuals of the era, including Pierre Loti, Harriet Martineau, James Silk Buckingham, Amelia Edwards and Jean-François Champollion, among others. They mostly intended to document their travels; however, their travelogues quickly became sources of knowledge about both the river and the locals. They contributed to producing a certain divergence of agency in the mind of the European readers, especially since travelling was a privilege inaccessible to all but a few. Even if these travelogues did not target colonial administration directly, they facilitated colonial missions by focusing on the natural resource and dismantling the locals' agency. As Derr argues, the British colonial administrators and engineers did not engage with what Egyptian intellectuals such as Mubārak produced about regulating the Nile. By contrast, English writings about the Nile had an opportunity to be circulated, being British-produced knowledge.[15]

[13] A. Mubārak, *Nukhbat al-fikr fi tadbir Nil Misr* (al-Qahirah al-Mahrusah: Matba'at Wadi al-Nil al-'Arabiyah wa-al-Ifranjiyah, 1297/ reprinted by Egyptian National Library and Archives, 2012). The publication date was in 1297 according to the Islamic calendar (Hijri), which corresponds to 1881 in the Gregorian calendar. It was published before the British formal occupation of Egypt in 1882.

[14] D. Manley, S. Abdel-Hakim and W.H. Bartlett (eds), *A Nile Anthology: Travel Writing through the Centuries* (Cairo: The American University in Cairo Press, 2015).

[15] J. Derr, *The Lived Nile: Environment, Disease, and Material Colonial Economy in Egypt* (Stanford: Stanford University Press, 2019).

We divide the article into four sections. Firstly, we present an historical brief on the main powers that tried to control the river across history (in the Ottoman and the British eras). Secondly, we focus on Alī Mubārak's ideas and plans for the Nile and the peasants (*fellahin*). Thirdly, we focus on the Western travelogues' perceptions and descriptions of the Nile and the locals. Investigating the diaries written for western and eastern readers (people from the Orient), as well as investigating the intersections and the differences between these narratives, enables us to understand the agency of the Nile and the locals in the Anthropocene as an outcome of storytelling through time. This is made possible by being attentive to the complexity and fluidity of memories and memoirs of nature (in our story, the river) across history.

Historical background: checkmate powers on the river

'When, eventually, the waters of the Nile, from the Lakes to the sea, are brought fully under control, it will be possible to boast that Man – in this case, the Englishman – has turned the gifts of Nature to the best possible advantage'.[16]

'He – Mohammed Ali Pasha – established many bridges/barrages and canals and considered maintaining them. He constructed the summer canals to improve the summer-seasonal agriculture. He replaced the foremen with engineers in irrigation works. Additionally, he sent many of the countrymen to Europe to study and master the art of agriculture to serve their country'.[17]

[16] E. Cromer, *Modern Egypt* (New York: Macmillan, 1908), 2nd volume, pp. 461. Lord Cromer was the British Consul-General of Egypt from 1883 (after the British occupation) to 1907. He designed and administered the economic and political plans in Egypt.

[17] J. Zaydan, *The Modern History of Egypt: From the Islamic Conquest to the Present Day with a Brief on the History of Ancient Egypt* (Egypt: Hindawi Foundation, 1889/2019) [in Arabic], pp. 698-699. The quote was translated by the authors. Jurji Zaydan (1861–1914) was one of the Arab renaissance 'Nahḍah' scholars. His writings in Islamic history, Arabic literature and journalism fed the Arab Nahḍah thoughts in the nineteenth century and early twentieth century.

These two sentiments reflect how actors located in rival powers – the elite in the British Empire and those under Mohammed Ali's reign – similarly imagined the Nile as an abundant river, albeit neglected and not yet 'properly' well exploited. Both employed modernist knowledge to remake the river as a 'perennial river',[18] which helped fix their imperial powers.

Mohammed Ali Pasha (ruling from 1805 to 1848) built his vision of a 'new Egypt', semi-independent from the Ottoman Empire, by regulating the Nile's water to increase land productivity as a means to secure his military and economic capabilities and to expand his international power.[19] Accordingly, during Mohammed Ali's reign the Nile was imagined as primarily serving its downstream areas, and in particular the delta, where extensive irrigation projects were established in order to export cash crops to Istanbul and Europe. By contrast, when the British occupied Egypt (1882) they reached and almost controlled the source of the Nile in the Equatorial Lakes. Their irrigation policy was aligned with their imperial plans in the other riparian countries.[20] Inside Egypt, the British built up its hydraulic and technological power on top of what Mohammed Ali's rule had already constructed.[21] Nevertheless, the British Consul-General of Egypt, Lord Cromer, accused the Ottoman ruler of inefficient and unscientific management of the Nile floods and droughts. The English engineers were therefore perceived as 'the saviour of the Egyptian irrigation'.[22]

[18] Derr, *The Lived Nile.*

[19] K. Fahmy, *All the Pasha's Men: Mehmed Ali, His Army and the Making of Modern Egypt* (Cambridge: Cambridge University Press, 1997); A. Mikhail, *Nature and Empire in Ottoman Egypt: An Environmental History* (Cambridge: Cambridge University Press, 2011). For more analysis about the Nile in the Ottoman era, see for example: R. Dankoff et al., *Ottoman Explorations of the Nile: Evliya Çelebi's Map of the Nile and The Nile Journeys in the Book of Travels (Seyahatname)* (London: Gingko Library, 2018), p. 98.

[20] T. Tvedt, 'Hydrology and empire: The Nile, water imperialism and the partition of Africa', *The Journal of Imperial and Commonwealth History* **39** (2) (2011): 173–194.

[21] R.L. Tignor, 'British agricultural and hydraulic policy in Egypt, 1882–1892', *Agricultural History* **37** (2) (1963): 63–74.

[22] Lord Milner (British administrator who served in Egypt from 1889 to 1892)

Historical scholarship of imperial powers in the Nile Basin has emphasised the hydraulic management of water through engineering technologies as a tool of control over the river and its people.[23] Not much attention has been accorded to the role of travelogues and memories in producing certain imagination and cultural discourses.

Materialising the Nile: Alī Mubārak's renaissance (*Nahḍah*) vision

Alī Mubārak saw the river through hydraulic knowledge in pursuit of building a 'new Egypt' as envisioned by Mohammed Ali's reign. He thus formulated a way of telling narratives about a 'natural resource' through the need to apply advanced science and technology, and the problem of educating unskilled fellahin. The knowledge he produced and his key writings (on education and hydraulic planning) contributed significantly to the Egyptian renaissance (Nahḍah). Mubārak's account emphasised the centrality of the Nile in defining the power and glory of Egypt against European countries. Despite his glorification of the Nile's significance, he emphasised the centrality of material and human interventions and transformation to maximise the productivity of the Nile waters. His renaissance approach, which could be described as 'imagineering' (a

quoted in Cromer, *Modern Egypt*, p. 458. Furthermore, when Cromer discussed the British irrigation mission in Egypt, he highlighted the role of the French engineer, saying: 'the Barrage – a work which owed its origin to the genius of a French engineer'. Meanwhile, he defamed Alī Mubārak's ideas and administrative skills in repairing the Delta Barrage, which contradicted the suggested plan of the British engineer Sir Colin Campbell Scott-Moncrieff. Cromer thus described Mubārak's repairment plan as 'costly and wasteful alternative' (Cromer, *Modern Egypt*, p. 459). Moreover, Scott-Moncrieff, who was in charge of the irrigation system, removed Mubārak from the Ministry of Public Works (Derr, *The Lived Nile).*

[23] See for example: H.H. Edwin, *The Nile: A General Account of the River and the Utilization of Its Waters* (London: Constable, 1952); W.R. Frederic, *Water Resource Planning in the Sudan: An Economic Problem* (Khartoum: [s.n.], 1966); S.G. Neville, *England, Europe and the Upper Nile, 1882–1899: A Study in the Partition of Africa*, Edinburgh University Publications. History, Philosophy and Economics, No.**18** 861738969 (Edinburgh: Edinburgh University Press, 1965).

term coined by Chris H. Büscher to describe the 'portmanteau of imagining and engineering' in understanding waterscapes),[24] relied on both advanced technology and educated *fellahin* to revive agricultural practice in Egypt.

Alī Mubārak Pasha (1823–1893) played a significant role in building a 'new Egypt'. He travelled to France as part of Mohammed Ali's various educational missions to European countries aimed at acquiring European knowledge and skills (e.g. engineering, medicine, military/naval fields).[25] These missions would shape the 'reformist' intellectuals and technocrats who later led the process of Egypt's renaissance (Nahḍah). The orientation of Nahḍah was to eventually blend European science and knowledge with a new national Egyptian identity.[26] Since his return from France, Mubārak had a pioneer role in 'modernising' the education system and urban planning of Cairo and the main Egyptian cities. Thereafter, he was seen as an icon of modernisation, working on restructuring knowledge production. He endorsed the establishment of a public schooling education system, which created a new space for acquiring and generating knowledge that differed from the prevailing religion-based education under the Al Azhar authority.[27]

Our analysis of Mubārak's book reveals his intellectual agency in the production of a 'modernised' knowledge of the Nile River. He constantly and explicitly affirmed the necessity of applying ad-

[24] C. Chris, 'Imagineering waterscapes: The case of the Dutch water sector', *Water Alternatives* **12** (3) (2019): 814–835, p. 815.

[25] Mubārak joined the mission to France in 1844 with four princes of the Mohammed Ali family. For more information on educational missionaries, see for example: H.A. Ead, 'Globalization in higher education in Egypt in a historical context', *Research in Globalization* **1** (100003) (2019): 1–5.

[26] O. El Shakry, *The Great Social Laboratory: Subjects of Knowledge in Colonial and Postcolonial Egypt* (Stanford: Stanford University Press, 2007); A. Patel, *The Arab Nahdah: The Making of the Intellectual and Humanist Movement* (Edinburgh: Edinburgh University Press, 2013).

[27] L.M. Kenny, 'Alī Mubārak: Nineteenth century Egyptian educator and administrator', *Middle East Journal* **21** (1) (1967): 35–51; M.J. Reimer, 'Contradiction and consciousness in Alī Mubārak's description of al-Azhar', *International Journal of Middle East Studies* **29** (1) (1997): 53–69.

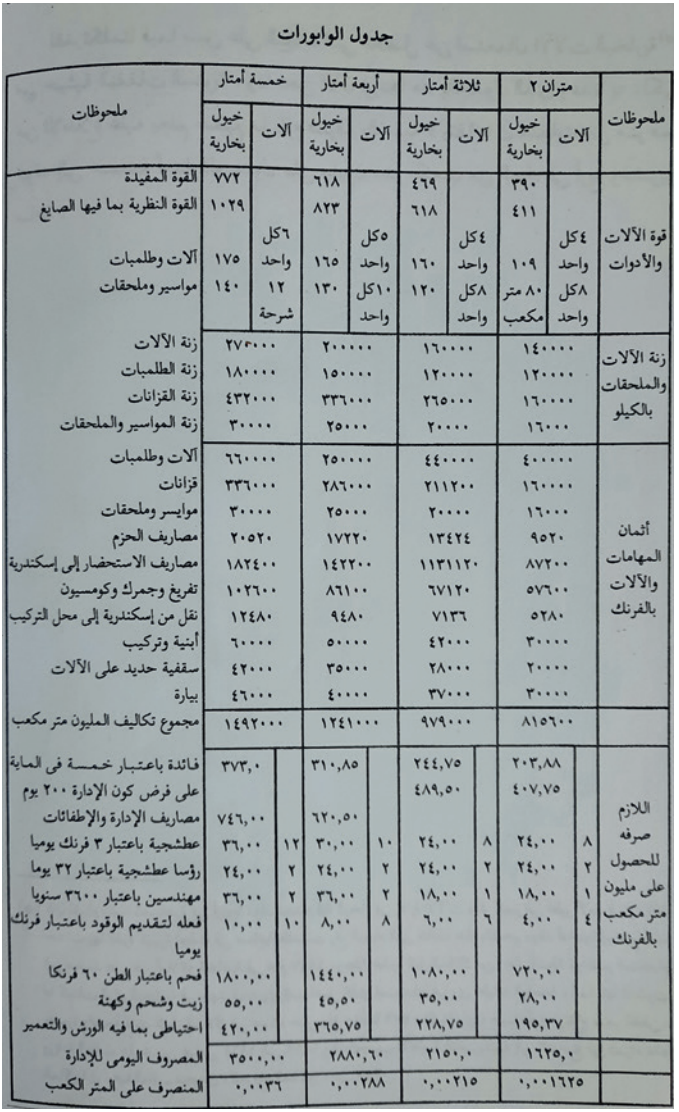
vanced technology, and educating fellahin, to utilise the Nile's water as a direct way to achieve the Egyptian Nahḍah. Sheehi argues that Mubārak's discourse throughout his works was a clear attempt to materialise the Egyptian Nahḍah as envisioned by Mohammed Ali's reign; importantly, he conveyed this ultimate vision as 'a natural, necessary and self-evident project'.[28]

The story of the Nile as told by Mubārak contends that the physical power (agency) of the river itself needs to be tamed/utilised by both infrastructure and skilled fellahin. The aim of Mubārak's book was to produce structured knowledge about the Nile that was built on scientific explanations. *Nukhbat al-Fikr* consists of four parts: the first part depicts the River's physiography with details of natural/artificial main and tertiary canals and flood plains across Egypt, as well as water measurement and constructed infrastructures on the Nile. The second part elaborates the agricultural system in Egypt and the causes of its deteriorations, highlighting the impacts on trade and industry. He discussed the main characteristics of Egyptians in the third part. The last part emphasises the importance of maintaining the Nile's infrastructures (i.e. canals and barrages). However, his reformist reasoning could be traced in his writing and argumentation, as he did not completely refute the established traditional knowledge in society. Rather, he injected historical narration, poems, prose and religious expressions to convince the reader of the significance and necessity of developing the Nile River on a scientific basis. Moreover, across the book's chapters, Mubārak illustrated the River's hydraulic features and infrastructures through figures, tables and measurements, while criticising the efficiency of traditional methods of agriculture. For instance, he demonstrated in tables the financial cost and returns of replacing the waterwheels (a traditional irrigation tool) with steam engines, to increase crops yields (Figure 2).

In the *Nukhbat al-Fikr*, Mubārak posited the Nile as the central means to attain Egyptian power in the world. He repeated throughout the book that 'the Nile is the cause of Egypt's happiness or misery'.

[28] S. Sheehi, 'Towards a critical theory of al-Nahḍah: Epistemology, ideology and capital', *Journal of Arabic Literature* **43** (2–3) (2012): 269–298, p. 279.

Figure 2. An excerpt of Alī Mubārak's numeric tables showcasing the cost and efficiency of steam engines



جدول الوابورات

ملحوظات	متران ٢		ثلاثة أمتار		أربعة أمتار		خمسة أمتار		ملحوظات
	آلات	خيول بخارية	آلات	خيول بخارية	آلات	خيول بخارية	آلات	خيول بخارية	
قوة الآلات والأدوات		٣٩٠		٤٦٩		٦١٨		٧٧٢	القوة المفيدة
		٤١١		٦١٨		٨٢٣		١٠٢٩	القوة النظرية بما فيها الصايغ
	٤كل واحد	١٠٩	٤كل واحد	١٦٠	٥كل واحد	١٦٥	٦كل واحد	١٧٥	آلات وطلمبات
	٨كل واحد	٨٠ متر مكعب	٨كل واحد	١٢٠	١٠كل واحد	١٣٠	١٢ شرحة	١٤٠	مواسير وملحقات
زنة الآلات والملحقات بالكيلو		١٤٠٠٠٠		١٦٠٠٠٠		٢٠٠٠٠٠		٢٧٣٠٠٠	زنة الآلات
		١٢٠٠٠٠		١٢٠٠٠٠		١٥٠٠٠٠		١٨٠٠٠٠	زنة الطلمبات
		١٦٠٠٠٠		٢٦٥٠٠٠		٣٣٦٠٠٠		٤٣٢٠٠٠	زنة القزانات
		١٦٠٠٠		٢٠٠٠٠		٢٥٠٠٠		٣٠٠٠٠	زنة المواسير والملحقات
أثمان المهمات والآلات بالفرنك		٤٠٠٠٠٠		٤٤٠٠٠٠		٢٥٠٠٠٠		٦٦٠٠٠٠	آلات وطلمبات
		١٦٠٠٠٠		٢١١٢٠٠		٢٨٦٠٠٠		٣٣٦٠٠٠	قزانات
		١٦٠٠٠		٢٠٠٠٠		٢٥٠٠٠		٣٠٠٠٠	موايسر وملحقات
		٩٥٢٠		١٣٤٢٤		١٧٢٢٠		٢٠٥٢٠	مصاريف الحزم
		٨٧٢٠٠		١١٣١١٢٠		١٤٢٢٠٠		١٨٢٤٠٠	مصاريف الاستحضار إلى إسكندرية
		٥٧٦٠٠		٦٧١٢٠		٨٦١٠٠		١٠٢٦٠٠	تفريغ وجمرك وكومسيون
		٥٢٨٠		٧١٣٦		٩٤٨٠		١٢٤٨٠	نقل من إسكندرية إلى محل التركيب
		٣٠٠٠٠		٤٢٠٠٠		٥٠٠٠٠		٦٠٠٠٠	أبنية وتركيب
		٢٠٠٠٠		٢٨٠٠٠		٣٥٠٠٠		٤٢٠٠٠	سقفية حديد على الآلات
		٣٠٠٠٠		٣٧٠٠٠		٤٠٠٠٠		٤٦٠٠٠	بيارة
		٨١٥٦٠٠		٩٧٩٠٠٠		١٢٤١٠٠٠		١٤٩٢٠٠٠	مجموع تكاليف المليون متر مكعب
اللازم صرفه للحصول على مليون متر مكعب بالفرنك	٨	٢٠٣,٨٨		٢٤٤,٧٥		٣١٠,٨٥		٣٧٣,٠	فائدة باعتبار خمسة فى المايه
		٤٠٧,٧٥		٤٨٩,٥٠					على فرض كون الإدارة ٢٠٠ يوم
						٦٢٠,٥٠		٧٤٦,٠٠	مصاريف الإدارة والإطفائات
	٨	٢٤,٠٠	٨	٢٤,٠٠	١٠	٣٠,٠٠	١٢	٣٦,٠٠	عطشجية باعتبار ٣ فرنك يوميا
	٢	٢٤,٠٠	٢	٢٤,٠٠	٢	٢٤,٠٠	٢	٢٤,٠٠	رؤسا عطشجية باعتبار ٣٢ يوما
	١	١٨,٠٠	١	١٨,٠٠	٢	٣٦,٠٠	٢	٣٦,٠٠	مهندسين باعتبار ٣٦٠٠ سنويا
	٤	٤,٠٠	٦	٦,٠٠	٨	٨,٠٠	١٠	١٠,٠٠	فعله لتقديم الوقود باعتبار فرنك يوميا
		٧٢٠,٠٠		١٠٨٠,٠٠		١٤٤٠,٠٠		١٨٠٠,٠٠	فحم باعتبار الطن ٦٠ فرنكا
		٢٨,٠٠		٣٥,٠٠		٤٥,٥٠		٥٥,٠٠	زيت وشحم وكهنة
		١٩٥,٣٧		٢٢٨,٧٥		٣٦٥,٧٥		٤٢٠,٠٠	احتياطى بما فيه الورش والتعمير
		١٦٢٥,٠		٢١٥٠,٠		٢٨٨٠,٦٠		٣٥٠٠,٠٠	المصروف اليومى للإدارة
		٠,٠٠١٦٢٥		٠,٠٠٢١٥		٠,٠٠٢٨٨		٠,٠٠٣٦	المنصرف على المتر الكعب

Source: Alī Mubārak's book *Nukhbat al-Fikr fī Tadbīr Nīl Miṣr*, p. 266

In saying that, while he believed in the agency of the Nile as a central natural resource for Egyptian political power, this physical agency still needed to be controlled and utilised by implementing advanced knowledge. The irrigation canals had deteriorated under the rule of Abbas (1848–1854) and Sa'id (1854–1863).[29] Mubārak therefore advised the rulers during Mohammed Ali's reign of the necessity of agricultural education so that *fellahin* could be productive with less effort:

> The governor (wāli) ought to establish peasantry schools to provide basic education by excellent educators ... This country deserves many peasantry schools that should be distributed across its corners by allocating places for experiments so each community will be able to get the results of the scientific explorations and the fruits of peasantry experiments.[30]

Firmly believing in the economic power of 'new Egypt', Mubārak addressed the international demand for Egyptian cash crops as a staple of the agricultural economy. He pointed out Egypt's comparative advantage based on its natural features, or 'our land's treasure', in other words fertile lands, the availability of water, weather conditions and a central geographic location. The comparisons that Mubārak included in his analysis aimed at showing the rulers during Mohammed Ali's reign how Egypt could be an international power equivalent to European powers (e.g. France and Britain). This lofty purpose, according to Mubārak, could perhaps be achieved by a divine blessing – but equally with Khedive rational policies. The knowledge-based rationalisation of upgrading the agriculture sector coalesced into 'the production of a single commodity'. This was combined with an attendant infrastructure through policy, i.e. expanding transportation, the land tenure system and security mechanisms. All these transformations would serve the objective of building or retaining the sovereignty and power of Mohammed Ali's reign – a vision of a 'new Egypt' facilitated at the same time, ironically, as the growing involvement of European power in Egypt's economy and colonisation.[31]

[29] Derr, *The Lived Nile.*

[30] Mubārak, *Nukhbat al-fikr fi tadbir Nil Misr*, p. 111 (translated by the authors).

[31] T. Mitchell, *Colonising Egypt* (Berkeley: University of California Press, 1988), p. 16.

Mubārak's renaissance vision did not, however, posit the Egyptian identity against or in contrast to European modernisation. Instead, as a reformer, he discussed the main characteristics of Egyptians as *fellahin* credited for inventing the 'agricultural art' that was transferred to other nations around the world. Mubārak explained that Egyptians are favoured by nature, being located in flat and fertile land with domesticated animals; this appealing 'natural' ecology enables Egyptians to farm and produce. They were also favoured by their religious beliefs, which educate Egyptians to avoid immoral/savage behaviour; and by the government, which likewise urges people to be law-abiding. Mubārak framed Egyptians as a superior nation. He argued: 'there is no nation now, or in ancient times, that has been at the top of civilization and as moral as the Egyptian nation'.[32] Moreover, he compared Egyptians with Europeans, who had initially been savage and underdeveloped, but whose fortunes and positions had changed and who came to be recognised by all other nations. Mubārak's reformist vision provided a way for recovering Egyptian glory with a belief in Egyptians' capabilities to restore the position of their moral and pioneer fellahin. In other words, Mubārak's vision aimed to place peasants at the foundation of a superior agricultural production infrastructure. They were the 'human resource' who filled an infrastructure gap in agriculture. In Mubārak's account, however, the agency of fellahin had been weakened and they had become non-productive because they did not improve themselves. Hence, he discussed Egyptians' conditions through the lens of educational and technical capabilities, these being crucial for the maintenance of Nile infrastructure and for the cultivation of crops. Peasants should therefore be 'instructed' on how to use upgraded technology and to apply advanced techniques in farming, besides work on constructing the overall hydraulic infrastructure. This in turn, established a 'structure' in which power was practised.[33] Mean-

[32] Mubārak, *Nukhbat al-fikr fi tadbir Nil Misr*, p. 360 (translated by authors).

[33] Mitchell argues that Mubārak's role contributed on one hand to setting up a schooling system of 'personal discipline'; on the other hand, his urban plans established the model village and city as a 'spatial order' in pursuit of building the mod-

while, he omitted discussing the suppression and unjust taxation system which was linked with land property and forced labour.[34] In conjunction with this production vision, Mikhail argues that peasants gradually disconnected from their local environment i.e. their small farms, livestock and inherited knowledge because the governments perceived them as mobile labour to dig and repair canals away from their home.[35]

Mubārak's ideas and perceptions about the Nile were derived from structured/secular knowledge that reconfigured the river's agency through the necessity of hydraulic infrastructure, and the agency of peasants through the necessity to build technical knowledge. Hence, Mubārak placed the river squarely at the centre of Egypt's renaissance and its accelerating economy.

Experiencing the Nile: foreign travelogues and people of the Nile

The collection of diaries and travelogues in the book under study were derived from the collision between the travellers' culture, societies, and interaction with nature in their own worlds. Even more, these travellers' diaries mediated the production of dominant knowledge at that time, since travelling was not accessible to the ordinary public. Thus, these writings were far from just personal stories once these stories themselves travelled across place and time. Such writing becomes an important analytical object whose performativity and agency in making universalising cultural discourse needs attention. The travellers were pioneers in their fields, such as the founder of modern nursing, Florence Nightingale, and one of the first female sociologists, Harriet Martineau. Some of the travellers' interests in Egypt had a direct impact in advancing scientific knowledge. French scholar Jean-François Champollion, for example, was able to de-

ern Egypt. For more information, see Mitchell, *Colonising Egypt*, chapter three.

[34] S. El Nour, *Land, Peasant and Investor: A Study of Agrarian and Peasant Questions in Egypt* (Cairo: Al Maraya for Cultural Production, 2018) (in Arabic).

[35] Mikhail, *Nature and Empire in Ottoman Egypt: An Environmental History*.

cipher the ancient Egyptian hieroglyphs, and Egyptologist Amelia Edwards founded the Egypt Exploration Fund in 1882 (currently known as the Egypt Exploration Society, which still supports and funds archaeology research projects in Egypt and Sudan). These were powerful intellectuals in their home countries, and they viewed the Nile based on their backgrounds, travels and experiences. In this section, we highlight these analogous writings and unravel the commonality in their observations, which re-produced 'antecedent authority'[36] about the Nile. In doing so, we analyse the agency of both the resource and the locals by differentiating between the romanticised language used to describe the beauty of the river and its *Dahabiyeh*,[37] and comparing it with the language that was used to characterise the locals as poor and disempowered.

The diaries present physiographic and hydrological attributes of the river as a beautiful resource amidst, and despite, the vast deserts of Egypt. These sentiments came from the ecological contrast between abundant water and parched deserts in the same location. French naval officer and novelist Pierre Loti conveyed this by saying:

> All along the banks of the Nile this movement of the antennae of the shadufs is to be seen. It had its beginning in the earliest ages and is still the characteristic manifestation of human life along the river banks. It ceases only in the summer, when the river, swollen by the rains of equatorial Africa, overflows this land of Egypt, which itself was made in the middle of the Saharan sands.[38]

Irish traveller and novelist Elliot Warburton's sentiment described ecological attributes in romantic phrases: 'The sailing on the moonlit Nile has an inexpressible charm; every sight is softened, every sound is musical, every air breathes balm'.[39] In contrast to Mubārak's vision and discussions on agriculture, the diaries did not include

[36] Said, *Orientalism*.

[37] Also written as Dahabeeyah or Dahabeah. Merriam-Webster dictionary defines it 'a long light-draft houseboat used on the Nile that is lateen-rigged and is often propelled wholly or partly by engines'.

[38] P. Loti, 'Notes along the Nile, 1910', in Manley, Abdel-Hakim and Bartlett (eds), *A Nile Anthology,* p. 5.

[39] E. Warburton, 'Nile by night and dawn, 1843', in Ibid., p. 48.

observations about farms or green landscapes despite the significant exports of Egyptian cotton and crops to Europe, and travellers could not have missed seeing farms in their journeys. The focus on the imagery of the desert allowed green fields to be omitted. As Said explained, the 'citation of authority' in describing the Orient compelled travellers to follow narratives produced by antecedent travellers; even if they saw new things, one did not see it in their writings.[40] Western travellers frequently documented desert and sands in their diaries, as well as Bedouin, camels and tents. The desert complemented the romanticisation of the Nile and the Orient. As Timothy Mitchell writes about nineteenth century European intellectuals travelling to Egypt:

> On the other hand, however, while setting themselves apart in this way from a world-as-picture, Europeans also wanted to experience it as though it were the real thing. Like the visitor to an exhibition, travellers wanted to immerse themselves in the Orient and 'touch with their fingers a strange civilisation'.[41]

In view of this, these travelogues enable us to extend Edward Said's ideas of orientalism from cultural practices to perceptions of waterscapes. Said argues that the documentation of the Orient is constructed on 'the restorative citation of antecedent authority',[42] such as when travellers reiterated the narratives and images as explained by former travellers. In cases of divergence between what was cited and what travellers really experienced, travellers often framed the new observations according to antecedents. As Derek Gregory states, through the act of travelling, places become 'sites' for tourists, 'located within an "imaginative landscape" where they become meaningful as "sights"'.[43] The 'sights' and 'sites' of the Nile described in these writings are made with continuous references to

[40] Said, *Orientalism*.
[41] Mitchell, *Colonising Egypt*, p. 26.
[42] Said, *Orientalism*, p. 176.
[43] D. Gregory, 'Scripting Egypt: Orientalism and the cultures of travel', in J. Duncan and D. Gregory (eds), *Writes of Passage: Reading Travel Writing* (London: Routledge, 1999), pp. 114–150, p. 116.

