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Public sector involvement in non-state governances for sustainable food systems—a biodiversity perspective

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The extensive use of natural resources in agri-food systems has widespread effects on biodiversity. Policies advanced to address these effects have largely failed to reduce the rate of biodiversity loss significantly. Current strategies for biodiversity and sustainable food systems increasingly advance two modes of non-governmental governance, Multi-Stakeholder Initiative (MSI) and Voluntary Sustainability Standards (VSS), among their key policy tools. In this paper, we analyze public-private VSS and MSI governances related to biodiversity enhancement and discuss how and whether they have shaped the ground for the wide-scale use of MSIs and VSSs as suggested in post-2020 strategies. Our analysis highlights the importance of governments' commitment to biodiversity enhancement as a prerequisite for effective and robust governance. We also emphasize the need for innovative regulation to supervise and advance various VSS and MSI simultaneously. Our findings indicate that up to 2020, governments' main motivations for being involved in food governance were the advancement of food safety regulation or economic development rather than biodiversity enhancement. Accordingly, public involvement in VSS and MSI at the global scale does not necessarily provide rigorous biodiversity protection. In 2020, the EU established a comprehensive strategy for biodiversity and integrated its three-decades-long engagement with organic farming into it as a policy tool. This policy has diffused to local European food policy councils. However, the capital-intensive boost in a single VSS, leaves other biodiversity-oriented initiatives without substantive governmental support.

KEYWORDS

biodiversity enhancement, post-2020 strategies, strengthening VSSs and MSIs, governmental involvement, sustainable food systems issues

1 Introduction

Population and economic growth have marked implications for the global food system. The rising demand for food and diets based on animal products threatens biodiversity and the stability of planetary conditions (Steffen et al., 2015; Leclère et al., 2020; Delabre et al., 2021). Unsustainable food systems are responsible for the disappearance of 60% of terrestrial biodiversity (Delabre et al., 2021). The growing demand for food has increased the pressure on natural resources: open spaces, fertile soil, freshwater, the oceans, the processes of carbon fixation, and climatic stability. Biodiversity, which underpins the stability of conditions on Earth (Steffen et al., 2015), depends on the availability and quality of those natural resources (Delabre et al., 2021; D'Odorico et al., 2018; Tilman et al., 2017; Raven and Wagner, 2021). Agricultural croplands and pastures have expanded at the expense of natural habitats and now

cover 40% of the global landmass (Ramankutty et al., 2018). As such, agriculture was found to be responsible for the extinction of 40% of global insect species (Sánchez-Bayo and Wyckhuys, 2019) and about 80% of the threatened terrestrial mammal and bird species (Tilman et al., 2017). The widespread use of monoculture, fertilizers, and pesticides (Maxwell et al., 2016; Sánchez-Bayo and Wyckhuys, 2019) is another main factor in insects (Sánchez-Bayo and Wyckhuys, 2019) and soil biota (Lal, 2015) decline. This manner of food production decreases soil fertility (through erosion), harms pollinators, damages the resistance of agricultural species, and endangers the food security of the world's growing population (Ramankutty et al., 2018). Consequently, the inefficiencies of the current global food system are already evident as excessive food consumption leads to a steep rise in life-threatening diseases, while billion tons of food are wasted annually (Tilman and Clark, 2014; Westhoek et al., 2014; Wilkes, 2022). Concurrently, two out of every five people in the world suffers from malnutrition or has difficulty accessing nutritious foods (FAO, 2024a).

The 1992 Convention on Biological Diversity (CBD) (Convention on Biological Diversity, 2024a) and the operative goals determined by the Strategic Plan for Biodiversity (Aichi, Japan, 2010) (Convention on Biological Diversity, 2024b), as well as the reforms included in the European Union Common Agricultural Policy (CAP) (Falco et al., 2021), spearheaded the enhancement of policies for biodiversity conservation in agriculture. However, these policies were unsuccessful in halting the continuing deterioration of biodiversity (European Court of Editors, 2020; Van Zanten et al., 2016; Pe'er et al., 2017; Pe'er et al., 2021). An opportunity for a significant strategic change arose in 2020 when the CBD terminated and was redefined (Leclère et al., 2020; Delabre et al., 2021). A new EU biodiversity strategy for 2030, as part of the European Green Deal, was launched (Hermoso et al., 2022). Eight "enabling conditions" are mentioned in a suggested post-2020 biodiversity framework for sustainable food systems (Delabre et al., 2021). Among them are the strengthening of Voluntary Sustainability Standards (VSSs) and Multi-Stakeholder Initiatives (MSIs) (Delabre et al., 2021). Compared to the other key actions, these two measures are innovative because they require governments to be involved in non-governmental initiatives, boost them, and supervise them. The other six measures are conventional forms of governmental actions, such as removing incentives harmful to biodiversity or promoting sustainable diets (Delabre et al., 2021). Thus, the focus of this article is on the relatively innovative measure of governmental involvement in non-governmental governances, specifically in the modes of MSIs and VSSs, which are the most discussed in the context of biodiversity conservation in food systems (D'Hollander and Tregurtha, 2016; Midler et al., 2016; Potts et al., 2017; Ting et al., 2016; Tayleur et al., 2017; Delabre et al., 2021; Wilkes, 2022).

