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RECEIVED 27 August 2025

ACCEPTED 30 September 2025

PUBLISHED 20 October 2025

CITATION

Loayza G and Dangles O (2025) Monitoring sustainable food commons.
Front. Sustain. Food Syst. 9:1694069.
doi: 10.3389/fsufs.2025.1694069

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Monitoring sustainable food commons

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The global food system is in the midst of a structural crisis characterized by the commodification of food and the dominance of market-oriented production logic, threatening ecological sustainability and social equity. In response, we propose viewing food systems as socio-ecological commons, the collective management and adaptive governance of which are essential. However, situated monitoring mechanisms that allow for a rigorous and inclusive assessment of their evolution, impacts, and interactions are still lacking. Collaborative monitoring is emerging as a response that is understood not only as a technical monitoring tool, but also as a principle of care, learning, and community co-responsibility. We illustrate our approach through a project that aims to establish pesticide-free food commons in the Ecuadorian Andes. We use the concept of the *chakrakamak*, a Kichwa term meaning field caretaker, to refer to a person dedicated to monitoring the commons. We generate hybrid indicators that align with the Sustainable Development Goals (SDGs) and the *Buen Vivir* Goals (BVGs), recognizing the interconnectedness of society, nature, and individual well-being. This approach broadens the theory of the commons, establishes replicable metrics, and strengthens food governance to create more inclusive, equitable, and resilient systems.

KEYWORDS

food commons, collaborative monitoring, SDGs, BVGs, sustainability

Rethinking food systems: from global crisis to commons-based governance

The contemporary global food system is experiencing a structural crisis that threatens both ecological sustainability and social equity (Rockström et al., 2009; Willett et al., 2019). This is mainly due to the dominance of a hegemonic economic logic focused on profit maximization, the commodification of food, and productive specialization oriented toward global markets (Spagnuolo, 2018). This logic permeates national and international public food policies, limiting the possibility of promoting transitions towards just and sustainable food systems. In light of this, food sustainability has become a cross-cutting priority of the 2030 Agenda for Sustainable Development (Dangles and Struelens, 2023), as food systems directly impact several Sustainable Development Goals (SDGs) such as food security, health, gender equality, climate change mitigation, and biodiversity preservation (European Commission, Directorate-General for Research and Innovation, 2020; IPES-Food, 2019). In this context, food systems must be approached not as simple market-oriented production chains, but as common goods—that is, as interdependent socio-ecological systems whose collective management is fundamental to their sustainability (Kuljay et al., 2021; Manzoni, 2024). The concept of food commons challenges the prevailing paradigm of the agro-industrial system, by presenting an alternative vision that recognizes food as elements linked to territories, cultures, agroecological practices, forms of community organization, and relations of reciprocity (Manzoni, 2024; Teixidor-Toneu et al., 2025). Advocating for alternative forms of governance, this perspective highlights the roles of local communities, the state, and the

private sector in protecting and co-managing food as a shared heritage (Manzoni, 2024). However, despite these contributions, the food commons lack systematic monitoring mechanisms that allow for a rigorous and situated assessment of their evolution, impacts, and interactions within a socio-ecological system. A scientifically rigorous, interdisciplinary, and inclusive approach is necessary to track change, urge action, and hold decision-makers at all levels accountable (Fanzo et al., 2021; Béné et al., 2024). Monitoring should be viewed not as a technical instrument of supervision, but as a fundamental principle of commons governance, as Ostrom (1990) originally proposed and Cox et al. (2010) later expanded upon, linking it to practices of care, shared observation, and institutional adaptation. This perspective enables a re-evaluation of the role of local actors in the monitoring of their commons. Building on this view, it becomes clear that collaborative monitoring not only strengthens local governance but also opens a space to rethink broader sustainability agendas. Collaborative monitoring emerges as a bridge between scales, translating the learnings and needs of territories into international sustainability frameworks that move beyond technical indicators to also recognize the social, emotional, and cultural relationships sustaining life in food systems.

The need for collaborative monitoring of common goods

Common goods are vulnerable to overexploitation, requiring effective mechanisms to detect opportunistic behavior without burdening users who actively contribute to their sustainability (Ostrom, 1990). Monitoring is essential because it promotes accountability within the group. Cox et al. (2010) propose two sub-principles for effective monitoring: monitors must exist and they must either be community members or be accountable to the community. This practice makes non-compliance visible, strengthens sanctioning mechanisms, and enhances users' strategic behavior. It also encourages information sharing and collective preparedness. A study by Mora and Gunn (2001) on subsurface irrigation systems showed that communities with participatory monitoring had greater organizational capacity and were better able to respond than those that relied solely on external information.

