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Culture: the missing link in sustainable food systems

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This paper explores the sustainability potential of food and farming culture, which is largely overlooked by mainstream approaches for transitioning food systems. I present two cases where food and farming culture is alive and thriving—in the Maya-Achí territory of Guatemala and in Wales—illustrating how cultural practices and values may contribute to global sustainability challenges and resilience.

Culture matters. This is true in the arts and languages as much as ecology and development. Cultural diversity and heritage contribute to shared meanings and attachment to place, influencing how we manage, interact, and protect the environment[1]. It supports our capacity to coexist and even enhance biodiversity, as well as adapt to changing conditions, among other attributes[2,3].

Culture tied to food and farming, the result of generations of accumulated knowledge, trial and error, and interactions with the land, is equally significant—crucial even, for building sustainable and resilient futures. Yet, existing strategies to transition food systems from being destructive to regenerative often overlook culture, focusing largely on technological fixes for boosting yields, developing novel food alternatives, controlling pests, and so forth[4,5]. This not only represents a missed opportunity to engage with holistic and time-tested strategies, but it also may perpetuate the loss of traditional knowledge and cultivars, as well as provoke even further separation between people and the soil—which should be a concern for us all[6].

In this essay, I make the case for closer inspection of food and farming culture as a vital asset to any sustainability plan. I do this by first defining what food and farming culture means: its characteristics and relevance to sustainable food systems. I present evidence from existing literature and arguments, of which there are many, along with two case studies where I have personal experience. I then provide recommendations on how to safeguard and encourage sustainable cultural practices and values, from research priorities to policy initiatives, with examples of where protective measures are in place.

What is food and farming culture and why does it matter?

To begin, I recognise there is no single culture around food and farming, but many diverse *cultures*—embedded in place, reproducing and adapting to their specific, often changing contexts. For all purposes, this must include culture and cultural practices around industrial agriculture: its producers and consumers. It may be argued that aspects of our modern culture are intricately connected to food: fast food culture, for example, and the rise of ultra-processed foods[7]. This is a cultural phenomenon and from this perspective, a cultural problem, due to its environmental and social unsustainability, and adverse health impacts[8].

For the sake of this paper and its argument, I define culture in food and farming as a set of activities, histories, values, memories, knowledge systems, and beliefs attached to food production and consumption—combined. It is this combination, the shared meanings and interconnectedness between the two, that make it distinct. It is a culture that is both ancient and contemporary; alive, adaptive, and at risk due to industrial agriculture and the commodification of food[9].

Specific characteristics of food and farming culture include rituals, stories, music, and language; regional specialties, including heirloom crops, terroir, and culinary traditions; and local economies with diverse producers who transmit knowledge and principles both generationally and between community members.

There are multiple and often very practical ways that food and farming culture drives sustainable food systems. Providing a means of connectivity between producers and consumers is one of the more well-known benefits. By maintaining value and creating demand for local products, a thriving food and farming culture shortens supply chains and encourages seasonality, reducing carbon footprints and boosting local economies and food security[10]. Food and farming culture promotes what author and farmer Wendell Berry[11] calls "traditions of care," and what resilience experts Stephan Barthel and colleagues[2] describe as "stewardship memory," implying management practices steeped in reverence and attachments to the land—often as a means of practical survival. Given the emphasis on community, food and farming culture intersects with social capital—mutual labour, reciprocity, and local organising—an essential component to any sustainable agri-food transition[12].

Small-scale agriculture and agriculturalists are widely regarded as the primary vehicle of food and farming culture. Though definitions may vary, smallholders are often family-based (though not exclusively[13], meaning they rely on family and/or communal labour and heritable property[14]. The size of their farms, though generally under ten hectares, **corresponds** to their production types and other contextual factors, and is operated with limited resources compared to large-scale agriculture[15]. The logic of smallholding may be to grow food for the family unit only (i.e., subsistence agriculture), though typically an excess of products is sold in some form of market, traded or shared[16].