'home' standards. For example, positioning the Nile in analogy with the Thames is reiterated in many diaries to explain the beauty of the river and the organised plan of writers' journeys. Englishman John Fuller envisioned his sailing along the Nile like 'an excursion on the Thames'[44] because of the feeling of security he experienced from the presence of a police attendant and by the fact that he did not experience an incident of robbery. Another analogy to British life comes from Florence Nightingale, a British statistician and the founder of modern nursing, who sailed along the Nile in December, writing of her enjoyment of the Egyptian weather. She compared her feeling cold on the cruise to an experience of an 'English morning in October'.[45] Besides the weather, even the Pharaonic monuments were assessed with reference to English buildings. British journalist and traveller, James Silk Buckingham considered the temple of Hermopolis in Minya to be as eminent as the building of 'St Paul's Cathedral to Westminster Abbey'.[46]

Another type of distinctive site, which grabbed the tourists' attention a place of intimacy and authenticity, included stretches of the river with the *Dahabiyeh* (figure 3), which literally translates as 'gold'. The first luxurious sailing boat in the South of Egypt was called the *Dahabiyeh*, managed by the Thomas Cook Company and originally used during the reign of Mohammed Ali for the royal family's trips. Later, the *Dahabiyeh* style was replicated and its name came to describe a type of luxurious houseboat still in use today. Ziad Morsy, who has traced photographs of Western travel writings and used maritime ethnographic research, argues that the boats almost went extinct after Nile travel was commercialised with non-traditional boats.[47] In the description of the *Dahabiyeh* cruise and its distinctive structure, foreign travellers recalled their home 'sites'.

[44] J. Fuller, 'Just an excursion, 1819', in Manley, Abdel-Hakim, and Bartlett (eds), *A Nile Anthology*, p. 8.

[45] F. Nightingale, 'At home on the Nile, 1849', in Ibid., p. 18.

[46] J.S. Buckingham, 'The Temple of Hermopolis at Minya, 1813', in Ibid., p. 56.

[47] Z. Morsy, *Traditional Sailing Boats of Egypt: A Maritime Ethnographic Research of the 19th and 20th Century Boats* (MA thesis in Maritime Archaeology, Faculty of Arts, Alexandria University, 2016).

Figure 3. *Dahabiyeh.*

Source: Daniel Willard Fiske Papers #13-1-1165, Division of Rare and Manuscript Collections, Cornell University Library.

For instance, Egyptologist, traveller, journalist, and novelist Amelia Edwards described it as more 'a civic or an Oxford University barge than anything in the shape of a boat with which we in England are familiar'.[48] Moreover, the interior design of the cruiser was analysed in comparison to European ideals and innovation. Edwards described the kitchen, 'which is a mere shed like a Dutch oven in shape'.[49] Furthermore, standards of cleanliness were framed in com-

[48] A. Edwards, 'The Dahabiya, 1873', in Manley, Abdel-Hakim and Bartlett (eds), *A Nile Anthology*, p. 9.

[49] Ibid., pp. 8–9.

parison to European standards. The English author and translator, Lady Lucie Duff Gordon, wrote, 'the boat is quite as clean as an English boat as crowded could be kept, and the engine in beautiful order'.[50] She continued comparing crew dynamics and their professionalism with British standards. She expressed her fascination with the work of a multinational crew under the leadership of a Turkish captain in English uniform, saying, 'all the crew and captain too, wear English clothes and use the universal, "All right, stop her – fooreh (full) speed, half speed – turn her head"'.[51] Ziad's analysis of thousands of travel stories and his vast collection of photographs show that the diaries offer only a partial photographic perspective on the range of boats actually existing at the time. He argues that the travellers were not paying attention to their own boats.[52] This suggests that Western reference points had influenced travel writers' observations and their imagination, which in turn affected the accuracy of the description of boats, people and places on the Nile.

Additionally, the foreign travellers, regardless of their backgrounds, were keenly interested in commenting on social dynamics in Egypt. On the one hand, their diaries included many stories and sentiments which reflected their perception about Egyptians who inhabited the Nile's banks. On the other hand, the documentation of minor interactions drew a comparison between the reproduction of the Orient (Egypt) in Europe on the one hand, and the external reality they experienced on the Nile cruisers on the other. Said argues that the detailed elaboration in diaries reflects how Europeans reproduced the Orient that they had read about before their actual visit. Their descriptions thus constituted what he termed 'orientalising the Orient'.[53] The descriptions of the beautiful Nile stood in contrast to the condescending writings about the locals and their lifestyles. Travellers encountered Egyptians when they walked off the

[50] L.D. Gordon, 'On board a river steamer, 1863', in Ibid., p. 23.

[51] Ibid.

[52] Z. Morsy, *Nile Boats through the Eyes of Western Eravellers*, Research Presentation (Southampton: UK Centre for Maritime Archaeology, University of Southampton, 2018).

[53] Said, *Orientalism,* p. 167.

cruise to visit temples and ambled around the surrounding villages. Florence Nightingale wrote:

> But no European can have the least idea of the misery of an African village; if he has not seen it, no description brings it home…we walked round the village, the huts all tumbled together up and down, as animals build their nests without regularity or plan. The pigeons seemed better lodged: they had round cones provided for them ... There was not much curiosity about me, though they (the Arabs, not the pigeons) could never have seen a European woman before; but they looked on with the same interest which dogs did, –no more.[54]

This description of the village and its people, with its racist overtones, de-humanised Egyptians. Simultaneously, we see a romanticised sentiment of villages on the banks carrying a different tone when it comes to describing the locals. The female English pioneer in sociology, Harriet Martineau, wrote 'there was the ferryboat, with its ragged sail, and its motley freight of turbaned men, veiled women, naked children, brown sheep, frightened asses and imperturbable buffalo'.[55] The French scholar who deciphered the hieroglyphs, Jean-François Champollion, wrote about their becoming lost after leaving the cruiser to reach a temple in Luxor, and he described the Egyptian who found and guided them back to the Temple: 'This poor devil, barely reassured at first, took us along a good route and finished by walking with good grace, thin, dry, black covered with old rags, this was a walking mummy'.[56] Travellers could not bring themselves to describe or perceive the human agency of the workers on the cruise. Some travellers simply described Egyptians as 'black shadows' or 'servants' in their trips.[57]

[54] F. Nightingale, 'At home on the Nile, 1849', in Manley, Abdel-Hakim and Bartlett (eds), *A Nile Anthology,* pp. 18–20.

[55] H. Martineau, 'So much to see, 1848', in Ibid., p. 51.

[56] J.F. Champollion, 'Coming upon Dendera by Night, 1829', in Ibid., p. 62.

[57] These sentiments were expressed in the following statements in the travelogues: 'For the crew there was no sleeping accommodation whatever ... they just rolled themselves up at night, heads, and all, in rough brown blankets, and lay about the lower deck like dogs' (Edwards, 'The Dahabiya, 1873', in Ibid., p. 13); 'The perfect freedom from all restraint, and from the conventional tram-

The juxtaposition between the exotic description of the Nile and the condescending description of the locals has been very shocking. Furthermore, there was no reference to the locals as Egyptians, but rather as 'Arabs'[58] in many of the stories, thus indicating a wider 'othering' by dismissing diverse ethnicities in the region. The label 'Arab' reflects two entangled layers. The first is the ecological fact that the Nile runs through the heart of the desert, unlike the imagination of other Arab countries in the region. The second layer embeds an orientalist understanding of the desert and its uncivilised inhabitants as homogenous entities – i.e. as 'others'. In her fascination with sunsets on the Nile banks, Harriet Martineau described how 'the vast and dreary and hazy Arabian desert became yellow, melting into the purple hills'.[59]

Blouin argues that Western colonial power focused on Egypt as narrated in Greek and Latin texts and narratives. According to this

mels of civilized society, from an episode in a man's life that is vastly agreeable and exciting'(J.L. Stephens, 'Only on the river, 1836', in Ibid., p. 27); 'We got used to it, as one gets to everything in time; but it looked like slaves' work, and shocked our English notions disagreeably' (A. Edwards, 'Tracking, 1873', in Ibid., p. 30); 'It was near a little mud village, of which I forget the name, and several Bedouin tents were on the bank, in one of which I was sitting smoking a pipe' (J.L. Stephens, 'Wind-bound, 1836', in Ibid., p. 35); 'Finally, a man was discovered; we called to him and he bolted, taking us for Bedouin, for, dressed in the eastern manner and covered with a great white hooded cape, we resembled to the Egyptian man a tribe of Bedouins, whilst a European might have taken us without hesitation for a guerrilla force of Carthusian monks armed with guns, sabres and pistols' (Champollion, 'Coming upon Dendera by night, 1829', in Ibid., p. 61); 'thin, dry, black covered with old rags, this was a walking mummy' (Ibid., p. 62); 'Don't think us grown quite savage and uncivilised. It is very hard to be all day by the deathbed of the greatest of your race, and to come home and talk about quails or London' (F. Nightingale, 'Life at Thebes, 1850', in Ibid., p. 77).

[58] The reference to locals as 'Arabs' or others occurs in several stories and statements, including: 'Be stared at by the Arabs' (Stephens, 'Only on the river, 1836', in Ibid., p.28); 'The Arab always covers his head' (Nightingale, 'At Home on the Nile', in Ibid., p.19); 'Arab boatmen' (S. Poole, 'Nile-boat prayers, 1842', in Ibid., p. 13); 'Arabs were out' (Stephens, 'Wind-bound, 1836', in Ibid., p. 36), 'Arabian desert' (H. Martineau, 'So much to see, 1848', in Ibid., p. 52).

[59] H. Martineau, 'So much to see, 1848', in Ibid., p. 52.

European classical discourse, the Nile was the centre of Egypt. Nevertheless, European archaeologists, for instance, were not interested in investigating Egyptian people and their connections with the Nile.[60] Here, the Nile was imagined as part of European heritage and civilisation. So, they produced a river 'de-socialised' from its surroundings,[61] even though the river was intimately connected to the travellers' own cultural worlds. These Europeans travellers were influential thinkers of the time and had an integral role in the discovery of 'faraway' places, rendering an Egyptian river a part of the European imperial landscape.

Conclusion

The control of the Nile for state purposes, and harnessing it for the aims of renaissance in the nineteenth century, was made possible by specific discourses of the river, its ecology, and its people. This examination of discourses of the river reveals how the Nile is produced by cultural discourses in making nature as a co-constitutive process.

We discussed how Mubārak imagined the prosperity and hardship of Egypt as dependent on the advanced management of the Nile River. Therefore, his narrative about the Nile incorporated scientific analysis of the Nile's features and inhabitants, with the purpose of enhancing state power. On the other hand, we saw a clear separation in the foreign travellers' memoirs between how they described the Nile and used it as a comparative lens to the advancement already existing in their country, and their description of the locals as workers for the natural resource and the travellers. The different hierarchy of their stories also reproduced a certain image of the Nile on one hand and the Egyptians on the other.

On the surface, the European travelogues and Mubārak's book appear like a paradox of perceptions regarding the Nile and its inhabitants; however, the core of both narratives facilitated the re-making of

[60] Blouin, 'Beyond the Nile'.
[61] Hoffmann, 'Environmental determinism as Orientalism'.

the Nile, control over its ecology and the imposition of authoritative power over peasants. Travellers saw the flowing river as a beautiful spectacle of 'sites' in a landscape of uncivilised people, making a series of comparisons with a European 'home'. This narrative fixed the colonisers' mission of civilisation and development but also contributed to the entrenched view of underdevelopment of nature and its resources – a view paralleled in Mubārak's own writing. Mubārak's vision of capitalising on knowledge, technology, and agrarian labour in maintaining Nile infrastructure transformed the river into a fundamental 'natural resource' serving state objectives. Peasants were eventually rendered marginal in the pursuit of a nationalist cultivation mission. We conclude that the impulse of both the Egyptian nationalists' and European travellers' narrative traditions were not divergent as far as their effect on the agency of the Nile and its people was concerned. Both writing legacies legitimised the need for the Nile and its people to be transformed by human ideas and did not leave it as just a free-flowing river, devoid of any human entanglement. Moreover, both the experts and the writers created '(un)sustainability imaginaries'[62] in their writings of unsustainable and conflicting futures which dismissed the agency of the river and the peasants responsible for its development. Both the discussed imaginaries created an enduring genre of knowledge that continues to serve as a tool for political control of the Nile and its populations.

Acknowledgements

We are very thankful to Aarthi Sridhar for her thorough reading and continuous feedback and reflections on earlier drafts of the paper, which helped us develop the paper. Also we thank Claudio De Majo for his comments on the first draft. We also thank Osman Kağan Yücel for his generous sharing of maps, and his suggestion to

[62] S.E. Nabavi, More-than-water, more-than-human: a transdisciplinary sociology of water conflict in central Iran (Ph.D. Thesis, Australian National University, 2017).

read 'Ottoman Explorations of the Nile'; and Azza Dirar for her efforts in proofreading earlier drafts of the paper. We are also thankful and very grateful for Ziad Morsy's outstanding efforts in collecting and analysing Nile boats and European travellers. And finally, we thank Ingy Higazy and Yosra Ali for their birthday gift (*A Nile Anthology: Travel Writing Through the Centuries*), which inspired this project.

Abeer Abazeed is an assistant professor in political science at the Faculty of Economics and Political Sciences (Cairo University, Egypt). She has developed research expertise in global civil society, social network analysis, foreign aid politics and Nile politics. Geographically, her research and teaching focus is the African continent. She holds a Ph.D. degree from the Institute of Security and Global Affairs at Leiden University (Netherlands). Her Ph.D. research tackled the role of civil society in hydro-politics issues in the Eastern Nile Basin (Egypt – Sudan – South Sudan – Ethiopia). Abeer has a B.Sc. in Political Science from Cairo University and a MA degree from the American University in Cairo (AUC) with an international development specialisation.

Email: abeer_rabei@feps.edu.eg

Yasmine Hafez is a researcher on water security and trans-boundary management with a focus on the Nile Basin. She is currently a Ph.D. candidate at the Department of Development Studies at SOAS University of London. She holds a Masters in Conflict, Governance, and International Development from the University of East Anglia (UEA) and bachelor's degree in Political Science with double minors in Economics and Community development from the American University in Cairo (AUC). Her academic background and professional experiences in international organizations, and research collaboration with several water scholars and consultants on hydro-politics, have exposed her to different stories in the Nile Basin, and together have inspired and shaped her current interest in conducting interdisciplinary research on the communities living around the lakes along the river.

Email: y_hafez@soas.ac.uk

From National to Cosmopolitan Hydrocarbons Resource Space: Hydrocarbons, Transnational Politics and the State in Greece

Yannis Fotopoulos and Stathis Arapostathis

Introduction

Hydrocarbon exploration and exploitation are now considered obsolete by the European Union's (EU) energy funding policy, which is geared toward the promotion of Renewable Energy Sources and the reduction of CO_2 emissions.[1] These suggestions attempt to prepare the EU's economy in all areas to tackle this challenge. They put the EU on track to meet its climate goals by 2030 in a fair,

Global Environment 15 (2022): 322–369

doi: 10.3197/ge.2022.150206

cost-effective and competitive manner (see: European Green Deal).[2] Nonetheless, despite the EU priorities and Climate Change pressures, international geopolitical dynamics, corporate interests and a technocratic culture of the domination and exploration of nature push for the furthering of exploration and exploitation of the hydrocarbon potential of regions that had not previously attracted the strong interest of the extractive industries. In the last ten years, the Eastern Mediterranean has been transformed into a sea of geopolitical and corporate antagonisms due to the prospects for hydrocarbon explorations. The contest for hydrocarbon explorations increased the complexity of geopolitical dynamics in a region that has been an area of wars, diplomatic tensions and border contestation throughout the twentieth century. States such as Greece, Turkey and Cyprus have, for more than seventy years, prioritised the reclamation of hydrocarbons and their economic exploitation and promoted the politics of 'civilizing nature'.[3] As in the North Sea, different resource spaces[4] co-exist in the Mediterranean. Disco and Kranakis have argued persuasively that technological and knowledge infrastructures and systems configure and reconfigure resource spaces and shape the processes of valorisation, conservation and sharing of nature. Commons are far from being pristine entities, since in the industrial world their meaning and ontological status are defined by technology and knowledge and thus by the relevant politics.[5] By looking

[1] Adapted in Greece under the National Plan for Energy and Climate, *Min. Environment and Energy*, (December 2019), https://ec.europa.eu/energy/sites/ener/files/el_final_necp_main_en.pdf (accessed 11 Feb. 2022).

[2] European Union, *Delivering the European Green Deal* (2022), www.ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en (accessed 11 Feb. 2022).

[3] P. Carroll, 'Water and Technoscientific State Formation in California', *Social Studies of Science* **42** (4) (2012): 489– 516, at 497.

[4] A. Håkon, 'Changing Technology, Changing Commons: Freight, Fish, and Oil in the North Sea', in N. Disco and E. Kranakis (eds), *Cosmopolitan Commons: Sharing Resources and Risks across Borders* (Cambridge/Massachusetts/London: The MIT Press, 2013), pp. 245–70.

[5] N. Disco and E. Kranakis, 'Towards a Theory of Cosmopolitan Commons', in *Cosmopolitan Commons*, pp. 13–53.

at Greek sources and historical archives, popular press, published geological reports and surveys, governmental reports and interviews, we reconstruct the story of visions established by experts, attempts at the establishment of knowledge and technological infrastructures, antagonisms involved in the control of hydrocarbon explorations and the co-production of the Greek state. We unravel how statehood was articulated around an emerging petro-culture boosted by the agency of foreign and native experts, the international oil companies and the geopolitics of the region in Eastern Mediterranean. In this context, we unravel aspects of the transnational dimensions of state formation in the case of Greece.[6]

We argue that there are three periods in the history of hydrocarbon politics and the shaping of resource spaces in Greece with the reclamation and construction of hydrocarbon spaces being shaped along with the quest for state sovereignty and energy independence (1920–1987). Considering the technical constraints of the time (up to the early 1960s), oil exploration was initially limited to inland areas. With the discovery (Appendix, Table 1c, green row) of the first commercially exploitable deposits offshore (in Thassos in the early 1970s), the hydrocarbons resource space expanded through offshore drilling. In the second period (1987–2016), a dispute over hydrocarbon resource spaces nearly led to war between Greece and Turkey in August 1976 and later in March 1987. A non-commons truce was established in the Aegean Sea and maintained until 2016. The abolition of the non-commons truce in 2016 marked the beginning of the third and latest period (2016 to the present), which is escalating into a tug of war between the disputed areas, paving the way for the estab-

[6] A. Filis and R. Leal-Arcas, 'Legal Aspects of Inter-State Maritime Delimitation in the Eastern Mediterranean Basin', *Oil, Gas & Energy Law Journal* **11** (3) (2013); C. Yiallourides, 'The Aegean Sea Maritime Delimitation Dispute (June 1, 2019)', in C. Yiallourides (ed.), *Maritime Disputes and International Law: Disputed Waters and Seabed Resources in Asia and Europe* (London and New York: Routledge 2019); A. Ioannides, 'Rights and Obligations of States in Undelimited Maritime Areas: The Case of the Eastern Mediterranean Sea', in S. Minas and H.J. Diamond (eds), *Stress Testing the Law of the Sea Dispute Resolution, Disasters & Emerging Challenge* (Leiden, Boston: Brill Nijhoff, 2018).

lishment of a cosmopolitan hydrocarbon commons as the only non-coercive or hostile solution. We show how discourses and policies, which aimed for the empowerment and the sovereignty of the state, were co-produced with the conceptualisation of the seabed of the Eastern Mediterranean as a resource that can be extracted, exploited and made valuable. We focus our research on the making of hydrocarbon resource spaces in Greece and eventually in the Eastern Mediterranean as a historically constructed entity of techno-politics that involved national energy policies, international corporate strategies and transnational politics of national and cosmopolitan commons.[7]

Methodologically, our primary research is based on Ministerial reports, particularly those from the Subsurface Research Department (under the Ministry of Coordination), later the Institute for Geology and Subsurface Research (IGME),[8] as well as governmental gazettes (Laws). Additionally, the archives of the Technical Chamber of Greece, including the technical journal *Technica Chronica* (Technical Chronicles), were critical to our research. We were unable to acquire access to the archives of the Public Oil Company SA (now known as ELPE): in general, research data in the hydrocarbons sector (after the 1980s) are regarded as assets (to their owners, who are normally subject to ELPE's jurisdiction), and are not open for public research and study. We are able to compensate for the constraints of archival research through interviews with real and living actors, pivotal figures in Greek petropolitics. During this period, a close check was also kept on the local news media (public press) in order to fill in the gaps created by the absence of primary archives relevant to Greece's hydrocarbons activities. Adding an Appendix at the end of this article offers a chronology of hydrocarbon resource spaces in Greece, as well as an indication of the main parties involved with the exploration activity in Greece, and is therefore a useful complement.

The coproduction of state and hydrocarbon resource spaces has

[7] N. Disco and E. Kranakis, *Cosmopolitan Commons: Sharing Resources and Risks across Borders* (Cambridge, Ma and London: The MIT Press, 2013).

[8] It was founded during the 1920s as the Ministry of National Economy's Geological Survey (GYE).

been articulated in developmental politics, foreign policies and politics of expertise in exploration and infrastructure design. The expansion of resource spaces through anthropogenic intervention and technological infrastructures reconfigured the spaces as well as the geographies of power and capital.[9] In several cases, technological entanglements, material and technological dependence, knowledge capabilities and resource dependencies formed regimes of colonialism or 'neocolonialism' or conditions of technological, knowledge and energy dependence despite the unquestionable existence of sovereign states.[10] During the period of our study, several contemporary actors stressed the emerging technological dependence in relation to the energy regime. In this context, there were approaches that understood the conditions of technological dependence as the setting of colonialist or neo-colonialist relations that emerge conjointly with the emergence of the capitalist state.[11] Despite domestic political and ideological differences, political debates were triggered because all the actors understood the shaping of natural commons like hydrocarbons as a resource, as a significant tool for statecraft and for measuring state power, while also configuring technopolitical,

[9] E.C. Ellis, *Anthropocene: A Very Short Introduction (Very Short Introductions)* (Oxford: Oxford University Press, 2018); H. Trischler, 'The Anthropocene: A Challenge for the History of Science, Technology, and the Environment', *International Journal of History & Ethics of Natural Sciences Technology & Medicine* **24** (3) (2016): 309–35.

[10] P. Vijay, *The Darker Nations: A People's History of the Third World* (New York: The New Press, 2007); R. Samaddar, *A Post-Colonial Enquiry into Europe's Debt and Migration Crisis* (London: Springer, 2016); K. Nktrumah, *Neo-Colonialism: The Last Stage of Imperialism* (Bedford: Panaf Books, 1987); D.A. Yates, *The Rentier State in Africa: Oil Rent Dependency & Neocolonialism in the Republic of Gabon* (Trenton, NJ: Africa World Press, 1996); G.N. Uzoigwe, 'Neocolonialism is Dead: Long Live Neocolonialism', *Journal of Global South Studies* **36** (1) (2019): 59–87.

[11] R. Samaddar, 'The Post-colonial Bind of Greece', in *A Post-Colonial Enquiry into Europe's Debt and Migration Crisis* (Singapore: Springer, 2016); N. Agiomamitis, P. Gkargkanas, A. Erotokritou, S. Kontogiannis, N. Loudos, R. Margolis, L. Bolaris and M. Styllou, *Greece–Turkey: The Conflict of the Sub-imperialists. Against the "Axes" and the Threat of War [in Greek]* (Athens: Marxist Bookstore, 2020); K. Kolmer, *Spheres of Influence. The Road to National Independence* (Livanis, 2020).

domestic and international relations.[12] The process of the construction of the resource spaces and regimes of valorising nature bring the Anthropocene closer to the Capitalocene and make them identical twins due to an emphasis on industrialisation, intensification of resource exploitation and the establishment of technological infrastructures for the control and the transformation of nature.[13]

The reclamation and the construction of hydrocarbon resource spaces in Greece, 1920–1987

For Greek experts and state officials in the early twentieth century, the existence of hydrocarbons on Greek territory was based more on assumptions and comparisons with other bordering countries than on evidence, research and measurements. For example, in his study on *Greece's Future Wealth*, Professor K.M Mitsopoulos, Director of the National Technical University of Athens, believed that 'Greece is not poor'[14] in respect of mineral wealth,[15] but that the Greek state should enhance its research activities. Evidence of poor drilling operations and research activities leads us to surmise that the regime actors were not accustomed to concentrating their efforts and will on oil explorations. This is partly justified because, before World War II, hydrocarbons (mainly oil) had a minor (but growing) share of the Greek economy's consumption and energy mix.[16] From

[12] M.T. Klare, *Resource Wars: The New Landscape of Global Conflict* (New York: Henry Holt and Company, 2002).

[13] J.W. Moore (ed.), *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism* (Oakland, CAP: PM Press, 2016).

[14] K.M. Mitsopoulos, *Greece's Future Wealth: Our National Wealth Geographically and Geologically Compared to Other Small European Countries [in Greek]* (Athens: Vergianitou, 1905), p. 53

[15] In his research, he mentions the significance of oil and tar, as well as related drilling operations and activities in the island of Zakynthos.

[16] K. Kegel, 'The Investigation of the Lignite Problem of Greece. Summary of the Report of Prof. Kegel of the Freiberg/Sa Braunkohlen-Forschungs-Institut', *Technical Chronicles [in Greek]* (1939): 301–27.

the early 1920s, the reclamation of this domestic energy source became inextricably linked to the empowerment of the Greek state's sovereignty, thereby liberating it from the status of a poor country depending for its energy sector on imperialist Great Powers (England, France, Russia and Germany) by importing solid fuels, mainly coal. G.K. Georgalas, a doctor in natural sciences and head of the Greek geological office under the Ministry of National Economy, in a report to the minister I.D. Rallis in 1921, expressed the importance of direct geological research for the country's economic development. Georgalas stated: 'It is, of course, well known that a country's geological awareness is critical for the national economy, because the majority of the national economy's branches are directly connected to it.'[17]

Geologists and engineering experts stressed the importance of and need for new knowledge and research infrastructure in order for the state to capitalise on its natural commons and wealth. Prominent academic geologists, including K. Mitsopoulos, G. Skoufos, F. Negris and K. Ktenas, exercised significant pressure on the government to increase research infrastructure by establishing a National Geological Service in order to prepare the country's mineralogical charter, a laborious and financially demanding project.[18] In June 1920, the first Geological Service of Greece was established under the Law 2258.[19] It was an attempt to systematise and intensify the geological surveys in Greece, a task conducted by the Geological Office of the Greek state and coordinated by the Ministry of National Economy from 1917.[20] In his report of 1921, Georgalas[21] stressed that min-

[17] G.K. Georgalas, *Establishment and Operations of the Geological Survey Until the Year 1920 [in Greek]* (Athens: National Printing House. Ministry of National Economy. No.1, 1921).

[18] Ibid., p. 8.

[19] Law 2258, Published in the *Official Gazette* 166 – 27 July1920, 'On amendment and supplementation of Laws "On organisation of the Ministry of National Economy"'(in Greek).

[20] Law 780, Published in the *Official Gazette* 179 – 29 Aug. 1917, 'On the organisation of the central service of the Ministry of National Economy' (in Greek).

[21] Ibid.

eralogical research in Greece until then, was characterised by laboratories that were understaffed and lacked many instruments, tools and machines (for example, polarising microscopes, pantographs, speedometers, microscopes). Greece was dependent on research expertise and instruments from British laboratories. There was limited and fragmented research due to the lack of research infrastructure.