Within community-based monitoring, collaborative monitoring has emerged as a key strategy in commons management, particularly in contexts where local communities play a central role in the production, care, and governance of agroecological systems (Pollock and Whitelaw, 2005; Kouril et al., 2016; Lam et al., 2019). This monitoring approach is based on the framework of knowledge co-production, a method that is widely endorsed by scientific and funding agencies (Volkery et al., 2008; Mauser et al., 2013; Norström et al., 2020; Nicklin et al., 2021). It recognizes that addressing sustainability issues requires the active collaboration of academics and non-academic actors.

In the case of collaborative monitoring, community participation goes beyond simply providing data. It encompasses active involvement in the methodological design, data collection, analysis and interpretation, and decision-making (Danielsen et al., 2009; Dangles et al., 2010; Kouril et al., 2016). This transforms traditional vertical power dynamics into horizontal processes that strengthen local autonomy, territorial control, and the legitimacy of situated

knowledge. Unlike external surveillance systems, which are typically designed by state or private actors with little connection to local dynamics, collaborative monitoring is designed by the community itself. It is based on relationships of trust, reciprocity, and shared responsibility (Pollock and Whitelaw, 2005), recognizes local ecological knowledge (Berkes et al., 2000), enhances the social-ecological resilience of territories (Chambers et al., 2021), and contributes to the political empowerment of communities.

In recent years, the importance of monitoring in food systems has been emphasized by the Food Systems Countdown Initiative (FSCI), launched after the first United Nations Food Systems Summit in 2021 (Schneider et al., 2023). The initiative aims to address gaps in food systems monitoring by taking an interdisciplinary, collaborative approach (Schneider et al., 2023; Fanzo et al., 2021). In this context, collaborative monitoring consolidates its position as a fundamental tool, enabling the identification of transformations in land use, the impact of agricultural practices, water quality, and biodiversity. It also generates processes of collective learning, democratic deliberation and social cohesion while strengthening cooperation networks (Fernández-Giménez et al., 2008; Gavin et al., 2018). Thus, collaborative monitoring of the food commons provides more legitimate and relevant data for decision-making while also promoting transparency, co-responsibility, and coordination among multiple stakeholders (Pollock and Whitelaw, 2005). Consequently, it strengthens the governance and resilience of food systems.

Bridging paradigms: from food commons to global sustainability agendas

The 2030 Agenda represents a significant advance compared to previous international agendas, especially in environmental matters, by proposing the SDGs as a framework for global action (United Nations, 2015). However, as a product of the United Nations' international system, the SDGs do not challenge the structural elements of Western societies, such as modernity, capitalism, and anthropocentrism (Hidalgo-Capitán et al., 2019). This limits their ability to respond to current civilizational challenges, which require rethinking not only public policies but also the cultural and ethical foundations of our societies.

Faced with this, there is a need to broaden the horizon of the 2030 Agenda toward a more inclusive and transformative framework, capable of engaging with alternative paradigms such as the European degrowth (Alier, 2011) or the *Buen Vivir* (Acosta, 2012). While the European degrowth paradigm calls for planned reductions in production and consumption to ensure ecological sustainability, social equity, and well-being beyond economic growth, the *Buen Vivir* paradigm, with three general and 21 specific objectives (Hidalgo-Capitán et al., 2019) developed in the Andean region of Latin America, envisions well-being as living in harmony with nature, community, and oneself, prioritizing collective flourishing over individual accumulation (Viteri Gualinga, 2002; Medina, 2001; Hidalgo-Capitán et al., 2019). From a transmodern and trans-developmental perspective (López, 2016; Hidalgo-Capitán and Cubillo-Guevara, 2016), the proposal is to overcome the limitations of sustainable development and build a paradigm that integrates the lessons learned from pre-modern subsistence, the contributions of modern

development, and postmodern critiques of the dominant model. In this sense, both European degrowth and Latin American *Buen Vivir* Goals (BVGs) constitute proposals that enrich the global discussion on sustainable futures. In particular BVGs recognize the interdependence of all life forms and promote principles of reciprocity, respect, and care (IPBES, 2024). Over time, it has been informed by currents critical of dominant development, including socialism, political ecology, ecofeminism, and environmental justice (Acosta and Martínez, 2009; Gudynas, 2011), as well as indigenous perspectives (Dávalos, 2008; Bautista, 2010). Far from being a nostalgic evocation of a distant past, BVGs offer a framework that engages with the diversity of critical perspectives on development and promotes a civilizational reform oriented toward sustainability (Vanhulst and Beling, 2014).

