



# Article Post-Growth for the Global South: Reframing Agricultural Policies in Brazil

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Abstract: Mainstream responses to the climate and ecological crisis currently rely on the idea of decoupling GDP growth from ecological damage, i.e., green growth, an approach that has failed so far to avoid the overshoot of most planetary boundaries. The limitations of green growth have increased interest in post-growth policies, as seen, for example, in the reports from the Intergovernmental Panel on Climate Change since 2022. Yet, little research has focused on post-growth agriculture, a vital economic sector heavily dependent on healthy ecosystems and, currently, also a major driver of ecological overshoot. This paper begins to address this gap, focusing on Brazil, a leading producer of agricultural commodities, by asking how a post-growth framework can contribute to the country's agricultural policy. We use a growth/post-growth metabolism framework to analyze emblematic agricultural policies. We show that policies promoting both metabolisms already co-exist. A case is made for post-growth to be explored as a useful framework to offer policy pathways beyond green growth, helping to rethink agricultural (and other) systems in social–ecological ways compatible with the degree of structural change necessary to mitigate the catastrophic effects of climate change and ecological breakdown.

**Keywords:** climate change; post-growth; degrowth; agricultural policy; provisioning systems

## 1. Introduction

Agriculture is one of the main drivers of ecological collapse worldwide, connected in varying degrees to all nine planetary boundaries proposed by Richardson et al. [1], such as causing nitrogen and phosphorus pollution, ground and surface water depletion, deforestation, biodiversity loss, and greenhouse gas emissions (climate change). Considering climate change only, agriculture is the second largest emitter of greenhouse gases worldwide, behind only the energy sector [2]; it is also the economic sector most vulnerable to climate change.

In Brazil, one of the world's leading agricultural commodity producers, the impacts of agriculture are proportionally more intense. In a comprehensive attempt to account for different types of ecological dynamics affected by economic processes, Fanning et al. [3] considered seven biophysical<sup>1</sup> and 11 social indicators to assess nations' performances to achieve social thresholds within ecological boundaries, known as the "safe and just operating space" framework as proposed by Kate Raworth [4]. In the most recent assessment, for the year 2015, Brazil had transgressed five out of the seven biophysical limits



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Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/ licenses/by/4.0/). studied, as illustrated in Figure 1. Agriculture is directly responsible for the two most notably transgressed indicators, namely phosphorus and nitrogen use, is a major driver of land use overshoot and  $CO_2$  emissions, and of all six transgressed planetary boundaries in Richardson et al. [1]. The increased rates of deforestation and agricultural expansion in the past decade since the assessment have potentially worsened the situation.



Figure 1. Planetary boundaries assessment for the world and Brazil. Source: [3].

Considering this critical scenario, there is a need for policies conducive to an agricultural metabolism that operates within the safe and just operating space. The concept of "metabolism" recognizes that societies, like other biological organisms, maintains and reproduces themselves through processes of exchange of energy and materials with nature [5], consuming inputs (such as fuels, water, minerals) and generating different types of output as waste (such as sewage, thermal pollution, greenhouse gases). The mainstream response to ecological collapse in the past decades has been known as "green growth", a policy narrative officially pushed forward by institutions such as the Organization for Economic Co-Operation and Development (OECD), the World Bank, and the United Nations Environment Program since the Rio + 20 Conference on Sustainable Development in 2012 [6]. In agriculture, green growth propositions are designed around increasing the output per unit of resource input (i.e., technological efficiency), "getting the price right", and expanding property rights on resources (i.e., market efficiency) [7]. The gist of green growth is the idea that economic growth (as typically measured by Gross Domestic Product—GDP) can happen indefinitely, while, at the same time, reducing greenhouse gas (GHG) emissions and resource use, a concept known as "decoupling". Decoupling can be either "relative", when GDP grows faster than ecological impact, or "absolute", when GDP grows while ecological impact diminishes. Since we have already exceeded numerous planetary boundaries, only absolute decoupling (also known as dematerialization) would be an appropriate response.

Reviews, however, indicate that, while absolute decoupling of GHG emissions has been achieved by some high-income countries for limited periods of time, those achievements are still far from meeting the Paris Agreement targets [8]. When considering not only GHG but also energy and material use, there is no historical evidence that absolute decoupling can be achieved and sustained throughout time [6,9,10].

In agriculture, the "decoupling" argument can be mirrored in the "land sparing vs. land sharing" debate. "Land sparing" consists of the hypothesis that agricultural intensification (usually through the industrial model) leads to more agricultural productivity and, thus, spares more land that can be devoted to conservation. "Land sparing" theoretically decouples agricultural output from habitat conversion/deforestation. In contrast, the "land sharing" argument recognizes that increased efficiency often results in increased production and consumption (i.e., Jevons Paradox or Rebound effect [11]), and therefore argues for agricultural systems that produce food and ecological benefits on the same land [12]. An empirical assessment in 2023, considering data from 122 tropical countries, concluded that agricultural intensification leads more often to increased deforestation than to land sparing [13], further questioning the empirical validity of the "decoupling" argument in green growth agricultural narratives.

The limitations of green growth propositions are also illustrated by climate evidence. From 2010 to 2019, overall greenhouse gas emissions kept rising, despite efficiency improvements and emission reductions in some sectors and regions [14]. Climate responsibility is also extremely unequal, with the wealthiest 10% of the population being responsible for almost half of the emissions [14]. In recent decades, economic growth has only worsened inequality, with 38% of economic growth from 1995 to 2021 [15] and nearly 2/3 from 2020–2023 being captured by the richest 1% [16]. Finally, the IPCC report [14] portrayed the so-far failure of climate politics, with the sum of countries' Nationally Determined Contributions (NDCs) being insufficient to meet the maximum 1.5 °C warming limit, and ongoing policies being insufficient even to comply with the NDCs.

In the face of the current evidence against the likelihood of absolute decoupling, the core premise of green growth policies becomes jeopardized, highlighting the importance of alternative policy paradigms. In this context, post-growth scholarship gains relevance, aiming to provide pathways to promote ecological sustainability, well-being, and social justice while moving away from the economic growth imperative and from GDP as the main indicator of social progress and well-being [17]. Not by chance, the post-growth literature has entered Intergovernmental Panel on Climate Change (IPCC) reports since 2022 (see Parrique [18] for a discussion of this milestone).

Post-growth economics emerges from a critical analysis of the social–ecological consequences of the dominant economic system, hooked on a growth imperative [19]. Postgrowth scholarship is also understood as an umbrella term encompassing several strands of critiques of economic growth, such as steady-state, Doughnut and well-being economics, and, most notably, degrowth [20,21]. With specificities and differences, what all those lines of thought have in common is the aim of reorganizing the economy around the satisfaction of human needs within planetary boundaries, instead of pursuing GDP growth. In quantitative terms, post-growth can often mean a planned downscaling of the economy's throughput back into safe and just social–ecological boundaries (i.e., degrowth), especially in the context of Global North countries [22,23]. But post-growth goes beyond downscaling, implying also a qualitative dimension: the reorganization of economies in fundamentally different ways, with strong attention to equity and wellbeing. This qualitative dimension can also be relevant for Global South countries, where abandoning GDP as a progress indicator does not necessarily imply a call for the absolute reduction in economic throughput.

