Transformative Partnership Platform

Agroecologically-conducive policies: A review of recent advances and remaining challenges

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1 Introduction

Even before the current global COVID-19 health crisis, whose potential long-term impacts on food systems are still unclear (e.g Béné et al., 2020), experts from several areas have pointed to a “global syndemic” characterized by the confluence of environmental degradation, climate change, and the triple burden of malnutrition (Swinburn et al., 2019; Willet, et al., 2019). According to numerous studies, the behavior of some private sector actors and the eating habits of a significant part of the world’s population, combined with insufficient government action, is leading to significant loss of biodiversity and ecosystem function (Wagner et al., 2021; Rampino & Shen, 2019). In light of this, over recent years, demands for concerted actions or initiatives that simultaneously tackle the many dimensions of this problem complex have expanded, arguing that solutions focused on single issues will be insufficient and may even worsen other aspects of the problem. Historically, this has been the case with agricultural policies favoring industrial approaches, which while contributing to reducing hunger, also generated externalities contributing to environmental degradation, climate change (IPCC, 2019) and, when associated with ultra-processed food consumption, impacts on public health (Monteiro et al., 2019; Vandevijvere et al., 2019). This has generated a vigorous discourse on how innovative farming practices

and the development of food value chains, enabled by conducive policies, could promote healthy, sustainable and inclusive food systems that is now a major concern for both governments and civil society (HLPE, 2020; FAO et al., 2020; IFOAM, 2017, Blay-Palmer et al., 2019; Lamine et al., 2019).

Among the alternatives that have appeared in the lexicon of many organizations, is the term “agroecology” (Loconto & Fouilleux, 2019; HLPE, 2019). Understandably controversial because it encompasses the political economy of food systems, this concept has become an important reference for the design of public policies in several countries, mainly in contexts where grassroots movements have been active stakeholders in designing food policy instruments. In comparison with other current concepts such as “climate-smart agriculture” and “nutrition-sensitive agriculture” (Burlingame & Dernini, 2018), agroecology is distinguished by being supported by a global network of social organizations (Canfield, Anderson & McMichael, 2021; Pimbert, 2015). These organizations, have engaged with policy processes in the UN Committee on World Food Security (CFS), developing a basis for “policy transfer” between international impetus, national action and vice-versa, leading to development of public policy instruments designed to favor agroecology and their dissemination to new contexts (Sabourin et al., 2018).

The development, implementation and scaling up of agroecological practices requires an appropriate enabling environment. In fact, it often requires overcoming structural constraints that lock in conventional models of agricultural improvement, necessitating fundamental shifts in the way food systems are organized and function (HLPE, 2019). One of the principal bottlenecks constraining agroecological transitions beyond the availability of technical solutions, from farm to fork, suitable to local contexts, is whether the right policies can be put in place to enable their adoption at scale, in a transformational way (Sinclair et al., 2019). The purpose of this paper is to provide a review of recent advances in policy developments that might be conducive to agroecological transitions and associated challenges to their implementation.

In recent years, policies specifically designed to support agroecology have emerged in a few countries such as Argentina (Patrouilleau et al., 2017), Brasil (Niederle et al. 2020a), France (Hubert & Couvet, 2021), Nicaragua (Fréguin-Gresh & Sabourin, 2019) and Senegal (Boillat et al., 2021; Bottazzi & Boillat, 2021) while Sri Lanka recently announced a national transition to agroecological production supported by an import ban on agrochemicals (USDA, 2021). There are other examples of policies that, despite not mentioning agroecology specifically, incorporate instruments to support “agroecological principles or practices” and therefore are supportive of agroecological transitions. These instruments have different natures, scales, and objectives, either oriented towards production or consumption, commercial activity or environmental protection; value chain or territorial dynamics (IFOAM, 2017). Nevertheless, among these policies it is still rare to find a concerted set of policies that respond in a systemic way to production, environmental and public health challenges. It is even rarer to find studies analyzing the effects of these policies or the reasons for how well they performed.

