Can Ancient Practices be entitled Biodesign?

A terminology proposal based on Ancestral Knowledge and Traditional Practices

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Introduction

What are vernacular knowledge and traditional practices?

Vernacular knowledge embodies the organic and natural essence of man's harmonious relationship with the surrounding environment or the Roman mythological concept of genius loci. It differs due to the unique constraints – geographic, economic, social, historical and cultural – of the places and population group that holds it, summarizing local materials, resources and techniques while adapting to climatic specificities and responding to the family structure, respective economic activity and community customs (Cerqueira, 2005).

Traditional practices refer to the acts and wisdom generated over many generations by local communities. They honor ancestral knowledge to ensure its continuation, mainly of those with positive physical, emotional, and/or spiritual relationships with the surrounding environment and those fostering pride and identity.

Therefore, vernacular knowledge and traditional practices are related to memory and the non-erasure of culture and values. They encompass Julia Watson's term Lo—TEK, derived from Traditional Ecological Knowledge, a cumulative body of multigenerational knowledge, practices, and beliefs. Lo-TEK is "an exploration of lesser-known local technologies, indigenous cultural practices, and mythologies passed down through generations. In a world that often values homogeneity, Lo-TEK reframes indigeneity as an evolutionary extension of life in harmony with nature" (Watson, 2019, p.17).

It leads to Indigenous Knowledge place-based knowledge accumulated across (Jessen et al., 2021, p. 93) or Radical Indigenism, a term that "dares to suggest, as its fundamental theoretical premise, that American Indian peoples possess philosophies of knowledge that can be understood as rationalities – articulable, coherent logics for ordering and knowing the world" (Garroutte, 2018, p. 170).

All of them – ancestral | vernacular| indigenous knowledge, and traditional practices – are not static relics of the past that must be preserved. Instead, they are dynamic and evolving, offering us the opportunity to learn from and reinvent our traditions without losing our intangible cultural heritage, one that is "transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity" (https://ich.unesco.org/en/convention).

They are also part of a belief system derived from written, oral, and spiritual epistemologies, as explained in Jessen's diagram of conceptual foundations and approaches of Indigenous knowledge and Western science in ecology and evolution (Fig. 1), and are of interest nowadays because they present a close relationship between what is currently defined as the three pillars of sustainability (economy, society, and environment).