Within this framework, the SDGs and the BVGs can establish a fruitful dialogue. While the SDGs offer a common language and quantifiable goals for international cooperation (United Nations, 2015), the BVGs provide a biocentric, ethical, and relational vision (Taylor, 2011; Gudynas, 2010). For example, SDG 17 on partnerships (United Nations, 2015) finds a counterpart in the vision of *Buen Vivir*, which values cooperation, co-responsibility, and the construction of solidarity networks (Hidalgo-Capitán et al., 2019). Likewise, the goals linked to reducing inequalities, climate action, and ecosystem life acquire greater depth if framed within an ethic of care and reciprocity proposed by *Buen Vivir* (IPBES, 2024). Thus, the dialogue between the two frameworks does not imply replacing the SDGs, but rather complementing and enriching them, recognizing that current challenges require proposals that go beyond the limits of conventional sustainable development. We cannot maintain the exact solutions for increasingly complex problems: we need to evolve toward perspectives that integrate diverse knowledge and promote structural transformations (Vanhulst and Beling, 2014).

Case study: pesticide-free food commons in the Ecuadorian Sierra

To ground the above conceptual reflections, we present a case study from the Ecuadorian Andes where adjacent pesticide-free fields constitute a food common, built through a participatory methodology that articulates communities, academia, and NGOs. Briefly, this project fosters activities of co-creation with farmers, beekeepers, and institutions, develops community pest and pollinator management, participatory monitoring, agroecological schools, and biodiversity habitats. The aim is resilient, productive food systems that reduce chemical dependence, conserve biodiversity and strengthen citizen-policy-science linkages (see <https://www.ccrp.org/grants/pesticide-free-territories> for further details). The initiative involves 19 families in Guayama Grande (00°42'03" S, 78°53'14" W) and 29 families in Aláquez (0°52'0" S, 78°36'0" W) in Cotopaxi province, who collectively agreed to manage adjacent plots without pesticides as a shared territory.

The commons are primarily monitored by the *chakrakamak*, a community figure chosen based on local criteria that include residency, experience in agroecology, attendance at agroecology schools, availability, and an annual commitment to remaining in the role. This role is remunerated by the project, which ensures continuity and reinforces the legitimacy of the process (Cox et al., 2016). As

community member noted, “The project began with the definition of the *chakrakamas* functions” (woman, Aláquez, 2024). Comparable experiences, such as that of Agrawal and Yadama (1997) in the forests of Kumaon, India, show that the permanence of local monitors has a direct impact on the quality of the managed territory. The monitoring process is built collectively with the support of a field technician and an academic from the project. This co-production of knowledge, as highlighted by Kouril et al. (2016) and Lam et al. (2019), integrates community members into the collection, analysis, and interpretation of data. In this way, tools based on direct observation, territorial surveys, and collective agreements are developed, which not only generate information for decision-making but also foster trust, shared emotions, and mutual learning.

We developed context-specific monitoring metrics that engage in dialogue with both the BVGs and the SDGs (Figure 1). This approach recognizes for the interdependence between human beings, non-humans (e.g., crops, pollinators, soil, water), and individual well-being, and avoids a fragmented view of the SDGs by proposing a relational and collective framework instead. Methodologically, these metrics were established through a participatory co-design process that combined community-based monitoring by the *chakrakamak*, direct field observation, territorial surveys and collective agreements. With regards to the BVGs, we considered their three central axes: harmony with nature (biocentric sustainability), harmony with other human beings (social equity), and harmony with oneself (personal satisfaction) (Hidalgo-Capitán et al., 2019). Details on the definition of these indicators can be found in Supplementary material 1.

