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The concept of 'palimpsest' in a reconceptualization of biodiversity conservation

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The concept of the Anthropocene has highlighted the significant global impact of human activities on ecological systems on a geological scale (Crutzen 2002). This concept has come to significantly influence a scientific and political agenda orientated towards documenting and denouncing multiple negative anthropogenic factors that have led to global change. Nevertheless, not all large-scale environmental transformations by human societies have been intrinsically destructive. Many indigenous communities in the Neotropics, Palearctic, sub-Saharan Africa, North America, Indo-Malaya and Australasia have radically – albeit often constructively – modified the physical and biotic conditions of the ecological systems that they inhabit (Ellis 2015). It is necessary to revise the assumption that human actions always degrade the environment, through a reconceptualization that we have previously called 'anthropogenesis' (Rivera-Núñez et al. 2020). Instead of the naïve portrayal of the 'good Anthropocene' (Hamilton 2016, Fremaux & Barry 2019), anthropogenesis seeks to enrich the biodiversity debate with the historical human expressions of constructed environments that the conservation-focused 'Edenic sciences' and the 'pristine syndrome' (Robbins & Moore 2013) tend to ignore, or 'Anthropo-not-see' (de la Cadena 2019). The objective of this comment paper is to urge the academic community, grassroots organizations and governments to employ a concept of 'palimpsest' (from the Ancient Greek for 'again scraped', implying that something is scraped clear ready to be used again) in the reconceptualization of biodiversity conservation from a historical perspective that implements research and policy agendas that incorporate the human propensity for environmental construction in a deeper and more inclusive manner.

Historical ecology, archaeology and agroecology – including the concept of agrobiodiversity – subscribe to this concept of palimpsest as a historical landscape with successive layers of environmental change in which *Homo sapiens* acts as a keystone species through a variety of cultural manifestations (Sinclair & Crumley 2017, Rivera-Núñez et al. 2020). The challenge is to categorize and determine the magnitude or scale of the cumulative effects of such transformations (Crumley 1994). Research on the physical impacts on historical landscapes and associated narratives in indigenous communities can further our understanding of such processes (Zimmerer & Young 1998, Balée et al. 2020, Clement et al. 2020).

Palimpsests are constructed through so-called 'human-mediated disturbances' (H-MDs) that are controlled by or mediate physical biotic transformations made by indigenous communities through management practices that generally take place outside of intensive, industrial and globalized natural resource uses (Balée 2006). Documented H-MDs around the world include: (1) controlled use of fire with such intensity, frequency, duration and scale as to achieve total ecosystem change or avoidance of catastrophic natural fire in dense forests; (2) deviation, narrowing or expansion of rivers, lakes, coastal systems or wetlands to settle land and obtain water for domestic purposes or develop agriculture, fishing and aquaculture; (3) construction of anthropogenic soils by re-depositing sediments, inducing erosion, pyrolysis or enhancing the soil microbiota; (4) domestication and selection of many plant and animal species; (5) human–wildlife behavioural co-evolution; (6) introductions of new species into ecological systems or translocations of existing ones and changes in species distribution and abundance; (7) moulding of landscapes by managing vegetation succession; and (8) designation and guardianship of sacred spaces (Fedick 1991, Marris 2006, Thurston & Fisher 2007, Erickson 2008, Ford & Nigh 2015, Armstrong et al. 2017).

H-MDs can provide counterintuitive insights for biodiversity conservation practices premised upon the classic conceptualizations of biodiversity such as island biogeography, refuge theory, environmental gradients, restoration ecology and invasion biology (Balée 2014, Clement et al. 2020). Many cases have been documented of H-MDs impacting the quality of habitats,