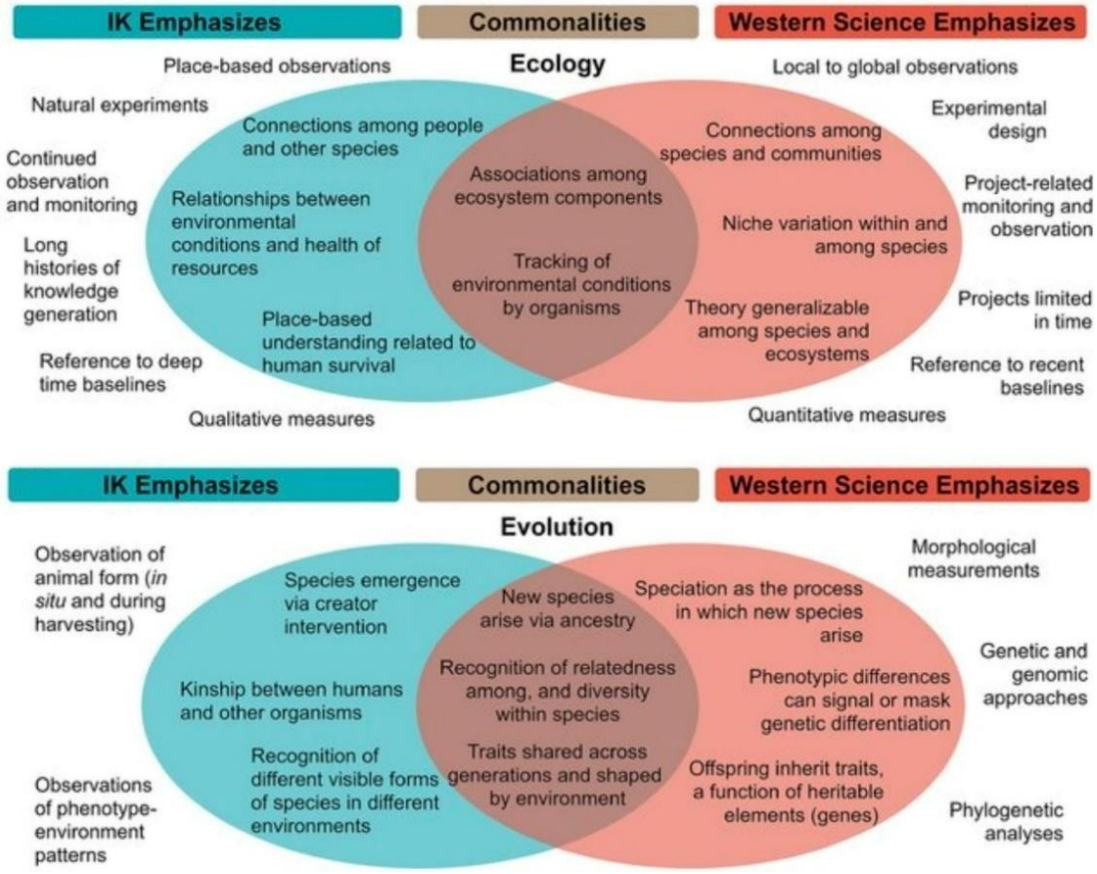

Fig 1. Jessen et al. (2021) A framework with the connections and differences between Indigenous Knowledge and Western Science. p.97.

What is Biodesign?

Biodesign emerges as a contemporary design strategy characterized by the collaboration between designers and living organisms, transcending conventional paradigms of product design conception and manufacturing (Colani, 1984; Karana & Camere, 2017; Myers, 2018; Camere & Karana, 2018; Collet, 2021). Central to its ethos is the imperative to lower environmental impact, embodying a response to contemporary society's prevailing ecological crisis.

One of the critical objectives of Biodesign is to cultivate material and product alternatives that not only foster ecosystem sustainability and resilience but also inspire a new way of thinking. Biodesign extends its view to encompass the realm of biomaterials, employing living organisms such as bacteria, mycelium, and algae as sources, renewable resources, and once-living materials. These biomaterials encapsulate ecology and resource efficiency principles intrinsic to Biodesign's ideology. Agro-industrial byproducts or residues from culinary enterprises, such as eggshells and fruit peels, also serve as fundamental substrates for biomaterial fabrication.

In 2015, Oxman discussed this integration trend or transition from binary codes to biological systems. In 2016, Dade-Robertson pointed out that we are moving towards an era in which a new relationship occurs between biology and the built world as co-creators of new material structures (p.9). In 2021, Collet framed it in Fig. 2, explaining how designers can work with nature and become biodesigners.