From a scan of the global literature along with a few deeper insights from Brazil, India, Senegal, France, and Nicaragua, this paper aims to fill an important knowledge gap related to advancing policies in support of agroecology.[1] By public policies, we mean laws, decrees, regulations, as well as strategies, plans or investment programs with

[1] These are countries that, according to the literature, have some of the most developed experiences in terms of public policies supporting agroecology principles. Moreover, they represent cases we have been studying for several years in different initiatives.

specific policy measures or instruments implemented by or with support from state actors, whether at regional, national or sub-national levels. This definition does not aim to hide the importance that private actors and civil society organizations have in the different phases of policy design, implementation, and monitoring, but emphasizes a concept of public policy that requires the presence of the State (Mény & Thoening, 1989). Agroecological transitions need to cover production to consumption, and to be suited to context. Because of this, we identify and classify conducive policies in five types: **consumer oriented**; **producer oriented**; **market and food environment oriented**; **macro and trade oriented**; and **cross-cutting policies**. All of them are considered to the extent that they are aligned with a set of "principles" that guide agroecological transitions, referred to below as AE principles (HLPE, 2019).

In recent years, efforts to build a consolidated concept of agroecology have taken place in international arenas. Two major initiatives were those conducted by the FAO Global Dialogue on Agroecology and the High Level Panel of Experts on Food Security and Nutrition (HLPE). Both of them involved social organizations, experts, and policymakers from different countries, and resulted in two reports with complementary lists of "agroecological elements" and "principles" (respectively, FAO, 2018; HLPE, 2019). The AE principles, incorporate the elements but are more explicit and so can be used to guide the development of agroecological practices adapted to local contexts through co-creation of knowledge with local stakeholders (Wezel et al., 2020). Therefore, in this paper, by not limiting our attention to farmers and organizations that identify themselves as "*agroecologists*", we set out to understand how public policies induce the different routes of transition adopted by actors who are still predominantly engaged in other practices but willing to engage with a vision of healthier and more sustainable food systems as set out in the AE principles.

2 Objectives of agroecology in overcoming the problems of current food and agricultural systems

For the last 40 years, civil society organizations and academics have been pointing out a series of problems created by so-called "industrial agriculture" (or "modern agriculture", "high-external input agriculture", "resource-intensive agriculture"). This model was promoted by public policies after WWII, first in the US and Europe and then, with the Green Revolution, in low- and middle-income countries. In general terms, industrial agriculture is characterized by a high dependence on external industrially derived inputs (fertilizers, pesticides, machinery) as a way to increase agricultural productivity, with the objective of limiting the increase of food prices over time, while allowing income gains for producers; however both have been challenged by rising costs of production caused by the high dependency on fossil energy and other external inputs (Ploeg, 2000).

As a set of principles guiding agricultural and food practices, agroecology could be traced back to scientific evidence produced long before social movements started to care about the impacts of the industrial agriculture. Because of that, it is crucial to consider that agroecologically-conducive policies can contribute not only for the sustainable transitioning of this model of agriculture – and its associated forms of food consumption, distribution and processing –, but also for making "traditional" (or non-industrialized) forms of farming more environmentally, socially and economically sustainable. Similarly, the agroecological movements are relevant for, and active in, all types of farming systems.