In the policy arena, post-growth scholarship has been advancing new macroeconomic models and policy recommendations that take into account ecological and social parameters to promote well-being even in the absence of economic growth [21]. Those studies point towards the feasibility of improving social outcomes while maintaining economic

stability [17], breaking free from the imperative to maximize monetary value and focusing instead on the social–ecological configurations needed to ensure equitable provisioning systems, e.g., for food, housing, energy, and healthcare.

However, most of those studies have focused on the conditions of Global North countries, and on provisioning systems more relevant to industrial and urban contexts (e.g., [24]). There is a gap in the implications of post-growth for Global South contexts in general and, specifically, for agriculture. Considering that Brazil is one of the world's largest agricultural producers and exporters, this paper aims to address this gap by asking: How can a post-growth framework contribute to agricultural policy in Brazil?

This paper is organized into four sections. Following this introduction, Section 2 outlines a literature review on post-growth agriculture. Section 3 introduces general aspects of Brazilian agriculture and discusses agricultural policy from a post-growth perspective. Finally, Section 4 explores a more comprehensive post-growth possibility for Brazilian agriculture.

#### 2. What Is Post-Growth Agriculture?

Historically, post-growth research on agriculture has not been as common as in other areas such as social and environmental justice, and urban and industrial ecology. From a broad post-growth conceptualization, one could inductively state that a post-growth agriculture would be one that promotes well-being, notably through the production of healthy food, within planetary boundaries, which is not the case currently. This broad goal, nevertheless, reveals little about what this agriculture can look like and the types of institutions and policies needed to promote it. Thus, this section reviews how post-growth literature has conceptualized agriculture.

The review of the literature was performed on Web of Science, which was chosen due to its wide coverage of articles from diverse disciplines. The search string (("post growth" OR "post-growth" OR degrowth OR "de-growth") AND (agricultur\* OR agroecology OR farm\*)) was developed according to the main words<sup>2</sup> and their respective synonyms related to the research question and the main theme of this article. The search was performed in August 2024, and the following paragraphs describe the literature that explicitly addresses conceptualizations of post-growth agriculture.

In a review of agriculture from a degrowth perspective, Gomiero [25] analyzed the literature through the lenses of social metabolism, agricultural techniques, and technologies. Some general characteristics of agriculture in degrowth imaginaries include local production and self-sufficiency, reduction of fossil fuel dependence, ban of agrochemicals, and qualitative assessment of technologies (e.g., through E.F. Schumacher's concept of "appropriate" and Ivan Illich's "convivial" technologies). Gomiero stresses the need for more studies regarding the feasibility of transition pathways and scenarios, illustrating his argument with simplified calculations on the implications of projecting a 100% organic and self-sufficient (no imports) food provisioning for Germany in terms of energy balance, labor demand, urban/rural population shifts, and land area demand.

On a more theoretical level, Gerber [26] explored the interface between degrowth and critical agrarian studies (CAS). He argued for the need to "bridge the Agrarian Question with the Growth Question" (p. 236), drawing on the works of key authors from both fields (namely Simone Weil, Alexander Chayanov, Joseph Kumarappa, Nicholas Georgescu-Roegen, and Joan Martínez-Alier) to illustrate possibilities of research on "agrarian degrowth". Gerber stresses that degrowth should not reproduce the "agrarian myth" nor naïve ideas about peasant economies, and CAS should not reproduce the "growth myth". Common degrowth topics such as autonomy, cooperation, decentralization, localization, and appropriate scale are discussed from a peasant and agrarian economy perspective. The author calls for social–metabolic approaches to analyze rural systems and the need for more rigorous conceptualizations of what kind of agriculture is needed in a degrowth society. Policies related to decommodification, post-extractivism, debt audit, tax and subsidy reform, and common property rights are mentioned as examples of relevant fields of exploration for agrarian degrowth. The author also calls attention to the organization of work, which has not been explored from an agrarian perspective. While the degrowth movement often calls for the reduction of working hours, a more sustainable and small-scale agriculture will probably imply dramatic reductions in energy use and hence a higher demand for human labor.

Amate & Molina [27] conducted a life cycle analysis of the energy consumed in each link of the Spanish agrifood system chain, from production, transportation, processing, packaging, retail, and, finally, consumption of food in households. With a value chain consuming six times more energy than the food it provides, the authors concluded that the Spanish agrifood system is energetically inefficient. They call for a less energy-intensive agriculture with reduced transportation and packaging. Measures to achieve those goals include organic agriculture, phase-out of subsidies to meat and dairy, and a shift towards regional and local agriculture to minimize transportation. The authors proposed four principles (4 Rs) that summarize the recommendations: re-territorialization of production, re-localization of markets, re-vegetarianization of diets, and re-seasonalization of consumption.

The Cuban experience of large-scale agroecological conversion as a response to the sudden restrictions of industrial agricultural imports following the collapse of the Soviet Union has been theorized in terms of its degrowth characteristics. Cuba's complex agricultural system encompasses agroecology, industrial organic agriculture, and more conventional petro-industrial systems. More nuanced frameworks are then proposed to conceptualize those systems, such as mapping the geographic scales of their inputs and outputs to assess sustainability, resilience, and autonomy [28]. Boillat et al. [29] concluded that Cuba's strong agricultural public policies, as well as the limitations for agrarian capital accumulation through governmental control of land, input, and service markets, resonate with agrarian degrowth. On the other hand, the authors ponder whether centralized governance ends up privileging industrial agriculture, limiting the agroecological and degrowth potential more characteristic of smaller and self-managed farms. Despite the insights on agrarian degrowth, it is important to recognize that the Cuban transition was mostly an emergency adaptation to the interruption of agricultural imports from the USSR; a degrowth transition, on the other hand, is better conceptualized as a voluntary and democratically driven process.

Alcock [30] investigated synergies and contradictions between degrowth and the New Rural Reconstruction Movement (NRRM), a Chinese social and academic movement devoted to regenerating the countryside through enacting rural alternatives and advocating for policy change. The author analyzes NRRM in relation to degrowth discourses around six categories (ecology, critiques of development, meaning of life and well-being, bioeconomics, democracy, and justice), also discussing specific NRRM characteristics such as voluntary simplicity and sharing harvests. The author concludes that NRRM's resonant understandings of environmental justice and critiques of capitalism, growth, and the rural–urban divide align it with the degrowth movement. Alcock also argues that if degrowth is to address the global socioenvironmental crisis, it should engage in interactions with resonant theories and practices "which are sensitive to the specifics of different countries and localities whilst avoiding the imposition of ideas from above" ([30], p. 267).