A heterogenous group, and frequently marginalised, smallholders are tenacious, resolute not to disappear, and increasingly recognised for their role in global food security and developing sustainable production systems, often termed agroecology[17,18]. This is due to several factors. First, given the manageable size of their farms, level of ecological knowledge and resourcefulness, smallholders often preserve and make use of biodiversity[19]—a stark contrast from industrial monocultures. They also conserve agrobiodiversity[20], given the wide range of crops and varieties they grow—an

attribute proven critical for climate resilience and supporting diverse, nutritional diets[21]. Under favourable conditions—which, although context-specific must include adequate land, supportive policies and rights, and markets[22]—smallholders are innovative and develop low-input systems based on recycling and prevention[23]; a strategy that supports their autonomy[24]. Contrary to popular belief, small-scale farming systems are proven to be more efficient than their industrial counterparts on all fronts, including yields, given the diversity of crops and harvests in both managed and unmanaged settings[25].

Food and farming as an art and requisite for wellbeing

Countless examples exist in both the global north and south where food and farming culture is alive and thriving. Here, I briefly illustrate two cases: from Highland Guatemala, where I have worked with Indigenous organisations over the past two decades, and in Wales, where I currently research food systems transformation.

The Maya-Achí are one of two dozen ethno-linguistic groups in Guatemala, a global centre of crop domestication and repository of traditional practices[13]. With approximately one hundred thousand inhabitants across rural, dry-tropical terrain, the Maya-Achí territory is among the most marginalised in the country, disproportionately impacted from climate change as well as the state-sponsored violence of the 1980s, which displaced and took the lives of thousands of innocent farmers and leaders[26].

Processes to rebuild the social fabric and community wellbeing, called *Utziil K'asleem* in the Achí language, are interwoven with food and agricultural practices[27]. These include safeguarding named and locally adapted maize varieties, semi-wild herbs that are highly nutritious, and regional dishes. As our research shows[28], ancestral farming practices that include careful management of organic materials are linked to cultural beliefs, for example, religious activities and reverence for Mother Earth.

Seeds in the Maya-Achí territory form the basis of food sovereignty and identity. Stories of cultural survival recount family members who risked their lives to preserve family heirloom seeds moments before the soldiers arrived, later to be recovered and planted by surviving family members. Programmes that reteach seed conservation and diverse farming systems are considered vital, as the violence and adoption of agrochemicals and non-native crop varieties have eroded traditional practices[29]. Cultural projects directed by Maya-Achí associations involving agroforestry and homemade bio-fertilisers encourage members to rethink agriculture "as an art," unleashing its creative potential and reconnecting with ancestral values: autonomy and caring for Mother Earth[30].

As stated by Maya-Achí community leader Alfredo Cortez, "Our ancestors studied the soil, birds, plants, water… They accumulated wisdom and knew how to live harmoniously with nature. This is science. It is a legacy, a part of our DNA. But it is endangered, and we must recover it" (Personal Communication, May 1, 2025).

Wales, in a Global North context, features similar aspects of cultural memory linked to sustainable food and farming.

As a nation, Wales is rich in cultural capital, with a thriving language and a strong sense of identity entwined with the land and sea. The country also features a large proportion of smallholders among its farming population, an increasingly uncommon characteristic in Western Europe[31].

At the same time, Wales has some of the highest incidences of obesity and food poverty in the UK[32]. It is also known for its ecological degradation, resulting from a legacy of extractive industries and excessive grazing on concentrated landholdings, of which the end-products are largely exported[33].

Cultural erosion is entwined with the loss of agricultural practices, including crop and dietary diversity. This is evident by the near extinction of heritage 'black' oats, and drastic reduction in small-scale orchards—and diversified farming systems in general—which rely on local knowledge and markets, and people on the land[34,35].

Welsh culture acts as a platform and catalyst for sustainable food transitions in various ways. Although commonly assumed that the Welsh landscape is suitable only for sheep, one needn't go far back to encounter mixed farming and harvesting (seafood, seaweed, wild plants) systems, which formed the backbone of local food security. These systems included ancestral practices such as integrating livestock for nutrient recycling and maintaining biodiverse hedgerows—not only for creating boundaries, but for fuel, fodder, medicinal and edible plants, and animal habitat. As recounted by food historian Carwyn Graves[35], it is still within living memory that Welsh farmers interacted ingeniously with their ecosystems to produce food, largely without fossil fuels and rooted in cultural heritage: language, songs, and livelihoods.