There was predominantly inland hydrocarbon research, while the Ionian and Aegean seas, as well as other bays, were studied primarily in terms of salts and the prospect of salt pans. Georgalas' research interests were mostly focused on Epirus, a southeastern European province shared by Albania and Greece (Map 1).[22] He was attracted to Epirus for two reasons. First, there were reports from locals of oil wells in the area and, second, it shared geological characteristics with the Albanian border area, where an oil field was prominent; therefore the case offered many similarities and analogies to the Carpathian hydrocarbon zone in terms of hydrocarbon generation. Quantities of oil were discovered after nine drilling operations with the assistance of the Romanian Institute of Petroleum and the guidance of the Romanian geologist C. Nicolescu.[23] The quantities were insufficient to justify the continuation of oil exploration and exploration in the wider region. Despite the poor discoveries, Georgalas remained optimistic about finding exploitable oil wells, claiming: 'For the time being, let us hope that oil is pouring in the depths of the land of Epirus, that fossil fuel, which is needed in the pre-war age.'[24] Together with his colleagues and research team, he would submit their findings on Greece's hydrocarbon potential at the international congress in Liege in 1922.[25]

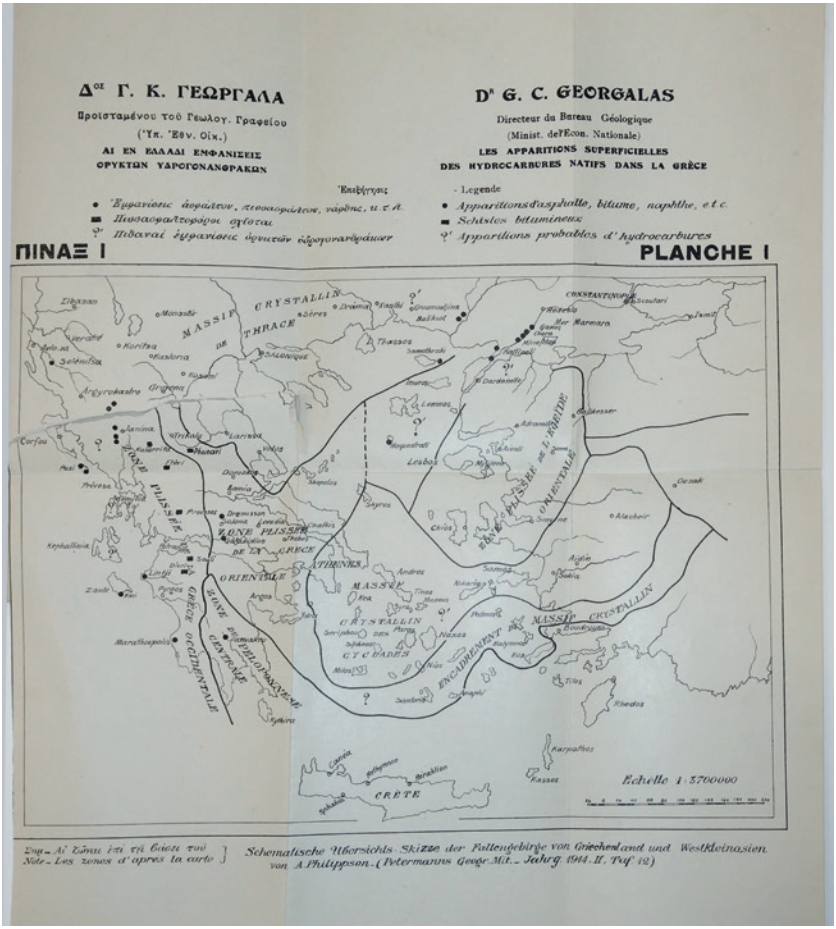
[22] G.K. Georgalas, *The Occurrences of Mineral Hydrocarbons in Epirus and their Research Works* (in Greek) (Ministry of National Economy, Geological Office. No. 6., 1922).

[23] Who studied at the University of Bucharest and the Geological Institute of Romania.

[24] Georgalas, *The Occurrences of Mineral Hydrocarbons*, p. 28.

[25] G.K. Georgalas, *Les hydrocarbures naturels en Grece*, Congres geologique international. XIII session (Les manifestation d'hydrocarbures dans les zones montagneuses de la Grece. D'apres les observations et etudes de MM. A. Philippson,

Map 1. Georgala's activities and the hydrocarbon spaces in relation to geologic surveys, with '?' indicating potential hydrocarbons spaces, '●' indicating potential asphalt and naphtha deposits, '■' indicating potential bituminous limestones and shales, and with '—' indicating geological formation zones



Source: G.K. Georgalas, *The Occurrences of Mineral Hydrocarbons in Epirus and their Research Works* (Ministry of National Economy, Geological Office. No. 6., 1922). Reproduced courtesy of Natural Sciences Library, National and Kapodistrian University of Athens.

In Metaxas' authoritarian regime (1936–1941)[26] the privilege for researching and drilling for oil was granted to a Greek-American entrepreneur, Vasilis (Williams) Chelis.[27] According to the regime's ideology,[28] science and technology became vital and deeply embedded in Greece's cultural features. Technology and science were blended with a national fascist ideology of a proudly expanding nation and the beginning of the Greek renaissance.[29] This was influenced by ancient Greek ideals, coupled with Byzantine Christian principles. In this logic, the state's tools must not be compromised or employed by foreigners, but only by Greeks. As a leading figure in the Greek culture of that period, Zacharias Papantoniou,[30] argued, the Greek-American entrepreneur Chelis was an ideal fit because he could supply the machinery and his skills for the sake of the nation.[31] According to Zacharias Papantoniou, Chelis was even compared to Theodore Kolokotronis, the military general leader of the Greek revolution of

K. Fiedler, A. Martelli Coquand, A. Issel, A. Cordellas, C. Mitzopoulos, A. Damberghis, A. Christomanos, A.Vournazos, K. Ktenas, P. Zacharias et Cl. Richardson, C. Nicolescu et G.C. Georgalas), Belgique 1922. Extrait du compte rendu du XIII Conbgres geologique international 1922 (Liege. Imprimerie Vallant-Carmagne, 1926).

[26] J.V. Kofas, *Authoritarianism in Greece: The Metaxas Regime*, East European Monographs, number 133 (New York: Columbia University Press, 1983); A. Kallis, 'Unlikely Mediterranean Authoritarian Crossings. Salazar's Portugal as Model for the 4th of August Dictatorship in Greece (1936–1940)', in *An Authoritarian Third Way in the Era of Fascism* (Routledge, 2021).

[27] 'National Supremacy', *Eleftheron Vima* (in Greek), 27 Sept. 1938, p. 3 (Only the initial appearance of each published source provides an explicit indication of the language for Greek sources).

[28] V. Vogiatzis, *Meteor Modernism: Technology, Ideology of Science and Politics in Interwar Greece (1922–1940)* (in Greek) (Athens: Eurasia, 2012), pp. 253–65.

[29] Historians tend to characterise this period as the Third Hellenic Civilization in accordance with the Third Reich of Hitler and the Third Rome of Mussolini. See A. Kallis, ' Fascism and Religion: The Metaxas Regime in Greece and the "Third Hellenic Civilisation". Some Theoretical Observations on "Fascism", "Political Religion" and "Clerical Fascism"', *Totalitarian Movements and Political Religions* **8** (2) (2007): 229–46.

[30] Zacharias Papantoniou, a famous poet, politician and journalist.

[31] 'A Self-created Oil Well Owner' (in Greek), *Eleytheron Vima*, 16 Jan. 1932, p. 1.

1821, because their efforts to establish the Greek state were similar (according to Chelis): 'What Kolokotronis did with his struggles and bravery, along with my grandfather as a comrade-in-arms, in order to liberate the Greeks, I will do the same in another form, to bring to the surface the precious liquid wealth and donate it to my homeland',[32] Chelis stated. Chelis' privilege for research and exploitation for hydrocarbons of any kind (liquid, solid, gaseous) was granted for sixty years (Appendix, Table 1a).[33] Chelis' operations were thought by the Greek geologists who were aiding his operations to be encouraging, but they came to an abrupt halt due to the outbreak of World War II. Chelis' company ceased operations in 1953, along with the removal of his privilege by the Greek state. This decision by the Greek government marked the beginning of a new era in hydrocarbons exploration in Greece, as well as the recruitment of multinational corporations with established expertise in hydrocarbons exploration.

After WWII and the Civil War, and with the implementation of Marshall Plan aid (1948–1952), state officials made serious efforts to reclaim the possibility of oil deposits in post-war Greece. The Subsurface Research Department under the Ministry of Coordination took major initiatives towards the exploration of the mineral wealth of Greece with the funding and assistance of the Marshall Plan.[34] That initiative launched the first systematic geological and geophysical study in postwar Greece. As George Heikes stated in his prologue to the research progress report, when he arrived in Greece in July 1949, there was no organised programme for the study of Greek mineral resources, nor had any detailed mining geological work ever been done that would lead to the same economic benefits to the mining industry as were customary in the United States: 'There was no geological map of the country available to guide mining exploration or to help with the other problems connected

[32] Ibid.

[33] 'Oil Research Agreement', *Economikos, Taxydromos* (in Greek), 2 Jan. 1939, p. 6.

[34] The Mineral Wealth of Greece. Geological and Geophysical Research. The Subsurface Research Department under the Ministry of Coordination (in Greek) (Athens, 1951).

with the earth's surface.'[35] The enthusiasm of chief geologists like Dr Nicolas Liatsikas[36] and Dr K. Zachos managed to attract foreign specialists[37] to assist them in the research activities. Zachos. and especially Liatsikas, stressed that the reconstruction programme and the economy of Greece should depend on domestic mineral sources. During the reconstruction programme at the end of WWII, a heated debate erupted between different political ideologies and energy and industrial experts over whether the domestic wealth of the Greek subsoil could support the economic reconstruction of Greek industry and the sustainability of the Greek economy, salvaging it from solid fuel imports.[38] During the Marshall Plan, the director of the Transport and Mining Industry of the American financial mission in Greece, George Heikes, conducted offshore hydrocarbons research in southeast Greece. The task was assigned to the Geology Survey and was supervised by an American company, Drilling and Exploration Corp. Inc., under the presidency of J.E. Brantlu. The American explorations provided possible evidence of a rich oil area in the basin of the Aegean Sea between Greece and Turkey.[39] This discovery did not trigger any interest from oil companies until the 1970s oil crisis. According to Greek oil specialists, during the 1950s and 1960s, oil businesses could obtain inexpensive oil from Africa and the Middle East (Libya, Egypt, etc.); therefore they were only interested in gathering data from other nations in case an emergency arose in the future. Because Greek engineers and physicists lacked the necessary

[35] Ibid.

[36] Liatsikas was a leading geologist in the UNRRA programme of the geological wealth of Greece. He died (in an accident) in October 1949.

[37] Foreign specialists provided their skills and ideas to the Greek exploration programme. Special mentions to Dr Carl Renz of Basle of Switzerland; Dr Walter E. Petraschech, professor of Economic Geology at Leoben Austria; Dr F. Bahnemann, consulting Geophysicist from Johannesburg.

[38] See G. Politakis, *The Post-War Reconstruction of Greece: A History of Economic Stabilization and Development, 1944–1952*, Palgrave Studies in Democracy, Innovation, and Entrepreneurship for Growth (Springer, 2017); D. Batsis, *Heavy Industry in Greece* [in Greek] (Athens: Kedros, 1947/1977).

[39] 'We Knew Greece Had Oil, but Now It Was Her Turn!' (in Greek), *Economikos, Taxydromos*, 14 March 1974, pp. 9–10.

knowledge and competence for geological surveys, relying on foreign expertise coordinated by the Subsoil Research Committee in the Ministry of Coordination.[40]

According to Kyriakos Zachos, the chief of the Institute of Geology, foreign knowledge and bureaucratic expertise were critical components of the Greek hydrocarbons initiative. Despite the fact that several geophysical studies had been undertaken to discover prospective hydrocarbon spaces (in Thessaly, Aitoloakarnania, Northwest Peloponnese and Epirus), the Greek state required as many drillings as possible to be conducted by foreign companies. As Zachos stated: 'However, it is a well-kept secret that the Greek state does not have a staff of organised experts, nor does it provide the guarantee of a good organisation of the appropriate multinational mission, which risks being degraded quickly by the routine of bureaucracy.'[41] In the same public speech, he emphasised the significance of modernising the legislative framework, which he described as 'anachronistic', in order to attract key stakeholders, particularly international hydrocarbons corporations, to assist in the lengthy and capital-intensive Greek hydrocarbons programme.[42] A committee comprising officials from the Mines Directorate of the Ministry of Industry and other specialists in the subject was formed to research the matter and assist in the drafting of the bill. Until the actual discovery of any hydrocarbon deposits, state officials and Greek governments worked on developing the legal and technological framework, as well as opening up hydrocarbons spaces offshore, in the Mediterranean Sea, in order to attract foreign oil companies, as the Appendix (Table 1b) indicates. International firms such as the British Petroleum Corporation (BP) secured state contracts[43]

[40] 'There is Oil in Greece in Sufficient Quantities to Meet All Needs' [in Greek], *Economikos Taxydromos*, 18 April 1974, pp. 9–10.

[41] P. Kyriazis, 'The State Must Act as Soon as Possible to Locate the Oil Fields. The Views of K. Zahos, Director of the Institute of Geology' (in Greek), *Economikos, Taxydromos*, 24 April 1958, p. 8.

[42] Ibid., p. 13.

[43] Law 4156, Published in the *Official Gazette* 66 – 21 April 1961, 'On the ratification of the 6.7.1960 contract between the Greek State on the one hand and

to work closely with the Institute for Geology and Subsurface Research to produce accurate geological studies and collect more relevant data about the potential richness of the subsoil.

Greek governments focused their attention on attracting more multinational companies to assist and engage in exploration activities (Appendix, Table 1b) aiming to boost oil in the energy mix of the country. As part of this endeavour, two refineries were built, one in Athens (Aspropyrgos) and one in Thessaloniki, with the assistance of the American companies Mobil Oil and Standard Oil of New Jersey (ESSO) respectively. The Thessaloniki refinery was administered by the Greek-American entrepreneur Tom Pappas and that at Aspropyrgos by tycoon and ship-owner Stavros Niarchos. The use and utility of oil in the Greek energy system began to expand, and infrastructure such as refineries was critical in this direction. The prospects for the discovery of hydrocarbon deposits forged the vision for the country's energy autarky.[44]

By the end of 1966, 84,000 metres of deep hydrocarbon drilling had been conducted, but none had proven economically feasible. Technical knowledge was gained through the education of scientific staff at the Directorate-General of Mining (Ministry of Industry) under the direction of the French Institute of Petroleum (from 1961),[45] guided by famous petroleum scientists[46] (Appendix,

the Aetolian Petroleum Company S.A. and B.P. Exploration CNY Limited on the other' (in Greek).

[44] See S. Arapostathis,and Y. Fotopoulos, 'Transnational Energy Flows, Capacity Building and Greece's Quest for Energy Autarky, 1914–2010', *Energy Policy* **127** (C) (2019): 39–50.

[45] Law 4155, Published in the *Official Gazette* 66 – 14 April 1961, 'on the ratification of (a) the 12 March 1960 cooperation agreement between the Greek Government and the other three Romanian People's Republics for the exploration and exploration of oil in the areas of Karditsa and Grevena; and (b) the 19 May 1960 cooperation agreement between the Greek Government and the French Petroleum Institute to conduct scientific studies and research for oil in the area of Epirus and north of Grevena' *[in Greek]*.

[46] D. Trümpy and C. Sallé are two foreign experts mentioned by actors from the period.

Table 1b).[47] Constantine Karamanlis, the conservative politician and Prime Minister (1955–1963) had viewed knowledge and technological linkages with France as part of the integration of Greece into the European Economic Community, a policy that increased technological and knowledge dependence while further boosting the petro-culture of Greece. By the mid 1960s Greece's aim to become a productive oil country was live; the Minister of Industry at the time, Mr Toumbas, was confident that it was only a matter of time until drilling operations were successful.[48] These visions and policies were inscribed and boosted by the cold war political and energy tensions.

The 1960s saw a global increase in offshore drilling. Cold War antagonisms were extended into outer space and the oceans. Many Soviet scientists[49] believed that the ocean's abundance of solid fuels was waiting to be exploited.[50] Western countries, led by the United States, viewed this expansion of hydrocarbons explorations and projects of extraction as an industrial counterattack by the Soviet-Chinese coalition in global markets. It was understood by contemporary actors as an economic war in which the western-capitalist allies were far behind because they were uncoordinated and unprepared, and thus that they should react by coordinating visions and relevant knowledge.[51]

The intense petro-culture resulting from the cold war climate was boosted tremendously during the Colonels' dictatorial regime (1967–1974). The Junta, led by Col. Papadopoulos, was successful in opening up and constructing hydrocarbon space through in-

[47] '1st Panhellenic Conference of Civil Engineers', *Technical Chronicles* (in Greek), 1966, pp. 29–30.

[48] Ibid., p. 28.

[49] See I.P. Kuliev, *Construction des Puits de Pétrole en Mer* [Construction of Offshore Oil Wells] (Baku: Aznefteizdat, 1959).

[50] 'From Vision to Reality: Ocean Oil Extraction Preparations. A Daring Plan Devised by Soviet Scientists' (in Greek), *Ta Nea*, 27 March 1965, p. 6.

[51] 'Cold Economic War – The West Loses, According to a US Department of Commerce Survey' (in Greek). *Ta Nea*, 17 Nov. 1961, p. 3; '"Oil at Sea", an International Symposium on Seabed Exploitation Will be Held in Monte Carlo' [in Greek], *Ta Nea*, 7 May 1965, p. 10.

creased exploration and research, as well as the successful discovery of the Prinos deposits (Appendix, Table 1c). However, the expansion of hydrocarbon space offshore in the Aegean Sea put the Greek-Turkish relationship in jeopardy.

The Junta's expectations of Greece's hydrocarbon potential were extravagant, as they were of the other energy industries (i.e. electricity). At the time, Papadopoulos' militaristic administration investigated expanding the existing refineries (Athens and Thessaloniki) and approved two more outside the Athens area, to boost the country's refinery capacity. The new privately-owned refineries ('Petrola' and 'Motor Oil') were expected to be export-oriented.[52] The Junta's vision was informed by that of the Greek tycoons who collaborated[53] intensively with the regime. Local Greek capitalists envisioned the country as the node of a trans-Balkan oil-hub.[54]

In this context, the dictatorship period created a window of opportunity for many transnational oil companies by loosening the bureaucratic framework and signing contracts that favoured companies over the state.[55] Proposals for research exploration in various regions of Greece were accepted by the Ministry of Industry (Appendix, Table 1c). According to the Ministry of Industry, seven contracts were approved in the mid-1970s and 41 applications were submitted.[56] The most successful operation from the above investigations was the discovery by the OCEANIC consortium of the first exploitable hydro-

[52] 'The Vardinogianni Refinery will be Ready in the Summer' [in Greek], *Economikos, Taxydromos*, 20 Jan. 1972, p. 29; 'The Legislative Decree Ratifying the Contract for the Two Refineries Was Published' (in Greek), *To Vima*, 8 Aug. 1972, p. 9.

[53] C. Tsakas, 'Shipping Tycoons and Authoritarian Rulers: Doing the Oil Business with the Greek Dictatorship, 1967–1974', *Journal of Modern Greek Studies* **38** (1) (2020): 185–208.

[54] 'Vardinogiannis' Speech from His Refinery's Inauguration Opening' [in Greek], *Economikos Taxydromos*, 23 Nov. 1972, p. 24; 'Drillings for Oil Exploration should Continue as Planned' (in Greek), *Economikos, Taxydromos*, 28 Dec. 1968, p. 44.

[55] See D. Mpenas, *The Invasion of Foreign Capital in Greece. The Exploration of the Post-war Period* (in Greek) (Papazisis: Athens, 1976), pp. 75–97.

[56] Ibid.

carbon field offshore the island of Thasos near Kavala – the Prinos oil and natural gas deposit (Appendix, Table 1c).[57] The Prinos discovery set the conditions for the Aegean Sea's evolution into a contested hydrocarbon resource space. The Turkish government responded immediately to the expansion of of the Aegean hydrocarbons resource space by the Greek government. On 1 November 1973, Turkey acted fast by activating and engaging TPAO,[58] the Turkish national oil company, responsible for hydrocarbon explorations, drillings, processing and the production of oil and natural gas. The initial plan targeted no fewer than 27 locations in the Aegean Sea, locations that were near or shared the tectonic plates of the Prinos deposit. The line corresponding to territorial seas to a range of 6 miles offshore ignored the Greek islands' continental shelf as claimed by the Greek state. Collateral official and unofficial diplomatic negotiations were initiated.

The tensions between the countries continued after the collapse of the dictatorship and democratic restoration. The Turkish–Greek relationship deteriorated, and the two countries were on the verge of a tug of war in order to secure their resource spaces and venture into offshore drilling. In June 1974, the Turkish government used a small hydrographic ship called *Çandarlı* (Tsandarli) to conduct research on the continental shelf west of Lesvos. Tensions rose even higher in July 1974, when the Turkish government granted TPAO (18/7/1974) permission to conduct exploration activities on the Cyclades and Dodecanese continental shelf.[59] It was during the democratic government of Constantine Karamanlis that the Greek position on the issue of continental self-delimitation in the Aegean was established through the processes of the United Nations Security Council and the International Court of Justice (ICJ) in Hague. Diplomacy yielded no results

[57] Licensed on 21 March 1970, Legislative act of 462, Published in the Official Gazette A 67 – 21 March 1970 'On the ratification of the contract signed on December 23, 1969, between the Greek State and the United States Oceanic Exploration Company in Colorado, providing that company the right to explore and utilize hydrocarbons in the Thracian Sea' (in Greek).

[58] Türkiye Petrolleri Anonim Ortaklığı

[59] A. Peponis, *For the Aegean Issue – Oil, March 1987, Border Disputes, European Union and the Energy Bridge* (in Greek) (Livani: Nea Synora, 2008), p. 24.

because the Greek side insisted on the delimitation of the continental shelf, whereas the Turkish side proposed a holistic comprehensive solution, such as the co-exploitation of Aegean Sea resources. While Greece sought to configure and restrict its hydrocarbons resource space as a national common, Turkey sought to settle a transnational resource space of transnational commons through bilateral agreements. In early 1976, Oceanic sold its exploration and oil extraction rights to the Canadian Denison, sparking increased interest and the initiation of exploration surveys east of Thasos. While the Greek surveys elicited no immediate response, in August 1976, the Turkish survey ship *MTA Seismik-1* (previously known as 'Chora') conducted seismic surveys around what the Greeks considered their continental self and the Turks viewed as 'disputed waters'. The Turkish surveys conducted between the 5 and 8 August 1976 heightened tensions between the two countries, prompting Greece to refer the issue to the United Nations Security Council, while also initiating a unilateral case against Turkey in the International Court of Justice. The Security Council requested that the contested parties continue their diplomatic discussions, while the International Court of Justice rejected Greece's claims. On 11 November 1976, the two parties signed the Bern Agreement in response to a Security Council recommendation. According to the Agreement, the two countries agreed to refrain from engaging in any activity that could lead to disputes over the continental self.[60]

In 1978, the Hellenic General Staff of the Navy prohibited any research or geological activity east of Thasos for security reasons, limiting Denison's ambition to begin surveys in both territorial and non-territorial waters. The prohibition remained in effect until mid-

[60] A. Syrigos, 'The "Haunted" Berne Treaty of 1976' (in Greek), in G. Tsaltas and X. Anagnostou (eds), *Aegean and Southeastern Mediterranean* (in Greek) (Athens: I. Sideris Publication, 2014), pp. 399–416.

'Background Note on Aegean Dispute', *Rep. of Turkey Ministry of Foreign Affairs* (2020), http://www.mfa.gov.tr/background-note-on-aegean-dispute.en.mfa (accessed 3 March 2021); 'Greek-Turkish Dispute Over the Delimitation of the Continental Shelf', Greek Ministry of Foreign Affairs (2018), www.mfa.gr/en/issues-of-greek-turkish-relations/relevant-documents/delimitation-of-the-continental-shelf.html (accessed 23 Jan. 2021).

October 1981, just days before the Panhellenic Socialist Movement took over government (PASOK). On 29 January 1982, the Consortium that owned the rights to oil exploration east of Thasos began geoseismic surveys without retaliation from the Turkish side. According to the American press (Oilgram news), this move confirmed that the Greek government had reactivated the contract related to drillings in disputed areas. The Turkish press interpreted this move as a clear indication that the Greek authorities had violated and disrespected the Bern Agreement.[61] Following these incidents, diplomacy prevailed, and both sides agreed that the non-commons approach to the Aegean was the only sustainable way to avoid war. Denison was dissatisfied with this policy, which saw its licences devalued and deactivated. While the company pushed for the expansion of exploration surveys, the socialist government saw the configuration of the resource space as a national affair and pushed the agenda of Prinos oil exploration nationalisation. The Consortium's representatives believed they had been pushed out by the Greek state in order for state officials to fully exploit the prestigious riches east of Thasos. Turkish officials began to retaliate for the project's 'nationalisation', believing that Greece would simply breach the non-commons of the Aegean and catch them off guard; in 1987, the Turkish state would use two ships, the *Piri Reis* (for oceanographic research) and the *Seismik*, to challenge the Aegean resource spaces once more. Furthermore, the Turkish government granted TPAO licences for offshore research and exploration activities in disputed Aegean waters. The offshore drillings and exploration would take place in disputed waters between the islands of Mytilene, Chios, Lemnos and Samothrace. The situation deteriorated in March 1987, when *Seismik*, accompanied by battleships, began seismic surveys. The two countries came dangerously close to war. To avoid a conflict, both countries unofficially agreed and respected the Aegean non-commons. To be more specific, it was agreed that any action in the disputed Aegean resource spaces without a prior agreement on the sea borders between the two countries would lead to war.[62]

[61] Peponis, *For the Aegean Issue*, p. 37.
[62] Syrigos, 'The "Haunted" Berne Treaty'.

Having settled or deferred the conflict with Turkey, in 1987 the Greek Government[63] proceeded with the partial nationalisation of the Consortium,[64] in order to prevent it from challenging the non-commons of the Aegean (Appendix, Table 1d).[65] Although the acquisition of the majority of the Consortium's shares by the state-owned oil corporation was criticised by the opposition conservative party, it did reduce the consortium's ability to begin operations in contested areas.

The non-commons strategic approach did not mean that the Greek state had lost interest in the exploration and exploitation of its natural commons. In 1975 the establishment of the Public Petroleum Corporation S.A ('DEP') was legitimised within a political vision for the exploration and exploitation of possible hydrocarbon deposits in Greek territory. The vision was promoted by the conservative government of New Democracy in pursuit of expanding the country's energy mix and forging its energy sovereignty, but continued under the socialist government of PASOK after 1981. The Public Corporation was established following the standards of foreign petroleum companies and aiming at boosting and capitalising on the research activities and research capital of native researchers who studied abroad and could drive and promote oil explorations in Greece. The Public Corporation established a knowledge and technocratic infrastructure for oil exploration and secured the necessary drilling technologies through rental from Romania. From 1975, seismic research by the Public Corporation began in several locations in Macedonia, Thrace and Epirus (in Aitoloakarnania and Arta) and, from 1978, in the Ionian Sea.[66] Crews for inland, sea and shallow waters exploration were established by 1983 while, in the same period, the Public Corporation acquired a unique information centre for processing the collected data. Having continuous politi-

[63] Under the socialist Andrew Papandreou with PASOK (1981–1989)

[64] See Law 1701, on 'Compulsory participation of public bodies in private companies of Law 98/1975' (in Greek), (25 May 1987, A' 69)

[65] Peponis, *For the Aegean Issue*.

[66] Interview with Yannis Grigoriou, 16 Feb. 2022

cal support and a budget drawn from the Public Investment Programmes and the percentage of state profits from Prinos, the Public Petroleum Corporation flourished while explorations increased and peaked in the 1980s.[67]

The hydrocarbon state on the line: the truce of non-commons, 1987–2016

The truce of non-commons became the main paradigm for both nations during the 1990s and the early 2000s. In this context, Greek governments prioritised the establishment and expansion of a national natural gas grid, as well as focusing on hydrocarbon exploration outside the Aegean Sea (Appendix, Table 2).[68] Along with the construction of the national grid in 1995, the Greek government granted four licences (Appendix, Table 2) for the parallel exploration of hydrocarbon potential in inland and offshore West Greece (in the Ionian Sea), but not in any disputed area that could violate the non-commons. During the early 2000s, Turkey[69] and Greece competed to become the Balkans' and southeastern Mediterranean's energy hub. In this context, hydrocarbon activity became secondary to the prioritisation of pipelines for gas and oil that could establish a country's hegemony as a transit route.