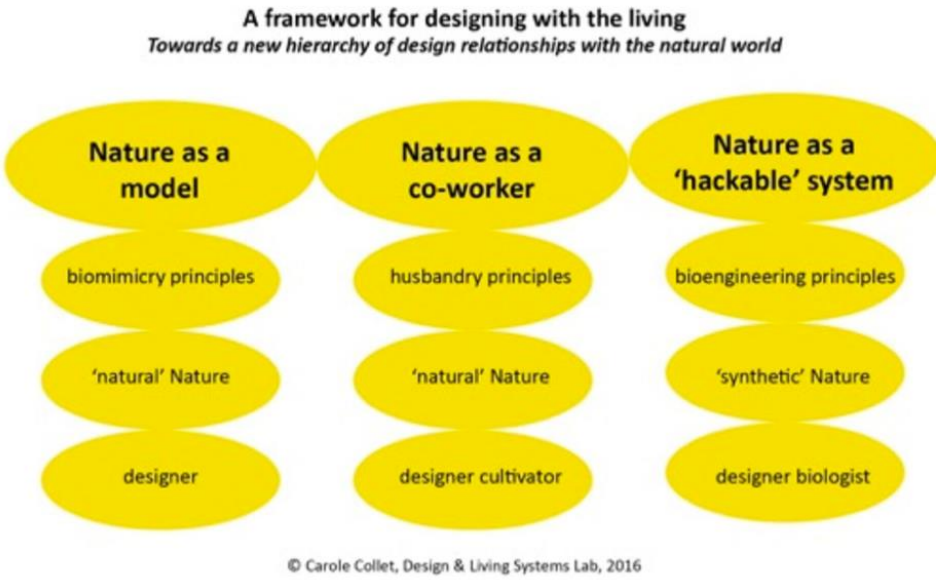

Fig 2. Collet (2021) A framework for designing with the living: toward a new hierarchy of design relationships with the natural world. p.1334

Ancient Practices & Biodesign

The intertwining of traditional knowledge and ancient practices with Biodesign is presented in William Myers' seminal work, "Biodesign: Nature, Science, Creativity," (2018), initially published in 2012. One of the book examples, differing from all other cases displayed, is the "Root Bridges of Meghalaya" in northeastern India (Fig. 3). These bridges, shaped through the ancient practice of guiding the roots of the local Ficus elastica trees, serve as a testament to the potential of engineering living structures and their endurance through time.

Fig 3. Myers (2018) The "Root Bridges of Meghalaya". p.31.

The Root Bridges of Meghalaya singular example within Myers' compendium highlights the intrinsic value of Indigenous technologies as part of a predominantly contemporary design discourse. It is a compelling case study for our research question: Can an ancient practice, predating and existing outside the scientific framework, be classified as "Biodesign?" This paper navigates the complex interplay between tradition and innovation through critical reflection and interdisciplinary dialogue. Doing so fosters a more inclusive and equitable discourse within the evolving landscape of Biodesign and Ancestral Knowledge or Traditional Practices and proposes a more fitting nomenclature.

Methodology

The hypothesis is that there is an alignment between the principles inherent in Ancient Practices and those from design's contemporary discourse. We conceptually relied on a recent publication by archaeologist Eduardo Neves and urban researcher Rodrigo Castriota that delves into a pertinent terminology discussion emanating from the Amazonian territory.

Then, an examination of different case studies elucidated this investigation's complexities. The case study represents a deliberate effort to delve deeper into the nuances of the discourse between Ancient Practices & Biodesign and were excerpted from Lo—TEK (Watson, 2019), Learning from Vernacular (Vitra Design Museum, 2013), BIO27 | Super Vernaculars (7th Biennial of Design, 2022), and What Design Can Do Conference at Mexico City (2023).

We followed a three-stage method: selecting case studies, analyzing converging points, and interpreting the results. Four cases were selected according to three main criteria, anchored by a pluriversal approach (Escobar, 2018), which promotes new perspectives, challenging the dominant paradigm and emphasizing the need for a more integrative perception of the world.

The first criterion was Ancient Practices that unveil natural materials. We draw on Camere and Karana's approaches to guide our selection process, arguing "the various roles that Nature can take in design, such as in rethinking the production of artifacts in a more efficient/sustainable way" (2017, p.102).

The second criterion was the focus on local techniques. "This active engagement in materials fabrication extends designers' control over product sustainability, as they can better handle materials' sourcing (e.g. favoring local, unused raw materials), their application in products (e.g. reducing amount of materials and waste) and end-of-life stage (e.g., crafting unique, non-repeatable aesthetics that stimulates users' emotional attachment to products)" (Camere & Karana, 2018, p.572).

Finally, the third criterion was the geographical location of each case, from the understanding that cultural issue is essential in studying the inclusion of different mastery in an epistemologically diverse space anchored in traditional local knowledge.

Theoretical base and case studies

The “tropical urbanism” and the “Amerindian cities”

In the Amazonian context, Neves & Castriota (2023) formalized a discussion surrounding the terminology associated with ancient practices and reframed conceptual frameworks to accommodate diverse cultural perspectives. For these authors, the Amazon region should be

recognized as an ancient centre of plant domestication and cultivation, with intense production of agrobiodiversity: "Just like a garden, the Amazon forests are a social product and result from the combination of biophysical processes and human actions, whether premeditated or not." (Neves & Castriota, 2023, p.65).

