"Living in the time of the butterfly:" Engaging more-than-human temporalities to rethink biodiversity conservation

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Abstract

This article describes the ecological accounts of Jñato and Hñähñu (also known as Mazahua and Otomi) people who inhabit a territory that is today the Monarch Butterfly Biosphere Reserve in México. We draw on their narratives, documented through a multiyear historical and ethnographic study, to discuss multispecies temporalities and reciprocal relations across more-than-human entities. Analyzing local environmental knowledge through "deep time" and relational perspectives, we invite conservation and environmental studies scholars to reconsider epistemological assumptions about time and the Anthropocene. We do so by documenting the multispecies rhythms and temporalities maintained in our research sites from time immemorial. In contrast with linear notions of time, these rhythms operate cyclically through reciprocal gifting between plants, humans, and other entities such as a water spirits and witches. The "deep time" lens that such practices offer, we suggest, can enrich biodiversity conservation and more-than-human political ecologies. We conclude by stressing that this relational "world-making" is also power-laden. Political identities are embedded in, and reconstructed through, a complex political economy and uneven relations of knowledge production. Together, these constitute what we call "the time of the butterfly."

Keywords: Monarch Butterfly, Anthropocene, Indigenous ecologies, deep time, conservation

Résumé

Cet article décrit les récits écologiques des peuples Jñato et Hñähñu (également connus sous le nom de Mazahua et Otomi) qui habitent un territoire qui est aujourd'hui la réserve de biosphère du papillon monarque au Mexique. Nous nous appuyons sur leurs récits, documentés par une étude historique et ethnographique pluriannuelle, pour discuter des temporalités multi-espèces et des relations réciproques entre des entités plus qu'humaines. En analysant les connaissances environnementales locales à travers le "temps profond" et les perspectives relationnelles, nous invitons les chercheurs à reconsidérer les hypothèses épistémologiques sur le temps et l'Anthropocène. Nous documentons les rythmes et les temporalités à long terme et multi-espèces maintenus dans nos sites de recherche. Contrairement aux notions linéaires du temps, ces rythmes fonctionnent de manière cyclique avec des dons réciproques entre les plantes, les humains et d'autres entités telles que les esprits de l'eau et les sorcières. L'optique du "temps profond" de ces pratiques peut enrichir la conservation de la biodiversité et les écologies politiques plus qu'humaines. Nous concluons en soulignant que cette "construction du monde" relationnelle est également chargée de pouvoir. Les identités politiques sont ancrées dans une économie

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politique complexe et des relations inégales de production de connaissances, et sont reconstruites grâce à elles. Ensemble, ces éléments constituent ce que nous appelons "le temps du papillon."
Mots-clés: Papillon monarque, Anthropocène, écologies indigènes, temps profond, conservation

Resumen

Este artículo analiza las narraciones ecológicas de los pueblos jñato y hñähñu (también conocidos como mazahua y otomí) que habitan el territorio que hoy es la Reserva de la Biosfera Mariposa Monarca, México. Con base en sus narraciones recopiladas a través de un estudio etnográfico e histórico, discutimos las temporalidades multiespecie y las relaciones de reciprocidad entre los humanos y el resto de entidades más que-humanas que habitan esta región. Nuestro análisis se basa en la noción de tiempo profundo y una perspectiva relacional que nos permite desafiar los supuestos epistemológicos sobre el tiempo y el Antropoceno. Documentamos los ritmos y temporalidades multiespecie que existen en esta región desde tiempos inmemoriales operando cíclicamente a través de intercambios recíprocos entre plantas, humanos y otras entidades como espíritus del agua y brujas, que contrastan con la noción lineal del tiempo presente en los estudios y las políticas de conservación. Sugerimos que el concepto de tiempo profundo visto desde la perspectiva de estas comunidades puede enriquecer los paradigmas dominantes de la conservación de la biodiversidad y las ecologías políticas más humanas. Concluimos subrayando que esta construcción del mundo relacional también está cargada de poder. Las identidades políticas se insertan en una economía política compleja y en relaciones desiguales de producción de conocimiento. Todo ello constituye lo que llamamos vivir en "el tiempo de la mariposa."
Palabras clave: Mariposa monarca, Antropoceno, Ecologías indígenas, tiempo profundo, conservación

Resumo

Este artigo analisa as narrativas ecológicas dos povos Jñato e Hñähñu (também conhecidos como Mazahua e Otomí) que habitam o território que hoje é a Reserva da Biosfera Monarca de Mariposa, no México. Com base nas suas narrativas recolhidas através de um estudo etnográfico e histórico, discutimos temporalidades multiespécies e relações recíprocas entre os humanos e o resto das entidades mais que humanas que habitam esta região. A nossa análise baseia-se na noção de tempo profundo e numa perspectiva relacional que nos permite desafiar pressupostos epistemológicos sobre o tempo e o Antropoceno. Documentamos os ritmos e temporalidades multiespécies que existem nesta região desde tempos imemoriais, operando ciclicamente através de trocas recíprocas entre plantas, humanos e outras entidades como espíritos da água e bruxas, que contrastam com a noção linear de tempo presente em estudos e políticas. de conservação. Sugerimos que o conceito de tempo profundo visto da perspectiva destas comunidades pode enriquecer paradigmas dominantes de conservação da biodiversidade e ecologias políticas mais humanas. Concluímos ressaltando que esta construção do mundo relacional também é carregada de poder. As identidades políticas estão inseridas numa economia política complexa e em relações desiguais de produção de conhecimento. Tudo isso constitui o que chamamos de viver na "época da borboleta".
Palavras-chave: Borboleta monarca, Antropoceno, Ecologias indígenas, tempo profundo, conservação

1. Introduction

> Butterflies have always been significant to the community. On November 2, we celebrate the Day of the Dead. When the monarch butterfly arrives – although back then our ancestors did not know that they were called monarch butterflies elsewhere – they attributed the arrival of orange butterflies to the souls of the deceased who came to visit relatives just for that day. The other butterflies have also been significant. Those smaller white butterflies are the souls of children, and the monarchs, the souls of the deceased adults […]. Animals have always been important to people here, and there has always been a respect for animals and the forest. In the rainy season, for example, when it rains too much, we do a small ritual; we light up copal [tree resin incense] around our milpa [intercropped field] to scare away the heavy rains that can flatten our corn. On August 15, earlier in the year and before the corn harvest, we use the Holy Mary flower [flor Santa Maria]. This flower grows in the field. Once blessed, we place it in each of the four corners