Sustainability programmes that draw from Welsh culture are growing and promoted by the Well-being of Future Generations Act, a government policy featuring criteria for strengthening food systems and culture together[32]. Examples include organisations like Cegin y Bobl (People's Kitchen) [https://www.ceginybobl.co.uk/], whose aim is to reconnect communities with their food by teaching children to cook using seasonal ingredients and joining up local farms with school cafeterias. Other groups are working to develop community-supported agriculture and local food hubs, to assist small-scale producers to regain their economic viability, as well as provide support for growers who continue planting and breeding heritage grains and fruits[33].

According to Graves, valuing culture and tradition is not about returning to an idealised past, but rather making practical use of the knowledge and place-based attachments developed over millennia, for producing abundant food within natural constraints.

"With food sovereignty movements gaining popularity around the globe," he states, "it is striking how all the themes can be found in Welsh language and traditional practices… even in cases where a clear generational gap exists between these practices – traditional orcharding and wassailing, organic market gardening, etcetera – and their recent rediscovery" (Personal Communication, June 4, 2025).

Concrete actions

As shown in the cases of the Maya-Achí in Guatemala and farming communities in Wales, actions to protect food and farming cultures are alive and gaining momentum. Some governments, like the Welsh, are beginning to acknowledge the connection between culture and a sustainable food-secure future, inserting the concept into policy and development goals[32]. To prevent further loss, more concrete actions are needed, as well as efforts to shift narratives and habits surrounding "modern" food culture and diets.

Effective solutions must include educating the public while supporting culture-based initiatives, with the goal to reconnect food production and consumption at multiple levels. Cegin y Bobl is a leading example, as they provide a channel to market for smallholders through public procurement, alongside educating children, teachers, and parents in areas with high food poverty and incidence in diet-related disease. This work is scalable yet requires more public buy-in and financial support.

Economic inequality and stigmatisation, which smallholders have battled for centuries, must be addressed. For this to happen, I return to the concept of favourable conditions—along with those deemed unfavourable, which include situations of land grabbing and land scarcity, and result in the same unsustainable practices smallholders are often stigmatised for, notably deforestation and overgrazing[36].

Small-scale, agroecological farming is difficult and not getting any easier, given the overlapping crises smallholders face: climate change, cost of living, financial speculation and corporate control[37]. Increasingly smaller landholdings, the norm across the global south, can exacerbate food insecurity and poverty[38]. Regardless of context, successful small-scale agriculture and dignified livelihoods for farmers must include better access to resources —land, water, credit, and human-scale technologies, such as the biofertilisers produced by Maya-Achí farmers. If smallholders are such crucial actors in stewarding the land and conserving our seeds and biodiversity, they must be duly resourced, honoured and compensated—especially women, who are fundamental yet often rendered invisible, despite the additional burdens they undertake[39]. Other criteria should include thriving local markets where farmers can circumvent megaretailers and their race-to-the-bottom approach by selling direct to consumers, with the support of local governments (see the Liege Food Belt, for example [https://www.catl.be/]. Food hubs, community supported agriculture (CSAs), farmers markets, and public procurement are also effective strategies[40]. But again, these actions must coincide with popular education that works at changing mindsets around food; e.g., reinvigorating culturally-relevant dishes, diets, and underutilised crops. Reconnecting people to their food and its production at any level, from making allotments more accessible to embedding it into the school curriculum, is essential. Education can also play an important role in strengthening cultural pride and knowledge, especially in communities traumatised from recent colonisation and repression[41].

International legislation protecting and supporting food and farming cultures is also needed. Yet, as we have argued elsewhere[29], successful long-term interventions should be developed and carried out by local actors who understand the context and needs of their communities. Therefore, community organisations already engaged in this work must take the lead.

"Eating is an agricultural act"[42]

As simple and popularised as it has become, Berry's declaration, written more than three decades ago, is as urgent a concept as ever. The consequences of distancing ourselves from our food have never been more apparent. Eating is indeed an agricultural act. Yet the solutions currently on the table may distance us even further.

Agriculture is also a political act.

Research verifies the importance of culture in sustainable food systems, especially regarding traditional agriculture and its role in biodiversity conservation[43]. However, more work is needed to understand the social and environmental impacts, as well as document where thriving food and farming cultures exist, and why. What are the factors that maintain culture and how is it being reinvigorated? Can new meanings around food and its production be constructed? Is it possible for cultural traits—principles and practices—to transfer from one region to another? And finally, how might cultural agents—smallholders, particularly—be upheld and protected in our globalised society?