Therefore, contrary to historical misconceptions perpetuated by colonial explorers, it is now widely recognized that the Amazon Forest was not an untouched wilderness (Castro, 2013). Before European arrival, Indigenous populations inhabiting the region fostered a profound and intricate relationship with the botanical environment, actively shaping the forest configuration and significantly contributing to its remarkable biodiversity (Neves, 2002; Furquim, 2020).

These authors contend that the Amazonian landscape comprises expansive and interconnected spaces where the boundaries between nature and culture are blurred. They challenged conventional paradigms, lamenting the inadequacy of archaeological terminology in capturing the complexity of these structures.

Neves & Castriota questioned whether these complex Amerindian settlements could be called "cities" and how to analyze contexts in which the "urban" centres produced forests, and the limits of their surroundings were subtle and gradual. "Can we talk about "Amerindian cities," or are we reproducing old ethnocentrisms?" they have asked (2023, p.71).

In light of these considerations, the authors suggest an expanded discourse on "tropical urbanism" grounded in contemporary archaeological and archaeobotanical discoveries. Specifically, within the Amazonian context, they propose a reevaluation in which ancient "urbanisms" are not confined solely to settlements but encompass the surrounding trails, fields, chestnut groves, capoeiras, and camps, together with the flexible movements and practices that characterized them (2023, p. 65).

Expanding upon their discourse of renaming urbanization, the authors pose thought-provoking questions, challenging conventional understandings of the modern colonial apparatus of exploitation. They interrogate whether the built environment of ancient Amerindian people holds insights that could inform the construction of a future that is inherently urban yet divergent from industrial paradigms.

In considering the legacy of Indigenous people, the authors highlight the potential for tension and destabilization of categories related to industrialization. They contend that through millennia of practice, Indigenous societies have demonstrated a capacity for abundance production without succumbing to industrial imperatives. In this light, they provocatively inquire: What lessons might be learned from "ancestral Amerindian urbanism"? How can these insights be mobilized to challenge and reconstruct contemporary practices?

The impasse in practice: four case studies

Biodesign and the Peruvian Totora Reed town - from Watson, 2019

The Uro community in Peru, deeply rooted in their environment, has made environmental sustainability a cornerstone of their ancestral wisdom. They have the ability and knowledge to fashion clothes, beds, houses, boats, islands, and platforms out of reed, a tradition that began as a means of protection from hostile neighboring tribes.

The totora reed bundle (Schoenoplectus californicus) is an organic and local material.

According to Paredes and Hopkins (2018, p.169), "evidence from the recent past and the historical and pre-Hispanic periods suggests that some aspects of the technology of reed vessel construction have persisted whereas others have been modified." To form the base module for island construction (Fig. 4), "Eucalyptus stakes are driven into blocks of the root and used to lash the bricks together, creating a two-meter deep floating foundation. Over time, bricks grow together, forming a single living base layer" (Watson, 2019, p.278).

Fig 4. Watson (2019) Uros, a recognized ancestral, indigenous and native town in Peru. p.277.

This knowledge of dealing with natural materials immerses the investigation on natural growth dynamics and inherent unpredictability. It embraces what Myers (2018, p.42) calls the 'aesthetic of uncertainty' that embraces material instability, impermanence, and self-sufficiency, as in the coastal fishing boat (Fig. 5).