This shift to the establishment of natural gas pipelines and interconnectors was a purposive transition that had the support of European policy plans and funding.[70] It would, however, serve as an additional source of diversification not only for Greece but also for the EU, as

[67] Ibid.

[68] 'The Oil Exploration Bill is Being Revised' (in Greek), *To Vima*, 11 Oct. 1992, p. 87.

[69] G. Bacik, 'Turkey and Pipeline Politics', *Turkish Studies* **7** (2) (2006): 293–306; Y. Kim and S. Blank, 'The New Great Game of Caspian Energy in 2013–14: "Turk Stream", Russia and Turkey', *Journal of Balkan and Near Eastern Studies* **18** (1) (2015):1–19

[70] Y. Fotopoulos, S. Arapostathis and P.J.G. Pearson, 'Branching Points and Transition Pathways in the Greek Natural Gas Regime, 1966–2016', *Environmental Innovation and Societal Transitions* **32** (2019): 69–89.

Map 2. Europe's priority energy grids. Source: European Union Commission Notice: 'Energy Transmission Infrastructure and EU Nature Legislation' (2018/C 213/02) Directorate-General for Energy (2010)

Source: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AC%3A2018%3A213%3AFULL (Public domain source).

it would inter-connect Azerbaijan's largest (known in early 2000) gas deposit with other gas markets from the Middle East and Asia. The construction of the 'Southern Gas Corridor' (SGC) was the first step toward realising this vision (Map 2). Different pipeline routes and company coalitions launched an unofficial 'pipeline war' to carry out this vision and push toward the realisation of the SGC, which would provide an additional route to diversification for the EU.[71] In the case of Greece, different natural gas projects[72] projected the interconnection of Greece with the most promising gas markets (Algeria, Israel, Azerbaijan) of the eastern Mediterranean.

The 'crisis' in the Greek economy since the end of 2007 radically changed energy planning and related visions built on the expansion of the developing hydrocarbons market in Greece. In that regard, a new return to the Eastern Mediterranean hydrocarbons resource spaces was planned in 2011, after an almost sixteen-year absence since the mid-1990s operations. The 'long-forgotten' non-commons agreement started to be abolished in the context of hydrocarbons politics during the crisis period, a period in which energy infrastructures were closely understood as energy assets to help Greece achieve debt relief.[73]

Even Deutsche Bank's London Director, Mark Wall, specifically mentioned the importance of offshore hydrocarbon deposits (primarily on the island of Crete) and their economic prospects in his report, implying that it might be useful to commit a percentage of

[71] V. Yorucu and Ö. Mehmet, 'The Southern Energy Corridor: Turkey's Role in European Energy Security', Lecture Notes in Energy book series LNEN, volume 60), (New York: Springer, 2018); P.K. Baev and I. Øverland, 'The South Stream Versus Nabucco Pipeline Race: Geopolitical and Economic (Ir)rationales and Political Stakes in Mega-projects', *International Affairs* **86** (5) (2010): 1075–90; M. Carretti, 'Gas Supply in Europe and the Pipelines' War: A Geopolitical Analysis', in AA.VV., *Geopolitics of Eurasia. International Relations, Security Issues and Economic Projects*, Asrie Geopolitical Report, Volume/3, 2018.

[72] C. Stambolis and N. Sofianos, 'The Role of Greece as a Supply Route to Europe in View of the Latest Gas Discoveries in the East Mediterranean', *IENE Research Note* No. 3, 2012; IENE, 'The Outlook for a Natural Gas Trading Hub in SE Europe', *IENE Study Project* (M19) [Final Draft], 2014.

[73] Fotopoulos et al., 'Branching Points and Transition Pathways'.

any future revenues from Greek hydrocarbon deposits to a special national fund. The fund should withhold around thirty per cent of public gas income to manage and offset short-term price swings and invest in non-energy activities that would benefit the economy in the long run.[74] From 2010, the socialist government under the guidance and the vision of Yannis Maniatis, the minister of Energy, took firm steps toward the modernisation of the legal and organisational framework, in order to facilitate these prospects.[75] Since 2011, the state-owned company the Hellenic Hydrocarbons Resources Management (HHRM) has managed the rights of the Greek State regarding the exploration and exploitation of hydrocarbons throughout the Greek Territory. The ambition was the integration of oil and natural gas infrastructures, the transformation of Greece into an energy hub and the empowerment of Greece's geostrategic position in the Eastern Mediterranean.[76] Under the guidance of Maniatis and an inner circle of petroleum advisors, the leading Norwegian company PGS was invited to complete seismic explorations and gather geophysical data in an arc from North of Corfu to South of Crete.[77] It was no coincidence that a new wave of hydrocarbon licence agreements was announced in early 2014 (Appendix, Table 2). These contracts were followed by an international round of concessions in 2015 and 2016, this time for offshore drilling in the Ionian Sea and south of Crete (Map 3). In December 2015 analysis of new seismic data by geophysicists in the Hellenic Petroleum Company increased the interest of the company and its collaborators like Total

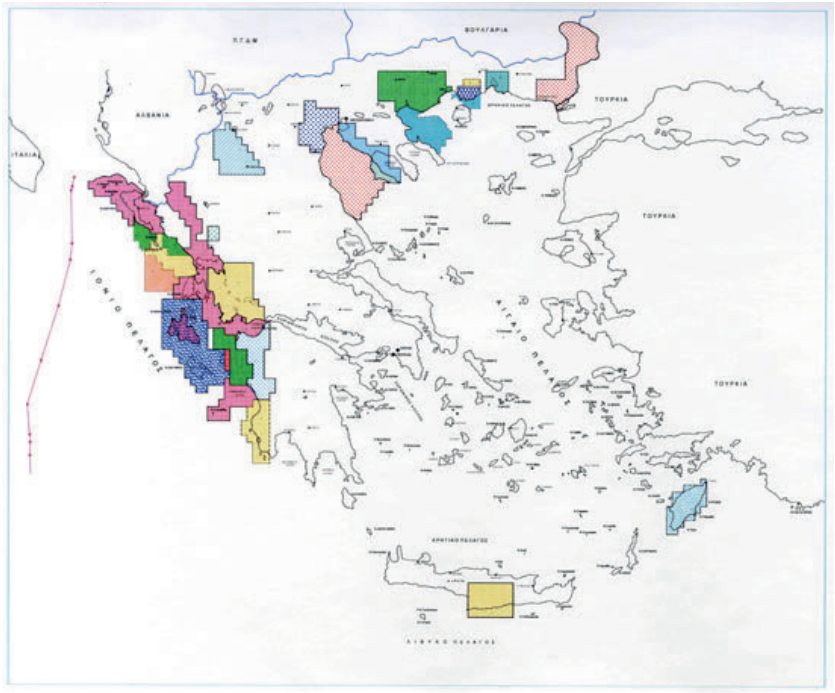
[74] I.G. Bellou, 'The Germans Put Gas Deposits on the Table' [in Greek], *capital.gr* (4 Dec. 2012), www.capital.gr/oikonomia/1680934/oi-germanoi-bazounsto-trapezi-ta-koitasmata-fusikou-aeriou (accessed 13 Feb. 2021).

[75] Interview with Yannis Grigoriou, 16 Feb., 2022.

[76] G. Mpatsias, S. Bellas, N. Mparkas, K. Kostaski, M. Matzakou, , O. Kakkava, D. Arvanitis, S. Tsani, S. Spinos, D. Poulos and L. Bouvery, 'Hydrocarbons in Greece: the role of HHRM' (in Greek), in P. Xalatsi (ed.), *HHRM - Hellenic Hydrocarbon Resources Management* (Athens: HHRM – Hellenic Hydrocarbon Resources Management), p. 7, www.greekhydrocarbons.gr/news_files/HHRM_book.pdf (accessed 9 Jan. 2021).

[77] Interview with Yannis Grigoriou, 16 Feb. 2022.

Map 3. Hydrocarbon exploitation with respect to the non-commons



Source: Ministry of Energy (2014), https://web.archive.org/web/20151012195128/http://www.ypeka.gr/Default.aspx?tabid=766&language=el-GR (Reproduced courtesy of Ministry of Energy).

and Exxon in the region East and South of Crete. Their geophysical reconstructions and models provided them with indications of hydrocarbon sources of substantial quantity along the Mediterranean Ridge and along an arc from the North Ionian Sea, South of Crete to the island of Kastelorizo.[78]

[78] Ibid.

It was in this period that the southeastern expansion of the hydrocarbon resource spaces was promoted by energy experts who promoted the vision of Greece's redemption from the crisis through continuous expansion and linkage with developments in the Levantine Basin. Most notably, Elias Konofagos, a former General Director of Research and Production of Hydrocarbons of Hellenic Petroleum, along with Alain Bruneton[79] and A. Foskolos from the Polytechnic School of Crete, publicly promoted[80] the expansion of Greece's (and partially Cyprus') hydrocarbon resource spaces in the Eastern Mediterranean, a move that reignited political tensions by abolishing the truce of non-commons.

The ongoing rise of the cosmopolitan commons, 2016–2021

While successive Greek governments battled with austerity and the related social crisis, the geopolitics of the region altered radically.[81] The SGC, as a prominent hydrocarbon space for the safety and the expansion of the gas market for the EU, expanded considerably due to the recent exploitation successes of the Egyptian and the Israeli governments. The promising gas field discoveries (Tamar, Leviathan, Zohr, Aphrodite, Karish) in the Levant Basin back in 2009, a sea region that borders the south and south-east corners of Turkey, the west of Syria, Lebanon, Israel and the Gaza Strip, the north of Egypt and the southeast of the Aegean Sea, created the conditions for political tensions in

[79] French geologist and geophysicist of BEICIP-FRANLAB who was, in the 1970s, advisor to the then Prime Minister Constantine Karamanlis.

[80] A. Bruneton, E. Konofagos and A.E. Foscolos, 'The Importance of Eastern Mediterranean Gas Fields for Greece and the E.U. Emphasis on the Probable Natural Gas Deposits Occurring in the Libyan Sea within the Exclusive Economic Zone of Greece', *Mineral Wealth* **160** (2011): 7–30; Id., 'Cretan Gas Fields – a New Perspective for Greece's Hydrocarbons Resources', *Pytheas Market Focus*, 30 March 2012.

[81] P. Siousiouras and G. Chrysochou, 'Southeastern Mediterranean: The Case-Study of Geopolitics and Maritime Delimitation Issues', *Global Journal of Human Social Science Research (B)* **14** (7) (2014).

the region.[82] The importance of the Eastern Mediterranean's hydrocarbon potential started to attract the interest of the region's neighbouring countries, as well as transnational hydrocarbon companies.[83] At the same time, hydrocarbon resources became a uniting power for collaboration between neighbouring countries, but also triggered conflicts.[84] Complexity characterised the situation due to national politics and expectations, difficulties in configuring sea boundaries and the intervention of major international companies like BP, Exxon-Mobil, ENI, Total, Shell and Noble Energy. A new energy region started to take shape in the Eastern Mediterranean through the configuration of a cosmopolitan resource space.[85]

The first country to initiate the reclamation of this space (Tamar) was Israel. Estimates made by Noble Energy, the American company that controlled the operations of the field, considered Tamar the most prominent gas discovery of that time (2009), and the biggest of the Levant Basin.[86] Soon after, the wider region of the Eastern Mediterranean Sea emerged as a primary boundary object,[87] through which governance and science were able to become increasingly linked, where national, international and transnational politics began to take form and interconnect. The Zohr gas field is considered, to this day, to be the largest gas field in that region,

[82] A. Stergiou, 'Energy Security in the Eastern Mediterranean', *Int. J. Global Energy Issues* **40** (5) (2017): 320–34.

[83] S. Karbuz, 'Geostrategic Importance of East Mediterranean Gas Resources', in A.B. Dorsman, V. Ediger and M.B. Karan (eds), *Energy Economy, Finance and Geostrategy* (New York: Springer, 2018); C. Ellinas, *East Med Gas: The Impact of Global Gas Markets and Prices* (Rome: IAI, 2019).

[84] M. Karagianni and A. Stergiou, *Does Energy Cause Ethnic War? East Mediterranean and Caspian Sea Natural Gas and Regional Conflicts* (Newcastle upon Tyne: Cambridge Scholars Publishing, 2019).

[85] Y.A. Stivachtis, 'Eastern Mediterranean: A New Region? Theoretical Considerations', in S.N. Litsas and A. Tziampiris (eds), *The New Eastern Mediterranean* (New York: Springer, 2019).

[86] 'Zohr Gas Field', *Offshore Technology* (2020), https://www.offshore-technology.com/projects/zohr-gas-field/ (accessed 17 Jan. 2021).

[87] P. Carroll, 'Water and Technoscientific State Formation in California', *Social Studies of Science* **42** (4) (2012): 489–516.

with more than 800 bcm[88] of natural gas reserves. ENI (through the IEOC, a joint venture with Egyptian General Petroleum Corporation) steered their drilling activities offshore and in 2015 succeeded in discovering the Zohr gas field, located more than 150 kilometres off the coast of Egypt.[89] Egypt not only had status as a traditional large-oil producer amongst the OPEC,[90] but also boasted the largest dry natural gas production in Africa. By owning critical material infrastructures (like the Suez Canal, pipelines etc), it historically acted as a leading energy actor and as an actor that entangled different global energy networks and markets. However, it had declining gas production and ended up importing gas from Israel, one of its own traditional gas customers.[91] With the new field, Egypt would be able to re-establish its status as a natural gas exporter, a regional LNG[92] hub of the Mediterranean and Africa.[93] Tarek el Molla, the current Minister of Petroleum and Mineral Resources, told the media his vision in relation to Egypt's energy hub-plans:

> The destiny of each country is its own decision, however, you get to capitalise on what you have – so if you have the resource, the gas, you can play smart. And of course it would be a tool, or a card, that you can play with in politics, definitely … about the hub, I say that we will together be the hub … Egypt will not ever be able to be the hub, no, it will be the hub together with its neighbouring countries, allies, partners … we are complementing each other in this field.[94]

[88] Billion cubic metres.

[89] 'Zohr Gas Field'.

[90] Organization of the Petroleum Exporting Countries.

[91] S. Hasan, 'Why is Gas-rich Egypt Importing Fuel from Israel?', *TRT*, 28 Jan. 2020, www.trtworld.com/middle-east/why-is-gas-rich-egypt-importing-fuel-from-israel-33295 (accessed 3 Feb. 2021).

[92] Liquefied natural gas.

[93] 'Hydrocarbons Projects Could Make Egypt a Leader in Energy', *Oxford Business Group* (2020), www.oxfordbusinessgroup.com/overview/firing-new-hydrocarbons-projects-and-push-renewables-seek-make-egypt-regional-leader-sector (accessed 3 Feb. 2021); J. Elass, 'With Increased Output, Egypt Set to Become a Regional LNG Hub', *thearabweekly.com*, 13 Jan. 2019, www.thearabweekly.com/increased-output-egypt-set-become-regional-lng-hub (accessed 5 Feb. 2021).

[94] N. Turak, 'Egypt's Gas Exports Can Give it a Foreign Policy Edge, Petroleum Minister Says', *CNBC*, 6 April 2019, www.cnbc.com/2019/04/06/egypts-

These transboundary gas-hub visions, viewing Mediterranean resource spaces as a cosmopolitan common, a field for promoting collaborative spirit and a resource of unity, were common between some nations due to the discovery of many gas fields, which were planned to be commercially exploitable and have potential for export.[95] Between 2009 and 2015 no fewer than seven major gas fields were discovered.[96] The Leviathan gas field (2010) offshore from the Israel Exclusive Economic Zone (EEZ), consisting of approximately 650 bcm of natural gas, was large enough to shift the energy balance in the region, while at the same time, having the potential to make Israel energy self-reliant.[97] Chevron entered the Israel market by buying out the shares of Noble Energy shares, main operator in that field. Chevron's move was viewed as a further shift toward the trans-nationalisation of the resource, since the technical and managerial capabilities of the company meant that the Leviathan's potential could be paired with a proper LNG capability that could export it to worldwide markets.[98]

gas-exports-can-give-it-foreign-policy-edge-petroleum-minister.html (accessed 13 Feb. 2021).

[95] O. Mehmet and V. Yorucu, *Modern Geopolitics of Eastern Mediterranean Hydrocarbons in an Age of Energy Transformation* (Springer, 2020); I.N. Grigoriadis, 'Energy Discoveries in the Eastern Mediterranean: Conflict or Cooperation?' *Middle East Policy* **21** (3) (2014): 124–133.

[96] Karbuz and Karbuz, 'Geostrategic Importance of East Mediterranean Gas Resources'.

[97] 'Leviathan Gas Field', *Delek Drilling* (2020), www.delekdrilling.com/natural-gas/gas-fields/leviathan (accessed 15 Feb. 2021); J. Beckman, 'Deepwater Leviathan Gas Project Secures Israel's Energy Needs. Leviathan is Israel's Third Offshore Natural Gas Field Development and the Most Ambitious to Date for Operator Noble Energy', *Offshore-Mag* (2020), www.offshore-mag.com/field-development/article/14075204/deepwater-leviathan-gas-project-secures-israels-energy-needs (accessed 23 Feb. 2021).

[98] 'Chevron Can Lift Israel's Leviathan Gas Field on to Global Stage, Partner Says', *Reuters* (2020), www.uk.reuters.com/article/us-delek-drill-chevron-leviathan/chevron-can-lift-israels-leviathan-gas-field-on-to-global-stage-partner-says-idUSKCN2521P0 (accessed 12 Feb. 2021); B. Lepic, 'Chevron Can Make Israel's Leviathan a Global Gas Supplier', *Offshore energy* (2020), www.offshore-energy.biz/chevron-can-make-israels-leviathan-a-global-gas-supplier/ (accessed 3 Feb. 2021).

Cyprus entered the scene a few years later. The Aphrodite gas field (2011) is approximately thirty kilometres away from the Leviathan gas field and almost 160 kilometres south of Limassol. It is estimated to hold 130 bcm of gas, which would make it possible for Cyprus to achieve energy independence, but today it lacks any proper infrastructure, LNG facilities or a pipeline. The Cypriot authorities also saw this resource space as an asset. On the one hand, it could be economically exploitable, as it would return a considerable revenue to the treasury of Cyprus, but, on the other hand, it could be used as a geopolitical tool to solidify and forge the geostrategic position of the country in the area. Cypriots used hydrocarbon diplomacy to build alliances and collaborations with neighboring countries (except Turkey) that shared the same interests and common efforts to export gas into different energy gas markets in Eurasia.[99] This field is operated by Noble as it still holds a 35 per cent share, alongside participation from Shell (35 per cent) and Delek Drilling (thirty per cent). Different technical arrangements have been proposed for export (pipelines, floating production storage and offloading, and LNG). A technical study was undertaken by the Egyptian Natural Gas Holding Company and Cyprus Hydrocarbons Company in 2015 to establish a potential gas route from the Aphrodite gas field to Egypt. The initial plan was designed to interconnect the Aphrodite field to the Egyptian gas market (for onward export) through an offshore pipeline to the LNG facilities in Idku of Egypt, operated by Shell (Map 4). This plan was ratified by an agreement between the two countries in 2019. Nevertheless, the entry of Chevron, in bidding for Noble shares (for $5 billion), has challenged this plan. While the Republic of Cyprus (RoC) managed to conclude agreements for an EEZ with its neighbouring countries (Israel, Egypt, Lebanon) and arranged the legal framework for the development of its offshore resources as part of the exercise of its sovereign rights, the

[99] 'The First Natural Gas Field in Cyprus', *Delek Drilling* (2020), www.delekdrilling.com/project/aphrodite-gas-field (accessed 3 Feb. 2021); R. Pedi and I. Kouskouvelis, 'Cyprus in the Eastern Mediterranean: A Small State Seeking for Status', in Litsas and Tziampiris (eds), *The New Eastern Mediterranean*.

Turkish Republic of Northern Cyprus (TRNC) and Turkey opposed and regarded these practices as illegal from the beginning of 2011 onwards. According to their argument, these hydrocarbon activities were violating the TRNC rights, by excluding them from the co-exploitation of the island's natural sources. In a countermove, Turkey and TRNC agreed to a self-delimitation of their EEZ according to their own interests. In advance, the Turkish government urged the governments with whom the RoC had made agreements to construct their EEZ, to revise these agreements. Moreover, Turkey gave alerts that continuing offshore exploration and related operations would be subject to retaliation. Turkish naval vessels were deployed to patrol the contested waters.[100]

As things become more complicated, a new cooperative framework and more direct action are needed in order to coordinate a transnational policy for the Eastern Mediterranean countries. The initial discussions in 2019, between the oil minister of Egypt Tarek el-Molla and his Cypriot counterpart Natasa Pilides, resulted in the agreement for a regional Gas Forum platform in order to achieve collaboration and a common oil and gas policy in the wider region. Indeed, this idea was gladly adopted by six countries (Egypt, Cyprus, Greece, Israel, Jordan, Italy) by establishing a common ground, an Egypt-based energy platform, which could encourage natural gas exports while, at the same time, improving relations and working intensively with the Arab world. The East Mediterranean Gas Forum (EMGF) was established as an intergovernmental organisation, observed by the US and EU, with the additional approval of the Palestinian Authority.[101]

Turkey's geopolitical vision for the region and the deterioration of its relations with Israel contributes to the potential for confron-

[100] H. Faustmann, A. Gürel and G.M. Reichberg (eds), *Cyprus Offshore Hydrocarbons: Regional Politics and Wealth Distribution*, A joint publication by the Friedrich Ebert Stiftung and the PRIO Cyprus Centre, Report 1/2012 (Oslo: Peace Research Institute Oslo (PRIO), 2012).

[101] 'East Mediterranean States Formally Establish Egypt-based Gas Forum', *Reuters*, 22 Sept. 2020, www.reuters.com/article/us-mideast-energy-idUSKCN26D14D (accessed 3 Feb. 2021).

tation and conflict of interest.[102] In 2010, the rapprochement of warm ties between Cyprus and Israel, embedded in an agreement for energy-and defence-related issues in the region, threw oil on the fire in a very complicated and troubled region. Furthermore, the Israeli–Lebanese conflict, which has a long history in a very troubled region and has led to military clashes, was re-fuelled, this time offshore, in relation to the construction of the EEZ, hence the reserves themselves. Lebanon insisted that Cyprus–Israel defined the EEZ in ways that conflicted with the EEZ resulting from the Cyprus–Lebanon agreement.

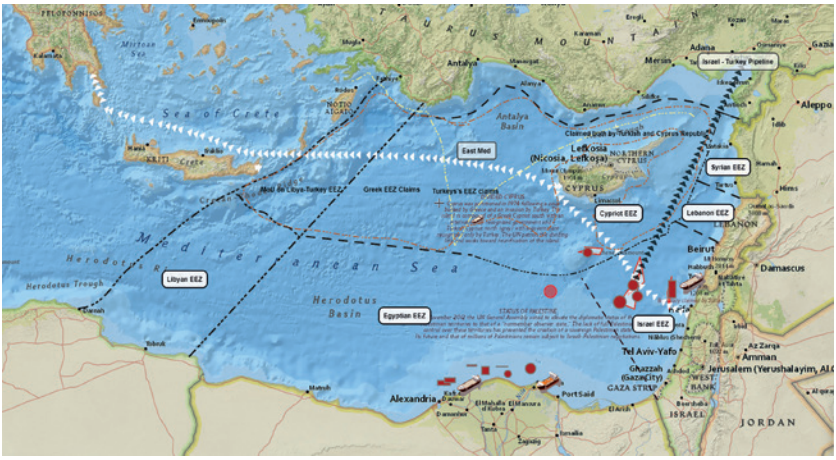
Seven years later, the Greek government backed and joined the plans of the Cypriot government. In June 2017, an agreement between the triumvirate of Greece, Cyprus and Israel took place, inaugurating the close collaboration of the three countries in the wider region, and having an influence on the energy dimensions. This was accompanied by the cooperation of the Greek and Israeli governments on hydrocarbon politics (2016). One of the most promising energy projects of this bilateral partnership was the development of the Eastern Mediterranean pipeline East-Med linking the Israeli gas reserves (Levantine Basin) to Cyprus (and the promising Cypriot EEZ) and thence to the Greek national natural gas grid (from Crete to the Peloponnese) for export to the EU (Map 4).[103]

In January 2016, Alexis Tsipras, the Prime Minister of Greece, sought closer cooperation and collaboration with the Israeli government of Benjamin Netanyahu. According to the public interview the two PMs gave after their meeting, the countries signed a series of bilateral agreements promoting cooperation in important areas of

[102] See E. Kuşku-Sönmez and Ç. Üstün, *Turkey's Changing Transatlantic Relations* (Boston: Rowman & Littlefield, 2021); A. Gürel and L.L. Cornu, 'Can Gas Catalyse Peace in the Eastern Mediterranean?' *The International Spectator* **49** (2) (2014): 11–33; Ayla Gürel and Laura Le Cornu, Turkey and Eastern Mediterranean Hydrocarbons, Global Political Trends Center, Istanbul Kültür University (2013).

[103] 'Tripartite Greece–Cyprus–Israel: The Energy Pillar of Strategic Cooperation', *Kathimerini* (in Greek), 15 June 2017, https://www.kathimerini.gr/914064/article/epikairothta/politikh/trimerhs-elladas---kyproy---israhl-h-energeia-pylwnas-ths-strathgikhs-synergasias (accessed 3 Dec. 2020).

Map 4. Hydrocarbons cosmopolitan commons in eastern Mediterranean in a nutshell: Exclusive Economic Zone (▪▪▪), gas fields (red cycles), pipelines (▷▷ and ▶▶) and Turkish claims (red line), Greek –Cyprus claims (yellow)]



Source: Authors' adaptation / elaboration of information from different sources using https://www.scribblemaps.com/.

common interest and most importantly in relation to energy policy and energy infrastructures like the natural gas transmission networks from the Eastern Mediterranean to Europe. Through the planned infrastructure and the expansion of the hydrocarbon resource spaces (Appendix, Table 3), Greece set its geopolitical agenda as a state that secures stability and peace in the region.[104]

Turkish officials have interpreted the visions and plans of the Tripartite, especially in relation to the Eastern Mediterranean pipeline

[104] 'Joint statements with the Prime Minister of Israel, Mr. B. Netanyahu, during the work of the Supreme Council of Greece-Israel Cooperation', *PM,* (Prime Minister Archive online, 27 Jan. 2016), https://primeminister.gr/2016/01/27/14567 (accessed 13 Dec. 2020); Z. Tziarras (ed.), *The New Geopolitics of the Eastern Mediterranean: Trilateral Partnerships and Regional Security*, Re-imagining the Eastern Mediterranean Series: PCC Report 3/2019 (Nicosia: PRIO Cyprus Centre, 2019).

and the broader ventures of the region, as a strong indication that the 'truce of non-commons' has been broken and that the expansive actions and policies of Greece are now violating the territorial rights and sovereignty of the Turkish state. Especially with regard to the EastMed Pipeline, the Turkish PM stated that this project would not be able to progress without Turkish approval, because in his opinion, the pipeline crosses Turkish territory.[105] Disputing the resource spaces that were once regarded as non-commons, by the deployment of ships capable of carrying out geographic and seismic exploration operations, such as the *Yavuz* drilling ship and the *Barbaros* and *Oruc Reis* seismic-survey vessels, the Turkish government has developed its claims to the openness of Eastern Mediterranean resource spaces. All these actions and the general politics of the Turkish regime come under the grandiose concept of 'Mavi Vatan' or 'Blue Homeland', which would establish Turkish (economic and energy) independence and enable Turkey to control the five gate-waters (Aegean Sea, Mediterranean Sea, Black Sea, Persian Gulf, Red Sea). In order to materialise this vision, major expenditure would need to be directed toward modernising naval capabilities, but also the armed forces and the general defence system.[106]

[105] 'The Exclusive Economic Zone between Libya and Turkey', *Modern Diplomacy*, 20 Dec. 2019, www.moderndiplomacy.eu/2019/12/20/the-exclusive-economic-zone-between-libya-and-turkey/ (accessed 11 Nov. 2021); K. Geropoulos, 'EU Reiterates Support for EastMed Pipe, Urges Turkey to Respect International Law', *NewEurope*, 6 May 2020, www.neweurope.eu/article/eu-reiterates-support-for-eastmed-pipe-urges-turkey-to-respect-international-law/ (accessed 13 Nov. 2021); 'Erdogan Says Turkey "Will Not Back Down" in East Med Standoff', *Reuters*, 15 Aug. 2020, www.reuters.com/article/us-turkey-greece/erdogan-says-turkey-will-not-back-down-in-east-med-standoff-idUSKCN25B0SJ (accessed 3 Feb. 2021); G. Butt, 'Turkey Pushes East Mediterranean Boundaries', *Petroleum Economist*, 9 Dec. 2019, www.petroleum-economist.com/articles/politics-economics/middle-east/2019/turkey-pushes-east-mediterranean-boundaries (accessed 11 Feb. 2021); A. Cohen, 'Turkey-Libya Maritime Deal Upsets Mediterranean Energy Plan', *Forbes*, 8 Jan. 2020, www.forbes.com/sites/arielcohen/2020/01/08/turkey-libya-maritime-deal-upsets-mediterranean-energy-plan/#16b461606bee (accessed 13 Dec. 2020).