In a study of farmers in Bosnia and India, Flachs [31] noticed that small-holders often strive for growth as a means to minimize risks, reduce difficult work, and maintain autonomy. These goals differ from the conventional extractive logic of financial capitalism and, thus, make the type of growth pursued more limited and congruent with sufficiency,

rather than with accumulation. The author calls for sustainability metrics beyond resource efficiency and yields, arguing that sustainable farming is often more about the stability and autonomy of communities, and for institutions to secure land rights, promote diversity of labor, and help farmers achieve their aspirations.

Bodirsky et al. [32] modeled the impact of degrowth propositions on GHG emissions and material throughput of food systems globally (both agriculture and land use change). The degrowth scenarios were defined in part by characteristics of degrowth food systems (namely dietary change to reduced animal-sourced food and food waste), and in part by broader policies related to social justice (minimum and maximum income) and by more conventional price-based efficiency mechanisms (GHG taxes aligned with Paris Agreement goals). Results pointed to the need to adopt all policies combined to achieve net zero emissions by the year 2100.

Fitzpatrick et al. [33] performed a comprehensive review of the degrowth literature from 2005 to 2020, including a thematic synthesis. "Food" was one of the 13 policy themes identified and encompassed several items related to agriculture, such as goals (for example sustainable farming and sustainable diets), objectives (for example, small-scale farming, the development of networks and cooperatives, the restoration of peasant agroecology), and several instruments (for example the promotion of urban gardening, a mandate for organic and local food for public procurement, VAT reduction for certain activities). The authors noted that degrowth policy proposals, in general, suffer from a lack of precision and often focus on the desired goals without properly addressing how to achieve them (i.e., instruments). Finally, the authors argued for a more integrated analysis of the interactions between different policies.

McGreevy et al. [34] proposed a framework to characterize sustainable agrifood systems from a post-growth perspective. The authors criticize the conventional focus of scientific discussion on sustainable agriculture, still reliant on the green growth paradigm and critical of the unsustainable role that the agri-industrial clusters play in the ecological and health crises. A metabolic framework is thus proposed to contrast "growth" vs. "post-growth". Beyond the focus on material and energy flows that commonly characterize socialmetabolic analysis, McGreevy et al. [34] propose five categories under which "growth" and "post-growth" metabolisms exhibit different operating principles (Table 1).

Table 1. Growth and post-growth metabolic principles.

Principles	Metabolism		
	Growth-Based	Post-Growth-Based	
Economic	Efficiency	Sufficiency	
Social-ecological	Extraction	Regeneration	
Allocative	Accumulation	Distribution	
Institutional	Private Ownership	Commons	
Relational	Control	Care	
Source: [34].			

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From the analysis of the degrowth literature on agrifood systems, Guerrero Lara et al. [35] argue that research must offer better conceptualizations of degrowth (e.g., advancing metabolic models), theorize transformations toward sustainability (i.e., advancing the "how" of degrowth transitions), challenge capitalism through the political economy of degrowth, and better engage rural populations and livelihoods in degrowth propositions.

Tilzey [36] analyzed the social metabolism of the UK's food system through multiple indicators (encompassing, for instance, food insecurity and climate change) and a political economy perspective, characterizing its unsustainability. The author also characterized the main policy narratives associated with sustainability transitions and concluded that political agroecology within a degrowth context is the only narrative capable of addressing the ecological crisis within social justice premises. Through structural propositions that challenge capitalist dynamics, political agroecology and degrowth propose reorganizing the economy to prioritize fundamental needs over profit, for instance by democratizing access to land and production resources, promoting public purchases of agroecological production, and reconfiguring subsidies towards agroecological production.

Post-growth scholarship is complex, interdisciplinary, and rapidly evolving. With limited literature, there is no all-encompassing normative definition for what a post-growth agriculture means in all contexts. Policy discussions, specifically, have focused more on generic recommendations, with little emphasis on existing policies and their effects from a post-growth perspective. Nevertheless, the seminal works listed in this review point towards some key characteristics that can inform policy discussions. From an agronomic standpoint, a post-growth agriculture would be mainly diversified and organic, adopting perspectives critical of the Green Revolution, such as agroecological approaches [25,29,33]. In terms of the social organization of production, it would be more localized and decentralized [25–29,36], privileging local and regional dynamics over global supply chains [34]. Politically, it would be critical of capitalist and free-market paradigms, either through state-led policy (such as the Cuban socialist experience [29]; or other policies geared towards stronger market regulation, e.g., [32,36]) or through more autonomist perspectives (as mentioned by Gerber [26] and Flachs [31]). From a social metabolic perspective, understanding agriculture as a system formed by flows of energy, materials, and mediated by social relationships, it would be an agriculture that operates within the "safe and just space" [3], assessed through multiple social and ecological indicators [36].

For the focus of the present paper on agricultural policy at the country level, we deemed McGreevy et al.'s [34] growth/post-growth metabolic framework particularly relevant. Its synthesis of growth vs. post-growth metabolisms in the form of principles is sufficiently flexible to encompass multiple dimensions of agriculture, compatible with the "socio-metabolic approaches" called for by Gerber [26] to conceptualize agrarian post-growth.

It is also important to highlight that post-growth literature on agriculture lines up with other traditions critical of industrial and capitalist agriculture, notably in the discipline of rural sociology. Those traditions have been arguing for the relevance of non-hegemonic agricultural paradigms, such as the concept of peasant agriculture [37,38], agroecology [39], and subsistence perspectives [40], including their sustainability dimension in contrast to industrial agriculture.

The following sections discuss further examples of how post-growth agriculture can be materialized, focusing on the case of Brazilian policy.

#### 3. Agriculture in Brazil

Brazil is the fifth largest country in the world, with 851 million hectares of land. Since the 16th century, when the territory that now forms Brazil became a Portuguese colony, the economic relationship with the land has been based essentially on deforestation and the establishment of large-scale plantations to produce export commodities: first sugar cane, then cotton, coffee, tobacco, and, more recently, mainly soybean and beef. Since the second half of the 20th century, agricultural policy has sought integration into global circuits of capital accumulation, with the neoclassical economic paradigm dominating the field of agricultural economics and leading to the hegemonic commodification of agriculture and food systems in general [41], adopting the model of the Green Revolution.

Currently, agriculture and livestock occupy 31% of the country's land (~351 million hectares [42]). According to the 2017 agricultural census, the country has around 5 million farms, employing 15 million people (around 7% of the population) [43]. These activities are

an important part of the country's economy, responsible for 40% of export value, equal to USD 120 billion in 2021 [44], making Brazil the world's largest net exporter of agricultural products [45].

The agricultural sector in Brazil is also characterized by historical structural inequalities. Of the 5 million farms in the country, 77% are classified as smallholder family farmers, which occupy only 23% of agricultural land [46]. Despite their socioeconomic struggles and limited access to land, smallholder family farmers are extremely important for national food security, producing most of the food consumed in the country [46,47]. These farms also employ 67% of agricultural workers and make up the largest economic sector in over 90% of municipalities under 20,000 inhabitants [46,47].