As a social movement, agroecology emerged embracing a critique of the industrial agriculture, first because of its environmental consequences, then its social effects in terms of marginalizing smallholders, and more recently, concern over its wide-spread impacts on nutrition. The first and the most consensual critique of industrial agriculture, was ecological, which gained momentum with Rachel Carson's Silent Spring (Carson, 1962). The list of negative impacts of industrial agriculture is now vast and no longer focused only on how industrial agriculture is exhausting the productive capacity of local ecosystems (degradation of soil and natural resources), but also on its global effects in terms of climate change (Rockström et al., 2009; Dale, 2020; Altieri and Nichols, 2015; Aguilera et al., 2020; Gliessman, 2017) and biodiversity loss (Wagner et al., 2021; Rampino & Shen, 2019). While the identification of these problems does not provoke serious disagreements within the scientific community, the debate about solutions is a long way from reaching consensus. Rather than support a transition to agroecology, several public policies are orientated to promote the "Doubly Green Revolution" (Conway, 2019; Ruttan and Conway, 1998). Supported by a narrative that promises "food for all in the twenty-first century", these policies expect industrial agriculture to solve its own problems by means of a new wave of technological innovation (hyper productive, enriched and resistant varieties and breeds; lab-grown and plant-based meats; nutraceutical and functional food components, *etc*.).

Even if this new revolution is open to agroecological practices, social organizations argue that its promise of an agriculture that no longer depends on massive quantities of land, water, fertilizers, and pesticides, only repeat the old pledge of agricultural modernization policies and, because of that, do not really offer an integrated response to the multidimensional challenge facing food systems. For example, the development of new varieties of seeds is often at the expense of traditional ones and agrobiodiversity loss worldwide (Zimmerer et al., 2019; Ficicivan et al., 2018). Technologies such as plant-based meat have also been questioned because their greenhouse gas emissions could be higher than those related to livestock systems (Van Vliet et al., 2020; Chriki and Hocquette, 2020). Conversely, supporters of these technologies contest that agroecological systems cannot feed the growing global population without significantly increasing cultivated area. Here, proponents of different approaches are talking at crossed purposes, because of diverging perspectives on future demand for food conditioned by what people chose to consume and the contention that we already produce more than enough food to feed everybody, but it doesn't get to the right people and much of it is lost or wasted (Fouilleux, Bricas & Alpha, 2017; Holt-Giménez, 2012).

The second main critique is about how industrial agriculture has marginalized smallholders and indigenous farmers. During the 1970's a UN Research Institute for Social Development project[2] pointed out the polarizing effects of agricultural technologies and how, in situations of sharp social inequality, the introduction of high-yielding varieties tended to marginalize smallholders and undermine their livelihoods (UNRISD, 1980). This critique generated many initiatives for redesigning technologies to local social and ecological conditions and also gave rise to participatory research methods. In Brasil, for instance, several NGOs were created in the late 1970s and 1980s with the clear objective of offering agricultural services that support smallholders to design alternative technologies (Lamine, Niederle & Olivier, 2020; Petersen et al., 2020). However, in Brasil and more generally throughout Latin America, these

[2] The research project "The Social Implications of Large-Scale Introduction of New Varieties of Foodgrain" lasted from 1970 to 1979 with field works in Colombia, Indonesia, Malaysia, Mali, Mexico, Morocco, Pakistan, the Philippines, Sri Lanka, Tunisia and Zambia.

localized initiatives only dampened the marginalization process and its consequences in terms of rural poverty, famine, and exodus (Altieri, 2018).

Concerning those farmers, countries, and regions that might be able to adapt their agricultural systems to respond to new industrial demands, the main concern is about their loss of autonomy and subordination (Holt-Giménez, 2021). Many of the tasks that make up agricultural labor have been increasingly prescribed by outside agencies, such as banks, providers of technical inputs, certifiers, extension services, accountancy bureaus, traders, and cooperatives. This process occurred particularly early in chicken contract farming in the US and Europe. Farmers growing chickens lost the control of their activity, production methods, the nature of inputs used, the calendar being now decided by the input provider and/or by the buyer (often the same enterprise). Since the early 1970's farmers organizations like "*paysans-travailleurs*" in France have been fighting against this (see Lambert, 1970) because, for them, autonomy is a value as important as the protection of the environment, the second one being a condition for the first.