> of the milpa so the corn will not fall with the wind, and so the corn will have a good amount of rain. Sometimes the rain does not arrive, so the ants eat the corn because the land dries up a lot. The timing of the rain is crucial.
>
> - Olivia, Rincón de Curungueo, Michoacán

Olivia kindly shared this passage with us as part of a project (2016-present) that seeks to document and understand local ecological knowledge in Mexico's Michoacán region, home to the iconic monarch butterfly (Danaus plexippus). Her words invite us to consider multispecies temporalities in terms of a sequence of reciprocal relations across animals, plants, water, and humans. Olivia is a respected elder in her Hñähñu (Otomi) community. Hñähñu and Jñato (Mazahua) people share their territory with what is now known as the Monarch Butterfly Biosphere Reserve (MBBR), a Mexican Federal Government conservation zone established to protect that species, which is now listed as endangered by the International Union for Conservation of Nature. In her testimony, Olivia subtly challenges mainstream conservation policies that sustain and reproduce human exceptionalism. She tells us that butterflies have always been important to the community. Butterflies do not matter more than other beings, but rather because they form one part of a sequence of events that implicates multiple species, their temporalities and reciprocal relations. Monarchs, which arrive by the Day of the Dead carrying the souls of human ancestors, are a timely gift to the community. This arrival, Olivia tells us, coincides with the corn harvest. Through reciprocal gifting and engagements with other animacies (Chen, 2012) and powers, such as those embodied in the Santa Maria flower, Olivia and her community become enmeshed in a sequence that brings forth good corn. Aside from butterflies, this sequence also includes other animals, such as ants when the gift of rain does not arrive on time.

In Mexico, natural protected areas have been created under a predominantly scientific vision that does not usually consider the interests, governance systems, and culture of the local actors involved (Hensler & Merçon, 2020; Toledo *et al*. 2015). Management programs have traditionally focused on protecting individual species and their ecosystems, without concern for the social history of their reciprocal interconnections with other entities and cultural processes. In this article, we draw on the testimonies of Jñato and Hñähñu (there are different names for these ethnic groups, in this text we use these) such as Olivia, who inhabit a forest territory that is today a monarch butterfly reserve. We do so to foreground the existing interspecies relationships that disrupt the narrative that anticipates the monarch butterfly's extinction as an isolated species. Our argument is that human and other-than-human beings and their associated temporalities are intermeshed and have co-evolved over a very long time horizon in what is now the Reserve site.

The "time of the butterfly" discussed in this article offers a lens on time and sequence that enhances a more-than-human political ecology by illustrating how humans, animals, plants, rain, and divine entities are all world-makers, and will be for as long as this sequence of reciprocal gifting can be sustained. The research builds on the work of authors associated with political ecology who have addressed the field's need to seriously account for agencies beyond the human. Aletta Biersack (2006) and Arturo Escobar (2010) assessed PE's intellectual trajectory as marked by an early stage or "PE1", claiming that it was too structured and too dualistic in terms of addressing nature and culture as "worlds" in interaction. In their view, this PE has been renovated as "PE2", a 'post' political ecology that is poststructuralist, post-Marxist, and postcolonial (Escobar, 2010). It is impossible to list all of the myriad of texts that have emboldened the field after Escobar and Biersack's work, but among the important contributions to our own academic trajectory is Juanita Sundberg's (2011) posthumanist political ecology. We build on a body of PE that has enriched ethnographic methods and analytics through a multispecies lens (Chao, 2022; Kirksey & Helmreich, 2010) and a more-than-human geography perspective (Barua, 2019; Barua, 2020; Durand & Sundberg, 2022; Whatmore, 2002).

Sophie Chao and Catherine Price's conversation (2023) on the nuances and reach of different terms such as "multispecies," "more-than-human," "non-human," and "other-than-human" has helped us choose how to name the relations that we found in the field without breaking them into a human and non-human dichotomy. Chao (2023: 183) suggests using the term 'multi-being,' coined by Sue Reid, to refer to all actors and animacies. Although 'more-than-human' and 'other-than-human' also convey the inclusion of multiple agencies from different origins, we agree with Chao's suggestion to use categories beyond multi-species in order to accurately

describe a specific context. In our case, a saint, a coyote, an ancestor, and a butterfly all play a role in creating the world, and we decided that "more-than-human" conveys well the situated relations across humans, animals, plants, good or bad spirits, and in-between entities that come to be in this forest through a sequence of reciprocal gifting.

These relations and non-linear temporalities are at odds with the presentist focus and single-species orientation of the mainstream conservation approach. To illustrate this, we explore the contrast between the UNESCO Man and the Biosphere (MAB) conservation model, and the local, relational approach characterized by deep interconnections between the monarch migration and life cycle, the seasonal corn harvest, and the water cycle. We argue that conservation and environmental studies should reconsider their tendency towards species-ism and their epistemological assumptions about time by contrasting these commitments with the monarch butterfly reserve timescape. The monarch butterfly is, at times, central to this forest region, and at other times it is just one more organism that is part of the forest. Engagement with this reciprocal and embodied timescape raises important questions about the failures and futures of monarch conservation.

2. Monarch butterfly conservation context

Each year, millions of monarch butterflies embark on a southbound journey from what is today Canada through the present-day United States to reach their winter habitat in present-day Mexico. This migratory path has been documented by scientists and regular citizens who have been tracking the monarch butterfly's migration for almost 30 years (Gustafsson *et al*, 2015; Méndez-Arreola, 2019). According to these observations, the insect, upon arrival in its southern destination, slows its metabolism to survive winter in partial hibernation without the nectar sources and native milkweed on which it lays its eggs in the North (Agrawal, 2017). This biological adaptation also extends the butterfly's lifespan. Migrating monarchs live up to nine months, near six times longer than their non-migratory parents. This extraordinary capacity to "play with time" in their favor allows the butterflies to "hold on" – quite literally – until the coming spring. Overwintering monarchs form beautiful rain-drop-shaped clusters of hundreds of individual butterflies, hanging semi-dormant from the branches of Mexican oyamel fir trees until their host plant (milkweed) sprouts back in the northern prairies. In essence, for the North American monarch, living across such a wide habitat is all about "good timing."

