The Role of Indigenous Ecological Knowledge in Climate-Resilient Food Systems

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Cite as: Goodridge, Sade. 2025. "The Role of Indigenous Ecological Knowledge in Climate-resilient Food Systems". Food-Fueled, 2, e00020. https://doi.org/10.57912/28968389.

Web address: https://edspace.american.edu/foodfueled/issues/volume-2/the-role-of-indigenous-ecological-knowledge-in-climate-resilient-food-systems/

Quietly but steadily, the world is running out of farmland. Unless substantial changes are made, this depletion will create severe food shortages over the next 50 years (Farm Journal 2020). Addressing this issue requires building robust, sustainable food systems to ensure a stable food supply despite a growing global population. Central to this transformation is the recognition of Indigenous food systems grounded in traditional ecological knowledge. Unlike dominant, industrialized food systems, Indigenous food systems are holistic and rooted in principles of biodiversity, promoting sustainable land stewardship and ensuring food sovereignty. Thus, this paper argues that to address the dwindling efficacy of current food systems, there must be a paradigm shift toward food systems grounded in Indigenous ecological knowledge.

Biodiversity and Agroecology

A fundamental aspect of Indigenous food systems is their promotion of biodiversity, which enhances climate resilience. Unlike monocultures, which are vulnerable to pests, disease, and extreme weather events, Indigenous communities utilize agroecological methods, such as intercropping and polyculture. The *milpa* system, used in parts of Latin America, exemplifies this approach (Hernandez 2022,

59). In a milpa, crops like corn, beans, and squash are grown symbiotically, creating a mutually beneficial system. Corn provides structural support for beans to climb, beans restore nitrogen to the soil, and squash acts as ground cover to reduce weeds and moisture loss. Such systems reduce the need for chemical pesticides and fertilizers, which are harmful to the environment (Hernandez 2022, 139). This demonstrates that biodiversity, as opposed to monoculture, is not only a sustainable approach but also a critical strategy for bolstering food systems.

Another notable example of biodiversity in Indigenous food systems is the fish-rice systems practiced in South and Southeast Asia. These systems integrate fish farming with rice cultivation, creating a reciprocal relationship in which fish control pests while rice plants provide food and shelter for aquatic life (Hodgkin 2015). Both the milpa and fish-rice systems embody the principles of polyculture and biodiversity, offering essential climate-adaptive benefits. These examples challenge the rationale for continuing industrial monocultures, which, despite their efficiency in the short term, are ultimately fragile and harmful in the long term.

Land Stewardship and Sustainable Practices

Indigenous land stewardship is the connection between Indigenous Peoples, their natural environment, and local communities. Unlike Western environmental conservation, which often views land as a resource to be controlled or "protected," Indigenous stewardship is rooted in holistic, place-based practices that emphasize reciprocity with the natural world. Dr. Elizabeth Hernández in *Fresh Banana Leaves*, notes that Indigenous peoples sustain 80 percent of the world's biodiversity despite occupying only 25 percent of global land (2022, 119). This stewardship approach is guided by the principle of taking only what is needed and using methods that enhance, rather than deplete, natural ecosystems (Hernandez 2022, 72-3). Nonetheless, reviewing how Indigenous peoples have stewarded the land will provide invaluable insights into how we can improve our current food systems.

In a podcast interview, Dr. Fodi Beatriz Huarcaya Ayhua, a veterinarian from Peru, discussed how climate change wreaked havoc on the country's planting

season. Instead of planting in the summer, they now plant in March and April and have to use harmful chemicals. Still, Dr. Ayhua and other Peruvians give back to the environment by recovering the areas and enriching them by planting trees in the forest, as they recognize that soil degradation is due to deforestation and the use of harmful chemicals (Thompson 2024). This anecdote exemplifies the reciprocal and endemic knowledge Indigenous peoples possess. Moreover, despite growing pressures such as colonization and climate change, Indigenous peoples continue to demonstrate perseverance and solutions with tenacity and resilience.