In light of Delabre et al. (2021) framework, this paper aims to investigate the arena of agri-food MSIs and VSSs where governments are involved to better understand how biodiversity has been promoted over the past three decades. To this end, we examined governments' involvement in agri-food MSIs and VSSs, asking how the protection of biodiversity is manifested among the many other sustainable food systems concerns such as food safety, food security, healthy nutrition, livelihoods of producers, fair employment, and food sovereignty. We also asked: (a) who are the proactive actors for biodiversity among the involved stakeholders? (b) What is the prominent level of action for governance operation? (c) What was the authorities' main interest in being involved in such VSSs and MSIs? (d) How were governments involved, and what are the developing trends regarding the proposed post-2020 framework? (Table 1).

2 MSI and VSS—background

MSIs function as supplementary executive institutions to the government for the achievement of the Sustainable Development Goals (United Nations, 2024). Their institutional construction is based on participatory democratic governance intended to engage all relevant stakeholders from all sectors (Mena and Palazzo, 2012). Despite this basic feature, MSIs appear in different levels of partnerships and power division between the stakeholders. It ranges from centralized governance, where government agents take the lead, to self-governance, led by the private and civil sectors (Driessen et al., 2012). MSIs were formally acknowledged as legitimate policy tools for sustainable agri-food systems earlier than VSSs (Reimer, 2015; Delabre et al., 2021; Pe'er et al., 2021). VSSs are a sub-set of MSIs (Collins et al., 2017; Mena and Palazzo, 2012). The core of a VSS consists of a certification mechanism based on three types of organizations, each of them designated for a different stage in the certification procedure: private standardization organizations; private certification bodies; and accreditation agencies that depend on governmental authorization (Fouilleux and Loconto, 2016; Havinga, 2018). The uniqueness of VSSs stems from this special mechanism meant to ensure reliability regarding the setting and application of standards, and traceability throughout all phases of production and supply (Henson and Humphrey, 2010; Havinga, 2018).

VSSs establish standards for improving social equity and mitigating negative externalities of commercial actions, including concerning ecological issues (Partiti, 2017). Eco-social VSSs intend to

TABLE 1 A sample of VSSs mentioned in the manuscript references, their main objectives, and action levels.

VSS' brand name and a reference of which it was mentioned	Main objectives, as detailed on websites	Level of action
FSSC22000 (Havinga, 2018)	Food safety (FSSC, 2024)	Global
GLOBAL GAP (Henson and Humphrey, 2010)	Food safety, the environment, animal welfare, workers' welfare and supply chain traceability (Global GAP, 2024)	Global
FAIR TRADE MAX HAVELAAR (Havinga, 2018)	Social, ecological, and economic criteria in order to promote fair trade (Fairtrade Max Havelaar, 2024)	Global
IFOAM organics international (Fransen et al., 2018)	Health, ecology, fairness, and care (IFOAM-Organics International, 2024)	Global
Rainforest alliance (Ting et al., 2016)	Environmental, social, and economic sustainability (Rain Forest Alliance, 2024)	Global
Heart-check mark (Havinga, 2018)	Heart-healthy foods (American Heart Association, 2024)	National

achieve significant normative changes by labeling certified produce, under the assumption that consumers will prefer to purchase products bearing the trademark of a sustainability standard or as a mean for risk management (Henson and Humphrey, 2010). Conceptions about public interests to advance VSS vary from solving market failures to overcoming political contestations (Bartley, 2007). Such VSSs had not been mentioned as official means for the protection of biodiversity in sustainable agricultural policies before 2020 (Delabre et al., 2021). Until recently, many had doubted their legitimacy because of a lack of transparency and a wariness of mixing irrelevant considerations in the settings of standards, fear of greenwashing, and of the centralization of regulative power in the hands of private standardization organizations that have not been democratically elected (Büthe and Mattli, 2011; Mena and Palazzo, 2012; Loconto and Fouilleux, 2014). Since VSSs are market-directed tools, researchers doubted their potential to instigate a global mitigation of the biodiversity crisis considering the insignificant demand for sustainable produce in the developing world (Potts et al., 2017). Nevertheless, in the past few years, recognition has grown of the positive influence of VSSs (Partiti, 2017), especially in the field of food systems sustainability (Tayleur et al., 2017; Havinga, 2018), with an emphasis on the need for governmental involvement to ensure the transparency and efficiency of VSSs further, and to help with their dissemination as a central measure of environmental policy (Midler et al., 2016; Ting et al., 2016).