[106] E. Pinko, *Turkey's Maritime Strategy Ambitions: The Blue Homeland Doctrine (Mavi Vatan)*, Research Institute for European and American Studies (RIEAS)

Israel's government collaborated with Turkey by agreeing to build a shared pipeline, in order to export the Levantine basin's hydrocarbons.[107] However, the Turkish regime is taking a further step in challenging the East Med pipeline and what they call the Greek 'provocation' by asserting that it is trespassing on Turkey's EEZ through the agreement of the EEZ with the Libyan Government. The Memorandum of Understanding between the Government of Turkey and the Government of National Accord–the State of Libya on the maritime jurisdiction areas in the Mediterranean served as a stumbling block for Greek–Cypriot–Israeli plans in the Eastern Mediterranean (Map 4).

The agreement was a tactical attempt to counterattack Greek plans and aspirations in the Mediterranean. Subsequently the Greek conservative government and the prime minister Kyriakos Mitsotakis responded to it, with the latter inviting Warlord General Khalifa Haftar to block the agreement. Moreover, the Greek government entered into a parallel agreement with the Italian and Egyptian governments in relation to the arrangement of their EEZ, challenging the Turkish–Libyan agreement.[108] The maritime treaty between Egypt and Greece

(2020), https://www.offshore-technology.com/projects/zohr-gas-field/ (accessed 6 Feb. 2021); 'Drums of War are Beating More Loudly in Eastern Aegean', *semedenergydefense*, 22 July 2020, www.semedenergydefense.com/drums-of-war-are-beating-more-loudly-in-eastern-aegean/ (accessed 6 Feb. 2021).

[107] V. Kotsev, 'Israel May See Turkish Rapprochement Logic', *Petroleum Economist*, Independent Analysis For Energy Leaders, 26 May 2020, www.petroleum-economist.com/articles/politics-economics/middle-east/2020/israel-may-see-turkish-rapprochement-logic (accessed 14 Feb. 2021).

[108] Turkey-Libya agreement must be revoked before a solution is sought for Libya, PM Mitsotakis tells Niall Ferguson at Davos, ANA-MPA, 23 Jan. 2020, www.amna.gr/en/article/424591/Turkey-Libya-agreement-must-be-revoked-before-a-solution-is-sought-for-Libya--PM-Mitsotakis-tells-Niall-Ferguson-at-Davos; V. Nedos, 'The Background of H. Haftar's Visit to Athens' (in Greek), *Kathimerini*, 24 Jan. 2020, www.kathimerini.gr/politics/1061645/to-paraskiniotis-episkepsis-toy-ch-chaftar-stin-athina/; G. Gilson, 'Haftar in Athens, Greece to Veto EU approval of Libya Peace Deal if MOU with Turkey not Canceled', TA NEA, 17 Jan. 2020, www.tanea.gr/2020/01/17/english-edition/haftar-in-athens-greece-to-veto-eu-approval-of-libya-peace-deal-if-mou-with-turkey-not-canceled/; Y. Ioannou, A Fresh Start from Greece–Libya Relations: A View from

(signed on 6 August 2020) infuriated Erdoğan's regime, which retaliated by announcing that Turkey would conduct seismic explorations in what Greece and Egypt have inscribed as their EEZ, claiming that the region was within Turkey's continental shelf (Map 4).[109]

Turkey has publicly argued that Greece, through these deals and infrastructures, is aiming to deprive and exclude Turkey from its privileges and the valuable resources of the Aegean Sea and the Eastern Mediterranean (Map 4). The main argument is that the maritime borders for economic exploitation should be determined by the distance from the mainland without taking into consideration the continental shelf of the Greek islands (Map 4). Hazardous incidents in the Aegean Sea have prompted both the EU and the US to advise Turkey to stand down,[110] for the time being, from its 'aggressive' behaviour and energy planning, before both countries return to the negotiating table, deploying their diplomatic virtues in the hope of trying to settle their historical differences.[111]

Nicosia, Working papers / Policy Papers | Security and Foreign Policy Program, ELIAMEP, 14 May 2021, www.eliamep.gr/wp-content/uploads/2021/05/Policy-paper-69-Ioannou-final.pdf

[109] 'Will Turkey Dare to Dissolve NATO's Southern Flank?', *semedenergydefence*, 10 Aug. 2020, www.semedenergydefense.com/will-turkey-dare-to-dissolve-natos-southern-flank/ (accessed 14 Feb. 2021).

[110] G. Dalay, 'Turkey, Europe, and the Eastern Mediterranean: Charting a Way Out of the Current Deadlock, brookings, 28 Jan. 2021, www.brookings.edu/research/turkey-europe-and-the-eastern-mediterranean-charting-a-way-out-of-the-current-deadlock/ ; J. Psaropoulos, 'Turkey Opens New Dispute Over Sovereignty of East Aegean Islands', Al Jazeera, 8 Feb. 2022, www.aljazeera.com/news/2022/2/8/turkey-opens-new-dispute-over-sovereignty-of-east-aegean-islands; J. Liam, 'France Steps up Military Presence in Mediterranean as Tensions Rise between Greece and Turkey', *The Independent*, 13 Aug. 2020, https://www.independent.co.uk/news/world/europe/france-military-greece-turkey-dispute-waters-mediterranean-macron-nato-a9668451.html; 'Michel calls for Conference on East Mediterranean', *Europe Diplomatic*, 6 Sept. 2020, https://europediplomatic.com/2020/09/06/michel-calls-for-conference-on-east-mediterranean/.

[111] A. Heraclides and G. Alioğlu-Çakmak (eds), *Greece and Turkey in Conflict and Cooperation From Europeanization to De-Europeanization* (Abingdon: Routledge, 2021); 'REPORT #5 NATO in Eastern Mediterranean: The Haze of Energy War', *semedenergydefence,* 23 Dec. 2019, www.semedenergydefense.com/

Conclusion

In our study, we identify three major periods of the coproduction of state and hydrocarbon resource spaces in Greece. In the first period (1920–1987), national commons were configured by inland surveys and explorations in Macedonia and Epirus and the finding of Prinos, which configured the Aegean Sea as a resource space. The second period (1987–2016) was marked by the transformation of the Aegean Sea into a non-common; and the third and most recent period (2016 to the present) has been that of cosmopolitan commons. The establishment – or attempts at the establishment – of the hydrocarbon state in the case of Greece was initiated not only by state actors but also by corporate actors, mostly international. The visions and imaginaries dominant in each of the different periods that we have studied politically legitimised national policies and diplomatic strategies at the transnational level. The hydrocarbon state,[112] materialised through the importation of expertise from Europe and the US, the use of foreign exploration technologies or the establishment of technological infrastructures, was co-produced with the politics of commons and the demarcation of resource spaces.

The resource spaces and their boundaries configure the domain where statehood is enacted and reproduced. We argue that the state was established by acts of non-commoning of resources too. While technology existed, the political and social dynamics were such that they prevented both the establishment of a regime of cosmopolitan commons and the national ownership of natural resources. Non-commoning shaped statehood in the 1980s in relation to the Aegean

nato-in-eastern-mediterranean-the-haze-of-energy-war/semedenergydefense, (accessed 15 Feb. 2021); 'Report #7: Energy Wars and Naval Diplomacy in the Mediterranean, *semedenergydefence*, 27 Sept. 2020, www.semedenergydefense.com/report-7-energy-wars-and-naval-diplomacy-in-the-mediterranean/ (accessed 17 Feb. 2021).

[112] T. Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London / New York: Verso, 2011); P. Carroll, *Science, Culture, and Modern State Formation* (Berkeley: University of California Press, 2006); Id., 'Water and Technoscientific State Formation in California', *Social Studies of Science* **42** (4) (2012): 489–516.

Sea. Furthermore, we argue that a nation state can be reproduced through the politics of cosmopolitan commons and the politics of transnational energy infrastructures. The hydrocarbon resource space is a privileged concept to show how anthropogenic activity of technological infrastructure and surveying links nature with statehood. The oil cultures nurtured in Greece and the Eastern Mediterranean boosted further the anthropocentrism of energy policy and the politics of natural resources. It forged political and developmental patterns built on the dichotomy of society and nature and the latter's subordination. Anthropogenic actions to 'civilise nature' are linked to capitalist state-building, as well as the corporate strategies of the fossil fuel industry. Anthropogenic interventions and climate change have been facilitated by the state's engineering machinery and the aim to secure state stability and construction through alliances with transnational engineering and oil companies and through furthering the fossilisation of energy policies.

This article has stressed the role of experts in shaping visions, the role of regional diplomatic dynamics and the role of transnational technopolitics and domestic politics in shaping the meanings of commons as resources and in boosting the pursuance of exploration and exploitation of hydrocarbon sources.[113] We show the importance of the agency and roles of local-domestic actors in the co-shaping of national and transnational energy politics. In this analytical context, local and regional actors are not approached as having a passive role in the story. They shape and place their local agendas into the wider political context of the region and participate actively in the transnational technopolitics.

Timothy Mitchell has shown that states of modernity tend to make nature economically exploitable.[114] The hydrocarbon state as enacted in the Eastern Mediterranean, which promoted furthering

[113] J.W. Moore, 'Putting Nature to Work: Anthropocene, Capitalocene, and the Challenge of World-Ecology', in C. Wee, J. Schönenbach and O. Arndt (eds), *Supramarkt: A Micro-Toolkit for Disobedient Consumers, or How to Frack the Fatal Forces of the Capitalocene* (Gothenburg: Irene Books, 2015), pp. 69–117.

[114] Mitchell, *Carbon Democracy: Political Power in the Age of Oil.*

the fossilisation of energy politics, is based on the creation of technological zones at regional and international levels.[115] In this context, a history that starts from national dynamics and framings of commons is transformed into a global history of the shaping of the Eastern Mediterranean as a cosmopolitan technological zone. Our story resonates well with Painter's approach that sees the Marshall Plan as a techno-imperialistic scheme to dictate energy politics and particularly petro-politics in Europe.[116] The involvement of large international oil and gas companies in the Eastern Mediterranean established relations of technological and economic dependence and control that can be perceived as a setting of neocolonial relations.[117]

Acknowledgements

We would like to thank Mr Yannis Grigoriou, retired former Managing Director of ELPE Upstream, for the incredibly intriguing and illuminating interview he agreed to conduct with us. His thoughts, knowledge and critical comments were crucial for this study's feedback. Stathis Tsotsoros, former Executive Chairman of the Hellenic Petroleum Group (ELPE) should also be thanked for his ideas and remarks on the Greek hydrocarbon industry. A special thanks to the staff members of the Benakio Library of the Greek Parliament, as well as the Librarians of IMGE, for their excellent knowledge and willingness to assist us in locating related archives. We must also recognise the editors' and the rest of the authors' contributions to this special issue, providing us with valuable feedback and comments on early drafts of our paper. Finally, we'd like to thank the blind reviewers for their insightful comments and recommendations.

[115] A. Barry, 'Technological Zones', *European Journal of Social Theory* **9** (2) (2006): 239–53.

[116] D.S. Painter, 'The Marshall Plan and Oil', *Cold War History* **9** (2) (2009): 159–75.

[117] W.H. Blanchard, *Neocolonialism American Style, 1960–2000* (Boston: Greenwood Publishing Group, 1996); Uzoigwe, 'Neocolonialism Is Dead: Long Live Neocolonialism'.

Open access is funded by the Deanship of the School of Science, National and Kapodistrian University of Athens.

Appendix

Major activities in the quest for hydrocarbons: year of activities, resource search, leading actors or consortia, geographical territories that licences covered (drillings), findings of the exploration. Source: Authors' creation using data from various sources: Economicos Taxydromos (1912–1999); Embros (1950–1967); Macedonia (1960–1980); Eleytheria (1960–1967); To Vima (1956–2020); Ta Nea (1957–2021); Kathimerini (2010–2017); Rizospastis (1975–1990); Zafeiropoulos and Marnelis (2012); Lalechos (1992);[118] GGS (1993);[119] HELPE (2000–2021);[120] HHRM[121] (2014–2021).

Table 1

1. The reclamation and construction of hydrocarbon resource spaces in Greece, 1920–1987					
a. The pre-war period (1865–1940)					
YEAR	**Resource**	**Actor(s)**	**Territory**	**Findings**	**Activity**
1865–1866	Oil	D.York	Zakynthos	Not economically applicable	At least 1 drilling (<1,200m)
1903	Oil	London Oil Devlopment Co Ltd	Zakynthos	Negative	At least 2 drillings (<1,200m)
1903	Oil	Kolaitis	Zakynthos	Negative	At least 1 drilling (<1,000m)

[118] N. Lalechos, 'Hydrocarbons Exploration in Greece', in *The Oil System in Greece Today. Problems and Prospects* (Technical Chamber of Greece, Athens, 22–26 June 1992), library.tee.gr/digital/m1151_1200/m1172/m1172_lalexos.pdf

[119] '40 Years 1951–1991, Evolution and Offer of Geology, Future Perspectives (Athens, Special Publications of the Greek Geological Society', *Greek Geological Society* 2 (1993) (Two-day symposium 22–23 March 1993).

[120] HELLENIC PETROLEUM, official website, www.helpe.gr/en/ (accessed 15 Jan. 2021)

[121] Hellenic Hydrocarbon Resources Management S.A., official website, www.greekhydrocarbons.gr (accessed 5 Feb. 2021)

1914	Oil	D.York	Samothraki	Negative	At least 1 drilling (<1,200m)
1935–1936	Oil	D.Pyrokakos	Alexandroupoli – West Thrace	Not economically applicable	10 drillings (<1,300m)
1936–1939	Oil	W.S.REESCO	Evros (Tavri,I,II,III)	Unknown	3 drillings (875m, 1,070m, 1,170m,)
1938	Oil	W.Chelis	Northwest Peloponnesus (Katakolo, Pyrgos, Kyllini, Lanthi, Vounagoron, Pelopion)	Negative	Research and 11 Drillings (<2,135m) [sum: 11,875m]
1938–1940	Oil	DEILMAN	West Thrace (Tauri, Evros, Ardanio)	-	Exploration-research
b. The post-war WWII period (1953–1967)					
YEAR	**Resource**	**Actor(s)**	**Territory**	**Findings**	**Activity, depth**
1953	Hydrocarbons	Kotopouli Co	Kastron Kyllinis	Unknown	Unknown
1953 -1956	Oil	W.Chelis	Hleia region: Purgos – Vournagon (Pyrgos), Lanthi, Kyllini (Kastro, Loutra), Katakolon, Pelopion	Negative	At least 8 (~351-2,370m)
1955	Hydrocarbons	DEILMAN	Ardanion village Alexandroupoli - Thrace	Not commercially exploitable	Unknown
1956–1960	Oil	Helios Co, DEILMAN	West Thrace (Evros, Ardanion-Trikala, Tauri)	Negative	6 drillings (<2,658m) [sum: 9, 432m]
1956	Oil	Thomas B. Ress	Thessaloniki region:Mesimvria	Negative	3 drillings (352m, 455m, 120m)
1957	Oil	PAN Israel-Israel	Zakynthos (Keri)	Negative	6 drillings (<492m) [sum:1,810]
1956–1960	Oil	Helios Co, DEILMAN	West Thrace (Evros, Ardanion-Trikala, Tauri)	Negative	6 drillings (<2,658m) [sum: 9,432m]
1950–1960	Oil	Ministry of Industry	Karditsa	Negative	3 drillings (113m, 60m, 300m)
1960–1965	Oil	Standard Oil	Ilia – Zakynthos – Paxos - Filiatra	Negative	2 drillings

1960	Oil	BP, Aitolki Etairia Petrelaion (BP Exploration+ national Bank of Greece)	Aitoloakarnania (Agrinio), Leukada, Kefallhnia	Negative	Geophysical, geo logical explorations
1961	Oil	Helios CO, Régie Autonome des Pétroles (RAP)	Evros/Imatheia region: Agios Georgios, Evros, Vougiounou Didimotuxo-Orestiada, Thrace	Not economically applicable	At least 3 drillings (2,133m, 3,055m, 1,745m)
1960–1966	Hydrocarbons	French institute of Oil	Neapoli – Kozani, Agnantero – Trikala – Kastoria- Thessali, Giordena-Karuotikon-Agia Triada-Thessaloniki, Central and West Makedonia	Negative	At least 18 drillings (<3,823m) [sum: 23,742m]
1960–1962	Hydrocarbons, copper, chromium	Hunt Co (Independent oil producer from Texas)	Thessaloniki (Katerini, Giannitsa, Korufi, Kleidi); Imatheias region: Korufi, Kleidi Pellis: Giannitsa	Negative	At least 3 drillings (3,129m, 4,089m, 2,605m)
1960–1963	Hydrocarbons	ESSO Hellenik Inc	NW / SW Peloponnesus, Zakynthos, Paxoi, Ilias regions: (Sostis, Celevi, Kyllini, Filiatra, Agios Leon, Keri, Paxoi), Kilini	Without interest	Geographic research and drillings At least 10 drillings (90m – 3,951m) [sum: 18,145m]
1960–1963	Hydrocarbons	R.A.P.	West Thrace (Oresteiada, Mpougkonion, Delta Evrou)	Indication for gas and oil	4 drillings (<3,548m) [sum: 10,481m]
1961	Oil	Pride Forasol S.A.	Aliakmonas-Thessaloniki, central Makedonia, Gianintsa	Negative	
1961–1963	Oil	BP Exploration	West Sterea Ellada, Kefallinia, Leykada (Aitolikon, Astakos, Kleisoura – Kastoria)	Without interest	Geophysical Research and 2 drillings (3,323m, 4,573m)
1962	Oil	IGEY	Thessaloniki: Mazarakia	Negative	1 drilling (791m)

1962–1965	Oil	Ministry of Industry	Prevezis region: Milaxitsi, RizaArti: Ag.Georgios Thessaloniki: Filiates	Negative	At least 3 drillings (709m, 2,408m)
1963	Oil	BP	Aitolkarnanias: Astakos	Negative	1 drilling (3.323m)
1963–1965	Oil	SAFOR	Rhodos (Katavia, Polykastro)	Without interest	2 drillings (1,569 m)
1963–1968	Hydrocarbons	Greek Government, Ministry of Industry, French Institute of Petroleum, IGME	Epirus, Grevena, Thessaly, Thessaloniki (Preveza, Arta, Filiates, Neapoli, Agnantero, Sofades, Koruotissa, Agriosukia, Tziorntiou, Litovoi)	Negative	At least 16 drillings (<3,823m) (sum: 23,742)
1966	Oil, minerals (lignite, asbestos, marble, chromite, iron, emery, copper),	Ministry of Industry, Institute of Geological Research, Hellenic Bank for Industrial Development, French Institute of Petroleum	North Greece	Relatively exploitable	
c. The Dictatorship period (1967–1974)					
YEAR	**Resource**	**Actor(s)**	**Territory**	**Findings**	**Activity, depth**
1967 (recontracted on 1970)	Hydrocarbons	OCEANIC Exploitation Co Kelman (Denver, USA)	North Aegean, Thasos, Kavala, Thrace sea	Confirmed Applicable / Successful [cost: 31.349.000$]	9 drillings (East Thassos, 2,270m for oil) (South Kavala, 2,034m for gas) [sum: 25,864m]
1968–1972	Hydrocarbons	Texaco	Thermaikos Bay, NW Aegean	Negative	Geophysical research and 2 drillings [sum: 7,220m]
1969-1971	Oil	C & K Petroleum	Seaside of the West Greece, Kerkyra, Prevezi, Amvrakikos Gulf	Geophysical research	Geophysical research only
1969–1973	Hydrocarbons	ADA Oil Exploitation Corporation (Texas)	Ionian Sea (Leykada), Central Aegean Sea (Limnos), Patraikos - Amvrakikos gulf,	Not economically applicable (Limnos)	1 drilling (2,752m)

1969–1972	Hydro-carbons	Chevron Oil Co (Standard Oil, California)	Aegean Sea	Geophysical research only	Geophysical research only
1970, 1974	Hydro-carbons	AN-CAR Oil Company Inc	Kefalinias-Zakynthos (Kypseli, Laganas), Kyllini, North Peloponnesus (land and sea), Ionian Sea	Without interest	2 drillings [sum: 2,160m]
1970–1974	Hydro-carbons	Anschütz Overseas Co (Denver, Colorado, USA)	Chalcidice, Thessaloniki Basin (Nea Kallikrateia, Aiginio)	Without interest	2 drillings [sum: 4,169m]
1973–1977	Hydro-carbons	Serres Shipping Ltd, Petmar Petrol Oil Exploration	Thessalia, Kyparisia Bay-Strofades, Pylos	Geophysical research only	Geophysical research only
1973	Hydro-carbons	L.V.O.	Central Aegean and West of Lesvos island and Chios	Unknown	Without drillings
1973	Hydro-carbons	Calvin	Aegean Sea	Geoseismic research	Geoseismic research
1971, 1974)	Hydro-carbons	DORCHESTER OIL TRADING COMPANY Ltd	Kerkyra, Aegean Sea (North), Chalkidiki (South)	Geophysical research / Unknown	
d. The democratic governance period (1974–1987)					
YEAR	**Resource**	**Actor(s)**	**Territory**	**Findings**	**Activity, depth**
1974–1975	Hydro-carbons	Calvin Oil CO (Temporal Permission)	Aegean Sea- Cretan Sea	Geophysical research / Negative	Geophysical research / Negative
1974	Hydro-carbons	Saipem, Anschütz	Chalkidiki	Geophysical research / Without interest	

1970–1975	Hydrocarbons	Oceanic 68.75%, White Shield Greece Oil Corp. 12.5%, Hellenic Oil Company Inc. 12.5%, Wintershall Aktiengesellschaft 6.25%.	Thrace Sea (Prinos, Kavala, East Thasos, West Thassos, Peramos, Athos, Ammodis, Nestos, Thermaikos Bay)	Confirmed applicable (expansion) deposits of hydrocarbons (Prinos, crude oil & gas, S.Kavala, Gas)	9 drillings [sum: 25,505m] [cost: $38,968,421]
1975	Hydrocarbons	Rogers Oil Co	Erasmio-Xanthi, Nestos	Negative	
1975	Oil, Lignite, ammonia	Tecmo Hunter Engineering, Inc	Achlada-Florina	Negative	
1976	Oil	Public Oil Company, French Institute of Petroleum, ROM Petrol	Komotini, Nestos, Strymonas	Negative	
1978	Hydrocarbons	Public Oil Company	Kerkyra-Paxoi, Parga-Preveza, Patraic bey, Northwest Peloponisos	Negative	
1978, 1979	Hydrocarbons	ROM Petrol, Public Oil Company, Western Offshore Drilling and Exploitation Company, Tribon Engineering Sevices	Murtia Pyrgos Hlias, Neoxori-Murtia-Katakolo, Ionian Sea, Patraic Bay	Geophysical research / Promising	
1980	Hydrocarbons	Public Oil Company, Nikken, Geofizika Zagreb Co, ROM Petrol	Northwest Peloponnesus-, Katerini, Serres	Geophysical research / Promising	
1980	Hydrocarbons	Public Oil Company	Adedndro Thessaloni	Negative	
1980	Hydrocarbons	ROM Petrol, Public Oil Company	Strymonas-Serres	Negative	

1980	Hydro-carbons	Public Oil Company, O.M.V.	Giannitsa, Loudias, Katakolo, Evros, Ionian Sea	Promising	
1981–1983	Hydro-carbons	Public Oil Company, AGIP/IEOC	Paxoi	Negative	1 drilling (5,494m)
1975–1987	Hydro-carbons	DEP-ELPE	Thessaloniki, (Epanomi, Thermaikos), Zakynthos, Crete- Messara and Libyan basin, Orestiada-Evros, Grevena, NW Peloponnesus	Relative applicable (Epanomi, Katakolo, Zakynthos)	53 drillings (sum: 116,564m)

Table 2

2. The Non-commons period (1987–2016)					
YEAR	**Resource**	**Actor(s)**	**Territory**	**Findings**	**Activity, depth**
1997–2002	Hydro-carbons	Enetrprice (63.3%), ELPE (16.67%), MIL(20%)	Ioannina	Without interest	Geoseismic research up to 400 km, 1 drilling up to 4,000m
1997–2002	Hydro-carbons	Enetrprice (54.88%), ELPE (28.83%), MIL(18.88%)	NW Peloponnesus	Negative	Geoseismic research up to 356 km, 2 drillings < 1,500 m
1997–2002	Hydro-carbons	Triton (88%), ELPE (12%)	West Patraicos Gulf	Without Interest	Geophysical research
1997–2002	Hydro-carbons	Triton (88%), ELPE (12%)	Aitolokarnania	Negative	Geoseismic research up to 216 km, 2 drillings < 1,500 m
2011	Hydro-carbons	Energean Oil % Gas	S.Kavala	Negative	-
2011	Hydro-carbons	Calfrac (75%), ELPE(25%)	Thrace Sea	Unknown	-
2012	Hydro-carbons	Petroleum Geo-Services (PGS)	Ionian Sea, South Crete	Geophysical research / Promising	-
2014	Hydro-carbons	Energean Oil & Gas, Trajan Oil & Gas Lmt, Schumberger	West Katakolo	Geophysical research / Promising	-

2014 – (ongoing)	Hydrocarbons	ELPE- Patraicos (50%), EDISON International E&P SpA (50%)	Patraic Gulf (West)	Negative	Geophysical and Geological research and 1 drilling
2015	Hydrocarbons	ELPE	Site 1	Negative	1 Drilling (East Ericoussa-1)

Table 3

3. The Cosmopolitan Commons period (2016–2021 / ongoing)					
YEAR	**Resource**	**Actor(s)**	**Territory**	**Findings**	**Activity, depth**
2018–2020	Hydrocarbons	TOTAL E&P Greece B.V. (50%, Operator), EDISON International E&P SpA (25%) and ELPE West Corfu SA 25%)	sea area 2 (Block 2), West of Corfu	Negative	Unknown
2018	Hydrocarbons	ELPE Upstream, (ELPE Arta-Preveza SA and ELPE B.D. Peloponnese SA)	Arta, Preveza, NW Peloponnese	Ongoing	Ongoing
2019	Hydrocarbons	ELPE	Kyparissia gulf - Sea area 10	Ongoing	Ongoing
2019	Hydrocarbons	ELPE: 50% (manager) EDISON: 50%	Patraic Gulf (West)	Negative	Geological surveys and 1 drilling
2019	Hydrocarbons	ELPE Thracian Sea, 25%) – Calfrac Well Services Ltd (75%, Operator)	Thracian Sea, in the North Aegean	Negative	Geological Surveys and 8 drillings
2019	Hydrocarbons	ELPE SA (50%) - Repsol Exploration S.A. (50%, Operator)	Ionian Sea	Ongoing	Ongoing
2019	Hydrocarbons	ΕΛΠΕ A.E. (20%) - TOTAL E&P Greece B.V. (40%, Operator) - ExxonMobil Exploration & Production Greece (Crete) B.V. (40%)	Western Crete 'and' Southwestern Crete	Ongoing	Ongoing
2020	Hydrocarbons	ENERGEAN HELLAS Ltd / Total (Administrator, 50%), EDISON International E&P S.p.A (25%) and ELPE WEST CORFU SA (25%)	Sea area 2 (Block 2), West of Corfu	Ongoing	Ongoing
pending	Hydrocarbons	ELPE (pending approval)	North of Corfu - Sea area 1	-	-

Yannis Fotopoulos (corresponding author) is a Ph.D. candidate in the department of History and Philosophy of Science at the National Kapodistrian University of Athens (NKUA), Greece. He graduated from the European (ESST) programme in Sociology of Science and Technology (MA) and from the Philosophy and History of Science and Technology (M.Sc.) of NKUA. His research interests include sociotechnical transitions (energy, telecommunications); the coproduction of technical choices within a framework of technological competition and of visions related to state formation; the role of technical communities in the appropriation of technical arrangements and in the construction of the credibility of a technology. His research project was funded by The Tokyo Foundation and by The Hellenic Foundation for Research and Innovation.