For the Indigenous communities of Mexico, this good timing exists through assembled agencies: the timely rain, the corn's agricultural cycle, the rituals performed by the humans and the butterfly carrying the soul of the ancestors. Yet these more-than-human entangled rhythms have been changed, and are increasingly experienced as an imposed conservation timescape. The people of this forest will often express how difficult it is to "live in the times of the butterfly." By this, they refer to the challenges of living in a Biosphere Reserve created to protect this single species through regulatory conservation instruments and laws that limit communities' access to and relations with other species and landscapes.

The Oyamel forest where the monarch butterfly hibernates is in the central highlands of Mexico, more than 2,000 meters above sea level. Below this altitude, the region is home to mixed forests, composed of species such as pines, oaks, and bushes, which occupy the mountain slopes and intermountain valleys. These diverse ecological niches enable different relationships and interconnections between human and more-than-human natures, through activities like foraging in the woods for mushrooms, firewood, medicinal plants, and resins. In the lowest areas, the communities have established forest *milpas*, an agroforestry system which combines natural vegetation, agricultural areas, and, in some cases, cattle pastures.

This forest is now protected under governing schemes that combine Mexican environmental policies with those of the UNESCO Man and the Biosphere Program (MAB). Since 2000, it has been called the Monarch Butterfly Biosphere Reserve (MBBR). Figure 1 shows the current UNESCO core and buffer zoning and the different boundaries across States and towns with Indigenous or Mestizo identification. The reserve covers a territory of 56,259 ha owned by several Indigenous and Mestizo communities who together occupy buffer and core areas (Machado, 2012). The map in Figure 1 shows this distribution. It is worth noting that the Mexican state considers the Mestizo identity as a categorization of communities that have been "mixed" with colonial powers. This identity allegedly represents a hybrid race that is a result of the mix of Indigenous and European races. We believe that the strict distinction between Indigenous and Mestizo identification is more of a state

construct than a reality for these communities. However, belonging to a federally recognized Indigenous group plays a crucial role in land management and is significant in current political movements aimed at achieving autonomous government in the area.

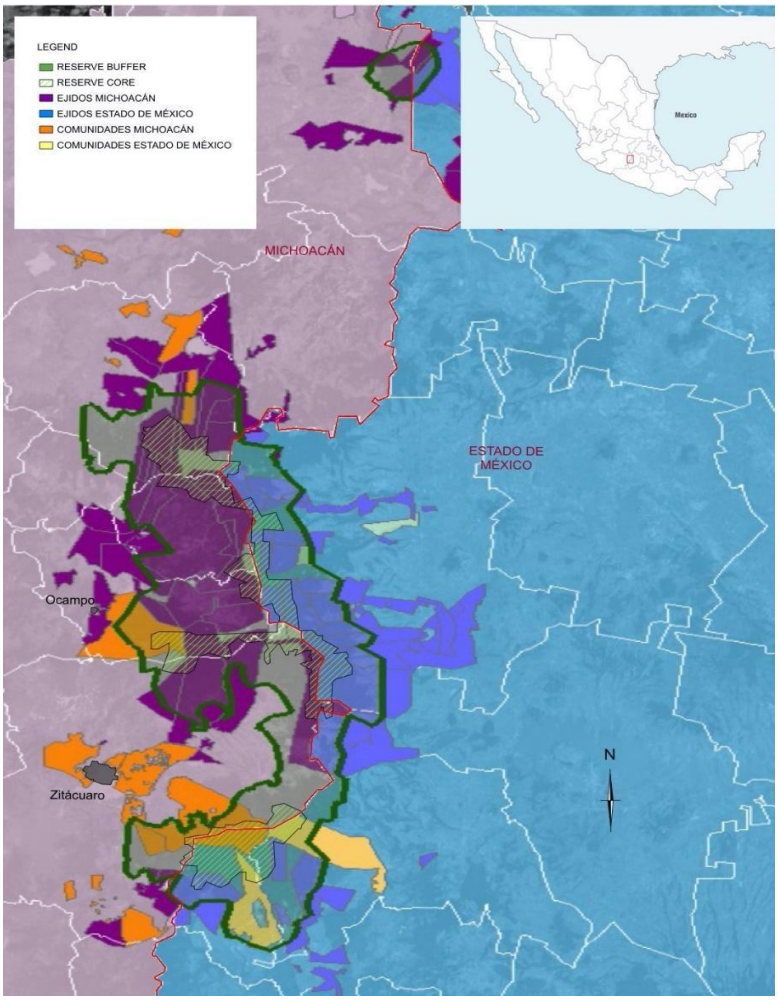

Figure 1: Map of the Monarch Butterfly Biosphere Reserve (reprint from González-Duarte, 2021). The map shows the collective forms of landholding – *ejidos* and *comunidades* – included in the rezoning from 2000 that is still in place today in the states of Michoacán and Edomex. The map was made using Mexico's Federal Government public databases from the Registro Agrario Nacional (National Agrarian Registry – RAN) and the Comisión Nacional de Áreas Naturales Protegidas (National Commission for Protected Natural Areas – CONANP).

With the scientific discovery of the monarch migration, knowledge of the butterfly overwintering colonies was broadcast to the world, leading to a series of conservation policies and actions that ignored and often contravened this forest's ecological and cultural diversity. In 1980, the monarch forest was declared a Reserve Zone and Wild Refuge. In 1986, forest exploitation in "hibernation zones" was banned, and the ban came with a Protected Natural Area demarcation by the Mexican government. In 2000, the Monarch Butterfly Biosphere Reserve (MBBR) was created under the model and guidelines of UNESCO's Man and the Biosphere (MAB) program. Although the MAB model seeks to align environmental conservation objectives with human

socioeconomic needs, there is evidence that the MAB's land zoning hinders local natural resource management with consequences for the continuation of communities' sociocultural ties with the forest. For example, González-Duarte (2021) shows how the conservation policy promoted by the MAB program, based on the creation of core and buffer zones, brought changes in the way mestizo and Indigenous communities relate to their forests, with consequences to their institutional arrangements and identity that ended up eroding their organizational capacity to defend their forests.