MSIs and VSSs are generally, and specifically in the agri-food sector, characterized by "profusion." This means a profusion of levels of action, multiple stakeholders, issues requiring attention, and various means for interaction between the authorities and the private and civil sectors.

MSIs and VSSs are multilateral and usually operate at several levels: internationally, nationally, and locally (Wilkes, 2022). This multilateralism is reflected in the combination of stakeholders from different levels and the interactions between MSIs/VSSs and organizations at different levels (Lange et al., 2013; Eberlein et al., 2014). For example, in the case of a transcontinental supply chain governance, the need to consider the sustainability ramifications and intersectoral collaborations arises in contexts of local production, the global supply routes, and the different import areas (Henson and Humphrey, 2010; Jaffee et al., 2011; Havinga, 2018). Even in the case of local supply chain governance, organizations and actors from the national and international levels are often involved (Driessen et al., 2012; Wilkes, 2022).

The sustainability of food systems is an interdisciplinary scientific endeavour linked to fields of study ranging from innovative technologies and the exact sciences to politics, sociology, and economics (Glamann et al., 2015). Accordingly, policies in this field encompass a variety of issues: ecology and the environment (the conservation of biodiversity, food waste, the reduction of greenhouse gas emissions); welfare and health (food security, food safety, healthy nutrition, livestock welfare); society and economics (livelihood for food producers and suppliers, food sovereignty, food culture, occupational fairness) (Henson and Humphrey, 2010; Zimmerer et al., 2019; Wilkes, 2022).

State involvement stems from four governmental prerogatives: regulation, finance, the promotion of knowledge, and administrative management (Duit, 2015). It enables the innovation of ways and forms of strengthening MSIs and VSSs in multiple ways: by co-regulation with private VSS systems, e.g., incorporating the VSS regulations and their enforcement bodies in governmental legislation as mandatory standard or legally protected voluntary standard (Henson and Humphrey, 2010; Gulbrandsen, 2012); by public procurement of certified products (Collins et al., 2017); through financial support for research, the establishment of databases and supervision, as well as increasing public awareness and an improvement of transparency and efficiency (Havinga, 2018); by initiating MSIs or becoming a partner in them in a variety of modes and capabilities (Driessen et al., 2012; D'Hollander and Tregurtha, 2016; Midler et al., 2016).

Regarding biodiversity enhancement, researchers agree that greater public involvement is needed to address several critical issues in VSSs and MSIs, such as expanding and pooling databases, developing result-based standards, enhancing transparency, promoting the application of standards over extensive areas, providing technological assistance, and introducing suitable equipment (Midler et al., 2016; Ting et al., 2016; Potts et al., 2017).

In their proposed post-2020 framework for biodiversity, Delabre et al. (2021) recommended the widespread rule of VSSs across all agricultural lands, not just in areas producing specific commodities. Their framework suggests that international trade in agricultural products should require certification based on a minimal biodiversity-oriented VSS. State's role regarding both VSSs and MSIs includes ensuring accountability, preventing fraud, innovating result-based incentives, and raising public awareness about responsible food consumption (Table 2).

TABLE 2 A sample of MSIs mentioned in the manuscript references, their main objectives, and action levels.

MSI's brand name and a reference to which it was mentioned	Main aims as detailed on websites or reference	Level of action
The committee on world food security (Wilkes, 2022)	To ensure food security and nutrition for all (FAO, 2024a,b)	Global
Round table on sustainable palm oil (Vogelpohl, 2021)	To transform the palm oil industry to make it sustainable (RSPO, 2024)	Global
FOLU, the food and land coalition (Alonso-Fradejas et al., 2020)	To transform food systems to unlock a net-zero, nature-positive world while also ensuring social justice and food security for all (The Food and Land Use Coalition, 2024).	Global
Zero budget natural farming (Wilkes, 2022)	Advance agroecological practice to mitigate the consequences of climate change, reduce input costs, and enhance sustainable agricultural livelihoods (FAO, 2024c).	State
Food policy councils in USA, Canada, and Tribal Nations (Calancie et al., 2018)	Resilient food systems, increasing access to healthy foods, supporting economic development, promoting equity in food systems, promoting environmental sustainability, increasing knowledge and demand for healthy foods (Calancie et al., 2018)	Local

3 Methods

We conducted a literature search on Google Scholar using the keywords: "VSS" and or "MSI" and or "private certification," "biodiversity" and or "ecological," "food" and or "agriculture," "state" and or "government" and or "public sector." The search was limited to the timeframe from 1990 onwards. Our search included original research articles, reviews, book chapters, anthologies, and reports published in peer-reviewed journals or websites of institutions, platforms, and initiatives for sustainability or ethics. The search was limited to the English language. Every publication was evaluated and we included in our analysis only those with public sector intervention with VSS or MSI for the advancement of sustainable food systems.