At the same time, the country's agri-industrial sector is a severe source of ecological degradation and social conflict, responsible for more than half of the country's GHG emissions either directly (33%) or indirectly (27%) through deforestation and other land use changes [48]. Soybean, corn, and sugar cane monocultures collectively occupy 84% of cropland (~55 million hectares) [43]; they also account for 70% of pesticide use in Brazil, one of the top countries in pesticide use in the world [49]. Evidence suggests that livestock and soybean plantations (primarily for animal feed) were the main drivers of record deforestation and forest fires in the Amazon in the late 2010s [50], transitioning the Amazon from a carbon sink to a carbon source [51]. Land disputes have also intensified, along with the assassination of environmental activists, most of them leaders from indigenous and other traditional communities [52].

This context illustrates the urgency of critically re-considering the Brazilian agricultural paradigm. The next section outlines the history of policy responses to the social– ecological problems of agriculture in Brazil through the perspective of McGreevy et al.'s [34] growth/post-growth metabolic framework (see Section 2).

#### 3.1. A Metabolic Perspective on Agricultural Policy

This section describes the institutional arrangements that have supported Brazilian agriculture since the late 1980s, when the democratic regime was re-established in Brazil following a twenty-year dictatorship that started with the military coup of 1964. The return of democracy brought with it a resurgence of political participation and social movements, leading to a new constitution in 1988, with important advances such as the possibility of expropriation of idle agricultural land. It is also a period when sustainability considerations started to be institutionalized in the country, notably with the city of Rio de Janeiro hosting the United Nations Conference on Environment and Development (the Earth Summit) in 1992, when, for instance, climate change was officially acknowledged as a problem by the international community.

The diversity of Brazilian agriculture, marked by farmers with different social– economic characteristics and production goals (e.g., exports, subsistence, or supply for local markets), adds several challenges to the design of policies for agricultural and rural development. Over the last decades, Brazil has developed policies targeting different types of agriculture, with mixed outcomes influenced by power dynamics that favor larger producers and direct most federal resources to supporting the production of export commodities [53,54].

The main institution responsible for implementing agricultural policy since redemocratization has been the Ministry of Agriculture, through instruments such as technical assistance, agricultural research, and, most notably, the offer of subsidized rural credit. Since 2003, an annually revised "Plano Safra" (Harvest Plan) has made subsidized credit the core of agricultural policy and one of the most well-funded policies of the federal government. From the perspective of the growth/post-growth metabolic framework, we argue that the Ministry of Agriculture is the main institution fueling a growth metabolism in Brazilian agriculture, with Plano Safra as the most illustrative example of a growth-based policy design (see Section 3.1.1).

The growth metabolism becomes evident with the strong focus on technological modernization that has dominated agricultural policy since the 1960s. With a growing urban population and food shortages, the main policy response became subsidizing the technological modernization of the large properties that historically dominated the Brazilian political economy [55]. From 1974 to 2021, crop production in Brazil increased by around 500%, and productivity rose from 4.4 to 12.1 t/ha. Yet despite the common narratives praising Brazilian agribusiness for its eco-efficiency, agricultural land more than doubled in the same period, and the use of industrial fertilizers (NPK) increased by over 1000% [56]. Deforestation remains the main source of GHG emissions in the country, fueled by the occupation of cleared areas by mainly soybean monoculture and livestock pasture. Operating on a logic of efficiency directed towards maximizing monetary value, the growth metabolism sustains the dominance of industrial monocultures, the structure of large-scale properties, and the political power of an agribusiness class.

At the same time, a parallel policy paradigm coexists in Brazil, more resonant with a post-growth metabolism. Emerging out of agrarian social movements' struggles against the Green Revolution approach in the 1970s, policies tailored to small-holders and traditional subsistence communities started to be institutionalized in Brazil at the end of the 20th century [57,58]. In the late 1990s, a Ministry of Agrarian Development (MDA) was created to deal specifically with smallholder family farmers and land reform, while the already existing Ministry of Agriculture dealt primarily with commodity-based agribusiness. In contrast to the Ministry of Agriculture, the MDA, we argue, has promoted a post-growth metabolism through policies focused on supporting family farming, food security, and organic and agroecological production, especially after the 2000s. Among these policies is the National Policy for Family Farming (federal law 11,326/2006), which, since 2012, has supported agroecology, one of the few national policies anywhere to do so (presidential decree 7794/2012).

Alongside these institutional advances, two policies with an emphasis on food security became key drivers of agroecological transitions by smallholder family farmers, namely, the Food Procurement Program (PAA, in Portuguese) and the National School Feeding Program (PNAE, in Portuguese), both focused on supplying public institutions. In the 2000s, both programs changed their requirements to privilege the direct purchase of food from local smallholder family farmers, including a premium of up to 30% for organic or agroecologically grown products. Although not designed primarily as an agricultural policy, PAA and PNAE had important positive effects on the sustainability of smallholder family farmers by enabling stable and decentralized local markets for diversified small-scale agricultural products. Among the benefits achieved by these programs are diversification of production, improved quality of food, strengthening of agroecological and organic production, maintenance of regional crop varieties and associated food culture, and dynamism of local economies [58].

Emerging from competing social processes, we argue that both growth and postgrowth agricultural metabolisms coexist in Brazil. Based on McGreevy et al.'s [34] growth/post-growth framework, Table 2 compares the metabolic principles of Plano Safra vs. PAA/PNAE, as illustrative policies of growth and post-growth metabolisms. The table is not meant to be an extensive analysis but rather to contrast the dominant features of both policy paradigms.

Metabolic Principle	Plano Safra	PAA/PNAE
Economic	Increasing commodity production as the main goal (Efficiency)	Promoting food security as the main goal (Sufficiency)
Social–ecological	Privileging industrial, monoculture, and pesticide-based agriculture (Extraction)	Prioritizing agroecological and organic production as well as traditional and land reform farmers (Regeneration)
Allocative	Targeting agribusiness investors (Accumulation)	Privileging local smallholder family farmers and promoting decentralized markets (Distribution)
Institutional	Fostering large-scale production (Private ownership)	Favoring procurement from land reform peasants and other traditional communities; Adopting council-based governance (Commons)
Relational	Strengthening global agri-industrial corporate clusters (Control)	Supplying public institutions with healthy food from local producers (Care)

Table 2. Metabolic comparison between Plano Safra and PAA/PNAE.

Although the table presents categories and at least one example for each of the principles in both growth and post-growth metabolisms, it is important to note that the principles are not isolated and are better understood systemically. For instance, PAA/PNAE's privileging of traditional communities addresses an allocative dimension of income distribution, the institutional principle of strengthening territories managed as commons, and a social–ecological dimension supporting traditional farming methods. On the other hand, corporate control implies private ownership, and increased yield efficiency is achieved via extractive practices that deplete soils.