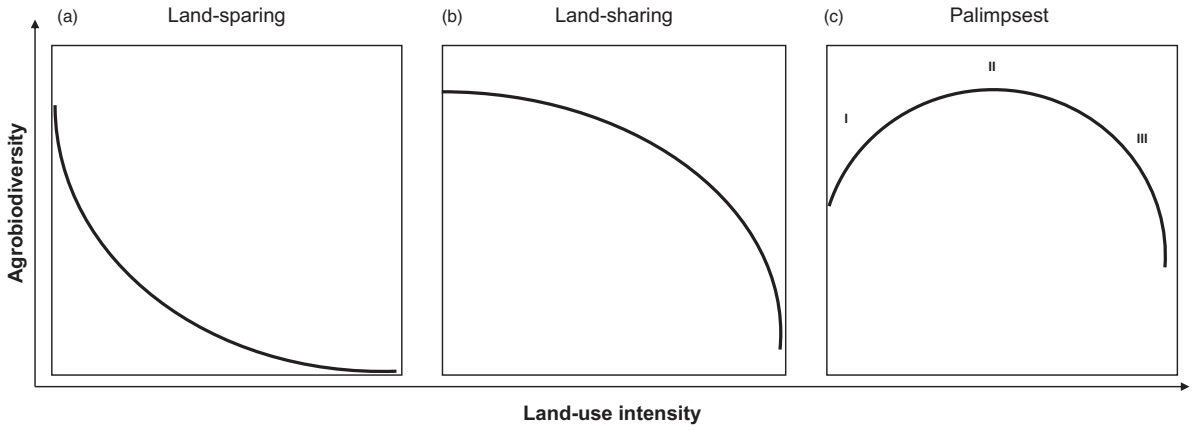

Fig. 1. Hypotheses on the implications for agrobiodiversity conservation of (a) land-sparing, (b) land-sharing and (c) palimpsest land-use intensity models. Land-sparing proposes the separation of agricultural intensification and human population in order to free up land for conservation because such activities intrinsically degrade agrobiodiversity in a stylized convex function. Land-sharing proposes that ecological and peasant agriculture build high migratory connectivity (meta-population) matrices that allow agrobiodiversity conservation at a landscape level in a stylized concave function. The palimpsest model recognizes that mainly indigenous communities, throughout centuries or millennia of inhabitation and human-mediated disturbances, have conserved and built agrobiodiversity on the crest of a stylized concave curve. (I) At low levels of ecological disturbance, species richness decreases as competitive exclusion increases. (II) At intermediate levels of disturbance, diversity is high because species in early and late successional stages can coexist. (III) At very high levels of disturbance, species richness is reduced due to habitat fragmentation and high migration rates (based on Connell 1978, Vandermeer 1995, Zimmerer et al. 2015).

constructing new ecological niches and contributing to landscape heterogeneity – thereby functionally modifying source–sink population dynamics, as well as migratory patterns through matrices of high connectivity, and modifying the composition of alpha, beta and gamma diversities. Thus, indigenous communities with a long history of occupation within a given environment whose livelihoods directly depend on their immediate environment consciously balance ecological functionality (e.g., vegetation succession) with human utility (e.g., agrobiodiversity). This results in the construction of historical landscapes that profoundly rely on local management for their survival (Boivin et al. 2016). H-MDs involved in palimpsest construction and maintenance can be considered a third management scheme (Fig. 1) in the debate surrounding the implications of agrobiodiversity conservation and land-use intensity among land-sparing (seeking to separate spaces for conservation from agricultural activities) versus land-sharing models (promoting the construction of agroecological conservation matrices; Perfecto & Vandermeer 2010). In order to move from approaches of biodiversity conservation to approaches of biodiversity construction, understandings of ecological novelty and instability are fundamental, as well as the indissoluble biodiversity–culture relationship provided by the theoretical–methodological understandings of new ecology and non-equilibrium landscapes (Botkin 1990, Zimmerer 2000), nature's matrix (Perfecto et al. 2019), agrobiodiversity framework (Zimmerer et al. 2019) and biocultural paradigm (Merçon et al. 2019).

H-MDs result from and lead to indigenous social and cultural expressions of great importance for preserving biodiversity. Social cultural expressions intimately linked to the biological diversity of a landscape include symbolic expressions such as indigenous cosmologies, social norms, local institutions, systems of inheritance, cultural transmission, metaphorical thought, relational ontologies and sacred ecologies (Descola 2013, Berkes 2017, Fernández-Llamazares & Cabeza 2018). Material cultural manifestations include traditional ecological knowledge, communitarian territorial zoning, local taxonomic systems, culinary practices, ethnomedicine and traditional technologies (Nazarea 2006, Reyes-García & Benyei 2019).