For those social organizations and academics concerned about the effects of social marginalization, agroecology is perceived as a way farmers and communities can regain control over labor and knowledge, and design sustainable ways of farming in harmony with nature (Ploeg, 2021; González de Molina & Lopez-Garcia, 2021; Anderson et al., 2020; Rosset & Martinez-Torres, 2012). This fight for autonomy is also translated at the collective and territorial level by the claim for food sovereignty, international trade being, in the view of these organizations, a way to impose production norms and standards that mainly respond to the interest of the industry and retail corporations (McMichael, 2016). Similarly, small producers have been disempowered by more powerful interests in the articulation of organic certification schemes, whose rules, procedures and actors are often standardized, against which the agroecological movement supports locally-established participatory guarantee systems (Loconto & Tanaka, 2017; Niederle et al., 2020b).

The rapid expansion of the global market for "organic junk food"; that is, unhealthy ultra-processed food derived from organically grown produce, has also motivated agroecological organizations to pay more attention to the retail and consumption end of the food chain (Deaconu et al., 2021). Nutrition-sensitive agriculture has become an additional argument in the discourse on sustainable food systems. The evidence indicates that it is no longer possible to understand calls for an agroecological underpinning for public policies without encompassing the whole arrangement of practices "from farm to fork", as noted in the European Green Deal aiming to make food systems fair, healthy and environmentally friendly. In this sense, agroecology is presented, not only as a way to offer adequate food for all, but healthy food adapted to local cultures (Altieri & Nichols, 2020). One of the effects of this evolution to encompass consumption dynamics is the attention recent studies have given to how agroecology is connected to new urban food movements, which, with the ideas of food democracy, equity and citizenship, are identified as potential drivers of important changes to food systems (Bornemann & Weiland, 2019). HLPE (2019) recommends including agency as a fifth pillar of food and nutrition security alongside availability, access, utilization and stability. Agency relates to the extent to which all actors within a food system are able to influence how food is produced, processed, stored, transported, sold and consumed.

What types of policies could facilitate widespread agroecological transition? Would they be the same types of policy instruments created for the Green Revolution? If not, how do they differ? Even if these questions sound simple, finding answers to them demands a careful attention to the "grey areas". Food and agricultural systems are not really

divided between industrial and agroecological practices. In reality, countries, sub-regions and landscapes (or territoires) exhibit different underlying conditions and farming systems and indeed there is generally a mosaic of practices from farm to fork. Furthermore, aspirations for a 'better' future including the degree to which agroecology principles are embraced, will differ from place to place. Thus, it is important that policies are identified that consider different starting points, different target visions, and hence a diversity of context-specific transition pathways for connecting them.As previously mentioned, making industrial or traditional systems more sustainable would hardly demand the same sort of policy instruments and designs.

3 How public policies affect agroecology: current state of practice and promising reforms

Having discussed the potential for agroecology to address many of the ecological, nutritional and social problems associated with current agricultural systems we now turn to specific policies that have been or could be used to promote transitions towards agroecology. The section is organized into the following sub-topics: (1) types of policies that are expected to have a significant effect on agroecology transitions, both positive and negative, (2) examples of such policies taken by national or local governments from around the world, and (3) review of the state of knowledge on the effectiveness of such policies.

3.1 Typology of policies that shape agroecological transitions

Since policies have different dimensions to them (e.g. thematic area and type of instrument) there are multiple ways in which to develop a framework for analysis. We have chosen to begin with a well-used classification in the food and agricultural domain, the FAO Food and Agricultural Policy Decision Analysis (FAPDA) food and agriculture policy classification as a starting point. FAPDA consists of four hierarchical and nested levels of policy measures under the broad themes of producer-oriented policy, consumer-oriented policy and trade-oriented policy (which also includes macro-economic policy). For example, producer-oriented policy is disaggregated into four lower levels, one of which is production support; production support is in turn disaggregated into eight lower levels, such as agricultural input measures and finance and credit facilities. While the three high level categories are relevant for agroecology, we added a fourth category of "market and food environment oriented-policy" adapted from the FAO food systems framework (HPLE, 2017) to capture policies that focus mainly on the middle of the value chain between producers and consumers – e.g. food processors – as well as on strengthening markets and governing the broader food environment. Finally, we added a fifth category of 'cross-cutting' to account for policies that speak to multiple principles of agroecology and may span the previous categories, such as national agroecology policies.