#### 3.1.1. Plano Safra as a Growth-Metabolism Policy

Subsidized agricultural credit has existed in different forms and to varying extents in recent decades. From abundant and cheap credit in the 1970s during the Green Revolution to scarcer and more erratic funds throughout the mid-1980s to mid-1990s, since the early 2000s, Plano Safra has provided a more predictable and consistent credit policy [55]. Since its inception, Plano Safra has had the main goals of incentivizing modernization, competitiveness, diversification, and increasing agricultural exports by offering subsidized credit for farmers [59]. Throughout the years, Plano Safra's budget has grown consistently and substantially, rising from around BRL 30 billion in 2003/2004 to more than BRL 400 billion in 2024/2025.

We argue that Plano Safra reflects an agricultural policy nurturing mainly a growth metabolism. Contrary to policies that are implemented through multiple governance structures and civil participation (see Section 3.1.2), mainstream agricultural policies implemented by the Ministry of Agriculture are less permeable to the participation of social movements. Moreover, these policies are considerably influenced by representatives of agribusiness, such as the Brazilian Agribusiness Association (ABAG) and the National

Confederation of Agriculture and Livestock (CNA) [60], favoring the industrial agricultural model and a principle of corporate control over the public budget.

Corporate influence of Plano Safra translates into how its budget is divided. Although Plano Safra offers credit to producers of different sizes, most of its resources end up being used by medium and large-scale farmers, with smallholder family farmers, despite their majority status, accessing only a small percentage of funds [61,62]. The high reliance on credit mechanisms reproduces structural inequalities. For instance, access to credit is highly dependent on access to information, technical assistance, and guarantees to have loans approved by the banks, conditions more easily met by large-scale producers. Smallholder family farmers, on the other hand, struggle to access this type of support due to insufficient public technical assistance [62,63]. Through these inequalities, agricultural policy keeps favoring the principle of accumulation over distribution.

From a social-ecological perspective, Plano Safra highly favors the extractive approach of industrial-scale monocultures. On the ecological side, this model of agricultural development has contributed to deforestation, biodiversity loss, depletion of soil health, and water pollution, among others. In response to some of these problems, the Plan for Low-Carbon Agriculture (Plano ABC, for the Portuguese acronym) was created in 2010 (presidential decree 7.390/2010), being, at least from a budget perspective, the main institutional effort towards a sustainable agriculture in Brazil. Plano ABC was designed to promote the adoption of less carbon-intensive practices (e.g., no-till agriculture and silvopasture systems) through the same model of subsidized credit used in Plano Safra. During the program's first implementation cycle (from 2010 to 2020), 193.7 Mt CO2eq were estimated to have been mitigated, with a BRL 21.8 billion investment (Brasil, 2023); for a second cycle of implementation (from 2020 to 2030) rebranded to Plano ABC+, the mitigation target is five times higher. Despite considerable impacts on GHG mitigation through technological substitution, other ecological indicators related to agriculture such as deforestation (including GHG emissions) and pesticide use have continued to worsen, challenging the effectiveness of a reductionist policy focused only on one indicator. Moreover, the underlying logic and operation remains the same: over-reliance on credit (without incorporating broader instruments, such as the need for technical assistance and education) and a lack of differentiation of targets and procedures for different types of farmers, maintaining the bias towards large-scale producers over smallholder family farmers [64].

If Plano ABC was the mainstream response to the ecological problems from industrial agriculture, a policy targeting smallholder family farmers was the mainstream response to the social consequences of the industrial model, such as rural exodus, unemployment, exploitation of rural workers, and pesticide-related health problems [65,66]. In 1995, the National Program for Strengthening Family Farming (Pronaf, in Portuguese) was created with the "purpose of promoting the sustainable development of the rural sector constituted by family farmers" (presidential decree no. 1946/1996). As explained by Grisa et al. [62], even though Pronaf was created as a "sustainable development" rural policy, it reproduced some path dependencies from the Green Revolution, centered around productivist conceptions and disconnected from more structural social and ecological considerations. Also relying mostly on credit instruments, PRONAF has often mirrored the inequalities of access to resources already described for Plano Safra, with credit concentrated in the hands of more capitalized family farmers, focused on commodity production, and usually located in the richer regions such as South and Southeast Brazil [61–63]. From 2006 to 2017, the number of smallholder family farms decreased, while the total area covered by these farms increased, which shows the evolving process of concentration of land [67].

Overall, through the bias towards industrial monocultures, growth policies such as Plano Safra keep channeling resources towards multinational agricultural suppliers, notably, machinery, patented seeds, and industrial inputs such as fertilizers and pesticides. For example, around 76% of the soybean supply chain in Brazil is controlled by international corporations, fueling the economic power of global conglomerates of agricultural technology and commodities instead of the local producers [53].

#### 3.1.2. PNAE as a Post-Growth Metabolism Policy

PNAE is a national meal program that guarantees free lunches and snacks for students of all ages registered in the public school system. Although conceived as a food security policy in the 1950s, it has undergone important modifications and presently it is a multisectoral policy that, in addition to providing healthy meals for students, positively impacts small producers, family and traditional farmers, as well as local biomes, exemplifying what we understand as a post-growth metabolism.

An important element of PNAE resonant with post-growth is its decentralized governance. In the 1990s, PNAE's implementation went from being centrally managed by the federal government to allowing municipalities to autonomously organize the policy's resources, training, and logistics related to the purchasing, preparing, and distribution of food [68]. This change positively affected food quality, reducing the reliance on nonperishable food and enabling the acquisition of more basic ingredients such as produce and fruit, and allowed more culturally and geographically relevant meals. Decentralization also enabled the inclusion of local businesses and local production in the provision of school food and boosted the number of municipalities that adhered to the program, going from 1532 to 4314 in four years (77% of municipalities) [69].

Following decentralization, governance is organized by several public institutions and commissions in the form of councils, agencies, and NGOs, which vary by region. The participation of civil society and representation from a variety of sectors all contribute to managing PNAE funds and logistics.

One of the most relevant amendments in PNAE's legal framework that significantly aligns with post-growth logics is the federal law 11.947 of 2009. This mandate requires that 30% of PNAE procurement funds be used to purchase food directly from local smallholder family farming. Notably, this mandate financially prioritizes organic and agroecological food, purchased preferably from traditional, indigenous, Quilombola (maroon communities), and agrarian reform settlements, paying up to 30% more for food grown under these conditions. The law was also modified in 2023 to prioritize purchases from women farmers.

This law amplified the focus of PNAE from food security and student health to include rural sustainable development in a way congruent with a post-growth metabolism. For instance, its main goal of food security aligns with the economic goal of sufficiency as opposed to efficiency, according to an economic understanding of provisioning systems and the definition of food security (i.e., access to healthy, sustainable, and culturally appropriate food).