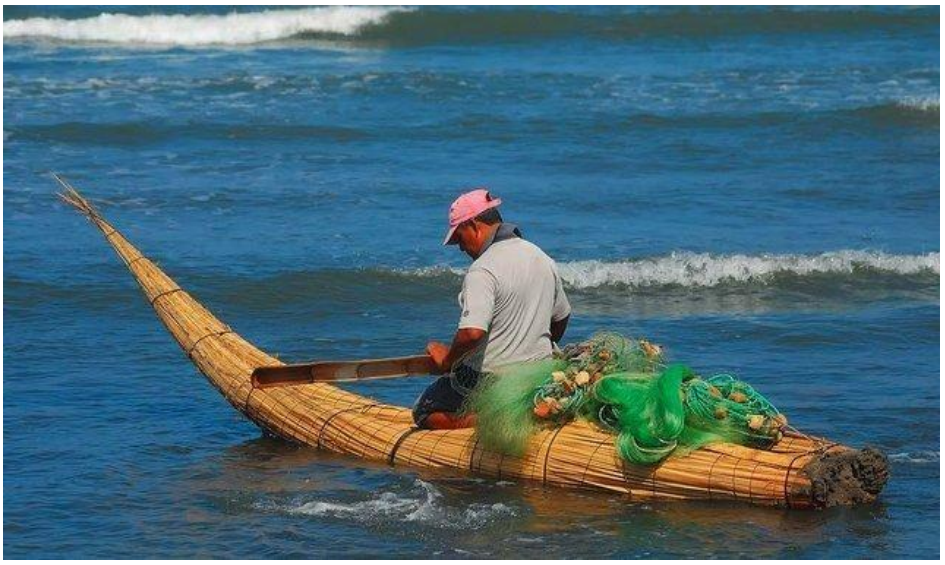

Fig 5. Erič (2016) A typical totora boat called caballito del totora or horse reed boat from the Trojiljo district on the northern Pacific coast of Peru. p.39.

Biodesign and the Koutammakou Silkien Houses - from Vitra Design Museum, 2013

Another project on the use of local construction materials and principles comes from Koutammakou, a vast region spanning northwestern Benin and northeastern Togo, Afrika. Primarily defined by the Atacora Mountains, this landscape is home to the Batammariba people, whose name in the Ditammari translates to "those who shape the earth."

Their distinctive mud tower-houses (Fig. 6), called sikien (with the singular form takienta), are made of traditional adobe or stone. Circular or elliptical forms characterize them and are usually gathered in units corresponding to family groups, often enclosed by earthen walls and sometimes interlinked.

Fig 6. Deidi van Schaewe (Vitra Design Museum) (2013) Taberma Tata or Takienta, Togo

Their unique architectural practices testify to their deep connection with the soil, an "expanded" Biomaterial considered a once-lived element. We can also see the relationship with the natural surroundings in Togo's pottery (Fig. 7). It illustrates how their community has continuously sought a balance between human life and the environment and how Nature influences beliefs, rituals, and daily life.

Fig 7. Yavo (2013) Ceramics pots inside of a canary, Togo. p.283.

Banana Leaf by Eames 1972 from BIO27 | Super Vernaculars, 2022

Banana Leaf is a 1:32-minute parable, photographed in live-action, by Ray and Charles Eames (1972). It was shown again in the BIO27 | Super Vernaculars, 2022, as an example of "a dish for eating from without a designer's intervention" (Fig. 8).

Fig 8. BIO27 | Super Vernaculars (2022) Banana Leaf shot screen. p.53.

South Asia is the world's largest producer of bananas (Musa spp.) due to its ideal climatic conditions. After the fruit is harvested, the leaves can be repurposed to create cost-effective packaging materials (Ezeudu et al., 2020). They are ideal for wrapping and steaming food (Fig. 9) because the leaves are large, flexible, naturally waterproof, and a source of antioxidants, which can help preserve packaged goods for longer (Sasikala & Umapathy, 2018).

Fig 9. Fitriani et al., (2017) Traditional "ombus ombus" food packaged using banana leaves. p. 19.

In an era of limited resources, simple and efficient natural materials can be a solution, especially when they reveal vernacular traditions and "values systems largely ignored in the modern era to create imaginative responses to contemporary challenges such as water scarcity, waste and declining biodiversity" (Super Vernaculars, 2022) resonating with Camere and Karana's Biodesign approach (2017).

Biodesign and the Amazonian Cuias - from What Design Can Do Conference at Mexico City (2023).

Cuias, crafted from the fruit of the Crescentia cujete tree, are made through an intricate process in which the fruit's skin is transformed into objects such as pots, bags, vases, and packaging. They exist in areas from México to Brazil (Moreira, 2017) and exhibit diverse production techniques.

