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CASETA

REFRACTIONS

Coordinating Natures in Conservation Practice

ABSTRACT

Anthropologists and scholars of science and technology have discussed the accuracy of describing “Western” societies as being underpinned by an ontology of unitary nature in contrast with the multinaturalism of “non-Western” ones. They have postulated instead that multiple realities are enacted by practices and made to hang together through various forms of coordination. In this paper I analyze how coherence is achieved in a natural protected area in coastal Peru and discuss its particularities vis-à-vis other proposed types of multiplicity. By observing a group of

fieldworkers engaged in practices of direct observation, I focus on the use of the caseta, a perceptive device designed to approach birds without disturbance. Reflecting on this specific context in which this method is used, I argue that a refractive multiplicity emerges due to the interaction of institutionally differentiated perspectives that get entangled within the caseta.

KEY WORDS: coordination, refractive multiplicity, conservation, ontology

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INTRODUCTION

The Sierra Club, a prominent environmental organization from the United States, recently published an article about the conservation status of Peruvian penguins. “Imperiled by their own poop”² reads the title, while identifying one marine reserve as their bulwark. What is it that makes penguin poop so threatening to its owners? The article is clear: the Peruvian guano industry that is determined to perpetrate habitat theft by extracting this poop for economic benefit.

The narrative, characteristic of *preservationism*, is a well-established staple in the history of American environmentalism. Preservationists such as John Muir, founder of the Sierra Club, advocated for the protection of nature from human use, alluding to their mutual incompatibility. Viewing nature as a pristine wilderness distinct from human influence, Muir advocated for the establishment of national parks that enforced this separation of human and nature, precluding damaging intrusions from human society.

Conservationism, by contrast, vies to integrate society and nature, and typically refers to the strategies laid out to make a sustainable use of nature. Presented as part of a foundational debate,³ preserving wilderness and conserving biodiversity often indicate two poles in environmental thinking and practice, indexing differences in values, affects and philosophical orientations between the parties that can be mapped onto current controversies around anthropocentric or non-anthropocentric approaches to policy.⁴ Jamie Lafferty's article for Sierra is redolent of the latter, cautioning readers of the pernicious effects of increased pressure on penguins as a result of guano extraction by humans. Yet, as environmental historian Gregory Cushman⁵ has pointed out, in Peruvian conservation history it is possible to see not so much a binary opposition between conservation and preservation but rather a composite resulting from technocratic tendencies among Latin American conservationists in the early 20th century.

In his book about the global history of guano, Cushman describes how Peru's first National Committee for the Protection of Nature was formed in 1940 in Lima from a gathering convened by American conservationists and local elite members, some of which were involved in the guano industry for decades. With the intent to

² Jamie Lafferty, “Peru’s Penguins Imperiled by Their Own Poop,” Sierra Club, April 2, 2023, <https://www.sierraclub.org/sierra/1-spring/notes-here-there/peru-s-penguins-imperiled-their-own-poop>.

³ Thaddeus Miller et al., “The new conservation debate: The view from practical ethics,” *Biological Conservation* 144, no. 3 (March, 2011) : 948.

⁴ Miller et al., 955.

⁵ Gregory T. Cushman, “‘The Most Valuable Birds in the World’: International Conservation Science and the Revival of Peru’s Guano Industry, 1909-1965,” *Environmental History* 10, no. 3 (2005): 477–509, <http://www.jstor.org/stable/3986000>. Gregory T Cushman, *Guano and the opening of the Pacific World: A global ecological history* (New York: Cambridge University Press, 2013).

fight the destruction of the nation's "biological patrimony," and to "instill in youth a love for Nature" and appreciation for its "aesthetic, scientific, and industrial values,"⁶ the Committee sought to educate the public and institute natural parks in the image of the American model of landscape monumentalization.⁷ Already in this initiative the traces of preservation and conservation blur into each other under the name of natural resource management.

In this article I will develop the case of guano management, which embodies yet another route in the history and practice of conservation. While Peru's National Committee's efforts did not come to immediate fruition, with its envisioned parks materializing only two decades later, conservation cannot be said to have had a late start in the country. Among the Committee's shortcomings were a marked elitism and a limited circulation of its environmentalist ethos among the public. However, rather than a disjuncture between the separation of society and nature typical of preservationism and the integration of interests via conservation, we find instead an entanglement between conservation and management.

Despite their initial failure to designate natural parks, several of the Committee members were also trustees of the Guano Management Company, a parastatal institution tasked in 1909 to protect "guano birds in whatever relates to the reproduction of fertilizer."⁸ Given almost total authority over the marine environment, the Company was able to "manipulate the wide variety of organisms affecting the welfare of birds, but also to manage the behavior of human beings... to maximize the production of excrement"⁹ for the benefit of Peruvian agriculture. Controlling and manipulating the guano ecology¹⁰ required gaining knowledge about the complex realities of oceanic life and climate, which mobilized hundreds of experts. This opened the field to innovative techniques and made guano a site of emergence of new disciplines such as modern oceanography and ecology.¹¹ Not quite *ecologists* yet, nor conservationists in the contemporary sense, guano managers outfitted their own set of tools and knowledges that are now enfolded in those of their more disciplinary counterparts. This is not simply a historical curiosity, but a legacy that endures in contemporary environmental politics around guano and marine conservation in Peru. It offers a compelling case for focusing ethnographic attention on the making of conservation knowledge at the intersection between professional and bureaucratic modes of engaging nature.

The managed guano ecology comprises 22 islands and 11 headlands (*puntas*)¹²

⁶ Cushman 2005, 249.

⁷ Yves Figueiredo, "Inventing Yosemite Valley: National Parks and the Language of Preservation," *Historical Geography* 35 (2007): 12.

⁸ Cushman 2005, 484.

⁹ Cushman 2005, 487.

¹⁰ "Guano ecology" is the name I use to describe the subset of ecological relations that managers consider relevant to the production of guano.

¹¹ Nancy Slack, *G. Evelyn Hutchinson and the Invention of Modern Ecology* (New Haven: Yale University Press, 2010). McCormick 2005.