Food and farming cultures, still alive in many parts of the globe, hold clues and practical tools for healthy and ingenious ways of sustaining ourselves and the land. But recognising this alone is not enough to halt further loss. Smallholders are ever more pushed out of the way for large-scale farms and factories, in the name of 'efficiency' and profit. Cultural embeddedness in diet, famously in the Mediterranean, is celebrated yet increasingly distanced from production—for economic reasons that do not hold up ecologically nor socially. This must be reversed through political will and swift action, addressing the commodification of food.

Data availability

No datasets were generated or analysed during the current study.

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References

1. Pretty, J. et al. The intersections of biological diversity and cultural diversity: towards integration. *Conserv. Soc.* **7.2**, 100–112 (2009).
2. Barthel, S., Crumley, C. & Svedin, U. Bio-cultural refugia—safeguarding diversity of practices for food security and biodiversity. *Glob. Environ. Change* **23**, 1142–1152 (2013).
3. Berkes, F., Colding, J. & Folke, C. Rediscovery of traditional knowledge as adaptive management. *Ecol. Appl.* **10**, 1251–1262 (2000).
4. Gugganig, M., Burch, K. A., Guthman, J. & Bronson, K. Contested agri-food futures: introduction to the Special Issue. *Agric Hum. Val.* **40**, 787–798 (2023).
5. Sage, C. Challenging high-tech solutionism in an era of polycrisis: a commentary on claims for novel foods and on building an alternative narrative. *Int. J. Sociol. Agric. Food* **2**, 187–205 (2024).
6. Pimbert, M. Transforming food and agriculture: competing visions and major controversies. *Mondes en Développement* **199-200**, 361–384 (2022).
7. Jayasinghe, S., Byrne, N. M. & Hills, A. P. Cultural influences on dietary choices. *Prog. Cardiovasc. Dis.* **90**, 22–26 (2025).
8. Amorim, A., Laurindo, J. B. & Sobral, P. J. A. On how people deal with industrialized and non-industrialized food: a theoretical analysis. *Front. Nutr.* **9**, 948262 (2022).
9. FAO. *The White/Wiphala Paper on Indigenous Peoples' Food Systems* (FAO, 2021).
10. Britwum, K. & Demont, M. Food security and cultural heritage missing link. *Glob. Food Sec.* **35**, 100660 (2022).
11. Berry, W. *The Unsettling of America. Culture and Agriculture* (Counterpoint, 1977).
12. Pretty, J. The agroecology of redesign. *J. Sustain. Org. Agric Syst.* **70**, 25–30 (2020).
13. Verfuerth, C., Bellamy, A. S., Adlerova, B. & Dutton, A. Building relationships back into the food system: addressing food insecurity and food well-being. *Front. Sustain. Food Syst.* **7**, 1219299 (2023).
14. Netting, R. M. *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture* (Stanford University Press, 1995).
15. Khalil, C. A., Conforti, P., Ergin, I. & Gennari, P. *Defining Small-Scale Food Producers to Monitor Target 2.3. of the 2030 Agenda for Sustainable Development*. FAO Statistics Division, Working Paper Series. Food and Agriculture Organization of the United Nations (2017).
16. Aagaard, L. K. More-than-capitalist economies: insights from community supported agriculture, tiny houses and hitchhiking in Denmark. *Ecol. Econ.* **240**, 108831 (2026).
17. IFAD. *Smallholders, Food Security, and the Environment* (International Fund for Agricultural Development/UNEP, 2013).
18. Altieri, M. A. Agroecology, small farms, and food sovereignty. *Mon. Rev.* **61**, 102 (2009).
19. Gonzales, N. C. & Kröger, M. The potential of Amazon indigenous agroforestry practices and ontologies for rethinking global forest governance. *For. Policy Econ.* **118**, 102257 (2020).
20. Isakson, S. R. No hay ganancia en la milpa: the agrarian question, food sovereignty, and the on-farm conservation of agrobiodiversity in the Guatemalan highlands. *J. Peasant Stud.* **36**, 725–759 (2009).
21. Johns, T., Bronwen, P., Maundu, P. & Eyzaguirre, P. B. Agricultural biodiversity as a link between traditional food systems and contemporary development, social integrity and ecological health. *J. Sci. Food Agric.* **93**, 3433–3442 (2013).
22. Mier, Y. et al. Bringing agroecology to scale: key drivers and emblematic cases. *Agroecol. Sustain. Food Syst.* **42**, 637–665 (2018).
23. Morales, H. & Perfecto, I. Traditional knowledge and pest management in the Guatemalan highlands. *Agric Hum. Values* **17**, 49–63 (2000).
24. Wilken, G. *Good Farmers* (University of California Press, 1987).
25. Ricciardi, V., Mehrabi, Z., Wittman, H., James, D. & Ramankutty, N. Higher yields and more biodiversity on smaller farms. *Nat. Sustain.* **4**, 651–657 (2021).
26. Comisión para el Esclarecimiento Histórico (CEH). *Guatemala: memoria del silencio. Report of the Commission for Historical Clarification Conclusions and Recommendations* (Comisión para el Esclarecimiento Histórico (CEH), 1999).
27. Einbinder, N. & Morales, H. Development from within: agroecology and the Quest for Utziil K'asleem in the Maya-Achí Territory of Guatemala. *J. Lat. Am. Geogr.* **19**, 133–158 (2020).
28. Einbinder, N. et al. Agroecology from the ground up: a critical analysis of sustainable soil management in the highlands of Guatemala. *Agric Hum. Values* **39**, 979–996 (2022).
29. Bakal, M. & Einbinder, N. Scaling local climate action: learning from community organizations to build a post-development agenda. *npj Clim. Action* **3**, 30 (2024).
30. Einbinder, N. Moving forward, looking back: Indigenous agriculture in Guatemala. TABLE Essays. TABLE. https://www.tabledebates.org/essay/moving-forward-looking-back-indigenous-agriculture-anthropocene (2025).
31. Devenish, K. The farming sector in Wales: research briefing. Welsh Parliament. Senedd Research. https://research.senedd.wales/media/iuch3jz1/22-47-farming-sector-in-wales.pdf (2022).
32. Bellamy, A. S. & Marsden, T. A Welsh food system fit for future generations. https://www.wwf.org.uk/sites/default/files/2020-03/WWF_Full%20Report_Food_Final_3.pdf (2020).