Andrea Bandoni, when speaking at the What Design Can Do Conference in Mexico City (2023), showed a "cuia-de-gomos" from the 18th century (Fig. 10). This piece is an ancient craft pot-shaped utilizing a string and a wooden base around the growing fruit, resulting in an unnatural form. The riverside artisans do not use this traditional technique nowadays; their pots (Fig. 11) still resemble contemporary Biodesign practices when manipulating the natural material (Karana & Camere, 2017). However, their form is similar to when the fruit is harvested, using only one-color sample and fewer symbols engraved.

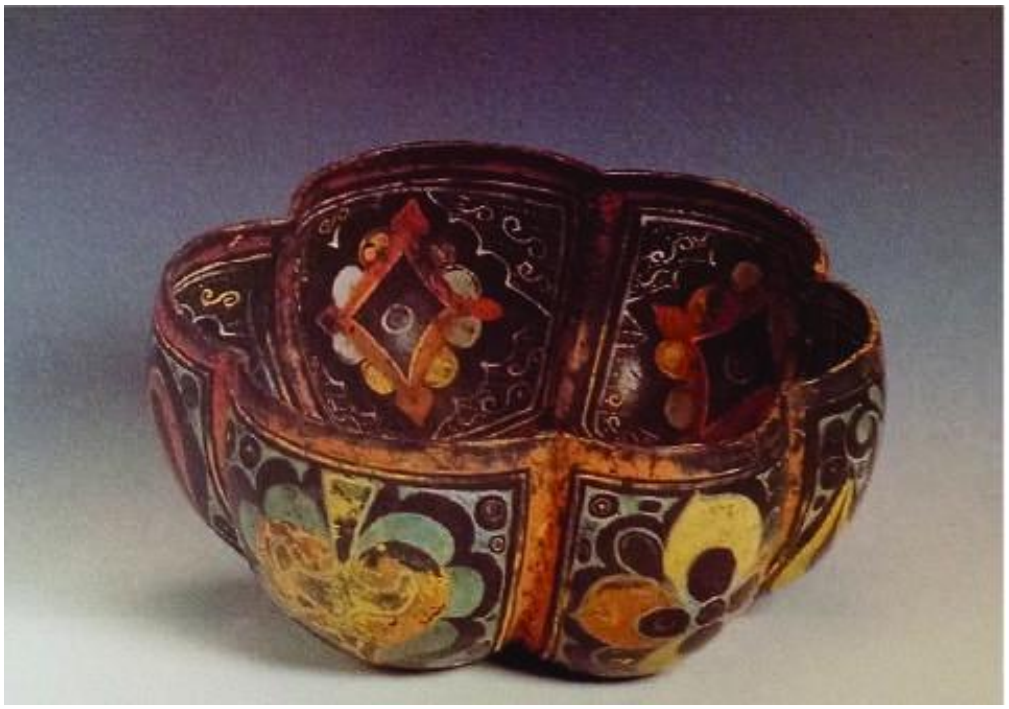

Fig 10. Hartmann (1991) "Cuia-de-gomos" – a fruit molded and transformed into object by Amazonians in the 18th century. (Part of the collection of the Museum Maynense at Lisbon Science Academy)

Fig 11. Bandoni et al. (2023) Contemporary cuias from the Association of Riverine Artisans of Santarém (Asarisan)

Analysis

Examining the abovementioned study cases, it becomes evident that Ancestral Practices exhibit striking parallels with contemporary Biodesign approaches. For instance, all the examples used organic materials and objects correlated with local environmental conditions, deeply rooted in place. Verification happened through repetition; they embraced the complexity and diversity of the practices. The makers understood and respected Earth systems' cycles, connections and changes. They also presented a close relationship with sustainability pillars, encapsulating ecological, social and economic values regarding resource efficiency.

The research and analyses of traditional case studies could persist. The problem would continue to be the dilemma of labeling the Ancient Practices found. That is because there are differences, as seen in the following table.