Part of this history is extensively detailed in the work of Merino and Hernández (2003), who point out that, with the creation of the RBMM, the forests ceased to be under the control of their ancestral inhabitants and passed to a type of management serving national and international conservation interests that outlawed the peasant uses of the forest and the community institutions that have been effective in governing the monarch forest commons (Durán, 2017). In sum, while Indigenous and mestizo communities of this region have maintained diversified landscapes through communal and culturally mediated ecosystem management practices (Berkes, 2008), mainstream conservation policies tend to focus on individual species, in isolation from the wider socioecological relations on which they depend. This top-down management responds to unequal relations across actors and states and it has been marked by a neoliberal view of nature as a resource.

3. Methods

Since 2009, both authors have conducted fieldwork in the region's communities. We have been involved in different community activities, conducted semi-structured interviews, and carried out participant observation. Our interlocutors include members of conservation organizations, researchers, and, above all, residents of the region who are dedicated to agriculture and community territorial defense.

In addition to this work, as part of a 2016 study on Indigenous Ecological Knowledge commissioned and funded by the Commission for Environmental Cooperation, we conducted an extensive review of research and publications and archival records. We identified and analyzed works that document precolonial, colonial and postcolonial ecological knowledge about the monarch butterfly, the region's forests, and local productive activities, mainly the *milpa.* In recent years we coordinated a series of oral testimonies in which Indigenous youth interviewed their community elders about their knowledge of the *milpa* and the monarch butterfly. Olivia's testimony is one of these cases.

4. More-than-human political ecology through a relational deep time perspective

> The ethics of the gift situates living beings as always entangled with and responsible to and for others – both nourishing and being nourished.
>
> - Deborah Bird Rose (2012, p. 137)

In this article, we build on a more-than-human political ecology perspective that engages with deep time to signal that all living beings and their ecosystems result from long-standing processes of co-existence and reciprocal gifting (Irvine, 2020; Rose, 2012). Geologists have used the term "deep time" to convey the earth system's evolution over vast temporalities without resorting to religious timescales (Gee, 2001; Wilkinson, 2005). This scholarship has recently converged with critical inquiries about the Anthropocene: the human-driven dismantling of reciprocal life sequences like those described by Olivia, to the point of accelerated mass extinction. Anthropocene awareness, however, often encourages further detachment from those deep interrelated more-than-human temporalities which once propitiated life and which are now on the brink of ending. It prompts what David Farrier calls a "deep time negative" (2019, p.5), a frightening alienation from an order that exceeds human memory and experience. The 'abyss of time,' as it was put by early European geologists interested in deep time, increasingly haunts human consciousness. Following Savranksy (2021), in the Anthropocene, time and space are disappearing for the Western system of knowledge. His critique of the Anthropocene is directed to its coloniality and epistemic (in)justice. A single "Earth" damaged by a generic human is now facing a catastrophic end. He writes: "in positing the End of the World as an impending event,

[the Anthropocene concept] reorganizes earthly and cosmic forces in such a way as to regroup multiple and divergent modes of living and forms of being into transcendental categories – including, at its very center, that of "Humanity" and of the "Earth-System" (2021, p. 4).

Yet, the anxieties towards extinction also reflect the legacy of modernity's illusory nature-society binary. In Anthropocene thinking, humans have, in controlling nature, become detached from those 'abysmal' sequences of life and death. Here, by contrast, we appeal to a deep time that is less clear-cut in its periodization, perhaps also less frightening, and thus less deserving of annihilation. Instead of a sharp break between humans and nature, we assume the coexistence and reciprocity between humans and more-than-humans, including butterflies, but also in-between entities such as the water saints or fire, as communicated by our research participants. In this view, recent environmental changes are a continuation of long-term geological and social-ecological processes in which more-than-humans have *always* been present and active.

We follow scholars from the social and natural sciences who understand all "*cenes*" as mediated by relations of reciprocity and created by everlasting yet changing entanglements (Cajete, 2000; Collard, Dempsey, & Sundberg, 2015; Fuentes, 2019; Haraway, 2016; Malone *et al.*, 2014). Along these lines, we propose a long-term and relational perspective to better capture the boundary event signaled by the Anthropocene or Capitalocene. In the words of Donna Haraway, "the Anthropocene marks severe discontinuities; what comes after will not be like what came before. I think our job is to make the Anthropocene as short/thin as possible and to cultivate with each other in every way imaginable epochs to come that can replenish refuge" (2016: 100). In this spirit, our article addresses more-than-human coproduced temporalities as a way to envision a less deadly future in the making. Responding to Haraway's compelling invitation to imagine together a less deadly "cene," we also respond to recent calls within more-than-human political ecology to create analytical frameworks that are mindful of earth beings' vitality (Ginn, Beisel, & Barua, 2014) and that aim to decolonize the theory and practice of conservation studies (Braverman, 2023; Schulz, 2017).

Through our lens on deep time, seen as a sequence of immemorial and ongoing reciprocal relations that sustain life, we contribute to the political ecology and more-than-human literature by illustrating how humans, animals, plants, rain, and divine entities are all co-productive worldmakers. In our framework, living species are not different from other forces such as water, goblins, or flowers that are infused with spiritual powers. The emphasis on other-than-human dynamics existing through reciprocal sequences across time and space situates the Anthropocene's local effects in the MBBR, and invites envisioning other possible "deep futures" or "anthropo-not-seen" as De la Cadena (2019) and Dicenta and Correa (2021) have called for. As pointed out by Dicenta and Correa the "Castorcene" can help "singularize, multiply, and decolonize the end of the world. Not only are there multiple Anthropocenes, but there are multiple ends of the world" (p. 4). For us, this re-thinking of the passage of time in nonlinear reciprocal terms is centered on co-learning with our interlocutors' reciprocal perspective and thinking with the rhythms of the monarch and other forest beings. We see a less human-driven timescape of the Anthropocene, yet one that carries important contradictions and power struggles. De la Cadena (2019) indexes those temporal, spatial and power-laden juxtapositions in the "not-seen": "Complexly, the anthropo-not-seen includes both the anthropos that embodies the self-granted will to make the world as he or she knows it, and the disobedient anthropos, the one that is inherently-with-others and thus *not only* human" (p. 40, italics original).