This relationship with the land is also deeply spiritual, shown in the continued practice of customary rituals passed down for generations to pay respect to their deities and ancestors. The narratives of Black and Indigenous communities converge on this issue, as both groups have faced displacement and loss of land rights due to settler colonialism (Agroecology Summit 2023). Thus, bell hooks' essay, Touching the Earth, discusses the land as a source of restoration and healing (hooks 2020).

Scholar and activist bell hooks frames land as a site of restoration and healing for Black communities, emphasizing the need for marginalized groups to reclaim control over their connection to the land and how the land is a source of restoration and healing for Black people. She also highlights the deep connection between Black people and Indigenous Americans, explaining how they taught each other to work with the land to grow food. These themes of restoration and education resonate with Leah Penniman's Black Earth Wisdom, a collection of essays and interviews exploring Black people's spiritual and scientific relationship with the land, water, and climate (2024). A quote on Penniman's website from the Queen Mothers of Kroboland, Ghana, admonished their Black American student in disbelief over their lack of spirituality (2024).

This same outrage and disbelief were passionately exclaimed by Jonny BearCub Stiffarm at the US Agroecology Summit, who questioned why Indigenous peoples should trust researchers when they do not have any spirit (Agroecology Summit 2023). These impassioned declarations emphasize a key pillar of Indigenous land stewardship—recognizing the interrelationships between all living

beings on earth and having a reverential attitude toward the environment in taking care of it while dwelling within its premises. It is important to note that spirituality is not synonymous with religiosity. Instead of the inherent hierarchical structure religions comprise, spirituality has been maintained as an individual act (Toledo 2022). Thus, each person can exhibit some form of spirituality in nature through actively engaging in one's surroundings or expressing gratitude for the natural world. Each of these acts allows for a greater appreciation of the earth, which results in greater care. As Penniman's website and hooks' sentiments state, "When we love the earth, we are able to love ourselves more fully" (hooks 2020).

Connecting synergistically with the land, as Indigenous and BIPOC stewards do, allows for what Dr. Hernandez emphasizes: Indigenous knowledge is place-based (Hernandez 2022, 119). This means that every Indigenous tribe, pueblo, or community has their own unique ways of thinking and managing their landscapes. Landscapes are looked at holistically and are not viewed or divided into systems, as is typical in Western ideology. This way of thinking results in a more inclusive way of viewing the environment instead of a transactional viewpoint. One can see themself as part of the environment, not apart from it. This type of perspective is crucial for recognizing one's place within the broader ecosystem and adapting our minds to develop robust food systems in a sustainable and long-lasting manner.

Food Sovereignty and Food Justice

Food sovereignty, a key principle of Indigenous food systems, offers a climate-justice-centered approach to food production. Echoing in the background of the movement of food sovereignty is reclamation—reclaiming what dominant groups have taken to exploit marginalized ones. One prominent example is the La Via Campesina movement, a global alliance of small farmers advocating for food sovereignty. The movement promotes collective action to protect farmers from corporate monopolization of seeds and agricultural resources (La Via Campesina 2022). This emphasis on unity is echoed in Karen Washington's interview (Brones 2018) and Leah Penniman's Farming While Black (2018), where the communities they formed provided spaces for collective empowerment. These stories highlight

the importance of working together to confront powerful entities like multinational corporations.

Additionally, as Jesus Vazquez from Organizacion Boricua de Agricultura Ecologica de Puerto Rico succinctly explains in the short film *Agroecology in Action*, “Agroecology is food sovereignty” (CAGJ 2022). This means Indigenous communities are building more democratic and equitable food systems. Furthermore, Mr. Vazquez notes that because of the colonial context, almost 80 percent of the food eaten in Puerto Rico is imported, whereas in the past, Indigenous communities domestically produced more than 70 percent (CAGJ 2022). So, combining Indigenous knowledge with modern innovation and the ecosystems’ natural processes honors ancestral wisdom and liberates the farmer from harmful practices championed by large multinational corporations.