Regarding the SDGs, we identified four that are particularly relevant to our project. Participatory monitoring contributes directly to SDG 17 (Partnerships for the Goals) by building alliances between community members, academics, and non-governmental organizations. These alliances engage with international agreements and policies on pesticide use and also can generate trust, reciprocity, and local well-being through activities such as knowledge sharing and conflict resolution. This is a key principle of commons management (Ostrom, 1990). SDG 5 (Gender Equality) is also highly relevant here as it highlights indicators that are often overlooked, such as the number of women landowners, female environmental leadership, and the intergenerational transmission of knowledge. These aspects reveal gender inequalities in access to opportunities and power (Schneider et al., 2023; Hidalgo-Capitán et al., 2019; Gimeno Coso, 2016). As the project relates to the dangers of pesticides, SDG 3 (Good Health and Well-being) enables us to consider comprehensive and intergenerational health where different forms of knowledge and practices converge, focusing not only on disease but also on the entire life cycle (World Health Organization, 2013). Finally, we also SDG 13 (Climate Action) is crucial in recognizing nature as a rights-bearing entity (República del Ecuador, 2008), and demonstrating how local actions, such as adopting adaptive agroecological practices or managing neighboring fields free of pesticides, can contribute to global climate action goals.

Lessons learned

The commons emerge as a dynamic, relational, and ethically situated process in which communities define, develop, and maintain the resources necessary for their collective well-being

Sustainable Food Commons

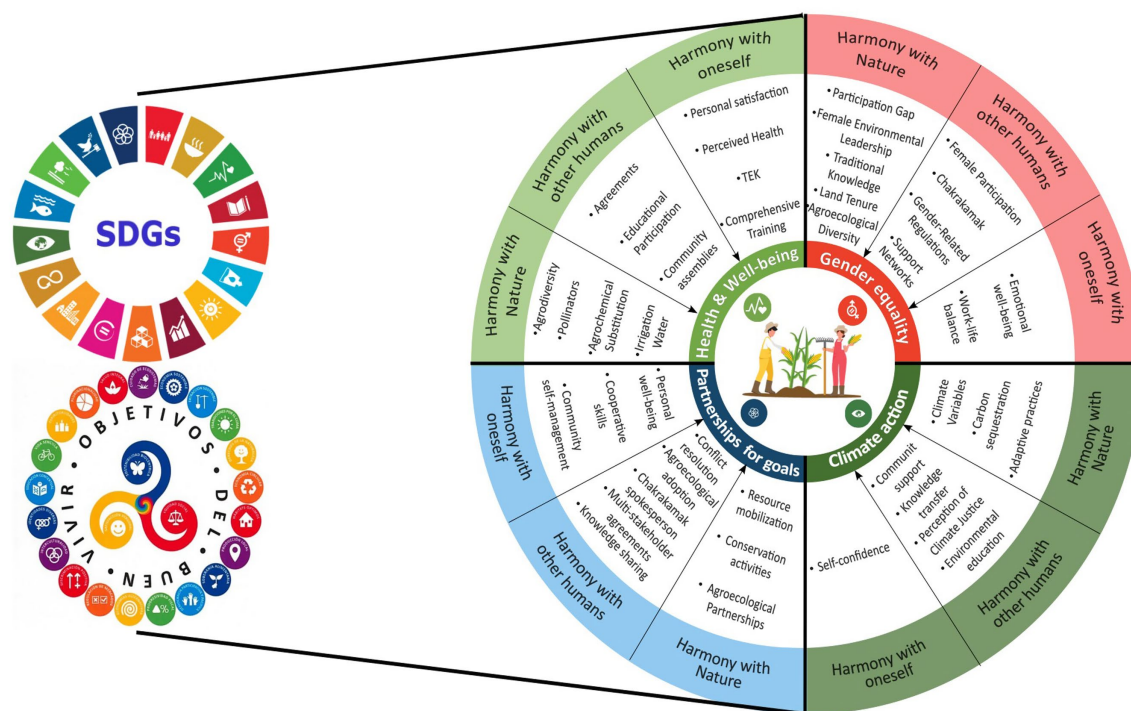


FIGURE 1

Indicators linking the Sustainable Development Goals (SDGs) (United Nations, n.d) with the Buen Vivir Goals (BVGs) (Hidalgo-Capitán et al., 2019). The SDG goals are 17 and 21, specific goals related to Buen Vivir. Still, in this study, four SDGs are organized around three general BVGs: harmony with nature (biocentric sustainability), harmony with other humans (social equity), and harmony with oneself (personal well-being), providing a framework for the sustainable management of the food commons. TEK, Traditional Ecological Knowledge.