It should be noted that this analysis aims to learn about governments' attempts to be involved in VSSs and MSIs and discuss their readiness to halt the biodiversity crisis by using this policy tool. Therefore, this study selects cases on food governance in which biodiversity was their exclusive objective or one among other sustainable food system issues. To identify the developmental trajectories, we also selected cases that provided data on trends throughout the last three decades and shed light on the interests of governments and other stakeholders. We used seven parameters to classify the main categories of governmental involvement in food governance from an ecological perspective. The seven parameters are as follows: (1) Type of governance - to distinguish whether it is a VSS or MSI governance due to differences between them mentioned above. (2) The biodiversity proactive stakeholder—to clarify if the necessary commitment for biodiversity enhancement (Delabre et al., 2021) is reciprocal or related to the part of the governance. (3) The level of action - a parameter that modifies governance politics and its impact boundaries (Driessen et al., 2012; Eberlein et al., 2014). (4) The type of public involvement - financial, regulatory, or administrative support or research advancement (Duit, 2015; Henson and Humphrey, 2010), and in terms of subsentence. (5) The type of public authority involved-in terms of governmental scale, geographic location, and functionality within the food system – features that may bear specific interests, for example as exporting or importing state (D'Hollander and Tregurtha, 2016). (6) The key food policy issues addressed by the governance – to understand the list of priorities made by the governance and where biodiversity is deployed. (7) Main public authority's motivation – whether the motivations are biodiversity enhancement or others. The classification of the relevant articles or publications merged into five thematic categories. These themes represent five developmental trajectories of public involvement in VSS and MSI governance since the establishment of the first CBD (Convention on Biological Diversity, 2024a). The categories are detailed in Table 3, which describes each characteristic (C) according to the seven predetermined parameters (P).

In the following sections, we analyze each identified thematic category according to their order in Table 3, detailing the examined parameters and discussing their relevance.

4 The adoption of ecological VSS by commodity-producing states

In 1992, the CBD, which took place at the Rio Earth summit (Convention on Biological Diversity, 2024a), raised awareness of the harsh impact of agriculture on biodiversity, particularly from commodity production in distant sensitive ecosystems. In response to concerned Western consumers, active NGOs initiated several VSSs to mitigate the negative effects of commodities such as coffee, cotton, or palm oil on ecosystems. Certified ecological commodities influenced some commodities markets and related ecosystems (Potts et al., 2017). Geographically, the areas influenced by VSSs have expanded, and their ecological effectiveness became apparent when key commodity-producing countries in tropical areas (Brazil, Mozambique, Indonesia, and Malaysia) cooperated with the voluntary certification schemes (D'Hollander and Tregurtha, 2016). Gradually, with professional and administrative assistance, the production systems changed over several years, and agreements were made with the central food producers. Ultimately, each of these countries adopted the format of a relevant, private VSS applicable to its specific commodities (Brazil for coffee; Mozambique for cotton; Indonesia and Malaysia for palm oil) as its legally mandated norms (D'Hollander and Tregurtha, 2016). Producer countries found cooperation with VSSs to be their opportunity to make economic progress by obtaining access to valuable Western markets (D'Hollander and Tregurtha, 2016). Analyses of the effectiveness of public involvement with VSSs for the protection of biodiversity, as well as the effectiveness of VSSs for biodiversity, mostly focused on commodities in tropical areas where the most significant relevant applications of VSS and MSI are concentrated to date (Midler et al., 2016; Ting et al., 2016; Potts et al., 2017). Some researchers claim that VSSs for commodities production provide good, mainstream protection for biodiversity and that there is a marked trend of improved efficacy (Potts et al., 2017; Fransen et al., 2018). Others evaluated the degree of protection provided by pro-biodiversity VSSs as moderate or insufficient (Ting et al., 2016).

In light of growing awareness of undernourishment and land displacement associated with the production of commodities in developing countries and emerging economies (Marselis et al., 2017), efforts to ease the burden of eco-social VSSs on commodity industries have begun to be combined with ideas of food sovereignty and local resistance to sustainability norms, imposed by importing countries (Vogelpohl, 2021; Bjork-James et al., 2022). Alternative market options have enabled governments and commodity producers to establish alternative domestic VSSs with minimal NGO participation (Nesadurai, 2017a). These domestic VSSs are tailored to perceived local economic needs and are often considered to have lower ecological standards (Vogelpohl, 2021). In addition, NGOs are facing capitalist agendas and excessive corporate power in the UN Forum for Sustainability Standards (UNFSS) networks; therefore, their ability to enhance significant eco-social standards is often limited (Nesadurai, 2017b; Alonso-Fradejas et al., 2020; Chandrasekaran et al., 2021; Wilkes, 2022). Thus, questions are raised about the feasibility of VSSs to address biodiversity conservation along with food sovereignty and economic growth, on a global scale (Vogelpohl, 2021), and about the contribution of global public forums to advancing substantial eco-social standards (Chandrasekaran et al., 2021; Alonso-Fradejas et al., 2020; McMichael, 2021).