¹² These spaces are known colloquially and in the specialized literature as "guano islands" or "guano headlands."

located across the Peruvian coast. They form part of a natural conservation area system known as the RNSIIPG (Guano Islands, Isles and Capes National Reserve, from now on the “reserve system”). Inside these protected sites, thousands of birds flock together under the co-management of environmental and agricultural authorities. Beside the natural landscape and its plentiful biodiversity, the state also maintains high stakes on guano, a nitrogen and phosphate-rich fertilizer produced by bird digestion. Since guano was coveted in the 19th century for its high nutrient value, the guano islands were near-depleted of it by the turn of the century, showing notorious signs of decline in bird population after decades of intensive exploitation by British and Peruvian concessionaires.¹³ Administered as foreign concessions, the deposits were nationalized in the 1910s and put under a strict management regime in order to restore ecological patterns and increase bird populations.

With a tinge of the preservationist ethos, the biologists working today at the reserve cited in Jamie Lafferty's article on Sierra Club's website echo the idea that the guano industry threatens conservation work at the Punta San Juan reserve. However, guano interests remain at the heart of conservation in these sites. In this article I problematize the preservation-conservation dichotomy by providing a less antagonizing view of the work necessary to conserve guano and the ecologies that produce it, including penguins. I focus on the entanglements present in the work of managers and conservation biologists stationed at Punta San Juan reserve, located in a headland of the southern district of Marcona, Nazca. Through the analysis of a distinct observational technique used by fieldworkers, the *caseta*, I argue that institutional perspectives are refracted and collated through inscription devices that allow the coordination of different versions of nature.

RESERVE ENACTMENTS

Modern conservation is a practice that is aware of the impacts of human activity on ecosystems. This awareness is, however, “steeped in Nature thinking and involves science, politics and practical encounters with life” that are distinctively marked by a sense of control over a given, external world. Probing alternatives, Lorimer arrives at the term ‘multinaturalism’ to name an ontology that “conservationists might use in place of Nature.”¹⁴ He redefines conservation as a matter of learning to be affected by the environment through a “set of embodied and skillful processes” that inform an environmental politics where “multiple forms of expertise and value” are recognized.¹⁵ This recognition allows the wager that “multiple natures are possible.”¹⁶ Myriad “forms of natural knowledge—not all of which are scientific or even human”¹⁷—contribute to multinatural reality. However, they are not all “equal, sufficient, or

¹³ Cushman 2005, 478.

¹⁴ Jamie Lorimer, *Wildlife in the Anthropocene: Conservation after Nature* (Minneapolis: University of Minnesota Press, 2015), 5.

¹⁵ *Ibid.*

¹⁶ *Ibid.*

¹⁷ Lorimer, 2.

definitive,” some are “more robust than others”¹⁸ and espouse different values, “cutting up” nature in various ways. This demands an “ontological choreography”¹⁹ to take up the resulting pieces in order to compose livable futures. In Lorimer’s analysis of knowledge-making among scientists, naturalists, filmmakers, ecotourists and volunteers, each one of these is a bearer of different “financial, administrative, and biological technologies”²⁰ that collude in the commodification of Nature, subsuming its multiplicity into singularity.

The tensions between guano extraction and penguin conservation, as described by Sierra, is underpinned by the kind of naturalism that Lorimer criticizes, and is related to the preservationist view of Nature as wilderness, as a single, timeless and pure domain untouched by Society.²¹ Rebuttals of this view are commonplace in critical scholarship and calls for overcoming it abound. But a multinaturalist approach, rather than negating the value of an “unspoiled” nature, affirms that this nature is one among many, “not different understandings of nature, but different ways of doing nature.”²²

Scientists at the Punta San Juan Program are expected to provide reliable knowledge about the reserve’s fauna and environment in order to prevent and mitigate disturbance by guano workers during critical reproductive periods. Punta San Juan was built in 1952 following a policy of containment that saw dozens of headlands walled-off in order to isolate birds’ nesting grounds from terrestrial predators. While it attempted to restore imagined natural conditions, conservation entailed performing them anew to allow a specific kind of nature to emerge, one of plentiful birds and no predators to compete with them. Previously managed solely by AgroRural, a special program of the Ministry of Agriculture, responsibility moved onto the Ministry of Environment when the reserve system was incorporated as a marine protected area that gathered all of the guano sites under the administration of SERNANP, the national parks service. This didn’t necessarily supersede the work by guano managers nor their established routines, and the system is now described as being “co-managed.” SERNANP very much relies today on guano conservation as an infrastructure for carrying out its own institutional goals.²³

Anthropological literature on conservation comes in different modalities. One of them includes literature critical of the environmental politics and forms of governmentality they embody, focusing on issues such as land grabbing and dispossession, asymmetrical power relations in negotiations with local communities,

¹⁸ Lorimer, 182.

¹⁹ Lorimer, 12.

²⁰ Lorimer, 5.

²¹ Lorimer, 1.

²² Filippo Bertoni, “Charming Worms: Crawling between Natures.” *The Cambridge Journal of Anthropology* 30, no. 2 (January, 2012): 74, <https://doi.org/10.3167/ca.2012.300205>.

²³ Fabio Miranda, “Managing guano ecologies: Environment and infrastructure in Peru’s coastal islands” (master’s thesis, Osaka University, 2022).

displacement and reduced livelihoods.²⁴ But other texts take a different route by engaging with multiplicity in connection with wider interest in anthropology on various configurations of nature and culture and human-environment relations.²⁵ Much of the work inspired by Eduardo Viveiros de Castro's and Philippe Descola's ideas on Amerindian perspectivism and animism²⁶ take up bodily perspectives and shamanic practices as starting points for exploring different ontologies among indigenous societies. Scholars concerned with conservation see it as a site of interactions that lead to "emergent ontologies"²⁷—yet another way of engaging the multiplicity of nature. Typically, these works concentrate on sites of colonial, neocolonial or extractivist conflict characterized by the radical alterity of indigenous inhabitants.²⁸ Scholars problematize conservation as instances of ontological difference, underscoring the negating effects of so-called Western naturalism over non-Western others, on the one hand, or the productivity of these encounters through the idea of emergence of new ontological configurations, on the other.²⁹