Table 1 – Differences between Ancestral Knowledge and Traditional Practices & Biodesign (adapted from Chapin et al. (2013)

Ancestral Knowledge and Traditional Practices	Biodesign
Qualitative oral record Communication of stories connected to life and values Local verification Practical and body-centred experimentation Trust in inherited wisdom Emphasis on skills and knowledge application Holistic Intergenerational methods of knowledge	Qualitative and quantitative written record communication of procedures, evidence and theory Local and global verification Controlled experimentation Scepticism Emphasis on understanding mechanisms part to whole Scientific knowledge

The cases underscore the tension between recognizing the importance of traditional knowledge systems and perpetuating colonialist viewpoints. Biodesign may recognize the ingenuity of traditional practices, but it risks ignoring their origins and homogenizing their knowledge. It aligns with a Eurocentric perspective, which mainly does not recognize ancestral know-how, nor does it give importance to preserving and perpetuating Indigenous or Ancestral wisdom.

They also confront the challenge of scalability and non-standardization that natural materials variability presents. Ancestral Knowledge and Traditional Practices use a subsistence strategy, with a production that remains correlated to the local society's needs. Biodesign, sometimes, is more concerned with industrial and global-scale production.

However, our research question - Can an ancient practice, predating and existing outside the scientific framework, be classified as "Biodesign?" -has yet to be answered. Authors Ginsberg and Chieza (2018) argued that despite Biodesign's contemporary appearance, its foundational principles are deeply rooted in traditional practices such as organism refinement through selective processes reminiscent of age-old agricultural and vernacular architectural techniques.

Similarly, Hénaff (2023) emphasizes the historical influence of earlier societies, suggesting that they have historically used their understanding of biological organisms and systems to address diverse hierarchies of needs long before Western scientists. Hénaff's perspective calls for a critical reevaluation of the prevailing Western-centric definition of biotechnology and design, urging researchers to identify and bridge the gaps in mainstream conceptualizations.

Defining ancient practices using current nomenclature may highlight the relevance of ancient wisdom in modern society but risks erasing the deeper meanings and understandings behind these practices, thereby diminishing cultural diversity and complexity. As Paulo Freire (1987) aptly noted, language can be a tool of domination, and it is imperative to be cognizant of this when seeking alternatives to prevailing crises.

Alternatively, as explained by Nêgo Bispo (Santos, 2023) in his "war of denominations" or "the game of countering colonial words as a way of weakening them," he replaces sustainable development with bio-interaction, coincidence with confluence, synthetic knowledge with organic knowledge, transport with transfluence, exchange with sharing, politics with self-management, and the dream with the imagination. He would suggest being careful with the chosen worlds in this paper.

Conclusion

This article explores the parallels between Ancient Practices and contemporary methodologies, particularly in Biodesign and Urbanism. It underscores the challenges of applying Western terminology to traditional practices and reiterates the crucial importance of recognizing Indigenous and Ancient Knowledge systems.

In light of these considerations, and following the example of "tropical urbanism," it advocates for utilizing the term "Biodesign" alongside qualifiers such as "Ancestral," "Vernacular," "Indigenous," "Traditional," or even "Biocraft" to acknowledge this heritage while avoiding colonialist perspectives. Meanwhile, it suggests a more inclusive and decolonized approach to understanding and naming ancient practices.

This approach delineates Ancient Biodesign practices from their contemporary counterparts

while acknowledging their relationship with traditional and natural practices. By incorporating decolonial perspectives, practitioners can ensure that these approaches are distinguished and that their custodians receive due recognition and credit for their contributions.

It's important to note that this is just the beginning of a lengthy investigation and that more case studies should be included in future research. This study did not fully address the dynamic challenge of scientific inquiry and creative disciplines when considering how meaningful collaboration can be fostered with ancestral people. "What mechanisms can co-produce knowledge collaboratively, ensuring equitable participation and outcomes for all stakeholders? " could be the following research question. It underscores the ongoing nature of the research and the need for further investigation.

As this investigation exemplifies, the juxtaposition of Ancient Practices with contemporary analogies underscores the imperative of acknowledging Ancestral and Indigenous society's historical legacies, cultural rights, and concerns—recognizing them as the original creative actors—in ongoing discourse. While the convergence of traditional technologies with modern knowledge holds promise for fostering innovative approaches to resource management, biodiversity conservation, and sustainable actions, it necessitates a balanced and mutually beneficial engagement between all parties involved.

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