The palimpsest concept should not be seen as a theoretical abstraction or just a new analytical category, but as a means of generating agendas that prioritize the construction and maintenance of biodiversity in historical landscapes (Table 1). These landscapes not accidentally contain the largest overlap among: (1) extant indigenous communities; (2) high linguistic diversity; (3) centres of origin, domestication and diversification of species; and (4) the highest levels of biodiversity. Therefore, this proposal for a research and advocacy agenda on biodiversity conservation based on the concept of palimpsest from historical ecology, archaeology and agroecology expresses substantial differences from previous uses of the concept of palimpsest in geography, art history and architecture by signifying the multiplicity of human interpretations and representations about spaces or landscapes (Meinig 1979). In operational terms, our proposal concurs with the call to articulate culturally appropriate expressions of biodiversity conservation for the nearly 370 million indigenous people of more than 5000 cultural groups in 87 nations, who are the custodians of 40% of the priority areas for the preservation of biological diversity in *c.* 25% of the total surface area of the Earth (Garnet et al. 2018). Revitalizing palimpsests is in line with the indissoluble triad of biodiversity, ethnodiversity and agrobiodiversity that the biocultural paradigm insists on as part of its contribution to environmental conservation (Merçon et al. 2019).

Modernity tends to conceive of the future as lying ahead and the past as behind. However, for many indigenous communities that resist the occidental notion of eternal 'progress', the past guides future possibilities from behind (Nazarea 2013). Reconceiving biodiversity conservation from the palimpsest concept involves the knowledge and practice of learning to read previously recorded landscapes in order to creatively rewrite over them based on twenty-first-century challenges. In the 'Capitalocene' (Moore 2017), the canvas is covered with both the ecological footprints of the 'development society' or 'society of development' (Figueiredo et al. 2020) and the 'ecological handprints'

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Table 1. Proposal to articulate research and practice agendas for biodiversity conservation based on the palimpsest concept.

Design principles	Considerations for setting the agendas
Palimpsest identification	*Identify* emblematic historical landscapes around the world upon which local populations depend for their subsistence that are currently being studied by socioenvironmental research groups and officially administrated by government agencies or non-governmental organizations
Research and advocacy teams	*Develop* inter- and trans-disciplinary research and biodiversity conservation teams to carry out studies based on a palimpsest vision including actors who typically participate in such initiatives (e.g., biologists, ecologists and environmental engineers), but also archaeologists, geologists, historians, geographers, environmental anthropologists and ecolinguists, with active participation by the inhabitants who manage local natural resources
Historical baseline	*Reconstruct* the environmental history of landscapes in order to define baseline ecological conditions and understand past human-mediated physical and biotic transformations carried out during specific cultural periods in order to then determine the changes that have most degraded or increased biodiversity
Cultural expressions	*Document and analyse* past and present cultural manifestations associated with biodiversity conservation, with a particular focus on processes of cultural autonomy as well as sociopolitical changes that threaten historic landscape-related knowledge
Historical landscape revitalization programmes	*Carry out* projects that restore and revitalize landscape palimpsests by recovering their ecological trajectory, capacity for resilience and the generation of new ecological processes
Socioenvironmental reconciliation	*Reconcile* natural protected area management plans, wildlife regulations, ecological territorial zoning and other forms of ecosystem regulation with recent socioenvironmental knowledge regarding palimpsests; the goal is to develop regional biodiversity conservation strategies in tandem with local populations to minimize unfavourable social outcomes
Customary rights of indigenous communities	*Historical expansion* of the vision of landscapes and palimpsests can contribute to coupling biodiversity conservation efforts with indigenous worldviews, which represent systems of traditional authority, norms and institutions
Local ways of life and livelihoods	*Synchronize* biodiversity conservation efforts with the recovery of historical natural resource management systems and social economies that have been lost due to the supplanting of productive rationalities and alienating economic models
Cross-cultural networks and horizontal exchange	*Establish* local networks of community members, researchers, government agencies and non-governmental organizations to exchange generalizable knowledge and practices from different biological conservation initiatives, along with the conceptual integration of palimpsests and cross-cultural approaches
International forums and vertical exchange	*Participate* in national and international biological diversity forums to compare methodologies, achievements and lessons based on conservation approaches that integrate the concept of palimpsest with mainstream conservation approaches used around the world