On a similar note, during a field trip to UDC Farms, Chef Marly, a food justice advocate, recounted how people send her heirloom seeds from around the world to preserve climate-resilient crop varieties from large corporations' attempts to monopolize. Such practices underscore the importance of seed sovereignty, a key element of food sovereignty. Seed sovereignty allows communities to control their own sources of food production, reducing dependence on industrial seed companies that produce genetically modified, non-replicable seeds.

Food justice builds upon the principles of environmental justice. The First National People of Color Environmental Leadership Summit, held in Washington, D.C., in 1991, declared in Environmental Justice Principle 7, “Environmental Justice demands the right to participate as equal partners at every level of decision-making, including needs assessment, planning, implementation, enforcement, and evaluation” (Environmental Justice 1991). In an essay, Malini Ranganathan critiques Western environmentalism for ignoring colonial histories and calls for a decolonized vision of environmental justice (2017). These perspectives underscore the urgent need for community-based approaches to food production that honor the contributions of Indigenous and BIPOC communities. Such approaches enable communities to reclaim autonomy over their food systems while promoting climate adaptation and resilience.

Decolonizing Knowledge and Centering Indigenous Voices

Unfortunately, conventional environmental practices or policies rarely prioritize or consult Indigenous peoples. Despite the effectiveness of these Indigenous agroecological practices, mainstream agricultural systems still prioritize monoculture farming and industrial food production. This is partly due to the systematic exclusion of Indigenous voices in conservation and agricultural policy. Scholar Leanne Betasamosake Simpson highlights this issue in her work on Indigenous pedagogy, contrasting Western education's emphasis on conformity with Indigenous modes of self-determined, land-based learning (2014). Indigenous knowledge systems are often dismissed as too radical or unscientific despite the clear evidence of their success.

Still, moving forward requires heeding insights like those from Indigenous scholar Kim TallBear, who emphasizes the need to decentralize conversations by "standing with" marginalized communities (2014). Unfortunately, many members of dominant groups tend to tokenize BIPOC voices rather than genuinely listen. Such behavior is counterproductive to the core of agroecology, which is fundamentally a social justice issue. Thus, it will take guiding principles like the Agroecology Research-Action Collective, which stresses respecting diverse knowledge and analyses to help provide a path forward (2021).

One of the most effective ways to center traditional Indigenous voices is to take a community-based approach. Such engagement helps prioritize real-world needs and create more adaptable policies. Authors Orlando Fals-Borda and Muhammad Anisur Rahman offered new perspectives on how community-based research is practiced globally. They outlined techniques such as collective research, critical recovery of history, valuing folk culture, and producing and disseminating new knowledge (1991). These themes resonated with the UNESCO report on transforming higher education institutions for sustainability, which advocated revising institutional practices to create opportunities for engaging diverse communities and employing inclusive approaches that respect cultural diversity (2022). These principles align with Orlando Fals-Borda's ideas on participatory

action research, calling for recognizing how culture and ethnicity play a role in the reciprocal nature of participatory research (Fals-Borda 1991, 6).

Conclusion

The documentary *Gather* underscores the importance of Indigenous ecological knowledge. While the United States is a relatively young nation, Indigenous communities have lived on and cultivated this land for centuries, fostering a profound understanding of its ecosystems. For example, master forager Twila Cassadore, featured in the documentary, demonstrates her expertise in identifying edible plants. She reflects on the tragic loss of traditional knowledge resulting from the genocide of the Apache people (Rawal 2020). This anecdote only highlights the urgency of consulting Indigenous communities and tapping into their extensive ecological wisdom to address current environmental challenges.

Indigenous knowledge systems promote biodiversity, sustainable land stewardship, and food sovereignty—offering a holistic model for climate-resilient food systems. However, policymakers, researchers, and environmental organizations must go beyond symbolic inclusion for these strategies to be effective. Centering Indigenous voices requires decolonizing knowledge systems and recognizing Indigenous perspectives as valid, scientific, and essential to the global climate response. This shift can enable a transition from extractive industrial food models to regenerative, ecologically sustainable systems that build climate resilience for all.

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