Its participatory arrangement and council-based governance align with the institutional principles of the commons, challenging privatization models and enabling more democratic participation where multiple social sectors come together to manage resources for a common good, i.e., a hunger-free society, sustainable agriculture, and rural justice.

Furthermore, the legal mandate to purchase food directly from smallholder family farming reflects the allocative principle of distribution as opposed to accumulation. This challenges one of the main tenets of capitalism and fosters local and diverse economies instead of transnational agribusiness-based corporations. Similarly, the financial incentive of agroecology and organic farming pertains to the social–ecological principle of regeneration as opposed to extraction. Besides its potential as an agricultural system within planetary boundaries, agroecology also targets the regeneration of the social fabric of societies, centering peer-to-peer learning and relations over exploitation [39,70].

Lastly, the relational principle of care is exemplified in the policy's broader goals to supply healthy and sustainable food while regenerating ecosystems and supporting rural justice. This is congruent with a relational paradigm where notions of interconnectedness result in connections between producers and consumers, and consumers and their local biomes. This raises critical assessments of the effects of technology, labor, and knowledge on the more-than-human.

The impact of this law for smallholder family farmers and ecosystems varies across states and municipalities, with different factors affecting the functioning and success of PNAE (see [71–74]). Where this policy works successfully, bottom-up processes such as farmers' cooperatives or associations and mobilization with civil society and organizations meet top-down policies to supply healthy, sustainable, culturally appropriate, and justly produced food. We believe this policy presents grounds for a post-growth metabolism in Brazil, and although we acknowledge that policy alone might not be enough to transition to a post-growth economic system, discerning the institutional elements that are leveraging post-growth transitions might help articulate policy processes and slow down, and ideally override, the growth paradigm.

#### 3.2. The Political Economy of a Post-Growth Metabolism in Brazilian Agriculture

Although policies promoting growth and post-growth metabolisms coexist, they are not politically equivalent. The agricultural panorama outlined in the first part of Section 3 illustrates how the political economy of agriculture in Brazil unequivocally sustains a "growth metabolism" as the dominant paradigm. In that sense, even with important positive impacts, post-growth resonant policies have not been sufficient to challenge the country's dominant agricultural structures.

To better understand the political economy around these limitations, it is important to note that the institutionalization of policies that support a post-growth metabolism was carried on by the Workers' Party government when it came to power in 2003. Those policies were designed to achieve social outcomes, namely ending hunger and extreme poverty, while strengthening food security, and involved two main governance structures. The first was an inter-institutional arrangement between different ministries at the national level, in coordination with state and municipal levels, forming a National System of Food and Nutrition Security (SISAN, in Portuguese). The second structure was the establishment of two levels of participatory spaces, the National Council of Food and Nutrition Security (CONSEA), and corresponding state councils designed to promote discussions, monitor, and recommend implementation mechanisms for food security policies. These governance structures enabled the coordination of multiple policies in participatory ways, involving, for instance, a national program of basic income (*Bolsa Família*, in Portuguese) and integrated policies to strengthen smallholder family farmers, rural development, and agroecology, such as Pronaf (credit for family farmers), PAA, PNAE, and land reform programs.

For over a decade, this policy and governance arrangement received considerable political support at the federal level. From 2000 to 2012, these types of social programs had a budget increase of 128%, with the budget from PAA alone increasing tenfold from 2003 to 2013 [75]. Indeed, these policies reduced extreme poverty from 25.5% of the population in 1990 to 3.5% in 2012; in 2014, Brazil was considered free from hunger, according to FAO metrics [75]. However, the impeachment of President Dilma Rousseff in 2016 initiated a significant disruption in Brazilian political history. This shift changed the social policy trend, with the extinction of CONSEA in 2019 and a general decrease in the budget of most social programs [60,76]. While Brazilian agriculture broke records in agricultural output

almost every year, the proportion of families experiencing food insecurity rose from 22% in 2013 to 37% in 2019.

The reversal of the trend observed after 2016 illustrates the political economy of growth vs. post-growth metabolisms. Even before 2016, although supported by the Workers' Party, post-growth policies still had limited ability to promote structural change. For example, Moraes et al. [77] analyzed the internal activities of CONSEA from 2006 to 2016 and noticed that, despite advances in the social agenda, debates and recommendations that challenged big economic and industrial interests, such as pesticide and food labeling regulation, would often be dismissed by legislators and high officials in the federal government.

Most notable is the fact that, although the post-growth policies are subject to political disputes at the national level, the growth-based policies are closer to a consensus, benefiting from budget increases regardless of the political leaning in power at any given point in time.

#### 4. Post-Growth Transitions for Brazilian Agriculture

In the Brazilian agricultural policy arena, the post-growth debate is currently negligible. Despite evidence of the existence of this metabolism, as we have highlighted thus far, agricultural policy continues to be formulated and debated from a growth-centric perspective and narrative. We are thus addressing this gap by situating post-growth as a relevant concept for Brazilian policymaking. We deem this important because, despite the existing mechanisms that support a post-growth metabolism within Brazilian agricultural policy, having achieved important social–ecological outcomes, they have still failed to meaningfully challenge the dominant growth metabolism. One of the contributions that post-growth scholarship can provide to sustainable agriculture is to enable a more systemic and interconnected view of policy to better identify the structural changes necessary to transform the economy as a whole. Thus, this section draws from the identified postgrowth metabolic principles outlined in Table 2 to propose a conversation to explore how additional policies, agricultural or otherwise, could strengthen the transition towards a post-growth economy.

Before returning to the post-growth principles, it is worth examining how well market allocation and the price mechanism work with food production and agriculture. Mainstream market theory argues that the price mechanism brings supply and demand into equilibrium at a quantity of output that maximizes social welfare as measured by economic surplus. However, as one best-selling textbook notes, "A rich man's cat may drink the milk that a poor boy needs to remain healthy. Does this happen because the market is failing? Not at all, for the market mechanism is doing its job- putting goods in the hands of those who have the dollar votes" ([78], p. 38). When food prices increase, lower income people reduce consumption by much more than higher income people. Rather than maximizing social welfare, markets often allocate the marginal unit of food to those who need it least [79]. The demand curve theoretically represents the marginal benefits of consumption, and the law of demand states that the demand for a product will move in the opposite direction from its price. However, the physiological demand for food is unaffected by price, which explains why the market demand for food is more price inelastic than for most other goods [80,81]. The supply curve theoretically represents the marginal costs of production yet markets largely ignore the ecological costs of food production. A recent study estimated that "US\$ 2 of production-related external costs were embedded in every dollar of food expenditure in 2018" ([82], p. 394). Internalizing ecological costs into food prices would force the poor to slash consumption, while ignoring them leads us to exceed planetary boundaries. Finally, for any resource with inelastic demand, total revenue moves in the opposite direction from supply, so the contribution of food to GDP perversely increases as production declines.