Another strand takes its cue from STS, particularly the work of Annemarie Mol, who argues that "ontology is not given in the order of things, but that, instead, ontologies are brought into being, sustained, or allowed to wither away in common, day-to-day, sociomaterial practices."³⁰ She describes her approach as "praxiographic," one that focuses on the practicalities of doing things. In her study of diagnosis in a Dutch hospital, "doing disease" involves multiplicity. Clinicians, radiologists and pathologists enact each a different version of the pathological entity known as "atherosclerosis" that "do not necessarily coincide" with each other.³¹ The resulting multiplicity is rendered singular in certain conditions such as those of medical intervention. Mol argues this is accomplished through "coordination and distribution: operations by which different performances are either made to hold

²⁴ Benjamin S. Orlove and Stephen B. Brush, "Anthropology and the Conservation of Biodiversity," *Annual Review of Anthropology* 25 (1996): 329–52; Carol Carpenter, "Conservation, Anthropology And," *The International Encyclopedia of Anthropology*, 1-10, January, 2021, <https://doi.org/10.1002/9781118924396.wbiea2388>; Mattias Rasmussen, Adam French and Susan Conlon, "Conservation Conjunctures: Contestation and Situated Consent in Peru's Huascarán National Park," *Conservation & Society* 17, no. 1 (2019): 1–14.

²⁵ Matej Candea and Lys Alcayna-Stevens, "Internal Others: Ethnographies of Naturalism," *The Cambridge Journal of Anthropology* 30, no. 2 (2012): 39, <https://doi.org/10.3167/ca.2012.300203>.

²⁶ Martin Holbraad and Morten Axel Pedersen, "Natural Relativism: Viveiros de Castro's Perspectivism and Multinaturalism," in *The Ontological Turn: An Anthropological Exposition*, ed. Holbraad Martin and Morten Pedersen (Cambridge: Cambridge University Press, 2017); Emily Yates-Doerr and Annemarie Mol, "Cuts of Meat: Disentangling Western Natures-Cultures," *The Cambridge Journal of Anthropology* 30, no. 2 (2012): 49.

²⁷ Caissa Revilla-Minaya, Caissa, "Environmental Factishes, Variation, and Emergent Ontologies among the Matsigenka of the Peruvian Amazon" (doctoral dissertation, Vanderbilt University, 2019).

²⁸ Paul Berne Burow, Samara Brock and Michael R. Dove, "Unsettling the Land: Indigeneity, Ontology, and Hybridity in Settler Colonialism," *Environment and Society* 9 (2018): 57–74, <https://www.jstor.org/stable/26879578>.

²⁹ Revilla-Minaya, 10, 65.

³⁰ Annemarie Mol, *The Body Multiple: Ontology in Medical Practice* (Durham: Duke University Press, 2002), 6.

³¹ Mol, 68.

together as a single entity or are kept apart to avoid mutual interference.”³² Conservation in the guano reserves can be analyzed praxiographically as well. The practices of managers and conservationists, though folded into each other, enact different versions of Punta San Juan. Through SERNANP, AgroRural and the Program’s entangled labor of keeping record of various movements in and out, the reserve multiplicity emerges as a guano and a natural reserve and made to hang together under the banner of naturalism, the shared assumption of a single nature that underpins the practices of management and conservation.

If we stick to Sierra’s version of the penguins’ plight (i.e. losing their habitat due to greedy managers invested in ignoring or reducing established precautions), the tension resolves around one nature where biological knowledge upholds conservation while a convenient agnotology insists in circumventing protections. Wrangling on a single natural terrain, Sierra depicts managers and conservationists as standing in opposing sides of a conflict of interests. One side sees biodiversity; the other, natural resources. Just a matter of perspective. But is this accurate? We might ask instead how many natures are involved and how do they appear as one? Explaining how multiplicities are turned into singularities, John Law proposes that “differences are hidden by divisions of labour.”³³ Therefore, to them I turn in order to analyze how multiplicity is handled at Punta San Juan.



Figure 1. Entry gate. The name Punta San Juan is shown twice in separate signs by SERNANP (left) and AgroRural (right). Photo by author.

³² Mario Blaser, “Doing and Undoing Caribou/Atiku: Diffractive and Divergent Multiplicities and Their Cosmopolitical Orientations,” *Tapuya: Latin American Science, Technology and Society* 1, no. 1 (January, 2018): 51, <https://doi.org/10.1080/25729861.2018.1501241>.

³³ John Law, “What’s Wrong with a One-World World?” *Distinktion: Journal of Social Theory* 16, no. 1 (January 2, 2015): 131, <https://doi.org/10.1080/1600910X.2015.1020066>.

In this article, I follow fieldworkers from three institutions active within the Punta San Juan reserve as they carry out routine tasks that enact the natural environment in entangled ways. Roberto, an *island guard* that works for AgroRural; Ana, *park guard* for SERNANP and Jaime, a *conservation biologist* at the Punta San Juan Program (PSJP). Roberto and Ana's roles as guards are somewhat overlapping as their job titles would suggest. They watch over the same legally defined perimeter; however, they are in charge of distinct versions of the reserve. Roberto is not exactly concerned with the environment as an overall object but the guano ecology put under the care of AgroRural. Accordingly, he oversees the conditions for the reproduction of guano birds, monitoring their mating and digestive patterns, as well as calculating their annual guano yields. Ana, on the other hand, is tasked with the protection of the environment in a more general sense while keeping track of the sustainable use of the resources derived from it, including guano. Her work consists mostly of protecting the boundaries between the reserve and uncontrolled incursions.

The PSJP, a field research program run by the Center for Environmental Sustainability, an institute at a prestigious university in Lima. Due to protections given in the 1940s, the guano headlands soon became a refuge for marine species like fur seals, sea lions and Humboldt penguins. San Juan's biodiversity drew the attention of scientists, including the biologist Patricia Majluf who arrived in the late 1970s as a PhD student.³⁴ Originally a site for South American fur seal studies, Majluf convened with reserve authorities the extension of her project into a long-term field station. It became a full-blown "multispecies initiative that looked after, researched and raised awareness" about biodiversity.³⁵ PSJP is now an important center for training ecologists and conservation biologists from all around the country.