5 The adoption of food safety and quality VSS without its eco-social chapter

Following a sequence of food safety scandals in Europe during the 1990s, which caused a sharp drop in public trust in the food systems (Jaffee et al., 2011), retailers and food producers developed private

TABLE 3 Parameters (P) and characteristics (C) of the five thematic categories reviewed in the article.

P C	Type of governance	Proactive biodiversity stakeholder	Level of action of the proactive stakeholder	Type of public authority involvement	Type of public authority	Key food policy issues of governance	Main public authority's motivation
1	VSSs and MSIs	Biodiversity conservation NGOs/ public awareness	International	Coregulation/networking	Commodities - producing states/ UN	Biodiversity conservation → economy /food sovereignty	Economic
2	VSS	Food retailers responding to consumer demands	Global	Partial coregulation	European Union and some other western countries	Food safety/quality	Public wellness
3	VSS	the international federation of organic agriculture movements – IFOAM	Global and national	Coregulation	UN and European Union, Countries trading organic products	global trade in organic produce	Global trade
4	VSS	European Union	Regional	Leveraging organic standard	European Union	Biodiversity conservation	Biodiversity conservation
5	MSI	European local food policy councils	Local/ regional	International networking of local food systems/ peri-urban food partnerships/ official acknowledgement as advisory body	European local governments	Holistic approach: food security and accessibility/local food economy and planning/healthy nutrition/ biodiversity conservation	Sustainable food system

No	Theme of category—describes public involvement in biodiversity-related food governance
1	The adoption of ecological VSS by commodity-producing states
2	The adoption of food safety and quality VSS without its eco-social chapter
3	The adoption and harmonization processes of the organic standards
4	The leveraging of organic standards by the EU
5	The operation of local food policy councils (FPC) and multilateral governances for sustainable food systems

regulations as means for risk management and to restore consumer trust (Henson and Humphrey, 2010). Within a few years, the number of private regulations greatly increased. To streamline this private regulation and to reduce expenditures, British retailers united in 1996 and published standards for the safety and quality of food (BRCGS, 2024), which were widely adopted also outside the United Kingdom (Chen et al., 2015). Over time the major European food retailers initiated a consortium that created a unified mechanism for the supervision of food safety and quality, the GFSI governance, upheld by private standards and certification bodies (Henson and Humphrey, 2010; Havinga, 2018).

The private supervisory mechanisms created an opening for the supply of safe food from distant locations. However, they faced criticism due to a lack of transparency, unsupervised use of natural resources, harm caused to small-scale farmers, exploitation of workers, and livestock welfare issues (Jaffee et al., 2011). In response to consumer demands, prominent private food standards like Global Gap upgraded their standards settings procedures to encompass sustainability, safety, and quality guidelines. Issues such as social fairness, the welfare of livestock, and eco-environmental aspects became part of the private regulation, achieving compliance from European farmers and food producers across global supply chains (Henson and Humphrey, 2010; Jaffee et al., 2011).

The perceived success of private food safety standards raised the need for broad legislative reform to fill the lacunae in public food regulation (Havinga, 2018). The first comprehensive reform was enacted by the EU between 2004 and 2006 and became known as the "Hygiene Package"(EUR-Lex, 2024). The reform determined the means for advanced regulation and coordinated with private enforcement mechanisms. It incorporated the Hazard Analysis and Critical Control Point (HACCP) (HACCP, 2024) private safety standard, along with the "Farm to Fork" operational tracking strategy. The creation of a harmonized food safety system in all member countries and in those marketing agricultural produce to Europe, was one of the reform goals (Chen et.al, 2015, Kotsanopoulos and Arvanitoyannis, 2017). However, by the partial adoption of food safety and quality standards exclusively, without the eco-social standards, the norms of good agricultural practice were largely enforced asymmetrically via market forces by the leading retailers and not by public regulation (Henson and Humphrey, 2010; Jaffee et al., 2011; Havinga, 2018). The United States, the United Kingdom, Canada, and other Western countries followed the European food safety reform by

recognizing their responsibility in this domain and co-regulating with private regulatory mechanisms in different scopes and approaches. However, this private regulation-based food safety regulatory shift did not include ecological aspects (Martinez et al., 2007; Chen et al., 2015; Kotsanopoulos and Arvanitoyannis, 2017).