Thus, post-growth economics invites us to think beyond market logics. A reflection on the post-growth economic principles of sufficiency, for instance, leads us to question how much agricultural production is enough. The post-growth literature debates what "enough" can mean in different provisioning systems and in different contexts to achieve wellbeing [24,83,84]. It is important to consider that agriculture goes beyond food production. This implies incorporating into models other agricultural outputs that can compete with, or complement, land used for food production, such as fibers, biofuels, and timber. A debate on what "sufficiency" might mean for those value chains, including the export role that Brazil plays globally, is far from simple but nevertheless necessary to enable an overview of how agroforestry and other desirable biodiverse agroecosystems could integrate and synergize food and non-food production. This type of debate needs to be informed by good data and science, but is essentially a political one that, on the premises of degrowth, should be democratic [22], e.g., through participatory planning [85]. The successful experiences of the national and state councils of food and nutrition security discussed in Section 3 can inform the design of participatory mechanisms to debate the country's agricultural model and the role it should play domestically and in the global arena.

Deciding how much agricultural output is appropriate also invites reflections on the macroeconomic role that agriculture currently plays in Brazil, especially in terms of export value and in stabilizing Brazil's balance of trade. A transition towards a post-growth agriculture would challenge this growth-based macroeconomic policy. In studies of the Global North, post-growth macroeconomic modeling illustrates the feasibility of ensuring socioeconomic stability even with a contraction in GDP through reliance on mixes of policies such as job guarantees, reduction of working hours, wealth taxes, and basic income [86,87]. We highlight, nevertheless, the need for studies that consider the specific conditions of Global South countries, for instance, taking into account the current macroeconomic role of export commodities, as is the case in Brazil.

Regarding the social–ecological principle of regeneration, it is important to acknowledge that extraction is usually faster and cheaper than regeneration and, thus, needs to be disincentivized. Currently, industrial agriculture is highly subsidized, with the soybean value chain alone benefiting from BRL 60 billion a year of federal subsidies [88]. Another example is pesticides, exempt from several taxes (notably state-level taxes), worth yearly around BRL 10 billion [89]. For comparison purposes, the 2015 budget for PNAE was BRL 3.8 billion. Organic farmers, on the other hand, must undergo an expensive certification process, and consumers pay more as a result, a perverse inversion of the "polluter pays" principle.

The principle of regeneration implies reversing the structural incentives for industrial monocultures, eliminating perverse subsidies, and improving control and labelling over damaging practices such as agrochemical use. The more direct form of correcting those distortions would be through an ecological tax reform to privilege agroecological activities as well as increased taxation on socially and ecologically damaging activities. As an isolated measure, nevertheless, an ecological tax reform relies solely on the price mechanism, disproportionately hurting low-income populations, as explained earlier in this section. Thus, we argue that an ecological tax reform will only be just as part of the broader set of post-growth measures that ensure sufficient production with equitable access to food, allowing for coordination in production and allocation of food towards basic needs in ways not currently guaranteed solely by market dynamics.

The agri-industrial model also pushes productivity gains enabled by mechanization and fossil fuels over labor, an option that is made artificially cheaper because it does not account for the socio-ecological costs involved, as the literature on planetary boundaries consistently illustrates. A post-growth agriculture would imply more labor-intensive systems, so structural measures need to look for a balance between labor demand vs. technological efficiency that enables the production of enough food within acceptable socio-ecological limits, a balance that should also inform an ecological tax reform towards reducing the tax burden on labor and increasing taxes related to resource-intensive and fossil-fueled technologies.

In the past two decades, these systemic distortions have also been reducing the cost of ultra-processed food and turning fresh and organic food into elite products, disproportionally worsening nutrition among low-income populations in Brazil [90]. A differentiated food tax connected with the level of processing and ecological footprint could be advanced, increasing the affordability, for instance, of short food supply chain fresh and agroecological products.

The allocative principle of distribution invites us to overcome the limitation of relying exclusively on commodity markets to allocate essential resources, promoting instead more diverse food provisioning systems. We propose that PAA and PNAE can be expanded into broader systems to guarantee healthy and sustainably produced food as a human right, e.g., through the expansion of public restaurants, community kitchens, networks of distribution of fresh and locally sourced food (such as the ones established during the COVID-19 pandemic, as described in Proença et al. [90]), and the support of urban, periurban, and community gardens, all of which supersede the land sparing vs. land sharing debate by increasing food production without extending the agricultural frontier. Public provisioning systems can internalize ecological costs without threatening food security, ensuring a social cushion that diminishes the dependence on markets to access essential healthy food, while also fostering agroecological production.

As mentioned before, fresh and minimally processed agroecological foods, especially fruits and vegetables, have had their consumption reduced due to relative increases in prices compared to ultra-processed foods. Logistically, healthy agroecological food should preferably be produced and distributed through short supply chains, notably in urban and peri-urban agricultural systems, making these systems ideal for job guarantees, another post-growth proposition. Job guarantees are an essential part of achieving social stability in post-growth macroeconomics, ensuring full employment, with socially and ecologically meaningful occupations, such as in food production, environmental restoration, and care activities [91–93].

The design and efficacy of public food provisioning systems also evoke quantitative questions around the needed resources to ensure sufficient, healthy, and culturally appropriate food production and distribution in socially and ecologically sustainable ways. To answer such questions, we must advance the social-ecological modeling of food systems appropriate for post-growth metabolisms. Virtually all mainstream agricultural models are built on industrial agriculture premises and a growth paradigm, unable to consider social–biological synergies, which are key advantages of agroecological systems [94], thus implying the need for different models designed specifically to account for agroecological dynamics. Appropriate models are an essential step to building more reliable scenarios on the potential of post-growth agriculture to respond to planetary boundaries overshoot and climate change. Currently, the only environmental policies for agriculture with established goals and a relevant budget are the ones limited to reducing GHG emissions through Plano ABC+, thus insufficiently considering the broader social and ecological impact of agriculture in policy design. Brazil has an extensive tradition in agricultural research, notably with the Brazilian Agricultural Research Corporation (Embrapa), which should be refocused institutionally to prioritize agroecological research.

The post-growth institutional principle of reclaiming and protecting the commons invites questions about land access and stewardship. A social justice perspective to agri-

culture implies, first of all, securing land tenure for all indigenous and other traditional communities (e.g., *quilombolas, ribeirinhos*), a legal right established by the country's Constitution in 1988, but still not materialized for all communities. According to CIMI [95], only 30% of indigenous lands had their legal recognition process complete, while 40% have not even started the process. Securing land tenure for traditional communities is also directly connected to ecosystem stewardship, since indigenous management of ecosystems, such as, for instance, the Amazon forest, is critical to tackling climate change [96]. In terms of land reform, at least 90,000 families affiliated with the Landless Workers Movement (MST, in Portuguese) are still waiting to be allocated land in new settlements [97].