In order to fulfill its stated goal of producing "scientific knowledge for the development of management that supports conservation of an ecologically viable protected area"³⁶ that produces sustainable guano, the PSJP maintains a long-standing, albeit fragile agreement with SERNANP to keep facilities within the reserve in exchange for scientific advisory about bird population dynamics, feeding patterns and emerging or recurrent relations with other species. However, the reserve as a scientific object does not necessarily align with the reserve as a guano management object. As Lafferty's article shows, there is an ongoing concern about the impact of guano extraction on the breeding behavior of penguins.³⁷ Biologists suspect

³⁴ Patricia Majluf, "Side effects of guano exploitation: unexpected refuges for seals in Peru." (presentation, 9th Biennial Conference on the Biology of Marine Mammals, Chicago, Illinois, December 1991).

³⁵ Susana Cárdenas and Marco Cardeña, "The Punta San Juan Project—Protecting One of the World's Largest Colonies of Humboldt Penguins," *Penguin Conservation* 16, no. 2 (December, 2012): 10.

³⁶ Punta San Juan Program, accessed July 31, 2023, <http://www.puntasanjuan.org/>.

³⁷ Leonardo Doig-Alba et. al., "Have We Achieved a Sustainable Balance? Evaluating the Effects of Regulated Guano Extraction on an Important Penguin Breeding Colony (2008–2019)," *Global Ecology and Conservation* 41 (January 1, 2023): e02351,

government decisions that signal a change in orientation toward less sustainable engagements with the reserve. The guano reserve interferes with the natural park. It is possible to see in these tensions how Punta San Juan is rife with disagreement.

ENVIRONMENTAL CLEAVING: FROM INTERFERENCE TO COORDINATION

In thinking about how these natures interact in the context of environmental conservation, Stephanie Lavau's work on water management offers a useful parallel. She argues that in conserving river water, managers use devices and techniques to divert water flow, performing an "ontological cleaving" between *environmental* water and *irrigation* water.³⁸ The differing materialities, spatialities, and temporalities that perform this cleaving are significant sites of tension in the management of the river.³⁹ In a similar vein, guano flows through different sites of ontological cleaving. It starts its voyage in the relation between birds and fish, and its future availability depends on the amount of *anchoveta* produced by the Humboldt current and left alive by regulating industrial fisheries. Fish is metabolized by the birds' digestive systems into nutrients and excrement. The reserve exists to increase the number of excreting seabirds, but also to function as a platform on which excretions can accumulate. But not all excretions are guano, not at least, guano that can be harvested. Guano needs to be qualified as available by going through the appropriate institutional channels. Here, SERNANP and the PSJP can be seen as potentially interfering with this enactment. This is the kind of tension that Sierra's story draws attention to. I am however, interested less in the interferences than in the ways they are made to coexist.

For Mol, one of the sources of multiplicity is the variety of places where objects are enacted. They have "local identities."⁴⁰ The different wings of a hospital, for instance, are separate yet interconnected. One enactment at the radiology department meets with another brought from the dissection room at the doctor's desk in the form of a single file, where all diagnostic techniques are stacked in a distinctive order. At the guano reserve, however, the places where enactments are made coincide geographically. The fieldworkers are immersed in them and their disciplinary practices take them to overlapping spaces. This is most evident in certain moments when my informants share resources to approach the bird colonies to make their individual observations and file reports for their superiors.

The network of animals directly relevant to guano production overseen by AgroRural is narrower than the general concept of ecosystem, although one is

<https://doi.org/10.1016/j.gecco.2022.e02351>; Rosana Paredes and Carlos. B. Zavalaga, "Nesting Sites and Nest Types as Important Factors for the Conservation of Humboldt Penguins (*Spheniscus Humboldti*)," *Biological Conservation* 100, no. 2 (August, 2001): 199–205, [https://doi.org/10.1016/S0006-3207\(01\)00023-4](https://doi.org/10.1016/S0006-3207(01)00023-4).

³⁸ Stephanie Lavau, "Going with the Flow: Sustainable Water Management as Ontological Cleaving," *Environment and Planning D: Society and Space* 31, no. 3 (June 1, 2013): 428, <https://doi.org/10.1068/d25411>.

³⁹ Lavau, 424.

⁴⁰ Mol, 55.

embedded in the other, and entangled in practice. The study of the Peruvian marine ecosystem emerged in close relation with the growth of the guano and fisheries industries throughout the 20th century.⁴¹ Managers were interested in the population of a certain subset of birds categorized as “guano birds,” which varied according to changing environmental conditions. Institutional interests informed the selection of animals under study, shaping guano ecologies as matters of concern. Nowadays only pelicans, *piqueros*, and *guanayes* are defined as such, but in the past penguins were also included. This guano ecology became coterminous with environmental ecology as understood by biologists, when the guano management company scaled up to an almost total control of the marine and coastal space,⁴² extending its scientific authority over fish populations, predatory and invasive species, and fishermen. By the 1960s, guano lost much of its economic appeal and the scope of management reduced. Regulations were lifted, fisheries gained terrain and guano management became progressively defunded. At the same time, conservation of the environment and biodiversity became major disciplines and policy objectives in the international arena. Following these shifts in the political economy of the Peruvian sea, the guano ecology and the wider ecosystem were demarcated from each other, although inextricably connected. Managers and conservationists began doing nature differently, sometimes overlapping and at other times interfering with each other. The latter characterizes the situation of Humboldt penguins at Punta San Juan. For certain issues, it is practical for natures to remain separate, as guano extraction may indeed impact penguin reproduction and the interventions of wildlife management prove deleterious to fertilizer production. They coexist in tension, however, as conservation ecology and guano ecology are ordered and made to cohere in planning documents.

Writing about earthworms in the development of Western science, Filippo Bertoni considers how different versions of earthworms can be of help in the task of counting “naturalist” natures. As in Lavau’s analysis of water conservation, worms and their natures multiply. But rather than contenting himself with the confirmation of worm multiplicity, he asks if after all the coordination that binds worms together, they remain many.⁴³ The naturalist version of Nature is an achievement of coordination by scientists who “order natures into a plurality and effectively achieve one Nature by policing the relations”⁴⁴ between them. Managers and conservation scientists at Punta San Juan rely on similar techniques of coordination to stabilize a natural reserve after doing nature. The biologists publish their papers, guards fill their reports, draw maps and communicate with higher bureaucratic instances to produce a (more or less) well-policed entity called Punta San Juan that features in inter-institutional planning documents. In Mol’s terms, this is coordination by adding up. Colony size, reproductive birds, nesting area and guano surface shapes are

⁴¹ Cushman, 2013; Kristin Wintersteen, *The Fishmeal Revolution: The Industrialization of the Humboldt Current Ecosystem* (Oakland: University of California Press, 2021).

