Beyond Native and Alien: An Ecology of Belonging

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Modern conservation inherited a powerful but mistaken premise: that nature in its true state is a wilderness untouched by people, and that every species can be sorted cleanly into native or alien, belonging or invading. This credo has organized a century of policy, funding and feeling. The evidence no longer supports it.

The land that European settlers described as pristine was nothing of the kind. Synthesizing the most complete reconstruction of human land use yet assembled, Ellis and colleagues (2021) found that even 12,000 years ago, nearly three-quarters of Earth's land was already inhabited and shaped by human societies, including more than 95% of temperate and 90% of tropical woodlands. The biodiversity we now treat as wild is, in large measure, the cumulative legacy of people. Denevan (1992) made the point decades earlier for the Americas specifically: the landscape of 1492 was humanized almost everywhere, and the "wilderness" later naturalists admired was a depopulated landscape recovering from catastrophic disease, not an untouched one. What John Muir mistook for untrodden Sierra meadows were the tended gardens of the Sierra Miwok and Valley Yokuts, shaped over centuries by fire, pruning and sowing (Anderson, 2005). In Amazonia, forests long imagined as primeval are still dominated by tree species domesticated by their Indigenous inhabitants, growing in soils those people built (Levis et al., 2017).

The static picture fails in a second way. Humans have not only shaped landscapes in place; we have also carried species across the world for as long as we have been a global species. Synthesizing the archaeological and paleoecological record, Boivin and colleagues (2016) show that human-mediated translocation reaches back into the Late Pleistocene: the northern common cuscus was carried out of New Guinea to the Solomons and the Bismarck Archipelago more than 20,000 years ago and became a staple food, while tree species and other animals were moved along the same maritime routes that carried obsidian and trade. These movements were a continuous feature of human life, unfolding across four great phases from the Pleistocene expansion through Neolithic agriculture, island colonization and the rise of cities and commerce, and their cumulative effect, in the authors' own words, was the creation of novel ecosystems around the world over millennia. The island record tells the same story: the movement of plants and animals through migration and trade is an ancient phenomenon whose time depth blurs the line between natural and cultural worlds and unsettles any notion of a pristine baseline (Hofman and Rick, 2018). The species compositions we now call native are themselves, in large part, the residue of this long history of movement.

If nature is everywhere historical, everywhere entangled with human and nonhuman agency, then a clean division between native and alien species reveals itself as a limiting tool and a constraining way of thinking. A growing body of scholarship makes this explicit. Ecologists writing under the banner of novel ecosystems hold that species assemblages with no historical precedent are now the norm rather than the exception, and that

many function, persist and support biodiversity on their own terms (Hobbs et al., 2006). A wider circle of thinkers has pressed the same case from different directions: that species should be judged by what they do rather than where they came from (Davis et al., 2011); that valorizing “native nature” as inherently the best nature has become impracticable in an age of constant movement (Warren, 2021); that so-called invasive species are often agents of ecological renewal rather than ruin (Pearce, 2015); that conservation must make its peace with a thoroughly humanized planet (Kareiva et al., 2012); and that the very idea of nativeness rests on unstable historical and moral ground (Pollan, 1994). Taken together, these voices raise a sharper question: whether, amid the accelerating change of the Anthropocene, we can still afford this old way of thinking at all. Origin, on this account, is a poor proxy for ecological value. What matters is what a species does, how it lives and whether the living system it belongs to is self-willed, able to set its own course and sustain itself through its own processes, without ongoing human direction.

Yet when we look honestly at the full fabric of life in the United States, nonnative species are not the exception. They are woven throughout, and modern society is built on them. The vast majority of crops that feed the country, among them wheat, soybeans, apples, almonds, peaches and rice, are nonnative, as is most of the livestock grazing its pastures. Beyond agriculture the picture holds: earthworms tilling American soils, dandelions blanketing meadows, house sparrows nesting in eaves, ring-necked pheasants in the grasslands, brown trout in mountain streams. And the humans who have named and managed all of it, with the exception of Indigenous peoples, are themselves part of this vast and ongoing movement of life across the planet. The landscape that most Americans experience as natural or familiar is, in large part, a novel one.

This is the ground on which Apis Arborea stands. The honeybee in North America is routinely dismissed as an invasive alien, a managed livestock animal out of place in wild systems. That framing collapses two very different things: the industrial paradigm, where bees are bred and trucked and chemically treated, and the naturalized honeybee, free-living, nested in a tree cavity, sustaining itself for years through natural selection without human intervention. The second is not livestock. It is naturalized, novel wildlife, and after centuries of free-living persistence on this continent it functions as a co-constituent of native pollinator communities rather than an alien standing outside them.

The disease objection most often raised against honeybees turns out, on close reading, to be an objection to management. The documented pathogen pressure on native pollinators traces not to the presence of honeybees as such but to the conditions beekeeping creates: colonies packed at unnatural densities (Seeley and Smith, 2015), viral loads amplified by the introduced *Varroa* mite and hives trucked across the continent each season. Where managed apiaries are present, prevalence of viruses such as deformed wing virus and black queen cell virus runs markedly higher in nearby wild bumblebees, with shared flowers serving as the route of transmission; where honeybee apiaries are absent, those infections are largely absent too (Fürst et al., 2014; Alger et al., 2019). Tellingly, the negative effects attributed to honeybees across the wider literature derive almost entirely from managed, high-density operations, while free-living, unmanaged colonies remain effectively unstudied (Mallinger et al., 2017). A naturalized colony at natural density, left to coevolve with *Varroa* rather than be chemically rescued from it, does not reproduce the dynamics that drive spillover. The

harm is a property of the industrial system, not of the animal. Removed from management and movement, honeybees take their place within an intact pollinator community rather than disrupting it.

The same logic dissolves the competition objection. Free-living honeybees occupy the landscape sparsely. Wild colonies persist at roughly one to eight nests per square mile, in modest cavities of 25 to 40 liters holding on the order of 15,000 to 24,000 bees each (Seeley, 2007). Industrial apiaries invert these proportions entirely. Stocked at densities that can reach several hundred hives per square mile, each box far larger and more populous than a wild nest, they concentrate on the order of 24 million bees in the space a wild population would fill with roughly 100,000, a density tens of thousands of percent above anything that arises on its own. The demand on shared nectar and pollen scales accordingly: a square mile of managed hives can draw down hundreds of thousands of liters of nectar in a season, against a few hundred for a wild population. Forage competition with native pollinators, where it is documented, is a signature of this artificial crowding, not of honeybees living at the low densities and small colony sizes that natural nesting imposes. A scattering of wild colonies in tree cavities makes a vanishingly small claim on the floral commons; some pallets of hives make an overwhelming one.

This is what we mean by wilding. It is not a return to an imagined pristine past, which never existed, nor is it an order imposed or restored from the outside. It is the embrace of processes already at work. Free-living colonies are self-willed in just this sense: they persist, adapt and thrive on their own, and they succeed precisely because they draw on the principles that wilding names. Wilding is natural selection further developed, the same evolutionary logic carried to a fuller understanding, and it points toward the wisdom held within ecologies themselves. Our part is not to impose that wisdom but to recognize it, trust it and make room for it to unfold.

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