that symbolize how certain indigenous communities in the Global South possess deep historical legacies that should be considered within biodiversity conservation research and practice agendas. According to the palimpsest concept, long-term thinking and the development of alternatives grounded in teachings from the past that look towards the future are needed.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S0376892920000399.

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References

Armstrong C, Hoemaker AC, McKechnie I, Ekblom A, Szabó P, Lane PJ et al. (2017) Anthropological contributions to historical ecology: 50 questions, infinite prospects. *PLoS ONE* 12: 1–26.

Balée W (2006) The research program of historical ecology. *Annual Review of Anthropology* 35: 75–98.

Balée W (2014) Historical ecology and the explanation of diversity: Amazonian case studies. In L Verdade, M Lyra-Jorge, C Piña (eds), *Applied Ecology and Human Dimensions in Biological Conservation* (pp. 19–33). Berlin, Germany: Springer.

Balée W, de Oliveira VH, dos Santos R, Amaral M, Rocha B, Guerrero N et al. (2020) Ancient transformation, current conservation: traditional forest management on the Iriri River, Brazilian Amazonia. *Human Ecology* 48, 1–15.

Berkes F (2017) *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. New York, NY, USA/London, UK: Routledge.

Boivin N, Zeder M, Fuller D, Crowther A, Larson G, Erlandson J et al. (2016) Ecological consequences of human niche construction: examining long-term anthropogenic shaping of global species distributions. *Proceedings of the National Academy of Sciences of the United States of America* 113: 6388–6396.

Botkin D (1990) *Discordant Harmonies: A New Ecology for the Twenty-First Century*. Oxford, UK: Oxford University Press.

Clement C, Levis C, Franco-Moraes J, Braga-Junqueira A (2020) Domesticated nature: the culturally constructed niche of humanity. In C Baldauf (ed.), *Participatory Biodiversity Conservation: Concepts, Experiences and Practices* (pp. 35–52). Gewerbestrasse, Switzerland: Springer Nature.

Connell J (1978) Diversity in tropical rainforests and coral reefs. *Science* 199: 1304–1310.

Crumley C (1994) *Historical Ecology: Cultural Knowledge and Changing Landscapes*. Santa Fe, NM, USA: University of New Mexico Press.

Crutzen P (2002) Geology of mankind: the Anthropocene. *Nature* 415: 23.

de la Cadena M (2019) Uncommoning nature: stories from the Anthropo-not-seen. In P Harvey (ed.), *Anthropos and the Material* (pp. 35–58). Durham, NC, USA: Duke University Press.

Descola P (2013) *Beyond Nature and Culture*. Chicago, IL, USA: University of Chicago Press.

Ellis E (2015) Ecology in an anthropogenic biosphere. *Ecological Monographs* 85: 287–331.

Erickson C (2008) Amazonia: the historical ecology of a domesticated landscape. In H Silverman, W Isbell (eds), *Handbook of South American Archaeology* (pp. 157–183). New York, NY, USA: Springer.

Fedick S (1991) *The Managed Mosaic: Ancient Maya Agriculture and Resource Use*. Salt Lake City, UT, USA: University of Utah Press.

Fernández-Llamazares Á, Cabeza M (2018) Rediscovering the potential of indigenous storytelling for conservation practice. *Conservation Letters* 11: 1–12.

Figueiredo MD, de Marquesan FFS, Imas JM (2020) Anthropocene and 'development': intertwined trajectories since the beginning of the great acceleration. *Revista de Administração Contemporânea* 24: 400–413.

Ford A, Nigh R (2015) *The Maya Forest Garden: Eight Millennia of Sustainable Cultivation of the Tropical Woodlands*. Walnut Creek, CA, USA: Left Coast Press.