Dicenta and Correa (2021) deploys the beaver (*castor* in Spanish) to discuss a technoscientific anxiety that uses the beaver's vitality to manage 'the end of the world.' In similar ways to their work, we argue that the butterfly conservation timescape indexes various, often clashing, relations and understandings of what a healthy or endangered planet is. We identify two interrelated but contradictory tendencies. First, the present timescape is lived and perceived through the conservation gaze of a single species: monarch butterflies. Yet, this current butterfly-centric impulse co-exists uneasily with longstanding relations among forest entities and agricultural cycles. These cycles merge organisms such as corn and butterflies and their distinct existences on Earth into a single timescape. We argue that this ancient amalgamation enables scholars studying environmental degradation to envision a future beyond catastrophic scenarios, although not without tensions.

Most mainstream conservation policy has been premised on a short-term understanding of monarchs' present condition (Bojorquez-Tapia *et al.*, 2003; Vidal *et al.* 2014). According to this dominant "story," the

monarch declined dramatically from the 1980s onwards, propelled by the local unsustainable logging of the oyamel fir (Abies religiosa), the monarch's host tree. This explanatory framework fails to capture the complex processes of social and environmental change narrated by our interlocutors who highlight immemorial entanglements of human and more-than-human worlds but are also forced to live under 'conservation time.' Yet, these tensions are constitutive of this timescape.

While residents continue to practice and protect their reciprocal relations with all aspects of the landscape, the butterfly has also assumed disproportionate influence in the region. The monarch's influence grew as Western conservation regimes, celebrating the uniqueness of the migratory phenomenon, sought to protect the butterfly through reductionist schemes such as payments for ecosystem services. This species-ist focus on a single charismatic animal – at odds with more-than-human reciprocity – is further reinforced by romanticizing "save the monarch" efforts. These include Go Fund Me pages that funnel North American cash to a small number of forests families, or "fast track" academic "meditations" (Pandian, 2022) that reinforce the spectacularization of a single species and the essentialization of these forest communities. Through their interventions and contested understandings of the region and the species, many actors, including Western-based non-profit organizations and academics, make and remake this "butterfly timescape." Moreover, local residents themselves sometimes mobilize the monarch's singularity in their claims for autonomous government and self-determination vis-a-vis imposed territorial management and intensified land grabbing by organized crime groups. By highlighting communities' talk about "living in the time of the butterfly," we seek to capture this complex context. We ask: what can this butterfly time tell us about situated ways of experiencing present and past relations with more-than-human entities in a global time characterized by the unmaking of life?

In the next sections, we present vignettes that speak to the relationality of this butterfly timescape. Categorizing the knowledge our interlocutors shared, however, presents fundamental challenges. For example, we never encountered narratives about monarchs (*palomas, monarcas* in Spanish) in isolation. On the contrary, the records we gathered merged rhythmical accounts with human and other entities, rituals to those entities, and past and present knowledge of ecological issues that mattered to both on-reserve and off-reserve communities. After much thought on how to convey this relationality, we sorted passages into four overlapping themes: water, corn, monarchs, and forest rhythms. While we dedicate a subsection to each type of narrative, we also illustrate their deep interrelations, such as how a reference to water rhythms also refers to many other entities and their times. Finally, we conclude this section by reflecting on an emergent and contested political project for Indigenous self-government, which mobilizes the monarch as a strategy for strengthening ethno-territorial claims. Together, these passages describe living in the time of the butterfly, yet in ways not understood by mainstream conservation.

5. Jñato and Hñähñu: Ancestral relations with the monarch forest

The narrative and conception of the monarch butterfly as a single, isolated biological entity is deeply entrenched in public discourse. Since its scientific discovery, the monarch migration narrative has focused on the "small and strong" individuals crossing three countries to reach their hibernation forests in central Mexico. Although that same science has shown us the interdependence of monarchs with other species, such as milkweed and oyamel during their migratory journey and in their hibernation sites, it has yet to consider human communities among these interdependent relations. The "solitary/epic" description of the butterfly's journey misses its links with diverse humans and more-than-human entities and across time and space. In discussing interrelationships and interdependence, we are also aware of the traditional tendency of our academic disciplines (biology and anthropology) to treat our own human species as autonomous. Here, by contrast, we are interested in conceiving of living beings through their relational timescapes. With the help of our local interlocutors – and the monarch itself – we describe in the following sections the monarch's interdependencies, including with humans.

To begin with, the monarch's hibernation in central Mexico depends on the presence of mature forests. Established forests provide perching or resting places but also an herbaceous layer which, once the feeding season has arrived in spring, supplies nectar from different flowering plants. Although logging in the MBBR is formally limited, these forests are at risk due to the presence and activity of illegal loggers. This risk is managed

by local communities, for whom the forest represents different things: a source of non-timber forest products such as mushrooms, firewood, and medicinal herbs; a place where water is generated; and a sacred, symbolic, and ritualized space central to the reproduction of community identity.

From our fieldwork and archive review we find that the monarch butterfly depends on human care and that the protection of its ecosystem depends on the community's past and present relationships with it. Without the oyamel forests, the monarch butterfly would not be able to carry out its migratory cycle; without the presence of the monarch, the fate of these forests would probably be unregulated logging as ancestral forest management has lost importance. Peasant communities play a central role in this set of relations, as they are the territory's ancestral owners and have legal rights, although circumscribed by conservation programs, over the use and management of natural resources. They want to protect the forest through management strategies that allow for multiple uses of the ecosystem and that include their knowledge of the forest's rhythms and times, as well as its multiple inhabitants. These forest-dwelling beings include rainwater, native corn, and in-between entities such as giants and fire spirits. When we asked about the monarch butterfly in relation to conservation management, several of our local interlocutors' answers included their knowledge of and encounters with other beings, including other butterflies and animals such as insects, coyotes, and deer. With remarkable consistency, water and corn planting were mentioned in conversations and interviews. From this point of view, it is difficult to conceive of one entity in isolation or to speak of the monarch without referring to its other links and connections. In other words, the monarch butterfly is part of a more-than-human world and is perceived through a relational understanding of times.