33. Bonfert, B. Agrifood policy after Brexit: the growing role of agroecology in Wales. *J. Rural Stud.* **114**, 103559 (2025).
34. Turner, A. Search for the holy grain: lost Welsh crops offer hope for future varieties. *The Guardian*. https://www.theguardian.com/environment/2022/oct/28/black-oats-llafur-ni-wales-crops-grains-growers-farmers-aoe (2022).
35. Graves, C. *Tir: The Story of the Welsh Landscape* (Calon, 2024).
36. Vandermeer, J. & Perfecto, I. The political ecology of deforestation in Central America. *Sci. Cult.* **7**, 519–555 (1998).
37. Gliessman, S. Agricultural land and water are up for grabs. *Agroecol. Sustain. Food Syst.* **48**, 1065–1067 (2024).
38. Giller, K. E. & Andersson, J. A. How small is beautiful? Farm size and economic development in Africa. in *Pathways to African Food Security: Challenges, Threats and Opportunities towards 2050* 1 edn (eds Giller, K. E. & de Haas, M.) 187–198 (Routledge, 2025).
39. Shiva, V. Women and the gendered politics of food. *Philos. Top.* **37** (2009).
40. Agroecology Coalition. Agroecology and consumers: strengthening the role of citizens in sustainable food systems. *News*. https://agroecology-coalition.org/agroecology-and-consumers/ (2025).
41. Bakal, M. L. *World-Making in Process: Agroecology, Learning and Co-design For Ecological Resilience and Cultural Survival in Maya-Achí Territory*. PhD Thesis, University of California, Department of Education (2024).
42. Berry, W. *What Are People For?* (North Point Press, 1990).
43. Altieri, M. A. & Nicholls, C. I. The adaptation and mitigation potential of traditional agriculture in a changing world. *Clim. Change* **140**, 33–45 (2013).

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