Email: iofot9@phs.uoa.gr

Stathis Arapostathis is Associate Professor of History of Science and Technology in the National and Kapodistrian University of Athens. He completed his D.Phil. in the History of Technology at the University of Oxford. Since 2006 he has been working in several national and international research projects in Greece, the UK and the US. He is researching the history of intellectual property in science and technology, the history of technology and environmental history, and the history and policy of energy technologies. He coauthored the book *Patently Contestable* with Graeme Gooday (MIT Press, 2013). He has published extensively on the history of technology, energy history and transition studies.

Email: arapost@phs.uoa.gr

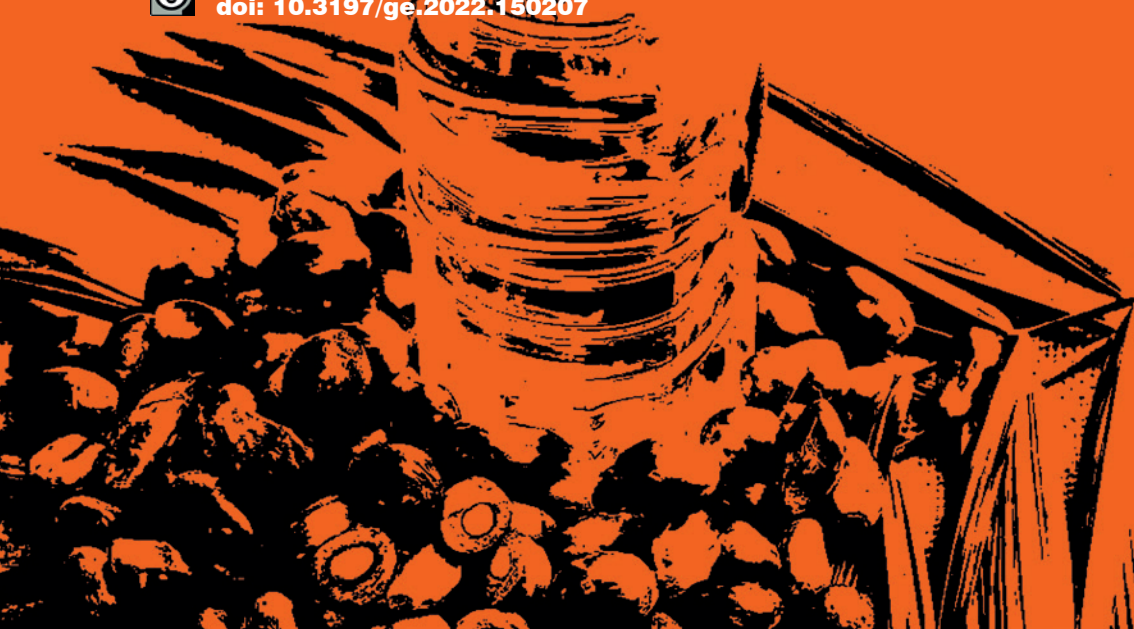
Catalysing Socio-Ecological Change: The Extraction and Processing of Edible Oils, 1910–1940

Frank Veraart

On 30 May 1931, the Dutch Indies newspaper in the Indonesian city of Surabaya, *De Indische Courant's* 'trade and industry' section featured an article on how margarine and soap producer Unilever had evoked a governmental crisis in Norway.[1] Now, why would readers be interested in relations between a country and a company on the

Global Environment 15 (2022): 370–397

doi: 10.3197/ge.2022.150207



other side of the globe? For its Dutch audience of presumably colonial businessmen, the article sketches the growing influence of this recently formed multinational in resource markets.

> It is the largest purchaser of copra and dried coconut, and regardless of the price setting of other buyers, Unilever ultimately dominates. The same goes for oil palm cultures, a lot of secondary colonial vegetable fats such as kapok kernel oil, soy, etc. And last but not least, whaling.[2]

The article reported on the fall of the Norwegian government, which initially approved of Unilever expanding its shares in the whale oil refinery Denofa. That decision, however, was not sustained by Norwegian anti-trust bodies and caused a political firestorm. To pressurise Norwegian politicians, Unilever announced it would not purchase any whale-oil from Norway the following season. The ensuing governmental overruling, in support of the largest whale oil purchaser, led to the downfall of Norway's prime minister Mowinckel. Amid the political chaos, Unilever announced plans to set up its own whaling company under the British flag. The article also highlighted Unilever's involvements in Africa: 'These African plantations are a large drawback for our Indian oil palm cultures in which millions are invested.' The reporter was surprised about the continuing investments in the Dutch Indies, especially in light of the Norwegian developments. 'The more Unilever grows its influence in soap and margarine consumption in the world, the more dependent these oil palm cultures become on this octopus.'[3] The article warned about similar events to those in Norway and called for community of interest among oil producers in the Dutch Indies.[4] It is interesting how the reporter described Unilever's global activities as a warn-

[1] Anon., 'Unilever's positie', *De Indische Courant*, 30 May 1931, 21. Consulted at Delpher (Dutch Royal Library archives), 31 Dec. 2021, https://resolver.kb.nl/resolve?urn=ddd:010279374:mpeg21:p021

[2] Ibid.

[3] Ibid.

[4] On Unilever's involvement in Norway, see P.T. Sanvik and E. Storli, 'Big business and small states: Unilever and Norway in the interwar years', *Economic History Review* **66** (1) (2013): 109–31.

ing to local entrepreneurs, focusing on the risk of these investments.

This article sketches how and why the global activities of this firm came about and how in the process it influenced social and environmental developments in regions it entangled. The latter is exemplified in a dramatic event – the Pende revolt in Congo. The revolt occurred in the Belgian Congo from May to July 1931 at one of the palm oil extraction areas run by Huileries de Congo Belge (HCB), a Unilever subsidiary. It was violently suppressed by the colonial authorities, resulting in over 1,300 arrests and over 550 deaths, according to the official accounts.[5] Accounts from indigenous people are lacking, but the parliamentary hearings in Brussels in July 1931 sketch the gruesome details and the event's entanglement with resource extraction activities. In the Belgian parliament, communist MP Joseph Jacquemotte questioned colonial minster Paul Cockaert about the revolt.

> As the price of palm nuts has fallen, the blacks are at present obliged to work for several months to pay their taxes. On the other hand, no one is unaware that this region … is essentially under control of the HCB, whose recruiting operations have made it impossible for families to cultivate their fields as they would wish. An attempt has been made to depict this revolt as exclusively religious in nature. This is wholly false ... The reasons are economic in nature. The oppression weighing upon the tribes of the Congo is growing heavier by the day, and the exploitation of the blacks is more intense and more inhumane. The revolt is simply the logical inevitable consequence of this oppression. It is the outcome towards which all those who, preferring anything, even death itself, to continuing their existence under present conditions, now willingly run.[6]

The Pende revolt, the downfall of the Norwegian government and the comments on the latter in Indonesia, exemplify Unilever's global entanglements, and its deep political, social and environmen-

[5] Other estimates than issued by the Belgian authorities mention 1,500 or more casualties. J. Marchal, 'The Revolt of the Pende (1931)', in Id., *Lord Leverhulme's Ghosts: Colonial Exploitation in the Congo* (London and New York: Verso, 2008), p. 167.

[6] Cockaert had taken up the post on 5 June, just as military action began against the ethnic Pende people. The revolt appeared in a Belgian newspaper *Le Soir*, 14 July 1931. Citation from *Annales Parlementaires*, Chamber 15 July 1931, p. 2157. See Marchal, 'The Revolt of the Pende (1931)', 159.

tal impact in the 1930s. The goal in the present article is to explain how this European merger of soap and margarine producing firms developed an interest in all these regions, how this interest affected these areas, and what this tells about the distribution of global economic, social and environmental gains and losses.

The article connects to various scholarly debates examining global histories of resources. Many excellent books and articles show how western actors have influenced regions in the global south during the period of colonisation and beyond. As these show, western knowledge production and technology application developed around notions of supremacy that aimed at efficiency in operations and resilience for western actors.[7] Historically analysed in terms of 'techno politics' and 'commodity frontiers', these highlight the western agency and shifting geographical boundaries of such activities.[8] Insights from studies on knowledge production and resource extraction demonstrate how scientific developments reconfigured western perceptions, manipulation and commodification of nature.[9]

[7] On western notions of perceived backwardness, see B. Hecht, *Being Nuclear. Africans and the Global Uranium Trade* (Cambridge, MA and London: The MIT Press, 2012); C. Ross, *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford: Oxford University Press, 2017).

[8] On technopolitics, see G. Hecht, *Entangled Geographies, Empire and Technopolitics in the Global Cold War* (Cambridge, MA and London: The MIT Press, 2011). On commodity frontiers, see J.W. Moore, 'Sugar and the expansion of early modern world economy: Commodity frontiers ecological transformation and industrialization', *Review: Journal of Ferdinand Braudel Center* **23** (3) (2000): 409–33; L. Campling, 'The tuna "commodity frontier": Business strategies and environment in the industrial tuna fisheries of the Western Indian Ocean', *Journal of Agrarian Change* **12** (2–3) (2012): 252–78; S. Joseph, *Commodity Frontiers and Global Capitalist Expansion: Social, Ecological and Political Implications from the Nineteenth Century to the Present Day* (London: Palgrave Macmillan, 2019); P. Högselius, 'The historical dynamics of resource frontiers', *NTM Zeitschrift Für Geschichte Der Wissenschaften, Technik Und Medizin* **28** (2) (2020): 253–66.

[9] M. Heymann et al., 'Challenging Europe: Technology, environment, and the quest for resource security', *Technology and Culture* **61** (1) (2020): 282–94; F. Veraart, A. Åberg and H. Vikström , 'Creating, capturing, and circulating commodities: The technology and politics of material resource flows, from the 19th century to the present', *The Extractive Industries and Society* **7** (1) (2020): 1–7; C. Kehrt and

Recognising this commodification process is a prerequisite to understanding how interest of global north actors became entangled with resources in the global south. These studies focus on episodes and events in the global south of what Noboru Ishikawa calls 'ecological, social, and cultural compression', in encounters between western and non-western actors.[10] They highlight the deep social and ecological impacts of these developments, and how this generated local inequalities at specific places of extraction in the global south.[11] Many studies are locally bound and rich in detail, that goes far beyond what I can achieve in this article. Here, however, I want to put the focus on the interrelations between various locations that developed in commodity trade. The buildup of transnational supply chains of commodities affected and (re)distributed wellbeing and sustainability in various places along the production chains.[12] Impressive global histories on, amongst others, rubber, cotton and oil palm illustrate the historical development of the interconnected

J. Martin, 'Reconfiguring nature: resource security and the limits of expert knowledge', in *Global Environment. A Journal of Transdisciplinary History* **13** (3) (2020): 512–23; C. Kehrt, 'Krill: The invention of a global resource in the long 1970s', *Global Environment. A Journal of Transdisciplinary History* **13** (3) (2020): 634–58.

[10] N. Ishikawa, 'Into a new epoch: Capitalist nature in the Plantationocene', in N. Ishikawa and R. Soda (eds), *Anthropogenic Tropical Forest. Human–Nature Interfaces on the Plantation Frontier* (Singapore: Springer Nature, 2020), p. 593.

[11] S. Haikola and J. Anselm, 'Mineral policy at a crossroads? Critical reflections on the challenges with expanding Sweden's mining sector', *The Extractive Industries and Society* **3** (2) (2026): 508–16; U. Bosme, *The Sugar Plantation in India and Indonesia: Industrial Production, 1770–2010* (Cambridge: Cambridge University Press, 2013); N. Ishikawa and R. Soda, 'Commodification of nature on the plantation frontier', in Id., *Anthropogenic Tropical Forest*, pp. 1–22; M. Ishikawa and N. Ishikawa, 'Commodified frontier: Jungle produce trade and Kemena Basin Society, Sarawak in history', in Ishikawa and Soda, *Anthropogenic Tropical Forest*, pp. 111–21; Ishikawa, 'Into a new epoch: Capitalist nature in the Plantationocene', 589–94.

[12] H. Lintsen, F. Veraart, J.-P. Smits and J. Grin, *Well-being, Sustainability and Social Development, The Netherlands 1850–2050* (Berlin: Springer, 2018). F. Veraart, J.-P. Smits and E. van der Vleuten, 'Connected by oil: A framework to analyze the connected sustainability histories of the Niger and Rhine Deltas, 1950–2015', *The Extractive Industries and Society* **7** (1) (2020): 50–67.

relations between the global north and south.[13] This article follows up on these works, however, by emphasising that the entanglements were not solely linear interlinkages between places of extraction, (knowledge) production, and consumption. Global commodity trade and the development of new requirements and substitutes also forged cross-linkages between globally dispersed regions of resource extraction. In the article I assess the social and environmental implications for these inter- and cross-related regions. I demonstrate how the globally entangled commodities functioned, with the Dutch margarine industries as a model.

Case and sources

The case investigated here is the research and development of oil hardening and commodification of resources by Unilever's margarine and soap industries and their predecessors. Unilever was established in 1929 on the eve of the Great Depression, following the merger between the European margarine industries of the Margarine Union with Lever Brothers Ltd, Britain's largest soap producers. Forming Unilever's core were Dutch margarine producers Jurgens and Van den Berg, Austrian margarine producer Schicht and Lever Brothers' soap industries. By 1910, these were the largest margarine and soap producers in Europe.[14]

Primary and secondary sources provide historical accounts of oil hardening technologies and explorations into applications of oils and fats. To assess the transitioning social, ecological and economic issues in entangled regions, I zoom in on developments in Congo between 1910 and 1940. At the time under Belgian colonial rule, Congo was one of Lever Brothers' earliest investment areas and re-

[13] J. Tully, *The Devils Milk: A Social History of Rubber* (New York: Monthley Review Press, 2011); S. Beckert, *Empire of Cotton: A Global History* (New York: Alfred A. Knopf, 2014); J.E. Robins, *Oil Palm: A Global History* (Chapel Hill: UNC Press, 2021).

[14] C. Wilson, *The History of Unilever. A Study in Economic Growth and Social Change*, Vol. 1 (London: Cassell, 1970).

mained a key palm oil extraction area for Unilever after 1929.

The sources for exploring the local impacts in Congo are contemporary publications ranging from business assessments to medical and political accounts. The latter are based on the publications of former colonial official Jules Marchal. He gathered these accounts from the colonial archives to show the often-gruesome details of Belgian colonial rule.[15] They describe in dramatic detail the immense social, cultural, economic and environmental transitions. Additionally, contemporary accounts of oil traders working in Africa and Asia are studied. Even though these are primarily western accounts, close reading provides insights into and backgrounds to the changing local circumstances. Business accounts demonstrate how the regions adapted to western requirements and in doing so changed activities in palm oil supply. By sketching the exploitation, they help us understand how subsequent developments in various localities of the Congo, the Dutch Indies and Antarctic waters became entangled and changed local environments. To assess the scope of these activities, ex-post statistical evidence is presented. This reveals how these developments eventually created more resilience in market dynamics for margarine companies.

Commodification: the socio-technical (re)definition of resources

Margarine industries developed in the late nineteenth century and showcased the typical features of western modernising industries appropriating the latest scientific insights into new products and processes. Commodification can be seen as the social construction of economic and use values attached to natural resources. Natural resources become commodities when humans define them as valuable, and what is valuable is highly dependent on the political, economic, social and cultural contexts.[16]

[15] Drawn from J. Marchal, *Lord Leverhulme's Ghosts: Colonial Exploitation in the Congo* (London and New York: Verso, 2008).

[16] Commodification has many definitions. There is an elaborate literature on commodification of products and goods. These also emphasise the non-western

For a long time, societies relied on natural resources, yet nineteenth and twentieth century developments in western science and technologies structurally changed views and visions about the natural environment.[17] Science and technology systematically attributed chemical and physical characteristics to substances.[18] This changed western perceptions of nature, reframing it in terms of resources. Keen to pursue new innovations, the margarine industries' interest in oil hardening went hand in hand with explorations and the commodification of plant and vegetable oils.

Since the 1870s, Dutch margarine producing firms had successfully adopted the production of artificial butter or margarine developed by French chemist Hippolyte Mège Mouriès in 1869. This process allowed them to develop blends of butter and margarine based on

cultural appropriation of 'things'. For a discussion, see W. Van Binsbergen, and P. Geschiere, *Commodification: Things, Agency, and Identities: (The Social Life of Things Revisited)* (Münster: LIT Verlag, 2005); F. Trentmann, 'Crossing divides: Consumption and globalization in history', *Journal of Consumer Culture* **9** (2) (2009): 187–220. In this article we focus on the commodification of substances. For discussion on this, see Veraart et al., 'Creating, capturing, and circulating commodities'; E.W. Zimmermann, *World Resources And Industries: A Functional Appraisal of the Availability of Agricultural and Industrial Materials*, (Rev. ed.) (New York: Harper & Brothers, 1951); S.C. Topik and A. Wells, *Global Markets Transformed, 1870–1945* (Cambridge, Ma: Harvard University Press, 2014); G. Bridge, 'Material worlds: natural resources, resource geography and the material economy', *Geography Compass* **3** (3) (2009): 1217–44; D. Avango, A.E. Nilsson and P. Roberts, 'Assessing Arctic futures: Voices, resources and governance', *The Polar Journal* **3** (2) (2013): 431–46; A. Bekasova, 'From common rocks to valuable industrial resources: Limestone in nineteenth-century Russia', *The Extractive Industries and Society* **7** (1) (2020): 8-19.; H. Vikström, 'Risk or opportunity? The extractive industries' response to critical metals in renewable energy technologies, 1980–2014', *The Extractive Industries and Society* **7** (1) (2020): 20–28.

[17] G. Dale, 'Sustaining what? Scarcity and the natural order in the discourse on sustainability, 1650–1900', in J.L. Caradonna (ed.), *Routledge Handbook of the History of Sustainability* (London: Routledge, 2019), pp. 71–95.

[18] E. Homburg, P. Baggen and J. Faber, 'The Rise of a knowledge society', in J. Schot, A. Rip and H. Lintsen (eds), *Technology and the Making of the Netherlands: The Age of Contested Modernization, 1890–1970* (Cambridge, Ma: MIT Press, 2010), pp. 252–323; E. Homburg, 'Chemistry and industry: A tale of two moving targets', *Isis* **109** (3) (2018): 565–76.

lard (oleo fat). These were exported to the seemingly insatiable British market, where it was sold as an inexpensive alternative to butter, feeding the growing labour force.[19] Framing it as an alternative for butter, the margarine industries continuously experimented with new blends that affected the product's taste, appearance and price. Margarine developed in many variants throughout Europe, depending on the local feedstock. Blends and recipes also varied by seasons, so as to influence the melting points of the margarine. It allowed the production of harder margarines in summer, and softer ones in winter. To make this happen, the industries acquired a great appetite for new technological developments, among others the ongoing research on fat hardening.[20]

It was the experimental work by Wilhelm Normann, working for a company producing industrial greasing oils, that caught the attention of Dutch margarine producer Jurgens. Normann was following up on hydrogenation experiments by French chemists Paul Sabatier and Jean-Babtiste Senderens around the turn of the century (Figure 1).[21] In 1902, Normann had filed a first patent in Britain on the hydrogenation of oils but faced huge challenges in controlling the process and the large amounts of hydrogen required. With the prospect of making vegetable oils more solid, Jurgens acquired British and German licences to Normann's patent in 1907 and started up an oil hardening factory in Emmerich, Germany.[22] This activity inspired rival companies in Germany, Britain and the Netherlands to conduct similar investigations. This multi-national context of incomplete and controversial patent claims resulted in fierce legal battles, but also made

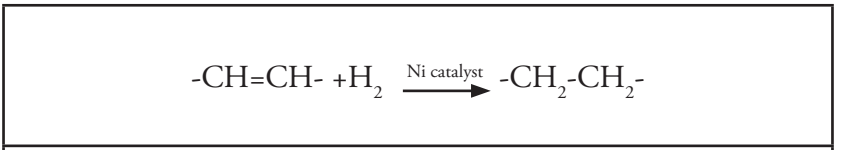
[19] N. Verbeek, 'Margarine', in H.W. Lintsen et al. (eds), *Techniek in Nederland, de wording van een moderne samenleving, 1800–1890. Deel I. Techniek en modernisering. Landbouw en voeding* (Zutphen: Walburg Pers,1992), pp. 134–69.

[20] T. van Helvoort and H. Lintsen, *Versnellen en Veranderen, katalyse en margarinegrondstoffen* (Eindhoven: Stichting Historie der Techniek, 2017); T. Jensen, 'The consumption of fats in Denmark 1900–2000. Long term changes in the intake and quality', *Anthropology of Food* S7 (2012) https://doi.org/10.4000/aof.7100

[21] K. Ruthenberg, 'Normann, Wilhelm', in *Neue Deutsche Biographie* 19, 344 (1999): www.deutsche-biographie.de/pnd117210358.html#ndbcontent

[22] T. van Helvoort, *Marktleider met R&D, Zichtbare en onzichtbare innovaties in Unilever-margarines* (Eindhoven: Stichting Historie der Techniek, 2017), p. 18.

Figure 1. Chemical representation of the hydrogenation reaction of a saturated hydrocarbon converted into an unsaturated hydrocarbon.



Paul Sabatier and Jean-Babtiste Senderens treated gaseous polyunsaturated organic oil compounds containing double bonds with hydrogen under high pressure, using powdered nickel as a catalyst. This reaction breaks the double bonds and the hydrogen is bound. In 1912, they received the Nobel Prize in Chemistry for the hydrogenation of hydrocarbons.

oil hardening research a major priority for many European margarine and soap industries. The research focused on catalyst carriers, alternative catalysts, bleaching, taste and other process improvements.[23]

Simultaneously explorations began into the applicability of various liquid plant plus animal oils and fats. This changed the understanding of these nuts, fruits and animal fats, as substances that could be chemically manipulated, made interchangeable and commodified in technical and economic terms. The research investigated the behaviour of many types of oil and fats in hydrogenation treatment, their characteristics after hardening and application in margarine and soap production. Fats and oils were described in terms of, for example, structures, iodine values and composition of fatty acids and glycerides. For whale oils, these investigations presented some pleasing effects. Experiments in 1906 showed that the hydrogenation process not only hardened but also deodorised the whale oil, making it potentially suitable in food applications.[24]

[23] Van Helvoort and Lintsen, *Versnellen en Veranderen*, pp. 19–23.

[24] Untreated whale oil's application in food and soap was limited due to its strong, unpleasant odour but it was used as streetlight fuel and industrial lubricant. Weber and Alsberg (1934), cited in W. Shurtleff and A. Aoyagi (eds), *His-*

Knowledge was gathered and exchanged in chemical societies' journals and in textbooks. A 1920s textbook on oils and fats concluded that

> (a)n abundant source of clean, wholesome and reliable raw materials is now available in addition to the usual animal and vegetable oils and fats hitherto solely employed. In time, a simple margarine may be manufactured, consisting of a single highly-refined edible oil hydrogenated to the desired butter consistency.[25]

The understanding and descriptions were not solely driven by the food industry's technical values and requirements but constructed in conjunction with developing insights in food quality, knowledge about healthy food, vitamins and various food trends.[26]

The commodification also highlighted the economic aspects, and these were also scientifically objectified. The international whaling commission (IWC), for example, introduced in the 1930s the 'Blue Whale Unit', (BWU) a theoretical measurement of the average whale in terms of oil yield and economic value. It was introduced to set quota and guarantee economic viable whaling activities. Fin, Sperm, Bowhead and other whale species were now understood in BWU.[27]

New insights and socio-economic developments in Europe kept adding new requirements for commodities and continued to change and shift commercial interests in various natural resources.

Entangling resources

The European actors in the soap and margarine industries, with their new conceptualisation of plants and animals as oil and fat resources, revisited their understanding of the natural environments.

tory of Hydrogenation, Shortening and Margarine (1860–2020) (Lafayette: Soyinfo Center, 2020).

[25] W. Clayton, *Margarine* (London: Longmans, Green and Co., 1920), p. 26.

[26] F. Veraart, 'Agriculture and nutrition: The end of hunger', in Lintsen et al., *Well-being, Sustainability and Social Development*, pp. 259–92.

[27] B.L. Basberg, 'Productivity in the 20th century Antarctic pelagic and shore station whaling: Growth and stagnation in two technological regimes', *The Great Circle* **19** (2) (1997): 93–108.

Global explorations and expeditions had shown the natural wealth available.[28] Science and technological developments opened up new markets of seemingly unlimited resources. Eyeing up these prospects, margarine and soap producers turned their attention to whale and palm oils, to replace the more expensive animal fats imported from the United States.

The growing interest of margarine and soap producers in the whaling industry coincided with a declining demand for whale oils as lubricants, candles and lamp oils. These markets were replaced by mineral oils and had plunged the whaling industries into crisis.[29] New prospects of applications in the margarine as soap industries revived the whaling business. Since the mid-nineteenth century, it had introduced new technologies like harpooning, and floating factory ships in the 1910s. This had transformed the whaling sector as it allowed whalers to move into the seemingly unlimited rich catching areas of the Antarctic seas.[30]

To secure a stable supply of whale oil, Dutch margarine producer Jurgens invested in shares in Norwegian whaling companies in 1911. The hydrogenation and subsequent commodification of whale oils entangled both industries. The whaling companies became an important supplier for the margarine and soap industries, and the margarine industries the main market for whalers. Fierce economic confrontations were unavoidable as the example in the introduction already showed. To confront the whalers' near monopolies, in 1913 the rival soap and margarine industries, together with fat hardening firms from Britain and Norway, established a 'Whaling-pool' that jointly purchased whale oils. The joint procurement of these industries was the prelude to more extensive collaborations that eventually led to the merger into Unilever in 1929.[31]

[28] D. Headrick, *Human versus Nature* (Oxford: Oxford University Press, 2020), pp. 251–54.

[29] J.N. Tønnessen, 'Norwegian Antarctic whaling, 1905–1968: An historic appraisal', *Polar Record. A Journal of Arctic and Antarctic Research* **15** (96) (1970): 283–90.

[30] J. Schokkerbroek, *Trying-Out. An Anatomy of Dutch Whaling and Sealing in the Nineteenth Century, 1815–1885* (Amsterdam: Aksant, 2008), pp. 224–26.

[31] F.J.M. van de Ven, *Anton Jurgens Hzn, 1867–1945. Europees ondernemer bouwer van een wereldconcern* (Zwolle: Waanders, 2006), pp. 134–37.

The demand from margarine and soap industries increased the production of whale oil, which almost doubled between 1910 and 1940. This had a huge impact on the Antarctic environment.[32] Britain and Norway began debating potential whale stocks and the probability that the great whales could become extinct.[33] Early assessments of the decline and efforts by the IWC in the 1930s to control whaling were, however, futile and commercial whaling continued until the 1960s. Playing an increasingly crucial role were the soap and margarine industries' demands. Today, the vulnerable natural environment of the Antarctic regions is still recovering from these activities.[34]

The margarine and soap industries also kicked off their own scramble for commodities in tropical regions, especially copra, coconut and palm oils.[35] Jurgens and Lever Brothers explored various resource extraction regions. In 1910, together with Van den Bergh, Jurgens invested in the German *Syndikat für Oelpalmenkultur* in Hamburg, which started building up plantations and oil works in the German colony of Cameroon. The outbreak of World War I interrupted this endeavour until 1923.[36] During the war, Jurgens sought additional investments in Nigeria in 1917, to secure the supply of groundnuts and palm kernels. The same year Jurgens discussed his ideas with the Dutch-Indies Trading bank to build a 'truly great enterprise in our colonies', and by 1920 he had invested in four existing oil factories in the Dutch Indies. In 1918 Jurgens developed

[32] Basberg, 'Productivity in the 20th century Antarctic pelagic and shore station whaling'.

[33] D. Dyrdal, 'Whaling and the extermination of the "great whale": Norwegian and British debate about whale stock in Antarctica, 1913–1939', *Environment and History* **25** (1) (2019): 87–115.

[34] A. Zerbini, G. Adams, J. Best, P.J. Clapham, J.A. Jackson and A.E. Punt, 'Assessing the recovery of an Antarctic predator from historical exploitation', *Royal Society Open Science* **6** (10) (2019): 190368.