6 The adoption and harmonization processes of the organic standards

The eco-social advantages of the organic standard as an agricultural practice are controversial among researchers. Some researchers claim that such standards have proven their ecological value (Gabriel et al., 2013; Tuck et al., 2014), while others remain doubtful or warn that adopting organic farming will harm both world food security and the ecosystem. The main argument against organic methods is their lower productivity compared to intensive agriculture, necessitating increased use of agricultural land (Seufert and Ramankutty, 2017; Meemken and Qaim, 2018; Tal, 2018; Tscharntke et al., 2021).

Others connect the erosion of the eco-social advantages of the original organic farming principles, written over 100 years ago, and a set of ideals formulated in 1972, to changes it underwent starting in the 1990s. During this period, the EU legislated the first enactment of national conditions for the legitimate trade of organic produce, followed by the adoption of similar legislation in many other nation states (Mutersbaugh, 2005; Fouilleux and Loconto, 2016).

The global harmonisation of organic standards was another significant process led by UN agencies such as the agencies for agriculture (FAO), trade and development (UNACTD), and the World Trade Organization WTO (Fouilleux and Loconto, 2016). The harmonisation process enabled global trade of certified organic produce. Furthermore, UN agencies supported the incorporation of sustainability measures into the organic standard, equivalent to other leading agri-food VSSs. In this way, the organic movement changed from an alternative, ideological movement into an international institution, associated with states, other international institutions, and global trade (Fouilleux and Loconto, 2016). This change diverted the values of the organic standards from their original eco-social values to focusing on global commercial aspects. Moreover, within the free trade enabled by this new harmonized organic standard, local organic agriculture in the Global South, based on traditional agroecological knowledge, shifted toward global volumes of produce led by profit considerations (Mutersbaugh, 2005; Fouilleux and Loconto, 2016). Furthermore, the organic standard became one VSS among many others, subordinated to the certification model in the competitive arena of VSS, an arena that, according to researchers, is characterized by minimal criteria for ecological commitment (Loconto and Fouilleux, 2014; but see Fransen et al., 2018; Bonisoli et al., 2019).

Responding to the criticism regarding harm to local agriculture and traditional produce, the organic standard underwent a localization process in which six world food culture regions were determined, specifically adjusting the standard to suit each designated region's unique traditions and cultures (Schwindenhammer, 2018). In addition, the ecological criteria of the organic standard for biodiversity protection were found to be at a high level according to the Biological Impact Indicators for Commodity Production (BIICP), developed by the Secretariat of the CBD and its partners (Fransen et al., 2018). Good results were also produced by applying criteria and parameters developed by the UN (FAO) (Bonisoli et al., 2019). Similarly, despite the aforementioned controversy, the International Panel of Experts on Sustainable Food Systems (IPES-Food), recommended the promotion of the organic standard as a useful policy measure to address the biodiversity issues since it sets a high standard for agroecology, internalizes criticism, and improves its performance in social aspects with the collaboration of farmers (Jacobs et al., 2019).

7 The leveraging of the organic standards by the EU

Protecting biodiversity and promoting sustainable food systems are the primary goals of the post-2020 EU strategy called the "European Green Deal" (EGD), which aims to phase out carbon emissions in Europe and rehabilitate the ecosystems by 2050. The updated "Farm to Fork" strategy set a target goal for 2030, in which 25% of the EU's agricultural land would follow the organic standard. To that end, a comprehensive action plan to leverage the organic standard was launched, based on three axes: stimulating demand and ensuring consumer trust (consumers); stimulating the conversion and reinforcement of the entire value chain (producers and suppliers); and improving the contribution of organic farming to sustainability (eco-social values). Thus, a detailed program was advanced to boost organic farming, marketing, and ecological performance. This new strategy included unprecedented governmental involvement compared with previously reported governmental involvement in agrifood VSSs (UNFSS, 2020; Martinez et al., 2007; Henson and Humphrey, 2010; Havinga, 2018). This action plan (EU, 2024) includes over 40 actions, most of which involve the cooperation of non-governmental actors, such as financial incentives for organic farming; improving the attractiveness of the organic logo; developing educational programs that illuminate the real cost of food and teach the benefits of eating an organic diet; integrating organic products into minimum mandatory criteria for sustainable public procurement; promoting research for the improvement of ecological implementations; finding substitutes for the use of controversial substances; and increasing the yield of organic farms, without their expanding into additional lands.

Nevertheless, some researchers doubt the likelihood of these ambitious goals being met without the allocation of additional resources for developing innovative means like blockchain for improving the attractiveness of organic products and the resorting consumer trust in their food safety (Kowalska and Bieniek, 2022). Others point out the need for additional action to reduce the consumption of animal products to ensure food security, alongside the transition to organic production without having to enlarge agricultural areas at the expense of ecosystems (Boix-Fayose and De Vente, 2023). Calls are made for further investments and support to bridge the gaps between EU members nearing the designated target and others where organic agriculture is neither familiar nor developed. Among the latter, notable concentrations of natural resources are located, and they function as significant food producers. However, adjustments are needed to make the standard suitable for these countries' characteristics (Prandecki et al., 2021; Ziętara and Mirkowska, 2021; Wrzaszcz, 2023).