⁴² Cushman, 2013, 168.

⁴³ Bertoni, 65.

⁴⁴ Bertoni, 75.

compared with each other, “balanced, added up, subtracted.” A hierarchy between divergent elements is established and “fused into a composite whole.”⁴⁵ This is, however, a latter step in coordination. In the next pages, I direct my attention to another technique used during direct observation.

CASETA PERSPECTIVES: APPROACHING, OBSERVING AND COUNTING

It was about to be noon in the Punta San Juan reserve but work was not yet on halt. Although the sun was almost at its strongest point, Roberto and Jaime were outside assembling the *caseta*, a lightweight booth made of aluminium tubes dressed with a piece of cloth. Blinds are used as standard ethological technique that seeks to reduce disturbance by blending with the habitat as closely as possible,⁴⁶ in order to allow direct observation of the target species. Jaime explained to me that he is not sure why this particular camouflage works, which is dark and gray and pops to the human eye against the bright sand of the Peruvian desert. Yet it allows researchers to draw nearer the center of the colony and even to manipulate some individuals. The *caseta* is large enough to accommodate four people comfortably. The day before, I attentively listened while they discussed the possibility of deploying it. Jaime noticed my interest in joining and seemed hesitant about my potentially disrupting presence during the delicate encounter. This time however he changed his mind and invited me inside, perhaps because I had just contributed to its assembly. After connecting the tubes and securing them with elastic bands, Roberto, Jaime and I picked it up from the outside and carried it for about five minutes into the *pampa*,⁴⁷ until we reached the birds’ line of sight.

In the context of ethology, blinds and habituation are two methods used with species characterized by different levels of sensitivity to humans. Animals on the lower end are susceptible to habituation, the process of waning their behavioral response to a stimulus.⁴⁸ Contrary to common views of habituation as a process only animals go through, Alcatayna-Stevens argues in a study about bonobo researchers that they, too become habituated to the animals and their sensorily-saturated environment.⁴⁹ Rather than simply a tool to accomplish neutrality, habituation calibrates scientists’ methods and data collection practice, shaping how they perceive and come to know bonobos.⁵⁰ As a technique for neutral observation, however, habituation stands in contrast with the *caseta* used in Punta San Juan. If habituation attempts to make the presence of researchers visible, yet uninteresting to bonobos,

⁴⁵ Mol, 70.

⁴⁶ Philip N. Lehner, *Handbook of ethological methods* (Cambridge: Cambridge University Press, 1996), 66.

⁴⁷ One way the space within the reserve is categorized is by differentiating between sandy plains (*pampa*) and rocky cliffs (*acantilado* or *islote*, depending if it is a cliffside from the headland or a nearby islet).

⁴⁸ Lehner, 32-33.

⁴⁹ Alcatayna-Stevens, 836.

⁵⁰ Alcatayna-Stevens, 842.

blinds do the exact opposite. Beyond their ostensive purposes, observation techniques have other epistemic and, I argue next, ontological consequences.

While standing at the threshold of visibility in the middle of the pampa, Roberto called Ana. It was time to enter the caseta and slow down our pace. The task at hand was to verify that the guanay population had entered reproductive season in order to track the life cycle of the colony. While surveying the bird colonies the previous morning, Roberto spotted a recently broken egg on a hill that suggested just this transition. Walking during his own patrol, Jaime had encountered similar hints in a different spot. Two eggs, however, remained too scant of evidence to officially declare a change of season for the whole population. Further inquiry was required. We made a stop near the largest guanay colony. By far the most numerous animals in the reserve, their nesting sites extend over the ground like long black sheets interspersed by patches of pelican colonies and crossing penguins. Everyone unzipped their side of the caseta and Roberto and Jaime peeked outside with their binoculars while Ana looked through her ultra-zoom camera lens. They seemed to be observing the same thing, the same chunk of nature outside, although from a slightly different perspective each. This vignette presents us with a microcosm of the various intersecting activities that enact the reserve and the nature within it.

Like Stefan Helmreich's discussion of technically mediated "transductions" of ocean environments into audible signals allowing oceanographers to immerse into and conduct research in an otherwise inhospitable medium,⁵¹ the caseta offers an opportunity to consider other method assemblages⁵² that enable other types of immersion and translation of environmental and behavioral data. Following Haraway, Helmreich draws attention to the cyborgian qualities of the submersible, which blur distinctions between artifice and environment; between inside laboratory and outside ocean.⁵³ In contrast, the aim of the caseta is to clearly demarcate a natural context for observers to sneak into; not by providing an extension to the bodily capacities of researchers in a hostile medium, but by confounding the objects of inquiry, the birds in their nests. The contrivance of the caseta is to allow researchers to blend into the background by negating their bodily presence for the birds. But it brings about another effect: refraction.

Typically, the three fieldworkers engage in their own patrols at different times during the day, observing, tracking and taking various notes. In their reports, data get inscribed in forms that move beyond the reserve. It is as if the three institutions that employ them have their own means to enact the reserve in their own likeness: a guano-making machine, a natural reserve and a scientific object. The image of three separate tracks maintains the illusion of institutional perspectives. This variety could lead one, then, to say there are simply various interpretations, that they all know the nature out-there "partially, and sometimes badly," tinted by their "cultural

⁵¹ Stefan Helmreich, *Alien Ocean: Anthropological Voyages in Microbial Seas* (Berkeley: University of California Press, 2009), 228.

⁵² Law, 2004a, 55.

⁵³ Helmreich, 2009, 214.

interpretations of nature.”⁵⁴ For instance, due to budgetary constraints that limit the presence of park guards, SERNANP could be said to hold an eco-centric, yet incomplete view of the reserve. Or that AgroRural has an economically biased gaze that misrepresents or ignores certain aspects of the ecosystem. Conversely, one could surmise that the PSJP has the most ‘scientifically objective’ version of this chunk of coastal land. Is the latter perspective more real than the others? Consider that from inside the caseta, the three fieldworkers look at the world from almost the same vantage point.