Questions around the values that motivate and drive farmers' decisions, especially in agroecological contexts, are also central to a post-growth agriculture. Specifically for the context of sustainable agriculture, Ament et al. [98] warn that, contrary to prevailing economic beliefs on homo economicus, real-world decision-making is much more complex and influenced by multiple values, motivations, and cultural and social components. Sustainable agricultural policies should consider not only instrumental values (e.g., price, profit, and market access) but also intrinsic and relational ones, which recognize that the economy is embedded in society and, thus, is shaped by non-economic factors such as friendship, aesthetics, and reciprocity. The emerging literature provides evidence, for instance, that not considering the plural values that motivate farmers undermines their engagement with sustainability policies [99–101]. From these premises, policy needs to take into account, for instance, the role of family and volunteer labor, informal markets, and non-market and subsistence practices woven into the social fabric of a community. Those points stress the importance of non-market-based policies to enable a post-growth metabolism, such as basic income for farm workers, expansion of public services specific to rural contexts, and other measures that reduce the financial pressure on farmers and help to sustain desired non-market social-ecological dynamics, such as urban and community gardens. Payment for ecosystem services might also play an important role. Although problematic in its danger of further commodifying nature [102], we would highlight public policies where payment for ecosystem services is implemented as a non-market instrument, such as a co-investment of governments with farmers in ecological stewardship for the common good [103].

Table 3 summarizes the policy ideas discussed in this section, classified among the five principles of a post-growth metabolism. Note that policy ideas may embody more than one and, sometimes, all of the principles.

Metabolic Principle	Policy Propositions
Economic	Post-growth macroeconomic modeling informed by the goal of minimizing the ecological costs of generating sufficient agricultural output.
Social–ecological	Ecological tax and subsidy reform to favor agroecology and short supply chains; Increase control and labeling for environmentally harmful production practices rather than for organic and agroecological ones; Modeling the social–ecological metabolism of agriculture.

**Table 3.** Summary of additional policy propositions for a post-growth metabolism in Brazilian agriculture.

Metabolic Principle	Policy Propositions
Allocative	Public provisioning systems for essential food; Publicly funded open access R&D to advance agroecological methods and technologies.
Institutional	Participatory councils for agricultural policy debate, monitoring, and recommendations; Land reform: Secure land tenure for smallholder family farmers, indigenous, <i>quilombolas</i> , landless rural workers, and other traditional communities.
Relational	Support of non-market social–ecological dynamics through expansion of rural public services, co-investment in ecosystem services.

Table 3. Cont.

Lastly, it is important to acknowledge that many of the post-growth propositions outlined here are already part of the Brazilian political debate, such as land reform, phasing out pesticide subsidies, and securing land tenure for indigenous and traditional communities. Relevant social–environmental movements such as the ones involved with agroecology, *bem* viver, and indigenous rights already hold narratives that significantly resonate with postgrowth in their critique of productivist, market-based, and developmentalist paradigms. Other propositions are, to an important extent, new in the political arena, such as postgrowth macroeconomic policies and democratic debates around sufficiency. We argue that policy processes could further benefit from a closer dialogue and collaboration with post-growth scholarship. Alvear & Vandana [104] exemplify degrowth's importance in challenging growth-centered imaginaries that dominate policy debate in the Global South by, for instance, inquiring how emerging technologies can be "put at the service of decreasing, rather than sustaining and increasing, current energy demands?" (p. 7). These generative disruptions are essential to de-center dominant green growth narratives from policy debates and gear them towards perspectives more coherent with the planetary social-ecological conditions required to sustain life and society.

### 5. Conclusions

Green growth policy narratives and solutions are insufficient to reverse the current trend of severe ecological breakdown worldwide, and specifically in Brazil. They fail to acknowledge the interdependence of economic growth and biophysical and social realities. In this paper, we identified a gap in Brazilian policymaking, where the conversation about post-growth is virtually absent. We advanced the argument that post-growth scholarship must be considered in policy making and highlighted existing post-growth premises in Brazilian agricultural policy. From our exploration, we argue that both a "growth" and a "post-growth" metabolism already co-exist in Brazil, with the growth metabolism being currently dominant and a barrier to effectively addressing social-ecological crises. We explored policy ideas to strengthen a post-growth transition involving, for instance, democratic debates around sufficiency of agricultural output as well as expanding existing policies that promote public provisioning systems of essential and agroecological food.

Moreover, we argue for the relevance of post-growth for the Global South, illustrating how existing food system policies in Brazil nurture a post-growth metabolism leading to important social–ecological outcomes, such as improving food security, reducing poverty, strengthening agroecological production, and promoting democratic and decentralized governance. Conceptualizing existing policy within post-growth lenses can help build bridges between post-growth and other social–environmental movements already advocating for advancing Brazil's agricultural paradigm beyond the limitations of growth-based narratives. These have failed so far to address the existential threat of climate change and ecological breakdown. We take inspiration from degrowth scholar Giorgos Kallis' perspective on the role of utopia for degrowth, "not as a blueprint but as a canvas that nourishes new imaginaries" ([22], p. 124).

Furthermore, we argue that viewing existing socio-political processes and their outcomes through post-growth lenses helps empirically ground post-growth scholarship, a field that, although expanding considerably, still needs development, particularly in designing how to achieve the desired goals of socially just provisioning systems within planetary boundaries [33].

With increasing disruptions due to climate change and international conflict, tensions between the growth and post-growth metabolisms tend only to increase. In Brazil, these tensions are made explicit through, for instance, economic pressures for increasing oil exploration (including in the Amazon rainforest), ongoing tensions over land tenure, and expanding mining in indigenous territories, all backed by a growth-based paradigm. Postgrowth scholarship offers underexplored paths to help rethink agricultural (and other) systems' policy imaginaries in ways compatible with the safe and just operating spaces of our planet.

#### Limitations and Future Research

This paper hopes to start a conversation about post-growth policy processes in Brazil rather than prescribe detailed pathways and make specific policy recommendations. We do, however, highlight particular elements from existing policy and group them into principles, explaining their compatibility with a post-growth metabolism.

We recommend future research adapt these principles to specific contexts and goals for the design of agricultural policy. Future studies should also model the metabolic effect of post-growth policy on social–ecological outcomes, further advancing the quantitative aspects of those policies. In the same way that we have identified post-growth policies in Brazil, post-growth scholarship should investigate other existing policies with important social–ecological outcomes regarding their post-growth relevance, especially in the Global South.

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#### Notes

- <sup>1</sup> Note that Fanning et al.'s [3] biophysical limits are similar but not identical to Richardson et al. [1] planetary boundaries; among the differences, the first consider ecological and material footprints, while the latter consider biosphere integrity, atmospheric aerosol loading, stratospheric ozone depletion, ocean acidification, and novel entities.
- <sup>2</sup> For the purpose of this review, publications adopting either "degrowth" or "post-growth" in relation to agriculture were considered, since both terms unequivocally imply an economic organization beyond the growth imperative.

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