The allocation of resources for advancing the organic standard and disregard for other agroecological enterprises by the EGD sparked additional criticism. Other agroecological methods, initiated by civil or private organizations, that have become common in Europe, such as multifunctional agriculture, ecological intensification, regenerative agriculture, nature-positive farming, and carbon farming, were not recognized by the EGD for financial support and benefits, despite their proven advantages in multiple ecological parameters (Gargano et al., 2021; Boix-Fayose and De Vente, 2023).

8 The operation of local food policy councils (FPCs) and multilateral governances for sustainable food

Local food policy councils (FPCs) are sub-sets of MSIs and are considered ideal institutions for applying sustainable food policies (Prové et al., 2019; Michel et al., 2022; Schiller-Merkens and Machin, 2023). The FPCs began to function in North America in the 1980s by creating local alternatives for food systems controlled by global corporations, lacking governmental representation. In light of their demonstrated ability to promote sustainability, the FPCs were formally acknowledged as advisory bodies (Wilkes, 2022; Prové et al., 2019). Today, they are quite common in the US, EU, Australia, and even in Africa and South America (Prové et al., 2019; Michel et al., 2022). Essentially, their political power stems from their ability to assemble all the individual stakeholders and institutions that deal with food systems within an area under one roof, enabling them to lead new food policies with the public sector, without confronting the existing food system (Schiller-Merkens and Machin, 2023). The "Farm to Fork" strategy made FPC leaders in local food networks and innovative regional models (Michel et al., 2022; Wilkes, 2022). The FPCs play a significant role in local and regional urban plans for sustainability, in connecting peri-urban rural areas to neighboring cities with shared interests in local food, as well as in preserving agricultural lands and ensuring sustainable local food production (Prove et al., 2019; Calancie et al., 2018; Nikolaidou et al., 2023).

The FPCs generally implement a holistic approach to sustainable food systems, emphasizing the advantages of short supply chains. Some researchers, however, argue that the beneficial impact of short supply chains is overrated from an ecological perspective (Prové et al., 2019). Nevertheless, the agendas of most FPCs include socio-economic, health, and nutrition issues: ensuring food safety, reducing diet-related diseases, promoting healthy foods and local agriculture, matters regarding food processing and catering services, developing local food culture, and occupational fairness. Issues with ecological characteristics, such as the conversion of land use, a cyclic economy, or a reduction of food waste, are likely to be esoteric issues in FPCs' prioritization (Reckinger, 2022; Calancie et al., 2018; Voglhuber-Slavinsky et al., 2021; Michel et al., 2022; Nikolaidou et al., 2023; Ambrose et al., 2022). Clear differences exist between the US and Europe in this regard. Although the European FPCs, like their American counterparts, promote fair and flourishing local economies as their primary goals, they also consider the adverse impact of agricultural practices on biodiversity, the promotion of organic agriculture, food loss, and the reduction of carbon emissions (Michel et al., 2022). However, the Luxembourg residents survey is a special case when biodiversity conservation was chosen as their top priority to be addressed by the municipal FPC (Reckinger, 2022). Researchers explain the differences between the US and Europe in political processes and levels of influence using the "politics of scale" metaphor (Smith, 1996). In the US, governances are constructed around the local community. The perspective is bottom-up and the goal is to ensure that community needs are met. As such, the entire agenda primarily consists of socioeconomic and welfare values. In Europe, the cities and FPCs function within top-down political processes, motivated to manifest the promotion of organic agriculture and ecological values as determined by governmental law—the Common Agricultural Policy (CAP) legislated by the EU, and EGD strategies (Prové et al., 2019).

Moreover, agroecology as an issue promoted by multilateral MSIs is explained as an outcome of stable governance construction, power symmetry, and a high level of stakeholder cooperation (Wilkes, 2022). This is the case of Zero Budget Natural Farming. As a national MSI in India it was founded to preserve traditional agroecological-farming and the livelihoods of small-scale farmers. With state involvement, among the aforementioned factors, its endorsed impact became significantly distributed within the state and beyond (Wilkes, 2022). This case emphasizes governments' commitment at the regional level to both the wellness of farmers and responsible agricultural practices (Wilkes, 2022). The promotion of agroecological values also depends on the position of the governmental actors in the functioning of the MSI—the more their position enables them to ensure accountability, fairness, and transparency, as well as financial support, the more likely it is that ecological issues will be addressed by their MSI (Wilkes, 2022).