6. On water, corn and *mariposas*: merging time and knowledge

El temporal: *Water rhythms*

> There has always been a cycle of rainfall. It would begin to rain in June. Before it was very predictable; the last few years it has changed a lot. We would prepare in advance of the rain, we would prepare the corn field two months before the rainy season.
>
> - Olivia, Rincón de Curungueo

The Hñähñu and Jñato, two of central Mexico's oldest indigenous groups, share a sedentary agroforestry tradition centered around corn and water. As Magali Tirel (2013, p. 69) has pointed out, their corn and forest resource harvesting systems have proven remarkably resilient to change, and communities maintain strong ethno-territorial ties even when they migrate to urban cores within Mexico or internationally. This resilience is facilitated, in part, by a commitment to reciprocity expressed in rituals linked to harvest cycles. Not merely a means to meet the biological needs of rainfed agriculture, this set of ritualized practices can be seen as the axis that connects earth entities – and their distinct time rhythms – into a complex socioecological web.

Traveling the roads and highways crossing the MBBR, one sees human-made valleys that are dotted with corn plots, family dwellings and *tapangos* – sheds that store the corn produced by each household. Lands on the lower hills hosts the *milpa* (a traditional mixed-cropping system consisting of corn, squash, beans, and other herbs) and, increasingly, avocado plantations. Upper hill land, where the butterflies rest during winter, is a commons that has been traditionally unoccupied by humans and protected communally. The upper hills are also the source of water captured downstream in the lower hills in natural or humanmade ponds (*lagunas*). Although the corn harvest may now occupy a secondary role in a household's livelihood, displaced in some cases by activities like avocado cash-cropping or monarch tourism, corn continues to be essential for subsistence and the organization of socio-ecological life. Providing food for several months and serving as the basis for other products, corn is, in other words, the center of household reproduction. Corn plots delineate domestic and public space as the corn crop usually marks the boundary between the individual household and communal forest.

In association with corn, water time is central for the Hñähñu and Jñato forest communities. The beginning of *el temporal* (Spanish for time of rain or "rainy season") marks the appearance of the first corn sprouts and consequently punctuates the rhythms of all social life. Because most of these households rely on the rain-fed production of corn and other *milpa* crops, they are vulnerable to changing weather patterns. Prolonged droughts, early frosts, and flash floods can all destroy a harvest. As other scholars working in the region have noted, rather than merely a natural resource that satisfies the biological needs of people and corn, water is a world-maker and the guiding force in these communities (Brenner, 2009; Gómez Reyes, 2011; Mendoza Fragoso, 2018; Tirel, 2013). The literature on Oyamel Forest communities documents the regular performance of rituals to petition for rain and thank it for arriving in a timely manner (Carreón & Camacho, 2011; Duarte & Martínez, 2004). When we asked about the importance of water, the main response across all communities was that water has its "own time," making an annual appearance in the form of rain. Water brings corn into being and dictates its life cycle, and corn enables and dictates ritual life. What we see here is that the butterfly forest is composed of intertwined rhythms which, more than linear patterns of time, are cyclical sequences of social (human and more-than) reproduction. Such rhythms have been active in these forest communities since before memory, yet climate change and the reserve demarcation have imposed arrhythmic relations with the land and the water.

In addition to the climate change challenges hinted at by one of our Hñähñu interlocutors quoted above, people shared diverse forms of oral knowledge about water's presence or absence and its significance. Water may appear in the form of in-between entities (called *nahuales*) such as water elves to educate or castigate residents. For example, residents explained that creeks deep in the forest host entities who can become angry and seek to punish community members who give in to greedy thoughts, wish harm on other community members, or otherwise violate the community's communitarian norms. In this sense, the presence or absence of water not only ensures or disrupts a good harvest, but as both a communal resource and spiritual entity, water serves as a moral compass and mediator of social relations and practices. However, in the current context shaped by climate change and a livelihood transition to water-intensive avocado plantations, the relationship with water is increasingly ambivalent. Residents at once maintain an attitude of deep respect and veneration for water, while also fearing its effects. They can no longer count on a "timely rain" each coming year, and if it fails to arrive they worry that water's absence could trigger greed, further angering water and potentially provoking its punishment. This risk is often sufficient to push people out of communities, which implies fewer ritual activities to maintain the rhythms of human-water reciprocity.

La milpa: *corn rhythms*

> In the water springs, in the springs where we get water to drink, on Holy Saturday a cleaning of the spring is done, and then we wash the little well and adorn it with many flowers; sometimes we place a wooden cross there to decorate the springs. Also, the stove in the kitchen is swept very well, and the stove, and around the metate [stone device to grind corn and make tortillas] we put many flowers.
>
> - Olivia, Rincón de Curungueo

In close relation to the "water time," the corn harvest cycle also determines family work routines and marks the rhythms of rituals and celebrations. Both in the literature (Sandoval Forero, 1997) and in our field records, we find evidence of longstanding ritual practices to ensure the presence of spring water and rain in the intimate space where the harvested corn is processed: the kitchen. The aim of these rituals, like the one described above, is to ensure that the spring continues to offer water to the cornfields so that the cornfields can in turn offer food to the household.

The celebration of the Holy Cross and the "cleaning of the saint" at the local spring ("*baño del santo en un manantial*") represent the most frequently referenced events in interviews and the archives (Carreón and Camacho, 2011; Cortés, 2005; Duarte & Martínez, 2004; Galinier, 2012). In this region, as in other parts of Mexico, the Holy Cross is celebrated on May 3, coinciding with the beginning of corn sowing before the rainy

season sets in. The celebration of the Holy Cross – which takes place in the hilltops and the *ojo de agua* (spring) – begins with praying, the preparation of food, and the blessing of a wooden cross. The community then carries the cross to geo-symbolic locations up in the mountains before placing it in the middle of the cornfield. The locations along the cross's journey represent key life and water-generating sites, parts of a local knowledge system passed down for longer than any community member can recall. In different forest communities such as Nicolás Romero, there is a pilgrimage of the Holy Cross to a chapel at the top of a mountain, a community activity which, according to our interlocutors, usually ends with heavy rains in the afternoon. Occasionally, the community in which we gathered these testimonies decides to carry the Holy Cross to a family home where prayers, songs, and food are offered all night to protect that family's land and harvest. Although the petitions are abundant and diverse, the most common and frequent request is for the presence of a timely rain to nurture the seeds through to germination. If the rain is late, we were told, ants will eat the seeds and the harvest will be either destroyed or insufficient. In the Holy Cross ritual, residents' prayers to the spirits are mediated by priests and in-between entities such as Saints or coyotes, who act as local guardians (addressed below). Other rituals, by contrast, involve more direct physical intervention into more-than-human elements. In the town of Senguio, for example, we found that residents will launch fireworks into the clouds when there is a risk of heavy rain that might threaten the integrity of the corn. They also use a machete to "cut" the clouds – tracing a cross shape in the air in the direction of the sky with the machete – to prevent the clouds from discharging their rain violently onto the young corn stalks.