[35] Robins places the scramble for palm oils in Africa by the mid-19th century as parts of monopolising commodity products. This study, however, also confirms the big influence on palm oil production and trade of the European soap and margarine producers from 1910. See Robins, *Oil Palm*, pp. 90–96.

[36] van de Ven, *Anton Jurgens Hzn*, p. 144.

activities in British Ceylon (Sri Lanka) aimed at the acquisition of copra.[37]

Lever Brothers had started up plantations in the Pacific and Solomon Islands in 1906. After this initial success, the company attempted to establish more plantations in the British colonies in Africa, but these attempts failed. The colonial authorities viewed large concessions of Western companies as a threat to social peace, as they would create a class of expropriated labourers and disruptions in the local palm oil markets led by numerous smallholders.[38] In 1910, Lever encountered a more favourable reception from the Belgian authorities, to develop plantations in the Congolese rainforest. On this occasion, Lever revealed the importance of his endeavour:

> I believe the scheme will be a success because it will make us independent, I hope, of the fluctuations in the raw material for the manufacture of soap and is a vital guarantee that the price will be kept at the level that most appeals to the buyer of the manufactured article.[39]

In the next section, I will further discuss how this endeavour impacted indigenous practices. The Belgian authorities reviewed Lever's plans in light of his achievements with social housing and facilities for his workers at the model village Port Sunlight in England. He seemed in their view an excellent candidate to pursue this endeavour in the Congo. Lever was granted a concession and established a subsidiary *Huileries du Congo Belge* (HCB) or Belgian Congo oil mills in 1911.[40] More Lever investments followed. In 1920, Lever Broth-

[37] Ibid., pp. 195–98.

[38] K.D. Nworah, 'The politics of Lever's West African concessions, 1907–1913', *The International Journal of African Historical Studies*, **5** (2) (1972): 248–64; B. Henriet, '"Elusive natives": Escaping colonial control in the Leverville oil palm concession, Belgian Congo, 1923–1941', *Canadian Journal of African Studies/Revue canadienne des études africaines* **49** (2) (2015): 339–61.

[39] N.a., 'Lever Brothers and the Congo', *Progress* **11** (1) (1911), cited in E. Boss, *The Scramble for Palms. A Comparative Historical Investigation: Two Companies Sourcing Two Commodities in Two Colonies* (Faculty of Humanities (Master's thesis), Utrecht: Utrecht University, 2014), p. 23.

[40] R. Loffman and B. Henriet, 'We are left with barely anything: Colonial rule, dependency, and the Lever Brothers in Belgian Congo, 1911–1960', *The*

ers was invited to acquire the *Niger Co Ltd*, a West-African trading company. Trading companies served as outlets for companies' products, but also as intermediaries between European firms and local producers of cocoa, ground nuts, palm oil and other commodities.

World War I and its economic aftermath, however, had greatly changed the soap and margarine industries' vertical integration strategies. Investments were seen in relation to a company's material needs and had to safeguard production. In 1921, the market for African produce collapsed and commodity prices almost halved. This dramatic drop had severe consequences for those involved in plantations and oil production. It fundamentally changed firms' viewpoint towards investing in plantations. Some investments were terminated, and others re-assessed by firms as horizontal diversification. In practice, this meant that European soap and margarine manufacturers started purchasing commodities from the global market, leaving the risks with local traders. Plantations remained an asset, as they were considered 'anticyclical' investments, meaning they returned high profits when commodity prices were high, and these could compensate for spending on purchasing resources.[41]

After the 1929 merger, Unilever consolidated the joint African assets comprising tens of thousands of hectares of plantations, oil factories and trading posts under the flag of its subsidiary, the United Africa Company (UAC). The UAC functioned both as a trading post for Unilever products and as supplier of raw materials. It exploited plantations for vegetable oil and fruit and ran its own merchant fleet.[42] Unilever also invested outside Africa in the Solomon Islands, Malaysia and the Dutch East Indies. Two thirds of the plantations cultivated palm oil, a crucial commodity for the margarine and soap industries.[43]

Journal of Imperial and Commonwealth History **48** (1) (2014): 71–100.

[41] D.K. Fieldhouse, *Unilever Overseas: The Anatomy of a Multinational, 1895–1965* (London: Croom Helm, 1978), p. 557.

[42] Id., *Merchant Capital and Economic Decolonization: The United Africa Company, 1929–1987* (Oxford: Clarendon Press, 1995), pp. 176–225.

[43] Ibid., p. 450; G. Jones, *Renewing Unilever: Transformation and Tradition* (Oxford: Oxford University Press, (2005), pp. 197–203.

Tensions and resistance

The entanglements affected and confronted the existing social-ecological structures. There is extensive literature on how western entrepreneurial activities impacted local, social, economic and socio-ecological relations in the global south. Entrepreneurial activities were often aligned with colonial governance and studies show the continuation and impact of these developments in post- and neo-colonial settings. To better understand these changes, we turn our attention to activities aligned with colonial governance in the forests of Congo and Lever Brothers' set-up to extract palm oil.

Belgium's state authorities took over King Leopold II's notoriously cruel private rule of the colony in 1908. Their aim was to put an end to the cruelties of forced labour practices and develop an economically independent colony. They envisioned establishing contracts with western companies, that, in return for their licences, would invest in public infrastructures, schools and health services for their workers. Part of the deal was that the colonial powers introduced 'civilisation' campaigns and a monetary system. In their view, a modern economic system based on money, wages and taxation was needed to gradually replace barter trade and other indigenous service mechanisms. This taxation was seen as a twofer, in that it would create not just a steady cashflow to build up colonial society, but also indigenous populations would 'improve' themselves by gradually acquiring western lifestyles.[44] The new economic system also opened the markets for western products through Unilever's United Africa Company trading posts as outlets for western goods and lifestyles.

For Lever Brothers, establishing productive palm oil extraction in the Congo turned out to be far more challenging than expected. Palm extraction in Africa was in the hands of local traders and connected with indigenous food markets and exports to European candle industries. HCB's first Congolese plantation kept to indigenous practices. Palm fruits were collected from wild trees in the natural

[44] D. van Reybroeck, *Congo een Geschiedenis* (Amsterdam: Bezige Bij, 2011), pp.156–95.

forests and brought to central collection points along the rivers for processing into palm oil.[45] To make this type of harvesting an economically interesting enterprise for western companies, a large area of tropical forest was needed. For this reason, Lever Brothers' first expeditions for palm tree plots were in forests. The company was granted concessions of 750,000 hectares of forest divided over six circles, each sixty kilometres in diameter, near rivers.

A tripartite contract between HCB, the colonial authorities and local chiefs arranged land claim and settlement issues. Besides other problems, this system created differences among palm oil workers. The indigenous 'fruit furnishers' were labourers not bound to HCB. They harvested oil palm from their own native lands and could sell the produce to local markets and private companies. This workforce, however, was too small meet the HCB demand for oil palm. Therefore, HCB contracted 'Fruit cutters' that worked under a strict regime in line with western industrial supply demands.[46] The system also introduced an institutionalised wage labour set-up in the concession areas. Incentives for locals to give up subsistence farming were low and past experiences with white people in Leopold II's colony had been dreadful. Furthermore, harvesting palm fruits was hard and dangerous work. A medical officer gave an account of the harsh and unequal working conditions:

> The work done by fruit cutters is very painful. With help of a strap passing behind the thighs, he climbs to the top of the palm tree, to a height of 20 to 30 metres. This work becomes very hard when it is a question of finding a crate of fruit, or in other words 30 kilos, in a natural forest in which palms are quite rare. When he is required to supply, as he usually is, 4 to 6 crates a week (9 to 12 to the [contract of] HCB), he has to cover, in order to find the necessary quantity of ripe clusters, many kilometers in uneven and all but impenetrable forest. This work, which lasts from morning to night, and which is painful enough for an adult, becomes an intolerable stain for old men and for the infirm, who make up the majority of the cutters. In order to supply the required amount, the cutter of fruits has to call upon his wife to help him. It is she who has to assume responsibility for cleaning, sorting and

[45] Boss, *The Scramble for Palms*.
[46] Henriet, '"Elusive natives"'.

carrying the fruit either to the post or to the road which may lie 5, 10 or 15 kilometers away.[47]

Baptised Congolese perceived fruit cutting activities as 'uncivilised' and refused to be recruited.[48] Recruitment proved problematic not only due to fierce competition with other enterprises. The resistance company recruiters met was also fierce. According to HCB officials, the people they could recruit were 'poor, underfed, ravaged by sickness and intertribal warfare, and were all cannibals'.[49] Recruitment efforts led to a massive reallocation of people, who were settled in temporary work camps. The fruit cutters therefore often originated from diverse and distant communities. Medical officers reporting to the colonial authorities sketched the poor living conditions, the lack of equipment, child labour, coercion practices, and HCB separating husbands from their wives. According to western doctors, the population was subjected to 'the harshest industrial slavery … Robbed, ill-treated, condemned in perpetuity to forced labour, they relapse into utter apathy and come to loathe us.'[50]

The 1930s global economic crisis amplified the existing tensions and vulnerabilities. When commodity prices fell, the situation in the plantations worsened. HCB decided that increasing production and lowering wages from 8.3 to 3.3 centimes a kilo were the answer to lost revenue.[51] With taxation levied at 85 francs, it took fruit cutters three to four months instead of days to pay their tax.[52] This put additional pressure on fruit cutter recruitment. Poor working and living conditions, and sick pay, gave momentum to opposition groups. These demeaning circumstances drew many of the indig-

[47] Dr. Raingeard (1932) in 'Labour in Kwango (Belgian Congo)', *La Revue de Médicine et d' Hygiène Tropicales*, January–February 1932, cited in Marchal, *Lord Leverhulme's Ghosts,* pp. 121–22.

[48] Henriet, '"Elusive natives"'.

[49] S. Edkins, 'Notes on the history of HCB', 12, cited by Boss, *The Scramble for Palms*, p. 35.

[50] Raingeard, 'Labour in Kwango', 127.

[51] *Lord Leverhulme's Ghosts*, 153.

[52] Ibid., 165.

enous population to the religious sect *Tupelepele* (the wanderers), that would have nothing to do with the white man. The sect refuted the western colonial and economic system, calling on its followers to destroy financial papers, tax documents, money and contracts.[53] A colonial administrator stated:

> The openly anti-European movement is characterised by a total cessation of economic activity. For several days now, not a single crate of fruits has been delivered ... The sect is known as 'the Devils' ('the shades') … to join, one has to get rid of all objects of European provenance, special paths are prepared behind the villages, which the shades are supposed to use; in the forest small barns are erected, and offerings are left there.[54]

The sect connected culturally with indigenous religious beliefs dating back to their ancestors' times, which they longed for. In these strained circumstances, a humiliating incident occurred when white recruiters abused indigenous women's sharing traditions, sparking the Pende people's 1931 revolt against the authorities. To regain control, the colonial authorities called in the military *Force Publique*. According to historian Jules Marchal's reconstruction, thousands of people were arrested, many were tortured and about a thousand died from the military intervention, with possibly many more who fled into the forest and perished.[55] The Pende revolt was a dramatic example of how palm oil exploitation had disrupted the indigenous way of life. It was a confrontation of colonial modernistic sociotechnical systems with indigenous socio-economic relations, between the entanglers and the entangled.

Other studies show that such confrontations remained important issues for developing these localities and analyse in far more detail how racist colonial rule transformed Africa and other colonies. Less explored, however, is how these regions also became cross-connected. Western developers acknowledged that palm oil production in Africa

[53] van Reybroeck, *Congo een Geschiedenis*, p. 176.

[54] Gustave Weekx in letter to district commissioner Jules Vanderhallen on 30 May 1932, cited in Ibid., p. 149.

[55] *Lord Leverhulme's Ghosts*, pp. 148–69.

was far more difficult than expected. They framed the conflicts and tension as the aversion of the native people who, in their view, were clinging onto redundant production methods. They did, however, also review the developments in a broader global context, connecting developments in Africa to other entangled areas in Asia and the Antarctic.

Global cross-connections

The global entanglements went beyond an interconnection between the global North and South. The European colonies and the Antarctic waters that were turning into resource extraction areas also became cross-connected. The actors in different extraction regions also interacted. This became particularly apparent when the price of commodities dropped in the early 1930s. In the wake of the global economic crisis, contemporaries critically reviewed the socio-technical setup of the various extraction sites and proposed new developments.

By the mid-1930s, African suppliers experienced increasing competition from new plantations in Malaya and Sumatra. There, European investors benefited from established practices of plantation development. In the Dutch Indies, the developments had followed up on work by the Dutch rubber planters' agricultural research station on Sumatra.[56] This station studied the most effective cultivation of *Eleais* palms. It had established new 'scientific' practices; palm oils were not harvested from natural forests, but from newly planted monoculture palm oil plantations. The nuts and kernel were processed locally in oil mills, then exported to American and European customers.[57]

Colonial authorities in Congo reacted by suggesting changes to the developed practices:

> (G)athering in the natural palm orchards will be abandoned once and for all. This gathering is threatened by the planting of oil palms in a good number of

[56] The station was known by its acronym AVROS (Algemeene Vereeniging van Rubberplanters ter Oostkust van Sumatra).

[57] P.A. Rowaan, 'Palmolie', *Berichten van de afdeling Handelsmuseum van de Koninklijke Vereeninging Koloniaal Instituut*, n. 106 (1936).

> colonies [principally Sumatra and Malaysia] (*sic.*) and by the substitution of chemical substitutes for palm oil. Only plantations yielding a richer raw material, harvested and transported more economically, producing higher quality oil, could rival foreign producers and chemical substitutes.[58]

British experts also commented on the changing palm oil markets and shifts towards plantations and palm oil production systems:

> Experienced agriculturists and planters have described the modern methods in vogue in French West Africa and in the Netherlands East Indies plantations for the proper exploitation of the oil palm, others have given a résumé of the most approved methods for the mechanical handling and treatment of the fruit. In these latter respects, the native industry in British West Africa is so handicapped in meeting successfully the competition of plantation-produced oil.[59]

Others believed that

> the chief obstacles to the success of plantations in West-Africa have been (i) the difficulty of putting even a small factory in an area large enough to obtain a constant supply of pulp sufficient to keep it working two-thirds of a year and yet be able to transport its oil to the coast for shipment; and (ii) unwillingness of the natives to work for money or goods for which they have no use or desire, and their native opposition and tribal jealousies.[60]

Colonial experts regarded the indigenous practices as unsuitable in light of global supply chain developments:

> The native West African methods of collecting and storing fruit are not only relatively costly in labour, but lead to the bruising of the fruit with consequent loss and deterioration of the oil. Native methods, despite their crudity and wastefulness, have nevertheless served to supply not only the extensive needs of the natives themselves for palm oil for local use, but until recently also the sole source of the immense quantities of the oil required for export.[61]

[58] Marchal, *Lord Leverhulme´s Ghosts*, p. 203.

[59] H.M. Langton, 'The oil palm industry and its future', *Chemistry and Industry*, 29 Jan. 1928: 655–64.

[60] E. Jones, 'The West African oil palm and the production of palm oil', *Chemistry and Industry*, 25 March 1932: 269–71.

[61] Langton, 'The oil palm industry', 655.

According to the British experts, production methods had to change to safeguard the colony's prosperity. They suggested integrating African communities further in the European supply chain system.[62]

Reporting on Dutch Indies exports, Dutch colonial experts pointed out that these palm oils contained fewer fatty acids than West-African ones. This characteristic, together with the vitamin-A content, made them preferrable for margarine producers.[63] It is noteworthy that the Dutch and British experts' discourse had shifted, reviewing palm oil specifically in terms of production quantities and food qualities favourable for industry. The commodification process continued to trickle down into the minds of investors and colonial experts. Palm oil production thus eventually became a synonym for monocrop plantations of Eleais palms and industrialised processing.

In the 1930s, Dutch investors assessed the prospect of new investments in plantations from a more global perspective. They also explicitly noted the increasing competition from copra, whale and soy oils. 'Competition from whale and soybean oils has become tougher, since technical processing (also de-odorising) made these applicable for usage in the food industries.'[64] Investment decisions about plantation farms in The Dutch Indies had become a way of competing with products in Africa and the Arctic Seas.

[62] Recent historical research confirmed the contemporary British expert worries. Business historian Valeria Giacomin has showed the market shift from Africa to Southeast Asia in the 1930s. See V. Giacomin, 'The transformation of the global palm oil cluster: Dynamics of cluster competition between Africa and Southeast Asia (c.1900–1970)', *Journal of Global History* **13** (2018): 374–98.

[63] Rowaan, 'Palmolie', 10.

[64] Nationaal Archief, Den Haag, Cultuur-, Handel- en Industriebank; Koloniale Bank; Cultuurbank N.V., 1881–1969, nummer toegang 2.20.04, inventarisnummer 1646, Afschriften van correspondentie met de afdeling Handelsmuseum van het Koloniaal Instituut over de teelt, produktie en verhandeling van palmolie, 1933–1937.

Shifting gains and pains

Commodification and oil hardening had opened up new resources around the globe. Their impact gradually became known in investors' offices. Whereas British experts feared the influence of the Dutch Indies, Dutch experts there in turn feared the competition from whaling and soy. Questions remain about the interrelations of these markets. Was it a global zero-sum game between the entangled regions, or is there a different explanation?

In 1930s, the market of palm oil shifted from Africa to Southeast Asia. Economic investigation into this palm oil trade seeks explanations in the differences in the palm oil plantation set-up, and the absence of local production and consumption schemes in the Dutch colonies, where palm oil production was based solely on export.[65]

Palm oil history also highlights differences in reaction to decreasing prices in African and Asia. Whereas Africans in general reacted by selling less palm oil, Asian plantation owners increased production to generate the necessary return on investments. Many, especially smallholders, suffered or went bankrupt.[66] These interesting facts do not, however, reveal the interaction with other commodities, especially whale oil.

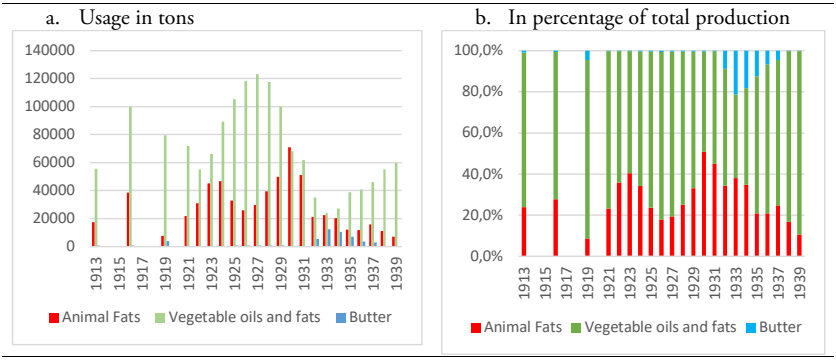
Reconstructing oil and fat imports to the Netherlands exposes the connection between these commodities from the purchaser's perspective. Figure 2 shows the inputs of these resources in Dutch margarine industries from 1913 to 1939.[67] The vegetable oils that the Dutch industries applied were coconut, palm, peanut, soy and sesame oils, mainly imported from the global south as seeds or oils. Animal fats (so-called premier jus from slaughtered cattle) were imported from the United States and South America. Footnotes in statistical reports mention that these were replaced by whale oils in the

65 Giacomin, 'The transformation of the global palm oil cluster'.

66 Robins, *Oil Palm,* p. 169

67 National Archives of the Netherlands, Den Haag, Centraal Bureau voor de Statistiek, nummer toegang 2.06.118, inventarisnummer 485, Productiestatistiek margarine-industrie- Adreslijsten fabrieken- Interne nota's- Verslagen van besprekingen- Correspondentie met de Ondervakgroep margarinefabrieken.

Figure 2. Application of various resources in Dutch margarine industries 1913–1934



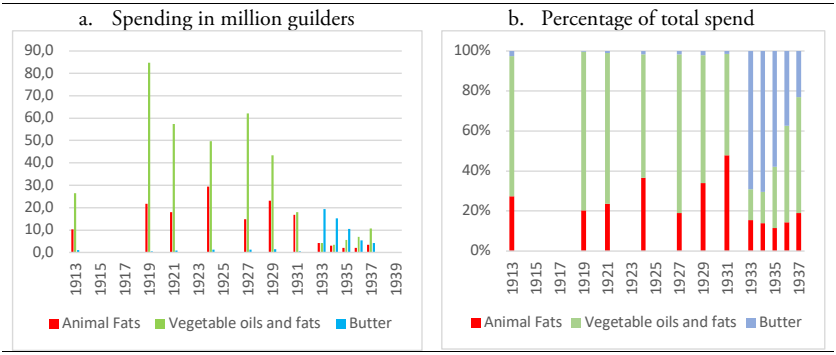
Data source: CBS (NL National Archives , CBS, 2.06.118 inv. nr 485)

1920s. In this period, whale oil application rose and vegetable oil declined (Figure 2a). The 1930s global economic crisis reduced both applications. At that time, the Dutch authorities ordered the adding of butter to margarine production to protect domestic farmers during the crisis.

The interconnection between the commodities becomes visible by the reviewing the spend on various resources, which paints a different picture (Figure 3). The increase in whale oil application did not lead to extra expenditure on this resource, nor did the increasing use of vegetable oils – this in contrast to the rather high forced spending on domestic butter. Thus, despite fluctuations, less money was spent on vegetable oils and animal fats. Unless there were fluctuations in resource inputs, the costs remained the same for Dutch industries. This stability indicates that, if the price of either resource rose, application dropped and vice versa. The spending data suggests a link between the two types of commodities, but not as a zero-sum game; in fact, throughout the period, it seems that the prices of both commodities continued to decline .

The new technological developments of fat hardening had helped Dutch margarine producers become more resilient to price fluctua-

Figure 3. Usage and spending on resources in Dutch margarine industries 1913–1939



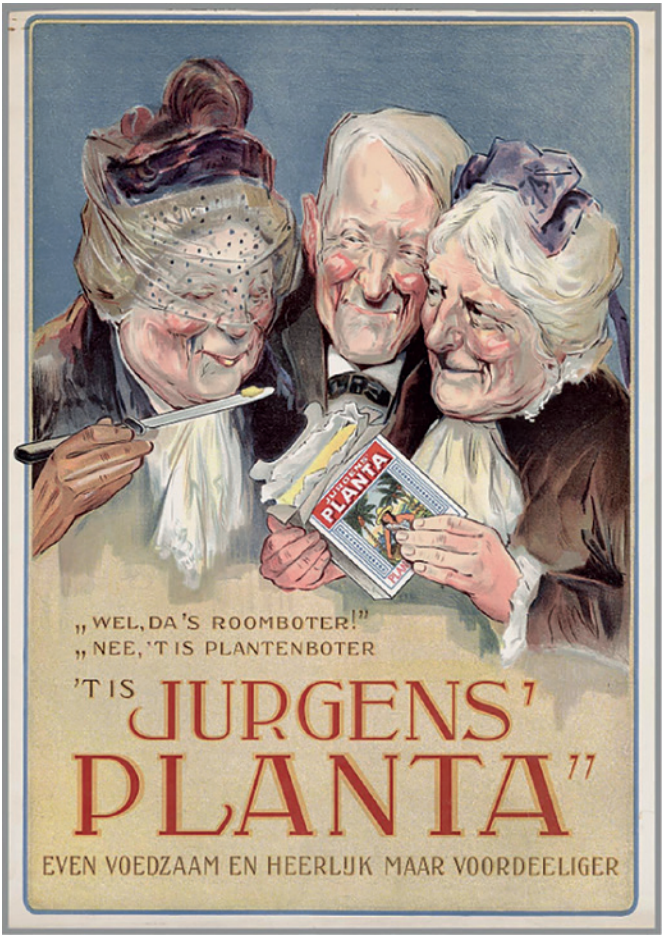
Data source: CBS (NL National Archives , CBS, 2.06.118 inv. nr 485)

tions. Oil and fat resources could be applied interchangeably. The reduction of prices signals that the burdens had been transferred to the global south. The entangled regions' resistance, such as the revolts in Africa or the whaling quota suggested by the IWC, were ultimately futile. Export markets in the global south declined or, as we have seen, were sometimes forced to change, to make them more productive and aligned with modern industrial complexes in the global north. The impact of lower revenues went far beyond reduced financial gains. It forever transformed the social and ecological environments in Africa, Asia, and the Antarctic.

Conclusions

This article has showed how new technological developments in oil hardening by hydrogenation opened up, affected and entangled new worlds, both literally and figuratively. It has revealed how technological developments in chemistry around 1910 changed western perceptions about the natural environment and food resources. These transformed seeds, nuts and animals into commodities of edible oils

Figure 4. Advertisement for Jurgens margarine in the 1930s: 'That's full cream butter', 'No it's plant butter', 'It's Jurgens Planta, as nutritious and delicious, but more advantageous'. Fat hardening technologies had allowed the application of palm oil in margarine, please note the colonial depiction on the package. For European industries, this enabled selecting the most economical resources, which radically changed societal and ecological environments in Africa, Asia and the Antarctic.



Source: https://commons.wikimedia.org/wiki/File:Jurgens%27_Planta.jpg

and fats. Catalysis, bleaching and deodorising technologies allowed manipulations to give the right properties for application in food, soap and other commercial products. This commodification of nature allowed and inspired entrepreneurs to expand their supply of resources. In doing so, the margarine and soap producers interlinked whaling with colonial trade schemes in plant oils. The entrepreneurial activities entangled the developments of regions of Africa, Asia and the Antarctic waters. Western modernistic appropriation of new scientific insights, treatment of the natural environment and economic schemes clashed dramatically with indigenous life in Africa. The entanglers of these new socio-technical systems – i.e, the western colonial traders, investors, and industrialist – got tied up with political, often racist, colonial development ideas violently enforced by colonial rulers. Many of these changes have been studied in isolation with far more detail on colonial context and other local historical specificities, than the confined space of this article has allowed me to offer here.[68] However, in these studies, the interrelated aspects of how the development of these technologies helped western industries to play regions and sectors against one another are less described.

This article shows that globally distant places not only became interlinked and integrated in global resource and product chains, but beyond this became cross-connected. Western margarine producers acted and reacted upon new opportunities that involved whalers in the Antarctic and palm oil gathering in Africa and Asia. Beyond these top-down, follow the flow interactions I have showed how actors involved in these various places of extraction reflected and acted on each other. Changes in African palm oil production and trade were influenced by competition from whale oils and Asian plantation schemes. This cascaded into new plans by entanglers towards further rationalisation and optimisation of this globally developing socio-technical system. Reviewing the global balance sheet showed

[68] For elaborate studies on palm oil, see Robins, *Oil Palm*; on Congo, see van Reybroeck, *Congo een Geschiedenis*; and Marchal, *Lord Leverhulme's Ghosts*; on Unilever, see Fieldhouse, *Unilever Overseas*; and Jones, 'The West African oil palm and the production of palm oil'.

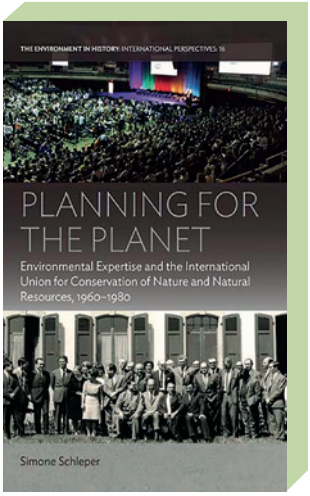
how these entanglements interconnected global regions and, for European manufacturers, created market resilience, stability and access to low priced resources. The social and environmental price paid in the global south transcended the economic revenue, as it fundamentally changed societal and ecological environments in Africa, Asia and the Antarctic.

Acknowledgements

The article has long antecedents. Early ideas of analysing the sustainability trade-offs in transnational supply chains were already present in the 2018 book by Harry Lintsen, Frank Veraart, Jan-Pieter Smits and John Grin, *Wellbeing, Sustainability and Social Development, the Netherlands 1850–2050* (Berlin: Springer). Workshops of the networks Global Resources and Sustainability of European Modernization (GREASE) and Challenging Europe: Technology, Environment, and the Quest for Resource Security (EURES) have helped further develop the argument and framing. I would like to thank Harry Lintsen, Stathis Arapostathis, Claiton Marcio da Silva, Aarthi Sridhar, Erik van der Vleuten, Evelien de Hoop and two anonymous reviewers of *Global Environment* for their encouraging and useful comments and feedback to earlier versions of this article.