9 Discussion

VSSs and MSIs have both initiated policies and supported governments' adoptions of biodiversity programs. As a matter of scale, VSSs and public-sector food governances operate globally and often advance a single goal of sustainable food systems: food safety and quality or ecological and ethical issues. Before 2020, such biodiversity and social concerns governances were primarily implemented in emerging economies that produce much of the world's food commodities. The states were involved in these VSS governance by adopting private voluntary standards and certification bodies into the public regulation and enforcement systems. The trend of success of several VSS governance in a few commodities and states has been slowed down when commodities-producing states preferred to respond to public resistance based on food sovereignty allegations and industry pressures. The ecological level of standards has dropped, and so has the efficacy of market coercion in the Global South.

Criticism of low agroecological level and claims of corporation bias was also directed at global MSIs. However, an appreciated agroecological level of practice was found in regional MSI networks and local MSI governances that foster nature conservation and communities' livelihoods. Nevertheless, in local FPCs, which are considered models for local food policy governances, biodiversity as a food policy issue is likely an esoteric issue. However, there is a marked trend toward prioritizing agroecological practice and biodiversity in a few European FPCs.

Up to 2020, NGOs were the prominent actors for biodiversity. Differently from governments who desisted from action for a decade, NGOs began to act for biodiversity right after the first CBD in the commodities industry arena. They recruited VSS and participatory mechanisms to change consumers' preferences and diet habits and struggled to keep high levels of standards. However, the ecological efficacy of Public-Private governances was not always of high level and casually changed. Our study indicates that the ecological efficacy of these governances depends on governments' main interests and the circumstances of their involvement. In most cases, governments' involvement on the grounds of the market and economic considerations did not lead to high levels of ecological standards or did not survive changes of priorities over two decades. Apparently, deliberate governmental motivation for biodiversity conservation is needed. From 2020, as part of a comprehensive strategy for biodiversity, the EU became the biodiversity proactive stakeholder while launching an action plan to boost a VSS as a policy tool to disseminate agroecological farming. Organic farming was further adopted in local European FPCs.

The EGD action plan for boosting organic farming may symbolize a major change taking place since 2020. It manifests congruence between a comprehensive policy for biodiversity enhancement and using VSSs as a policy tool to this end. This plan demonstrates the extent of comprehensiveness needed for deliberate public involvement in VSSs for the enhancement of biodiversity, and the entailed state resources.

Two-thirds of the action plans mentioned are formulated to support the commercial and public relations facets of the VSS supply chain. One-third is dedicated to agroecological improvements of the VSS. This emphasizes the extent of biodiversity enhancement as a policy domain in agrifood systems, especially with respect to non-state market-directed governances for biodiversity. However, the biodiversity aspect cannot be properly addressed without a firm socio-economic foundation and state support.

This insight can shed new light on the third category, "The adoption and harmonization processes of the organic standards." Harmonization processes were considered destructive to the ideological core principles of the original organic movement and its agroecological virtues. Nevertheless, these processes established a global trade in organic produce three decades ago based on rigorous trade agreements. Currently, the organic trade network includes 191 states worldwide (Willer et al., 2023). Thus, the global organic trade can guarantee global acceptance of future agroecological improvements of the standard, as long as the EGD action plan advances them. Furthermore, the adjustment processes of the organic standard to six world food-culture regions that ended in 2014 (Schwindenhammer, 2018) may also diminish resistance, based on territorial merits, to such improvements.

In the face of growing resistance in the Global South against Western market coercion of eco-social VSSs and inequivalent ecological measures in VSSs from both sides of the equator, the global organic trade can be considered advantageous from a biodiversity point of view, as well as in regard to the use of the organic VSSs as a policy tool. Its global distribution mechanisms are protected worldwide by states' regulations. They are adjusted to different food-culture regions, thus enabling the already high-level biodiversity-oriented practice of the organic standard to be further improved and globally adopted.

However, focusing only on organic farming, the EGD leaves various innovative non-governmental agri-food initiatives to enhance biodiversity out of governmental supervision and promotion. Focusing on a single VSS misses the target of post-2020 strategies for biodiversity, which aim to implement an inclusive use of VSSs and MSIs in all agricultural lands and levels. Post-2020 strategies for biodiversity enhancement urge states to stimulate simultaneously, an ensemble of VSSs and MSIs (Overdevest and Zeitlin, 2012) by applying measures such as enforcing minimal biodiversity-oriented content in agrifood VSSs, trade exclusively in certified produce, transparent and accountable governances and developing result-based incentives. Adoption of these strategies may affect a greater change in agri-food systems of all scales, for smaller budgets than a comprehensive action plan for a single VSS. Nevertheless, our paper indicates that states tend to initiate governances based on a single VSS rather than administrate several different VSSs for the enhancement of biodiversity. Future research is needed to examine the prospects and limits of states to simultaneously administrate an ensemble of agrifood VSSs and MSIs for the enhancement of biodiversity.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be constructed as a potential conflict of interest.

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