Figure 2. Social media post showing a similar caseta at Punta San Juan for the PBS documentary series “Changing Seas.”⁵⁵

In the caseta, all institutional perspectives mix and amalgamate. All fieldworkers perform analogous actions. Caseta observation provides a view of the entangled work done by the fieldworkers, but also of the equivocation of perspectivalism.⁵⁶ They look through distance-reducing devices and take notes to verify working hypotheses, identify specific individuals of interest, and pick up samples for later testing. That day, the caseta had been set up at the request of Roberto, who wished to verify the change of reproductive status of the guanay. He was also interested in directly counting the accompanying pelicans, which complements the indirect technique he uses for the guanay colonies, and finally, to pick up cuds regurgitated by the birds in order to keep track of their diet. Roberto was very vocal about his tasks, explaining in a loud voice what he was doing, and exchanging observations with Jaime. Ana and I remained in the back while she looked through the sides of the caseta. At the same time, I observed the observers, who almost never took their eyes off their devices. I was not completely

⁵⁴ Law, 2004b, 3.

⁵⁵ Changing Seas, season 12, episode 1203, “Peru’s Desert Penguins,” written by Alexa Elliott, narrated by Craig Sechler, aired 2020 on PBS, <https://www.changingseas.tv/season-12/1203/>.

⁵⁶ Blaser, 2018.

sure what Ana was interested in at that moment, but during a conversation later that day, she explained that she also kept track of animals. In any case, they all tipped each other off about interesting things to watch, crisscrossing their perspectives as they built upon each other to complete their observations for the day. Ana pointed at her direction, trying to draw attention toward one particular pelican. It sported a yellow marking on a wing which seemed off to the observers. Nobody was sure about its meaning, because the last study of pelicans had been performed long ago. Despite this moment of bemusement, Ana assisted Roberto's task in a rather oblique way by allowing Jaime to intervene. He reasoned that the pelican might come from another colony under study by a different research team and quickly changed the topic.

The question of whether the guanayes had in fact started reproductive season, the triggering matter of concern, could not be completely determined by looking at the lone eggs found earlier. The expectation was to see the guanayes up close and check if the couples were mating or if some of the females had begun hatching eggs already. Until that moment no eggs could be distinguished because although the birds were sitting on the nests, this could be mistaken with the previous stage of *apostamiento* (lodging): a defense tactic by which birds sit on the nests for up to four or even seven hours. Confronted with this timeframe, the fieldworkers didn't have many expectations about finding the evidential eggs, as the birds were unlikely to take off anytime soon. Somewhat discouraged, Roberto suggested taking the initial evidence as indicative of substantive changes in the birds' behavior.

While observing the intertwined relationships between fieldworkers within the caseta, it is worth noting the ontological effects therein. Rather than singling out its role as a contraption that enables neutrality through hiding, and viewing it as a device that offers a single naturalistic perspective, I suggest the caseta also functions as a refractive device. Refraction is the physical phenomenon of bending, or changing of direction, of light rays as they pass from one transparent substance to another. In contrast with Helmreich's transduction, which emphasizes the material transformations of the physical medium of a signal (water) into another that is hearable (air), the notion of refraction is grounded in the phenomenon of light. Refraction is at the heart of several optic effects that make possible the making of perceptual constructions such as prisms, magnifying glasses and lenses. I use this as a metaphor to characterize the role of the caseta in the coordination of the reserve as a single object.

As observation through institutional perspective remains central to the work of the fieldworkers at Punta San Juan, the caseta refracts what is outside, changing direction and reaching simultaneously Ana, Roberto and Jaime, despite their differing focal points. As Law & Lynch point out in an influential paper in STS about birdwatchers,⁵⁷ seeing and naming objects seem unproblematic, even natural. Contextual skills are concealed from scrutiny while only novices or outsiders notice them. However, watchers do not just 'see' birds and annotate natural kinds occurring

⁵⁷ Law and Lynch, 1988.

'out-there'. The latter are not just representations of what the mind perceives through the eye. 'Seeing' is not simply seeing. When birdwatchers see, they "engage in a reflexive elaboration in which a text provides an iterable organization, a bulky object and a moment in a hermeneutic reading of the world", and "organize their gaze sequentially".⁵⁸ Birdwatchers rely on textual artifacts such as lists and manuals that tell them what to see and how to see it, but also how to report it. Seeing is informed by a "textual order" that "lends" organization, packaging and stabilization, in other words, sense, that is "constitutive to the process of building and circulating claims."⁵⁹

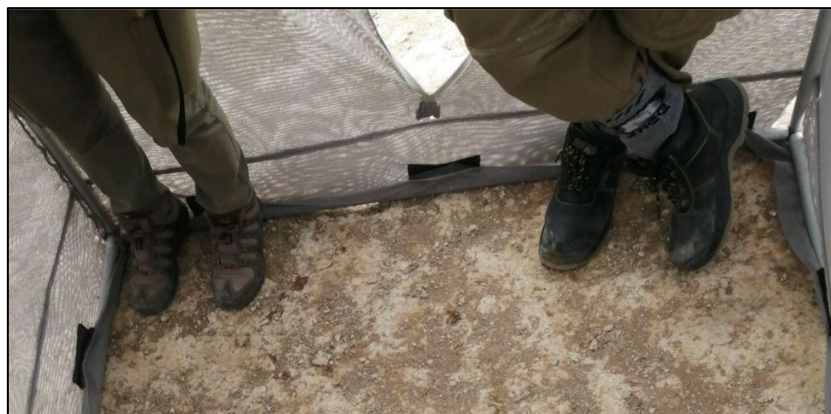


Figure 3. Inside the caseta, boots on the guano. Photo by author.

In the caseta, each fieldworkers' sight is similarly organized by their own institutional perspective and materially enabled by the hiding contraption. But the effect of refraction is that the perspectives of the collaborating fieldworkers inform their own seeing as part of their method assemblage.⁶⁰ According to Law, these assemblages craft and are crafted by hinterlands, that which can be taken for granted, the "standardized packages" that enable scientists to use reality-describing and reality-making practices from related fields.⁶¹ As a collaborative routine, Punta San Juan's fieldworkers rely on each other to see aspects of single reality out there, even if each one of them is seeing a different version of it. Their methods become hinterlands to each other. Writing about Mol's work, Law points out that "when medicine talks of lower-limb atherosclerosis and tries to diagnose and treat it, in practice at least half a dozen different method assemblages are implicated."⁶² A similar observation can be made about the reserve multiple: inside the caseta, I counted at least three methods of observation with each one as a hinterland to the other. The natures refracted through the caseta assemblage emerge as a perspectival singularity, an "out-there" that is represented differentially through institutional channels.