Using these five categories as the organizing principle, Table 1 unpacks each of them into several policy types that are important for agroecology transitions in column 1 and provides some concrete examples in column 2.

1 **Table 1: Important Policy Thematic Areas for Agroecology Transitions**

Policy Theme and Measure	Examples of Policies to Support Agroecological Transitions
Consumer Oriented Policy	
Taxes	Consumption taxes on highly processed, non-nutritious foods or tax exemptions on healthy and sustainable foods.
Social protection/safety nets	Food subsidy programs that purchase healthy, fresh, nutrient dense, seasonal, and locally sourced foods. Employment programs that contribute to environmental objectives Food banks, soup kitchens, public restaurants.
Nutritional and health assistance	Information campaigns to increase the demand for healthy and/or sustainable foods. Develop and implement educational programs at all ages on the importance of healthy diets and food environments. Develop food composition tables for all consumed and produced food items as well as healthy and sustainable dietary guidelines. Encourage food retailers to feature nutritious foods in their displays and marketing communications. Support the development and adoption of labels that help consumers select the most nutritious or healthy food item (e.g. nutria-score). Regulate the food environments around vulnerable populations (e.g. zoning to ban fast food establishments next to schools).
Producer Oriented Policy	
Production support	Reduce input subsidies that favor the use of agricultural and harmful chemicals and the production of less nutritious crops. Pesticide reduction and regulation policies, and promotion of Integrated Pest Management. Balance government development programs that are mainly oriented to major staple or export crops/livestock only to a broader set of commodities. Train public extension officers in agroecology principles and practices. Enable long-term, low cost-financing for environmentally friendly farming practices, and in particular, during transition periods to agroecological practices. Develop technologies that reduce the cost of recycling of biomass within farms. Tax incentives to farmers with sustainable production systems contributing nutritious and diversified food. Recognize and support farmers' rights and autonomy on traditional, local, indigenous seeds and breeds. Standards to promote animal health and welfare. Foster and facilitate farmer-to-farmer exchange for knowledge, experience, technology transfer.
Natural resource management	Develop long-term programs that support the maintenance or improvement of soil heath and (agro) biodiversity in public programs through multiple agroecological practices at the farm and landscape level. Improve security of tenure of land and trees for smallholder farmers (men and women), including encouragement of long-term renting of land over short-term renting of land. Increase incentives (cross-compliance programs) for farmers to generate ecosystem services from farming, including through agroecological practices.

Market and Food Environment Oriented Policy	
Direct Market Participation	Procurement of foods for public institutions that include healthy, locally sourced foods. Food price controls – remove biases that favor the consumption of staple foods. Embed negative and positive externalities from agriculture/food systems into pricing schemes.
Regulation of markets / actors	Food safety regulations to reduce use of harmful chemicals on foods. Create standards and labelling throughout the value chain of food contents, sources and farming practice to align with environmental, nutrition/health or social values.
Catalyzing new markets	Develop markets for agroecology produced outputs. Develop markets for organic nutrient inputs. Create markets for investing in ecosystem services from agriculture. Create technology hubs to foster innovation and facilitate the adoption and monitoring of agroecological practices and principles.
Macro and Trade Oriented Policy	
Trade related measures	Import restrictions related to food safety as well as meeting environmental and social certification standards.
Macro economic policy decisions	Steady balanced economic growth will enable consumers to desire and afford healthier more nutritious foods. Provide sufficient public funds for the agricultural and food sectors. Commit to diversify fields and diets with more crop species/varieties and livestock.
Cross Cutting Oriented Policy	
National agroecology policies	Policies, strategies, laws that address agroecology in an explicit and comprehensive way.
Institutional and organizational measures	Broaden agricultural research and development to agroecological topics. Enhance agricultural innovation systems to become more participatory. Create or strengthen agroecology as part of university and post-graduate courses and curricula.