(Bollier, 2025; Linebaugh, 2009; Manzoni, 2024). The free-pesticides commons methodology presented in the above project illustrates how these practices enable us to overcome the reductionist view of food systems that focuses solely on productivity and the market. It shows that food has cultural, ecological, and historical meanings that transcend its economic value. Therefore, adopting a “food as commons” perspective enables us to more easily address the challenges of sustainable development (Manzoni, 2024). This finding confirms that the commons are not static entities, but rather processes of *commoning* that articulate resources, social norms, and ethical values within adaptive local governance systems (Linebaugh, 2009; Capra and Mattei, 2015; Vivero-Pol, 2019).

Our case study shows that the application of traditional technical indicators, such as those proposed by the SDGs, are not enough to understand the complexity and changes in local food systems. While existing dashboards are useful for global comparisons, they are often designed without the participation of local stakeholders, which limits their relevance and applicability (Béné et al., 2019; Fanzo et al., 2020). Integrating BVGs with technical indicators is a key methodological contribution as it enables the development of hybrid monitoring systems combining empirical evidence, participatory co-construction, and local specificity. This ensures that management decisions reflect the values, worldviews, and practices of the communities involved. In the case of our study, this has resulted in the development of food commons that promote ecological sustainability, social cohesion, strengthened local capacities, and collective learning processes. This approach shows that food systems can be viewed as ethical and political spaces, where care, equity, and

sustainability exist inseparably (Gibson-Graham and Roelvink, 2016; Hipel et al., 2010; Blay-Palmer et al., 2016).

The relationship between the SDGs and the BVG can be understood by considering the different dimensions of harmony that underpin both frameworks. However, they are also aligned with the 21 specific objectives of *Buen Vivir*. For example, SDG 3 interacts with the Food Sovereignty and Sustainable Economy Goal, enabling the development of metrics to improve the quality of life for people and non-humans, while guiding production and trade policies based on agroecological and cultural criteria to promote food sovereignty for countries and local communities (Hidalgo-Capitán et al., 2019). SDG 5 has limitations in addressing gender equality due to its binary and cis-heteronormative logic, which renders queer identities invisible (Schilt and Westbrook, 2009), our project to create pesticides-free commons emphasizes the construction of indicators that recognize women's land tenure and female leadership. These aspects are poorly visible in conventional measurement frameworks. Similarly, SDG 13 is closely related to the BVGs as it incorporates ecosystem care, the rights of nature, and the sustainable economy. Meanwhile, SDG 17 aligns with the principles of *Buen Vivir* by promoting participatory democracy, peaceful cooperation, and collaborative management of the commons (Hidalgo-Capitán et al., 2019).

In conclusion, our approach offers several key innovations. First, it provides empirical evidence that food commons are dynamic social processes as well as resources, expanding *commoning* theory (Linebaugh, 2009; De Angelis, 2017) and linking its ethical and political dimensions to food system sustainability. Second, by integrating technical SDGs indicators with Buen Vivir Goals,

we introduce a hybrid monitoring framework that captures the ecological, social, and cultural complexity of local food systems. This approach combines empirical evidence, participatory co-construction, and local specificity, situating monitoring within socio-ecological systems and enabling a more nuanced understanding of local dynamics. Furthermore, recent studies, such as Maysels et al. (2023), have shown that local food systems in Southwestern Colombia can be conceptualized as alternative food networks in the Global South, reinforcing the importance of integrating local perspectives, community knowledge, and socio-ecological interdependencies in monitoring frameworks. Third, our findings advance the literature on participatory monitoring and commons-based governance (Ostrom, 1990; Cox et al., 2010; Pollock and Whitelaw, 2005), demonstrating how co-constructed indicators and community-based governance strengthen inclusive, equitable, and resilient food systems.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repository and accession number(s) can be found in the article/Supplementary material.

Author contributions

GL: Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. OD: Funding acquisition, Investigation, Supervision, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research and/or publication of this article. This work is part of the project “Building pesticide-free territories for sustainable food systems in the Ecuadorian Sierra” (OASIS), conducted within the Global Collaboration for Resilient Food Systems funded by the McKnight Foundation (grant number 23–216). GL was supported by the Fond Équipe France “Création d’un institut international des sciences de la durabilité et de son école doctorale en Équateur” funded by the French Ministry for Europe and Foreign Affairs (2024–2026).

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Acknowledgments

The authors thanks to Esteban González for his contribution to the figure.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fsufs.2025.1694069/full#supplementary-material>

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