However, the corn cycle is threatened by an increasingly irregular water time, and for this and other reasons the residents must seek out additional livelihood opportunities such as migrating, avocado farming or the seasonal monarch butterfly tourism economy. This deepens the influence of a different set of temporal rhythms, for example, those of conservation's institutional schedules which are (allegedly) attuned with the biological needs of the monarch, or those of Northern markets demanding avocados in Super Bowl season.

Monarch and departed kin rhythms

> ... butterflies have their season, in the time when they would leave for Canada and when they would return. The time of the feast of Todos Santos [Day of the Dead] is when there are the most butterflies, so when they start arriving in clouds we know the date of Todos Santos is already approaching.
>
> - Juventino, Zirahuato de los Bernal

People also shared local ecological knowledge that associates the arrival of the monarch butterflies with the timing of the corn harvest. Jñato groups – and to a lesser extent Hñähñu ones, depending on the town – refer to this butterfly in Spanish as "*la cosechadora*," "the harvester" in English. This term emerged most frequently in conversations in conjunction with the Day of the Dead celebrations or when we asked about the corn harvest. Monarchs arrive by the Day of the Dead and are said to be the carriers of a family's departed ancestors. This association of insects with the afterlife is not exclusive to Hñähñu and Jñato communities (Vela 2019). It has, however, proven attractive to tourists and is capitalized on by tourism operators who often construct the monarch region as an ecology of "enchantment." These imaginaries obscure the ongoing difficulties communities face in reproducing a healthy corn harvest. Often, interlocutors shared that the monarch's *arrival* signals the end of the corn harvest. According to this logic, in which the monarch, corn, and intergenerational rhythms across lifeworlds are attuned to one another, the monarch's *departure* from their forest (four months after the Day of the Dead) signals that it is time to start a new corn harvest cycle. Yet today the timing of monarch's departure is changing due to earlier warm Spring weather. This change, in turn, disrupts the timing of rituals to prepare the land for corn sowing in early spring and the beginning of a new agricultural cycle.

Regardless of their denomination as "harvesters," "*palomas*" (pigeons/doves) or "*peregrinas,*" (pilgrims) as they are also called in some localities in reference to their behavior of "visiting many houses," the monarchs' presence cannot be understood in isolation from the other times and cycles we have described.

Moreover, it is important to emphasize that despite residents' references to living in "the time of the butterfly," monarch butterflies do not occupy a privileged position relative to other beings and relationships in local accounts of environmental change. We collected information on how strong rains may affect monarchs just as they affect young corn. People insist that just as they see fewer monarchs, they may also see fewer coyotes, wild cats, wild birds, or mushrooms. During conversations about monarchs, a man once described a special drink called "*zende*" made from fermented corn and used by the Virgin Mary to trick the coyote and persuade the animal not to feed on the hens of misbehaving humans. These sudden shifts in our conversations, from monarch conversations to those of coyotes, corn, and divine beings capable of punishing selfishness, reveal the co-existence of different human and other entities and their rhythms. This co-existence is lived and experienced as a more-than-human sequence of gifting and receiving: a sequence of reciprocity which is at risk of breaking, with unknown consequences.

The forest: home to multiple beings and new rhythms

> Lord, give me permission, we are going to cut down these dearest trees.
> - Eusebia, Crescencio Morales

> I never imagined that the wild lands would shrink. These hills our father God raised with his great power. These hills are for oxygen and for the rain. In those times we had the custom that corn was planted in April and now the heat has increased too much and the land no longer retains moisture …the grandparents told us not to cut down a tree if we didn't use it.
> - Juventino, Zirahuato de los Bernal

When we talked to community residents about the forest at large, their narratives were divided between nostalgic recollections of a past communal forest that was 'very alive' and close to the community, and where different activities were carried out, and a present forest described as increasingly distant and absent. These latter narratives were associated with concern and grieving expressions about the forest's transformation and loss.

A common image residents shared with us about the forest prior to the establishment of the MBBR was a very dense, dark forest that barely let sunlight through. For example, young people, adults, and the elderly recall visions of a moist moss-covered forest, full of birds and trees which, from their perspective, does not correspond to the forest of the present. We were told of a forest inhabited by animals such as squirrels, rabbits, and armadillos, as well as others that are no longer there, such as deer and wildcats. The forest is also described as the place where oxygen and water are generated, so much so that the mountain is considered the place that allows life to flourish.

It is relevant to note that the forest is closely linked to daily activities in several of the interviews. The elderly told us about going to the forest as children, either alone or with their peers, to take care of the cattle and hunt birds or just to bathe in the river. Alternatively, they went accompanied by their grandparents to carry out various activities such as collecting mushrooms and firewood, helping to gather *morillos* (wood for the construction of houses and *trojes*, which are barns to store corn), as well as hunting for edible insects, including the monarch. Food always appears in these stories, with the collection of mushrooms occupying a particularly important place. For example, an elderly man from Zirahuato explained that "each fungus has its place and its time" and that the presence of insect larvae (worms) inside of a mushroom was an indicator that it did not belong to a toxic species and therefore could be eaten. Research shows that these practices around forest harvesting are gendered (Bello-González et al. 2015).