Fremaux A, Barry J (2019) The 'good Anthropocene' and green political theory: rethinking environmentalism, resisting eco-modernism. In F Bierman, E Lövbrand (eds), *Anthropocene Encounters. New Directions in Green Political Thinking* (pp. 171–190). Cambridge, UK: Cambridge University Press.

Garnett S, Burgess ND, Fa JE, Fernández-Llamazares Á, Molnár Z, Robinson CJ, Watson J (2018) A spatial overview of the global importance of indigenous lands for conservation. *Nature Sustainability* 1: 369.

Hamilton C (2016) The theodicy of the 'Good Anthropocene'. *Environmental Humanities* 7: 233–238.

Marris E (2006) Black is the new green. *Nature* 442: 624–626.

Meinig DW (1979) *The Interpretation of Ordinary Landscapes: Geographical Essays*. Oxford, UK: Oxford University Press.

Merçon J, Vetter S, Tengö M, Cocks M, Balvanera P, Rosell JA, Ayala-Orozco B (2019) From local landscapes to international policy: contributions of the biocultural paradigm to global sustainability. *Global Sustainability* 2: 1–11.

Moore JW (2017) The Capitalocene, part I: on the nature and origins of our ecological crisis. *Journal of Peasant Studies* 44: 594–630.

Nazarea V (2006) Local knowledge and memory in biodiversity conservation. *Annual Review of Anthropology* 35: 317–335.

Nazarea VD (2013) Temptation to hope. From the 'idea' to the milieu of biodiversity. In V Nazarea, R Rhoades, J Andrews-Swann (eds), *Seeds of Resistance, Seeds of Hope: Place and Agency in the Conservation of Biodiversity* (pp. 19–41). Tucson, AZ, USA: University of Arizona Press.

Perfecto I, Vandermeer J (2010) The agroecological matrix as alternative to the land-sparing/agriculture intensification model. *Proceedings of the National Academy of Sciences of the United States of America* 107: 5786–5791.

Perfecto I, Vandermeer J, Wright A (2019) *Nature's Matrix: Linking Agriculture, Conservation and Food Sovereignty*. London, UK: Routledge.

Reyes-García V, Benyei P (2019) Indigenous knowledge for conservation. *Nature Sustainability* 1: 657–658.

Rivera-Núñez T, Fargher L, Nigh R (2020) Toward an historical agroecology: an academic approach in which time and space matter. *Agroecology and Sustainable Food Systems* 44: 975–1011.

Robbins P, Moore S (2013) Ecological anxiety disorder: diagnosing the politics of the Anthropocene. *Cultural Geographies* 20: 3–19.

Sinclair P, Moen J, Crumley C (2017) Historical ecology and the longue durée. In C Crumley, T Lennartsson, A Westin (eds), *Issues and Concepts in Historical Ecology: The Past and Future of Landscapes and Regions* (pp. 13–40). Cambridge, UK: Cambridge University Press.

Thurston T, Fisher C (2007) *Seeking a Richer Harvest*. Boston, MA, USA: Springer.

Vandermeer J (1995) The ecological basis of alternative agriculture. *Annual Review of Ecology and Systematics* 26: 201–224.

Zimmerer K (2000) The reworking of conservation geographies: nonequilibrium landscapes and nature-society hybrids. *Annals of the American Association of Geographers* 90: 356–369.

Zimmerer KS, Carney JA, Vanek SJ (2015) Sustainable smallholder intensification in global change? Pivotal spatial interactions, gendered livelihoods, and agrobiodiversity. *Current Opinion in Environmental Sustainability* 14: 49–60.

Zimmerer KS, de Haan S, Jones AD, Creed-Kanashiro H, Tello M, Carrasco M et al. (2019) The biodiversity of food and agriculture (agrobiodiversity) in the Anthropocene: research advances and conceptual framework. *Anthropocene* 25: 1–16.

Zimmerer KS, Young KR (1998) *Nature's Geography: New Lessons for Conservation in Developing Countries*. Madison, WI, USA: University of Wisconsin Press.