Read together with other signs, such as the usual time of reproductive activity

⁵⁸ Law and Lynch, 273.

⁵⁹ Law and Lynch, 298.

⁶⁰ Law, 2004a, 55.

⁶¹ Law, 2004a, 32.

⁶² Ibid.

in previous years, and the occasional sighting of egg-stealing birds like the seagull, led Roberto to say to Jaime, “I shall pass it to *repro*, then.” He meant writing in his next report that the colony as a group had moved onto the reproductive stage. Jaime and Roberto discussed for a while and decided that this was the best course of action. Ana agreed. Observations and translations made in separate tracks are drawn into one in order to produce an official statement of change in population behavior. The caseta here appears as a moment in knowledge production where perspectives become coordinated by adding-up multiple enactments of the reserve into a coherent statement. This is “coordination” of multiplicity, in the sense Mol gives to the term, a “remarkable alignment”⁶³ of different findings, diagnostics and inscriptions, but also a moment of institutional coordination on the ground enabled by caseta refractions. While the purpose of the practices that enact the different versions of the reserve sometimes appear opposed, as in the tensions between SERNANP and the biologist Majluf, thus interfering with each other, most of the time coherence is achieved and the “single” Punta San Juan reserve emerges. But this achievement is not tightly sealed. Multiplicities leak and may even get reported in the international media, such as the opening story about imperiled penguins.

CONCLUSION

Throughout these pages, I have referred to several issues that have been analyzed through a praxiographic lens, by drawing parallels with Mol’s atherosclerosis, Lavau’s conservation water and Bertoni’s earthworms. To these I will now add the example of caribou/atiku from Mario Blaser’s ethnography of Innu hunters in northeast Canada. Mobilizing praxiography to question the now commonsensical view of indigenous people having a different, cultural perspective of nature, Blaser differentiates between types of multiplicities based on how they hold together. He refers to caribou, enacted by biologists, wildlife managers, environmentalists and corporations, who share similar, naturalist assumption “that there is a ‘thing’ out there,” as a “diffractive” multiplicity. It is this very assumption which “contributes to hold this multiplicity together,” an assumption that enables the “relatively ‘civil’ procedures”⁶⁴ by which they are singularized.

By contrast, atiku, the term that Innu people use to refer to caribou, is a “divergent” multiplicity. While the multiplicity of caribou can be pictured as a stack of overlapping outlines of various versions of the animal, the multiplicity of atiku/caribou works more like a trompe l’oeil. They are distinguished by the way they are coordinated. Divergent multiplicities are ambiguous, defined by equivocation, a situation in which interlocutors appear to speak about the same thing while referring to things that are actually different.⁶⁵ The Innu hunters’ practices that enact atiku and the technoscientific practices that enact caribou do sometimes cross each other such

⁶³ Mol, 57.

⁶⁴ Blaser, 56.

⁶⁵ Blaser, 57.

as during a hunting ban controversy, yet they don't add up nor are kept completely separate. Equivocations act as a resource that "allow different practices to come together either without interference with each other, or even enabling each other."⁶⁶ Blaser proposes the concept of divergent multiplicity for situations of power asymmetry between indigenous and state actors in colonial encounters. Caribou/atiku is a multiplicity made of multiplicities where one of the constituents is coordinated through symmetrical relations between actors (scientists, managers, etc.) while the latter diverges due to its asymmetrical position (non-Western practices). It is made to hold together by displacing difference to cultural perspective. A colonial multiplicity.⁶⁷

In Punta San Juan, the practices that multiply the reserve are not totally symmetrical nor colonial in nature. The difference between partially overlapping practices based on naturalist presuppositions could lead us to characterize the reserve as a diffractive multiplicity, coordinated by civil procedures at the institutional level, such as the planning documents that hierarchize and order conservation and extraction. However, despite the entanglement between management and scientific practices of observation, there is an asymmetry between them, suggesting another way in which different versions relate to each other. Management is suspected of economic bias, of holding an interested perspective, yet considered fundamental to scientific knowledge of the ecology. In refractive multiplicity, enacting practices do not diverge nor diffract natures. Instead, by becoming hinterlands to each other within the caseta assemblage, institutional practices/perspectives become entangled, holding together guano and environmental ecologies at crucial moment of knowledge production. ▣

⁶⁶ Blaser, 61.

⁶⁷ Ibid.

BIBLIOGRAPHY

-
- Alcayna-Stevens, Lys. “Habituating Field Scientists.” *Social Studies of Science* 46, no. 6 (October, 2016): 833–53. <https://doi.org/10.1177/0306312716669251>.
 - Bertoni, Filippo. “Charming Worms: Crawling between Natures.” *The Cambridge Journal of Anthropology* 30, no. 2 (January, 2012): 65–81. <https://doi.org/10.3167/ca.2012.300205>.
 - Burow, Paul Berne, Samara Brock and Michael R. Dove. “Unsettling the Land: Indigeneity, Ontology, and Hybridity in Settler Colonialism.” *Environment and Society* 9 (2018): 57–74. <https://www.jstor.org/stable/26879578>.
 - Blaser, Mario. “Doing and Undoing Caribou/Atiku: Diffractive and Divergent Multiplicities and Their Cosmopolitical Orientations.” *Tapuya: Latin American Science, Technology and Society* 1, no. 1 (January, 2018): 47–64. <https://doi.org/10.1080/25729861.2018.1501241>.
 - Candea, Matei. “Habituating Meerkats and Redescribing Animal Behaviour Science.” *Theory, Culture & Society* 30, no. 7–8 (December, 2013): 105–28. <https://doi.org/10.1177/0263276413501204>.
 - Candea, Matei and Lys Alcayna-Stevens. “Internal Others: Ethnographies of Naturalism.” *The Cambridge Journal of Anthropology* 30, no. 2 (2012): 36–47. <https://doi.org/10.3167/ca.2012.300203>.
 - Cárdenas, Susana and Marco Cardeña. “The Punta San Juan Project—Protecting One of the World’s Largest Colonies of Humboldt Penguins.” *Penguin Conservation* 16, no. 2 (December, 2012): 10–15.
 - Carpenter, Carol. “Conservation, Anthropology And.” *The International Encyclopedia of Anthropology*, 1–10. January, 2021. <https://doi.org/10.1002/9781118924396.wbiea2388>.
 - Elliott, Alexa, writer. *Changing Seas*. Season 12, episode 1203, “Peru’s Desert Penguins.” Narrated by Craig Sechler. Aired 2020 on PBS. <https://www.changingseas.tv/season-12/1203/>.
 - Cushman, Gregory T. *Guano and the opening of the Pacific World: A global ecological history*. New York: Cambridge University Press, 2013.
 - Cushman, Gregory T. “‘The Most Valuable Birds in the World’: International Conservation Science and the Revival of Peru’s Guano Industry, 1909–1965.” *Environmental History* 10, no. 3 (2005): 477–509. <http://www.jstor.org/stable/3986000>.
 - Doig-Alba, Leonardo, Alonso Bussalleu, Susana Cárdenas-Alayza, Marco Cardeña-Mormontoy and Armando Valdés-Velásquez. “Have We Achieved a Sustainable
-