Frank Veraart is Assistant Professor of history of technology at Eindhoven University of Technology. His areas of expertise include Modern and Contemporary History, Environmental Studies, History of Mobility, Spatial Planning and Computing. He studies how societal developments are influenced by technology and the choices of actors. Currently, Frank studies how international trade influences wellbeing and sustainability at places of excavation, production and consumption.

Email: f.c.a.veraart@tue.nl



Library

Simone Schleper

Planning for the Planet. Environmental Expertise and the International Union for the Conservation of Nature and Natural Resources 1960–1980

New York: Berghahn, 2019, 294 pp.

ISBN 9781789202984 (HB)

Jan-Henrik Meyer

Fifty years have passed since the United Nations (UN) Conference on the Human Environment in Stockholm of June 1972. Environmental and international historians have routinely praised the event as the breakthrough moment of global environmentalism. On the margins of the conference of government representatives, Stockholm provided an important meeting place for environmental non-governmental organisations (NGOs). For the first time, the new environmentalists exchanged views transnationally and learned from each other's experiences. This arguably contributed greatly to the growth of environmental movements and environmental advocacy in many countries.

One of the bodies involved in the conference preparations from an early stage was the International Union for the Conservation of

Global Environment 15 (2022): 398–403

doi: 10.3197/ge.2022.150208

Nature and Natural Resources (IUCN), arguably the world's oldest global environmental organisation. It had been founded in Paris in 1948 as the International Union for the Protection of Nature. Its roots go back to transnational networks of conservation-minded scientists and ecologists in interwar Europe. IUCN encompassed primarily non-state, but also some state members. Unlike the new NGOs – such as Greenpeace or Friends of the Earth emerging around 1970, which devoted much of their efforts to protest and campaigning, IUCN was involved in global conservation and the growing environmentalism through expertise as its key resource.

Simone Schleper's book *Planning for the Planet. Environmental Expertise and the International Union for the Conservation of Nature and Natural Resources 1960–1980* devotes an entire chapter to the Stockholm conference. However, in her account Stockholm hardly marks the great new beginning of the environment's forceful presence in global politics. To her, it rather constitutes a turning point, in two ways: first, for IUCN, the organisation she studies, but also for environmentalism and global environmental politics more generally.

Schleper argues that, in the new postcolonial international politics of the environment within the UN, there was only limited room for warnings about planetary limits and the destruction of nature and for the kind of ecological expertise offered by IUCN. Instead, the Stockholm conference prioritised socio-economic interests of development over the environment, and managerial knowledge, technological fixes and Promethean techno-optimism. Many countries from the global South viewed the new environmental agenda at best as a distraction, at worst as an obstacle, to their primary interest in economic development. Moreover, many developing countries viewed IUCN as an agent of the global North.

Schleper's book approaches the rise of global environmental politics through the lens of one specific expert organisation. Her main focus is on the politics of expertise in global conservation. Combining her interests in (political) environmental history and the history of international environmental politics on the one hand and the history of science on the other, Schleper enquires into three main issues relating to the interaction of (IUCN) scientists and interna-

tional policymakers: first, their interaction in defining the 'content of nature protection', including the 'scale and scope of conservation' (p. 7); secondly, in deciding about how to implement conservation advice; and thirdly, and more generally, in negotiating the role and importance of conservation expertise in a changing international institutional environment.

Methodologically, Schleper focuses on the role of a 'group of leading nature conservationists' (p. 4). The six key men in IUCN conservation were all born within a generation, between 1904 and 1929, and shared a number of biographical characteristics. Except for Canadian Maurice Strong, a self-educated businessman, the secretary general of the Stockholm Conference; and German-born Venezuelan Gerardo Budowski, an agricultural and forestry engineer, all these men were biologists trained at leading British and US universities. Their worldviews were shaped by an emphatic understanding of universal science, and by early twentieth century colonialism and the concomitant focus on late- and postcolonial African conservation, in which IUCN had an important stake (p. 47).

Schleper's focus on these six men is very appropriate to the subject matter. Rather few individuals within IUCN were involved decisively in the activities examined. The short biographies she offers in the annex provide additional insights into how personal, biographical experiences informed worldviews and action. This methodological choice is also is a result of her broad source base. Schleper accessed the personal papers of these (and further) core actors. She consulted twelve archives in seven cities in Europe and the US. Additionally, she analysed published sources, and conducted interviews with a number of key IUCN personnel and people who had worked closely with some of her six protagonists.

Schleper's study is clearly structured and accessibly written. Following an introduction that raises core issues and justifies her approach and focus on these two decades of conceptual and institutional change, Schleper lays out her argument in four substantive chapters.

Chapter 1, 'Old Hands, Pastures New. IUCN and the New Environmental Age', provides an overview of important contexts, introduces the key actors and outlines the main changes during the

period of investigation. These concerned new ideas about nature and the environment, but also about development. She discusses the challenges this implied for an organisation that considered itself politically neutral, with its expertise based on science alone, but that was clearly a Northern and Western-dominated body, as Schleper demonstrates (p. 45).

Chapter 2, 'Classifying Ecosystems. The International Biological Program, 1964–1974' analyses the involvement of IUCN in the collaborative research efforts of the International Biological Program (IBP), and the controversies this entailed about the nature of ecological advice. Two different camps emerged within IUCN: the first one, around the British Conservationist Max Nicholson, advocated grand global solutions informed by systems ecology; whereas a second camp, around the American IUCN Senior Ecologist Raymond Dasmann, defended a more regional approach.

Chapter 3, 'Expertise and Diplomacy: Systems Politics at the UN Stockholm Conference, 1972', discusses IUCN's disappointment with the events at Stockholm, as outlined above. Its expertise was marginalised. In fact, IUCN had to learn the hard way that the politics of international organisations did not necessarily accept relevant scientific advice. At Stockholm, IUCN's role was limited to its more traditional strongholds of wildlife preservation and national parks. Moreover, Schleper shows how UN institutional self-interest worked against involving IUCN. Instead, UN decision-makers favoured the inclusion of existing UN organisations in the new field.

Chapter 4, 'Nature's Value: The Fault Lines in the World Conservation Strategy, 1975–1980', offers yet another insight into the politics of expertise, and IUCN's limited influence. While IUCN was given responsibility to draft the World Conservation Strategy (WCS), and advocated the innate value of globally relevant ecosystems and biodiversity, UNEP's reviewers complemented this approach with a more flexible, development-friendly approach that 'put a price tag on environmental degradation' (p. 156), in line with a quantitative, monetary assessment of the environment that UNEP promoted. UNEP experts advocated environment impact assessments as a tool to limit – rather than completely avoid – environ-

mental damage, assessing cost and benefits in the process of development on the ground, and leaving decisions to the locals. The WCS' guiding concept of sustainable development gently paved over the discrepancies of the two approaches.

Schleper's thoughtful conclusion draws long lines from the time around 1980 up to the late 2010s, and links her findings to recent debates, such as that on the Anthropocene. One of the legacies of the WCS is clearly the malleable, and politically versatile, concept of sustainable development, which since the Brundtland Commission's report of 1987 has become the guiding compromise formula between environment and development in international politics. At the same time, Schleper observes an important shift away from IUCN's global approach to embracing a more community-based collaboration.

Schleper presents a well-written and very thoughtful account that breaks with convenient conventional wisdoms. For instance, many citizens, international relations scholars and most environmental historians[1] tacitly assume that international organisations were not only important mediators and promoters of the new environmental agenda, but also exerted a generally benevolent 'positive' influence in environmental politics, policies and law. Schleper demonstrates that the interplay of conflicting institutional and member state interests may work in very different directions. Furthermore, as a critical contribution to environmental history, Schleper offers new, differentiated answers to some fundamental questions about the history of environmental politics, those questions that the young activists of Fridays for Future or Extinction Rebellion pose to us: Why is it so hard for science to have its insights turned into political action? How can we explain – let alone justify – why, fifty years after Stockholm, the environment is in a much worse state than in 1972? Why has so little action been taken in the meantime?

[1] Perhaps with the exception of Frank Uekötter's more cynical account about international environmental politics in his recent global environmental history ('Ein Treffen in Tokio – internationale Konventionen' [A meeting in Tokyo – International Conventions], pp. 362–371 in *Im Strudel: Eine Umweltgeschichte der modernen Welt* (Frankfurt, New York: Campus, 2020))

Jan-Henrik Meyer's research combines an interest in the history, politics and law of European integration with environmental history. His Ph.D. on the European Public Sphere enquired into how citizens and the media viewed the emerging European Union, corroborated and challenged its legitimacy. His current research traces the emergence of Environmental Law from its inception in the early 1970s until the 1990s. Meyer has taught and conducted research in history and interdisciplinary European Studies as a Marie-Curie-Fellow at the University of Portsmouth and as a postdoctoral fellow and Assistant Professor at Aarhus University. He was a Rachel Carson Fellow at the Rachel Carson Center at the Ludwig-Maximilians-University Munich, an Associate Professor at NTNU Trondheim and at the University of Copenhagen. He is currently a researcher at the Max Planck Institute for Legal History and Legal Theory.

E-mail: jmeyer@lhlt.mpg.de


BE COOL
BE USEful
Help ICEHO
- Build & strengthen the global community of environmental historians
- Fund workshops & other activities to promote environmental history in places where it has little presence
- Offer travel assistance to young scholars from low income countries to attend world congresses of environmental history
- Move from strength to strength
Join The ICEHOUSE Society
International
Consortium of
Environmental
History
Organizations'
Underwriters
Supporters and
Enthusiasts
DONATE AT: http://www.iceho.org/icehousesociety
Underwriters US$50.00 Supporters US$ 25.00
Enthusiasts Free
For 2022 & 2023, ICEHOUSE SOCIETY Underwriters and Supporters receive complimentary digital access to current issues of GLOBAL ENVIRONMENT. Thereafter Underwriters and Supporters will be eligible for reduced (50%) digital subscriptions. Underwriters and Supporters will be recognized at WCEH4. Underwriters, Supporters, and Enthusiasts will receive all ICEHO digital communications.
Adapted from: Nifarion, "Icehouse at Battle Abbey, East Sussex, England" (CC by SA 4.0)

Notes from the Icehouse

Tigers, *The Magic School Bus* and Uncertainty

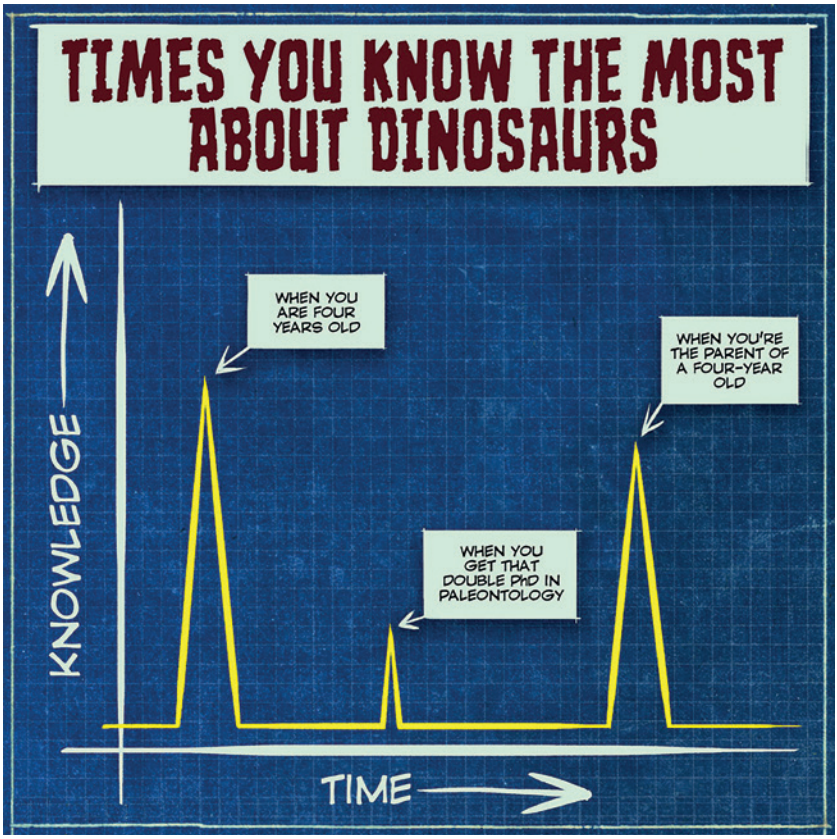
Claire Campbell

Department of History, Bucknell University

My son wants to save the tigers.

My son is eight and, for the past three months or so, he has been *very* interested in tigers. A tiger poster hangs over his bed; a small framed print of a tiger sits on his bedside table. He watches videos of tigers, and lions, and cheetahs, on YouTube. He has taken out every book on the big cats available in our two nearest public libraries. He takes notes. (He's in second grade. I can't get my university students to do this.) As a result, he knows that tigers are endangered worldwide; the books he reads all mention this. He can't really comprehend what this means – we haven't explained the sixth extinction, children's books aren't supposed to be dystopian, and he's never even met a tiger – but he's old enough to understand loss, and he's intuited what it would mean to lose something entirely and forever. So, he asked – maybe *because* he doesn't quite grasp the scale of the problem – 'What can I do?'

Figure 1. Children hold a preternatural capacity for detail about the subject of their current obsession: dinosaurs, tigers, etc. Copyright Dave Kellett, 2016, Sheldon Comics, 7 March 2016.



That's not a question for wildlife biologists or environmentalists or the IUCN; that's a question for his parents.[1] We told him he

[1] Full disclosure: I have one child. I am not an expert in parenting, child psychology and development, or early childhood education. As an historian I am charged with finding pattern, disruption and relationship; with drawing larger conclusions from individual details. Here I can only offer conclusions based on one detail, now eight years old.

Figure 2. The newest member of what the World Wildlife Fund calls 'Panda Nation'. He would have preferred Tiger Nation.

could do three things. First, he could learn as much as possible about big cats.

Second, he could talk to other people and teach *them* about tigers (although at this point, I'm not sure how many more facts about big

cats my brain can handle: did you know that every tiger has a unique stripe pattern? That tigers can jump thirty feet in a single bound? That three subspecies have already gone extinct? Such is our dinner table conversation.) Third, he could raise money for conservation organisations to help other people save the tigers. He promptly signed up to raise money for World Wildlife Fund's 'Wear It Wild' Day (3 March), so he could wear his tiger suit to school. Astonishingly, he raised over $200 in a little over a week.

All these suggestions, of course, were more about assuaging his anxiety by framing achievable, constructive actions than they were about actually 'saving' the Indochinese tiger. These were things he *could* do, that were age-appropriate and safe, and within his scale of influence; they echoed Rene Dubos' mantra to 'think globally, act locally'. They reinforced other lessons that we try to teach (like the value of going to the library, which I *also* can't get my students to do). And they acknowledged some of the most wonderful things about him: his curiosity, willingness to act and capacity for empathy with that which he has not yet seen or may never know.

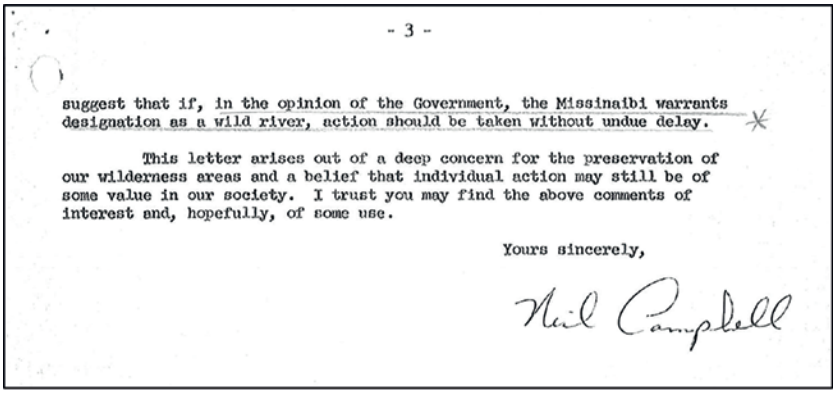
Still, I've struggled with our response. For one, these suggestions all seemed pretty simplistic, pretty reductionist and not that much different from what I did in high school thirty years ago when we were trying to promote recycling. My son's vocabulary for environmental degradation is more sophisticated than mine was at his age – he understands many of the causes and consequences of habitat loss. But surely we should have come further than 'raising awareness'? More unsettling is the way we frame such actions, the beloved story arc of the determined young hero changing the world one saved allowance at a time. I worry that this reinforces a neoliberal fiction that offloads responsibility for structural change and centuries of historical behavior onto the shoulders of a concerned child. Why should Greta Thunberg have had to walk out of school?

We are parenting in an age of environmental anxiety. We are not the first generation to do so; my parents grew up conscious of everything from nuclear fallout to unconstrained development. But with climate change and species loss, our anxiety is both diffuse and ever-present. When I was growing up in Toronto, Canada in the 1970s

Figure 3. The 'Suzuki Superhero Challenge', 2015–. David Suzuki Foundation.

and 1980s, we learned about acid rain – but that was America's fault. Pollution generally happened somewhere else. We weren't really worried about rendering the planet inhabitable. In the summers we could leave the city and go north into cool pine woods where people like us had been seeking refuge for a century. Conservation was more a frugality inherited from my grandmother – a single mother who lived through the Great Depression and the Second World War, and didn't waste a square inch of aluminium foil – than a practice

Figure 4. Letter from my father to Ontario's Deputy Minister of Lands and Forests in January 1968. The Missinaibi River was designated a provincial park in 1970 and a national heritage river in 2004. I don't think Dad's letter was really what tipped the balance here, but you never know.



- 3 -

suggest that if, in the opinion of the Government, the Missinaibi warrants designation as a wild river, action should be taken without undue delay.

This letter arises out of a deep concern for the preservation of our wilderness areas and a belief that individual action may still be of some value in our society. I trust you may find the above comments of interest and, hopefully, of some use.

Yours sincerely,

Neil Campbell

explicitly related to a precarious biodiversity. Such was the shield of middle-class privilege in a developed country in the late twentieth-century.

Now, though, that shield seems little more than a set of blinders. There are more and more reports of children anxious about their futures as the planet warms (and, more recently, as the COVID-19 pandemic rages). The rising generation has grown up with safety protocols for hot days, and is now asking the inevitable question: 'Will it be too hot for us to live?' So, we are caught between two precepts of modern parenting. We must be honest: tell your children the truth, as much as they can handle. Truth builds trust. We must also be calm. Children find security in their parents' equilibrium. Daycare staff tell parents not to dramatise morning drop-off; if you make it a big deal, they say, the child will learn it's a big deal. This applies to larger crises, too. (My husband's version of this is: 'Don't make everything the last ten minutes of *Casablanca.*')

Herein lies the dilemma and the angst: how can we acknowledge

Figure 5. December 2016, age 3. Two things I want for him: happiness and four seasons.

the enormous gravity of the climate crisis – or, indeed, that tigers may go extinct – that our children have been born to, but not define their lives by it. How do we prepare children for adulthood, that most fun-

damental responsibility of parenting, without corroding their rights as children: their rights to play, to happiness … to possibility.

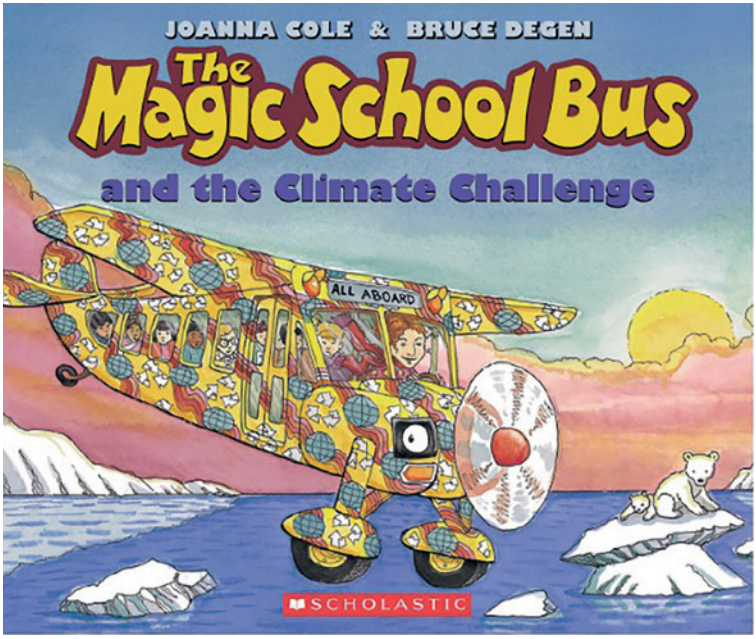
Facing this predicament, rising numbers of people – admittedly, generally urban professionals from the global North – are choosing not to have children, fearing that climate change will render their quality of life markedly less than our own.[2] David Suzuki wept as he held his infant grandchildren, not with joy but at the prospect of their reduced futures.[3] Social historians will point out that this is not entirely new – people have often delayed or foregone child-bearing in times of insecurity. But these decisions turned on immediate economic circumstances (delaying marriage until the harvest rebounds, the depression ends) and ebbed and flowed with material capacity. What if that capacity is biophysical, and cannot recover?

It isn't that children can't confront difficult subjects. There is at least a half-century of popular media – paralleling the modern environmental movement – featuring storylines of environmental catastrophe and intervention, from *The Lorax* to *Moana.* These can be surprisingly pointed; when Doc McStuffins enlarges her hospital for toys and stuffed animals, she discovers the hospital now uses too much energy and is melting the Toyarctic. That's not an allegory, that's the later twentieth century in microcosm. At the same time, *because* the problems are named and dire, books and movies about environmental problems end happily, however improbably; as for example in Dan Gutman's *Mr. Corbett is in Orbit!,* where Mr. Corbett returns from outer space with a giant beach umbrella, to block the sun's rays from reaching Earth. (To be fair, that's entirely in keeping with the attitude that geo-engineering is sufficient to mitigate climate change.) Diagnoses of impending environmental calamities are almost invariably scientific, and proffered solutions are nearly always highly technological or dependent on guilt-triggered individual actions.

[2] Emma Green, 'A world without children', *The Atlantic,* 20 Sept. 2021; Alex Williams, 'To breed or not to breed', *New York Times,* 20 Nov. 2021

[3] Raina Delisle, 'David Suzuki on 60 years of The Nature of Things: "I'm more determined than ever"', *The Narwhal,* 6 Nov. 2020 https://thenarwhal.ca/david-suzuki-the-nature-of-things/

Figure 6. Part of the wildly popular series by Joanna Cole, this appeared in 2010, promising to 'make the science easy to understand and fun to learn. This team brings a new, improved understanding to climate change, engaging kids and empowering all'.



As a humanist, I bristle at the easy omission of the historical gaze – and questions of scale, causality, record – and how all of this truncates our understanding of ecological health. The Brundtland Commission is not the origin of environmental anxiety or response, even if for my students it is now literally before their time. We need to acknowledge two simultaneous historical velocities: the longer genealogy of human impact and the real-time experience of our children. They are living a shifting baseline, observing significant environmental changes even within their childhoods. While Millennials and Generation X grew up with domestic legislation and international treaties on atmospheric pollution and sustainable development, the

current 'Gen Z' speaks about climate change in a way that no other generation has. It is the frightening difference between stories that promise and deliver restoration, and the view from childhood, projecting a life course onto a developing and open-ended catastrophe.

In the face of this, we environmental scholars often resort to the *Magic School Bus* approach in our teaching. We build course outlines that end with 'But here's what you can do!', in hope of empowering our students, and to avoid leaving them – and us – in a state of despair and exhaustion. I finish a course on the Anthropocene, for example, by documenting environmental concerns and actions over the past two centuries:

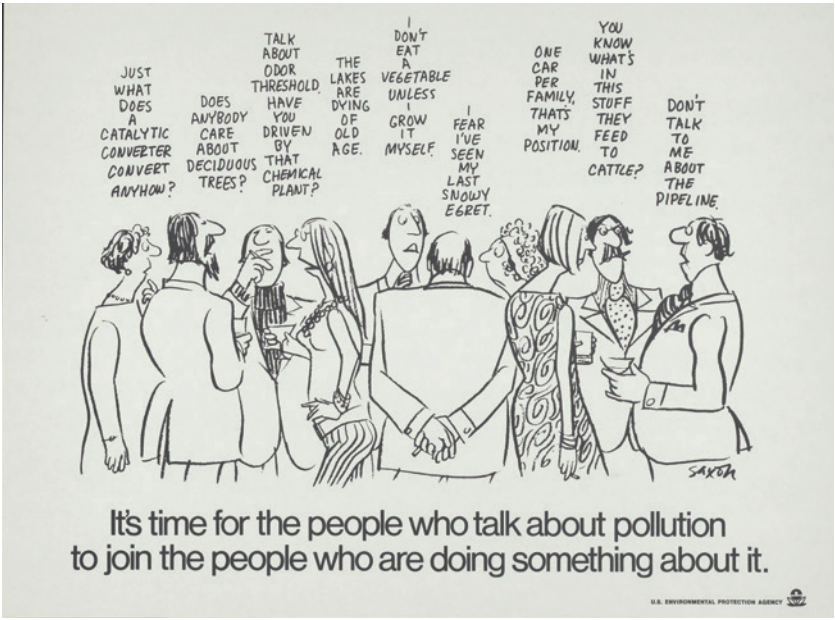
> But it is certain that man has done much to mould the form of the earth's surface … and every new fact, illustrative of the action and reaction between humanity and the material world around it, is another step toward the determination of the great question, whether man is of nature or above her.
>
> ~ George Perkins Marsh, 1864[4]

The intention here is three-fold. First, to complicate, albeit with more annoyance than effectiveness, the relentlessly presentist, scientific, short-term and inoffensive actions that our students generally associate with 'sustainability'. My aim is to draw in a humanistic constellation of concerns, about choices and beliefs, wellbeing and equity, that encircles the data of carbon accounting and composting. Second, to offer some reassurance that these problems are not entirely a surprise, unfamiliar, or a burden for this generation alone.[5] As Graeme Wynn observes, taking the long view, environmentalism

[4] George Marsh, Address to the Agricultural Society of Rutland County, 30 September 1847; George Perkins Marsh, *Man and Nature: Or, Physical Geography as Modified by Human Action* (1864); Graeme Wynn, 'Travels with George Perkins Marsh: Notes on a journey into environmental history', in Alan MacEachern and William J. Turkel (eds), *Method and Meaning in Canadian Environmental History* (Toronto: Nelson, 2009) pp. 2–23.

[5] Marguerite Schaffer, '"Give Earth a chance": Earth Day and the politics of modern environmentalism', *Origins: Current Events in Historical Perspective* **13** (8) (2020), http://origins.osu.edu/article/earth-day-50-environmentalism-thunberg-and-epa

Figure 7. Charles Saxon for the Environmental Protection Agency, ca. 1960. Library of Congress. This shows students that people have been talking – and doing something – about these questions for a half-century, for better or worse.



'remains a work in progress, a commitment that demands constant attention, a job not yet done'.[6]

And finally, to demonstrate that individuals can put a spoke in the wheel of History, and that opportunities to do so have widened. The conversation has become more self-aware, more inclusive and more pointed; I can't picture John Muir telling Gifford Pinchot, 'Blah blah blah', however much he may have wanted to. Yet is this not another sign of 'The Anthropocene' – the epoch marked by hu-

[6] Graeme Wynn, 'Finding hope: Environmentalism and the Anthropocene', *Historical Geography* **48** (2020), 7.

mans – this intellectual conceit, that we can save the planet as much as we have endangered it. Environmentalism has, traditionally, required a remarkable sense of human agency, or self-importance.[7]

Even more distressingly, we are teaching students about ourselves, and their parents, and grandparents – generations which have failed, in many ways. We find ourselves imploring our students, unfairly, to solve the problems we have given them.

> The world of air and water and soil supports not only the hundreds of thousands of species of animals and plants, it supports man himself. In the past we have often chosen to ignore this fact. Now we are receiving sharp reminders that our heedless and destructive acts enter into the vast cycles of the earth and in time return to bring hazard to ourselves. The problem you have chosen to explore is one that *must be resolved in our time*.
>
> Rachel Carson, 1963[8]

It has not been. And so my child is trying to save the tigers.

The anxiety is his. The angst is mine.

[7] Frank Zelko, 'Seeing like a God: Environmentalism in the Anthropocene', in Mark D. Hersey and Ted Steinberg (eds), *A Field on Fire: The Future of Environmental History* (University of Alabama Press, 2019), pp. 40–56.

[8] Emphasis added. Rachel Carson, 'Environmental hazards: Control of pesticides and other chemical poisons', Statement Before the Subcommittee on Reorganization and International Organizations of the Committee on Government Operations, 4 June 1963.