When they told us about today's forest, the people we interviewed alluded to activities such as the collection of medicinal plants, mushrooms, firewood, and *ochochal* (a pine leaf for making traditional handicrafts). They also raised concerns about the transformation of the forest, speaking of "the forest" as a place that no longer produces water and oxygen, and even of a place that the government has not been able to take

care of. In these accounts, it is a place full of "protected" yet "sad trees." These stories not only reference different uses of the forest, but also how communities care for the beings that live there and place restrictions on the use of forest products. This was clear in an interview with a woman from the Otomi community of San Cristobal, who told us that "animals have always been important to people because some have medicinal uses." An elder from another community pointed out that every time someone needed wood to build a house or wished to take a log, it was necessary to notify the community authorities who would then organize an inspection to ensure that the trees were correctly managed. Another account of this care and reciprocity with the forest was offered by an elderly man from Zirahuato, who insisted that the *abuelitos* ("grandparents"; the most common word used to signal ancestors or immemorial kin) taught him to plant a tree every time he took wood from the forest. During a 2022 visit, a young Indigenous man who interviewed his elders regarding monarch knowledge showed us a small piece of forest land recently burned down by loggers for the purpose of converting it to avocado trees. He showed it to us with a commitment to restoring it, affirming "do not worry, we will reforest it again as our ancestors did. We reforest, they chop it down, we reforest again."

These stories of quotidian forest life contrast with others that speak of the forest as a dark place inhabited by entities that can generate fear, respect, and even death. Residents told us, for example, of the presence of goblins who guard the forest, and Christian-influenced devil figures they call "witches" who assume the form of fireballs. One often-recounted story describes the appearance of these fireballs in the night sky above the hills, where they flit through the black forest. The balls of light are said to be humans who had bargained with evil forces and were granted the wings and legs of a wild turkey (*guajalote*). Children were reported to be most vulnerable to these negative spirits. In these accounts, the forest is always described as dark and full of vegetation. We surmised from these warning narratives that there were areas of the forest regulated by more-than-human entities. These areas are sometimes feared and are thought to be best avoided. Some of those dense forest patches remain uninhabited and are visited only during community rituals such as the Holy Cross and the pilgrimage to the springs described above. This thick forest, however, also provides the perfect cover for actors carrying out land invasions and other illicit activities as they can evade the gaze of conservation agents and other government authorities.

Local Indigenous self-governance in the "time of the butterfly"

For the communities with whom we work the forest is the home of the monarch, humans, and other entities who are all seen to share a relationship of respect. More-than-human entities together co-produce the times and rhythms that dictate life. The MBBR conservation program, by privileging the monarch and seeking to remove humans from the forest landscape that they have helped to maintain, is at odds with our interlocutors' local ecological knowledge and practices. While residents continue to engage in these ritual practices, they increasingly do so under the threat of sanctions from conservation actors and mounting violence from criminal organizations who take advantage of the less-monitored space imposed by conservation zoning (González-Duarte, 2021).

Today, these human-forest relations are yet again being reconfigured through an Indigenous self-determination process unprecedented for this area. At least two of the Indigenous communities of the MBBR have established autonomous self-government like that achieved by the Cherán and Zapatista movements (Del Conde, 2015; Wolfson, 2012). Their goal is to access federal funding, bypassing state and municipal intervention and monitoring. Local ways of caring for the forest are also being readjusted through these struggles. Some residents see self-government as a return to customary law and to the reciprocal relations with all species and animacies that the monarch reserve interrupted. As we have explained, local knowledge does not privilege the monarch but rather sees it as part of a wider relational social ecology. Specifically, residents strategically mobilize the monarch to illustrate their "good Indigenous ecological practices" with the goal of gaining political support and visibility for their cause across North America. We contend that this political centering of the monarch in struggles for local Indigenous self-governance could paradoxically allow this forest to once again offer refugia to all species and entities. This political use of the monarch, in concert with the revitalization of Indigenous identities and forest practices based on relationality and deep time rhythms, also

shows that a relational social ecology is not without frictions and contradictions. Nonetheless, in our view, this social ecology offers a powerful invitation to rethink nature conservation in terms of reciprocal care.

7. Conclusion

In this article, we analyzed how people from the Otomi and Mazahua communities in the Monarch Butterfly Biosphere Reserve in Michoacán, México understand their connections to their territories and to the beings who live there. We argue that it is impossible to separate people's relationships with monarchs from this wider tapestry of more-than-human relations of reciprocity and their associated rhythms. All the forest- and monarch-related conversations held during this research eventually evolved into corn and water conversations. People seek to protect the forest and the monarch to protect their corn and household reproduction in a timely sequence. We interpret the coexistence of these ritual systems as a singular deep time, and explore what it means to be "living in the time of the butterfly" in order to affirm the complex reality of living under the gaze of species conservation. We simultaneously show how monarchs, other animals, humans, plants, and sacred beings are interrelated and endure in a single web of reciprocity that offers a "deep time" perspective. Residents summon the divine entities to water sources to thank them or petition them for a good – and timely – rain for their corn. A sacred woman (the virgin Mary) uses a fermented corn beverage (*zende*) to convince the coyote not to eat humans or hens. The monarch carries the souls of ancestors, marking the temporal rhythms of the harvest cycle and merging the timescapes of the living and the dead. We see how more-than-human entities are sometimes worshiped, thanked, feared, or called upon to arrive in an appropriate and timely manner to produce good and healthy living. The well-being of monarchs and other entities is, in turn, deeply dependent on the rhythms of this past-present timescape. We suggest that this more-than-human temporality can also help imagine and enable deep futures. More research is needed to fully understand how these communities perceive deep futures, but we can appreciate their ongoing efforts to reclaim land management and Indigeneity as a future-making project. This is an important step towards reintroducing the ancient tradition of reciprocal gifting across all beings, which serves as an ecopolitical project to reclaim land, and as an act that enables a future that is less human-driven and less frightening.

Jñato and Hñahñu interlocutors make clear that the butterfly's winter home is also home to animals, plants, spiritual entities, and humans, and these exist in a relationship of long-term reciprocity. The only way to guarantee that these life forms continue to thrive, we insist, is by strengthening these interdependences. Such an approach to conservation means accepting the sometimes-unsettling fact that communities live in co-constitutive assemblages rather than as isolated species facing the abyss of time. The monarch butterfly is, in this view, not just the monarch. It is corn, rain, oyamel, coyote, fungus. It is kin.

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