-
- Balance? Evaluating the Effects of Regulated Guano Extraction on an Important Penguin Breeding Colony (2008–2019).” *Global Ecology and Conservation* 41 (January 1, 2023): e02351. <https://doi.org/10.1016/j.gecco.2022.e02351>.
- Figueiredo, Yves. “Inventing Yosemite Valley: National Parks and the Language of Preservation.” *Historical Geography* 35 (2007): 12–37.
 - Helmreich, Stefan. *Alien Ocean: Anthropological Voyages in Microbial Seas*. Berkeley: University of California Press, 2009.
 - Holbraad, Martin and Morten Axel Pedersen. “Natural Relativism: Viveiros de Castro’s Perspectivism and Multinaturalism.” In *The Ontological Turn: An Anthropological Exposition*, edited by Holbraad Martin and Morten Pedersen, 157–98. Cambridge: Cambridge University Press, 2017.
 - Lavau, Stephanie. “Going with the Flow: Sustainable Water Management as Ontological Cleaving.” *Environment and Planning D: Society and Space* 31, no. 3 (June 1, 2013): 416–33. <https://doi.org/10.1068/d25411>.
 - Law, John. “What’s Wrong with a One-World World?” *Distinktion: Journal of Social Theory* 16, no. 1 (2015): 126–39. <https://doi.org/10.1080/1600910X.2015.1020066>.
 - Law, John. *After method mess in social science research*. London: Routledge, 2004a.
 - Law, John. “Enacting Naturecultures: a Note from STS. Centre for Science Studies.” Lancaster: Lancaster University, 2004b. <http://www.comp.lancs.ac.uk/sociology/papers/law-enacting-naturecultures.pdf>.
 - Law, John and Michael Lynch. “Lists, Field Guides, and the Descriptive Organization of Seeing: Birdwatching as an Exemplary Observational Activity.” *Human Studies* 11, no. 2/3 (1988): 271–303.
 - Lafferty, Jamie. “Peru’s Penguins Imperiled by Their Own Poop.” Sierra Club. April 2, 2023. <https://www.sierraclub.org/sierra/1-spring/notes-here-there/peru-s-penguins-imperiled-their-own-poop>.
 - Lehner, Philip N. *Handbook of ethological methods*. Cambridge: Cambridge University Press, 1996.
 - Lorimer, Jamie. *Wildlife in the Anthropocene: Conservation after Nature*. Minneapolis: University of Minnesota Press, 2015.
 - Majluf, Patricia. “Side effects of guano exploitation: unexpected refuges for seals in Peru.” Paper presented at *9th Biennial Conference on the Biology of Marine Mammals*, Chicago, Illinois, December 1991.
 - Mol, Annemarie. *The Body Multiple: Ontology in Medical Practice*. Durham: Duke University Press, 2002.
 - Mol, Annemarie. “Ontological Politics. A Word and Some Questions.” *The Sociological*
-

- Review* 47, no. 1_suppl (May 1, 1999): 74–89. <https://doi.org/10.1111/j.1467-954X.1999.tb03483.x>.
- Miller, Thaddeus, Ben A. Minter and Leon-C Malan. “The new conservation debate: The view from practical ethics.” *Biological Conservation* 144, no. 3 (March, 2011): 948–57.
 - Miranda, Fabio. “Managing guano ecologies: Environment and infrastructure in Peru's coastal islands.” Master’s thesis, Osaka University, 2022.
 - Orlove, Benjamin S. and Stephen B. Brush. “Anthropology and the Conservation of Biodiversity.” *Annual Review of Anthropology* 25 (1996): 329–52.
 - Paredes, Rosana and Carlos. B Zavalaga. “Nesting Sites and Nest Types as Important Factors for the Conservation of Humboldt Penguins (*Sphensicus Humboldti*).” *Biological Conservation* 100, no. 2 (August, 2001): 199–205. [https://doi.org/10.1016/S0006-3207\(01\)00023-4](https://doi.org/10.1016/S0006-3207(01)00023-4).
 - Punta San Juan Program. Accessed July 31, 2023. <http://www.puntasanjuan.org/>
 - Rasmussen, Mattias, Adam French and Susan Conlon. “Conservation Conjunctions: Contestation and Situated Consent in Peru’s Huascarán National Park.” *Conservation & Society* 17, no. 1 (2019): 1–14.
 - Revilla-Minaya, Caissa. “Environmental Factishes, Variation, and Emergent Ontologies among the Matsigenka of the Peruvian Amazon.” Doctoral dissertation, Vanderbilt University, 2019.
 - Slack, Nancy. G. *Evelyn Hutchinson and the Invention of Modern Ecology*. New Haven: Yale University Press, 2010.
 - Wintersteen, Kristin. *The Fishmeal Revolution: The Industrialization of the Humboldt Current Ecosystem*. Oakland: University of California Press, 2021.
 - Yates-Doerr, Emily and Annemarie Mol. “Cuts of Meat: Disentangling Western Natures-Cultures.” *The Cambridge Journal of Anthropology* 30, no. 2 (2012): 48–64.