Consumer-oriented policies can include tax policy that could steer consumers away from non-nutritious foods, information campaigns to extol the virtues of healthy, nutritious, sustainably-produced foods, including those free from chemical residues (e.g. organic foods) and programs that support consumption through subsidization of food costs for whole populations or targeted populations or that provide supplementary income (e.g. social protection programs). An increasingly common feature of social protection programs is to include nutrition sensitive programming interventions. Policy efforts aimed at consumers would affect the demand for certain types of foods and production processes as well and ideally would send signals through food markets down to producers. Although labeling is a topic that is relevant for the entire value chain, there has been attention to the labeling of 'final' products sold to consumers, in particular to help them discern healthy foods from others.

Producer-oriented policies have been disaggregated into production support policies and natural resource management. Similar to consumer-oriented policies, taxes and subsidies can play an important role and indeed do across all the continents. Input subsidies that favor the use of agricultural chemicals run counter to one of the principles of agroecology. On the flipside, government support for technologies that reduce the costs of recycling of biomass in agriculture would help to spur trialing and adoption by farmers or rural businesses. Public investment in agricultural development

programs, including extension, is another vehicle to shape the type of farming that is practiced by farmers. Whether these focus on smallholder systems or larger scale farming and on staple or export crops only, will have an effect on incentives for agroecology or more conventional chemically reliant agriculture. A major challenge for agriculture as a whole and especially smallholder farmers is access to long-term financing that is compatible with longer term investments in practices aligned with agroecology, such as building of soil health through agroforestry or rotations with cover crops. A range of different policies or programs within agriculture may focus on the natural resources underpinning production. Payments for taking land out of production is an extreme, but there are also a number of schemes design to increase farmer adoption of practices that contribute to improved environmental outcomes, mainly focused on soil management practices. A popular type of scheme in high income countries are cross-compliance programs in which payments to farmers are triggered by either uptake of practices or evidence of environmental results. Tenure rights over seeds, land, water, trees and other natural resources vital to farming is another key policy area. Strengthening individual and/or community rights to these resources remain an important agenda for many countries. In more commercial farming areas where renting of land is common, incentives to promote longer term rentals may favor the uptake of long-term land investments such as with agroecology.

Market and food environment-oriented policies relate to policies, regulations, programs and the like that aim to have direct effects on actors that connect production to consumption, including retailers, wholesalers, processors and buyers. This may include rules to affect behavior of these actors, investment in developing new markets as well as direct participation of the public sector in markets. Food safety regulations and standards are commonly deployed mechanisms by governments to private sector actors at various stages of the value chain. These can simultaneously give quality assurance to consumers while giving signals to producers as to what the market will demand. Organic and territorial/landscape labeling are two growing phenomenon that may promote the use of agroecological practices. While markets for seasonal manufactured inputs like crop seed, fertilizer and pesticides are well developed in most locations, those for cover crop seed, nitrogen fixing woody and herbaceous plants, live fences, hedgerows, compost and other inputs useful for nature friendly farming are much less developed. There may be a role for governments to help catalyze the early formation of these markets. In addition, markets for ecosystem services or the benefits from sustainable management, whether from agriculture or another source, are still uncommon; the result is that adoption of environmentally friendly practices in agriculture are undervalued and consequently under-invested in. Similarly, the hidden social and environmental costs of unsustainable or conventional farming remain invisible in prices. Sustainable systems could operate independently (e.g. a price for carbon sequestration) or embedded into prices of agricultural inputs and outputs. Governments are also direct participants in food markets through procurement programs for public institutions and for social protection and humanitarian relief programs. These can be a fairly important component of final demand in some locations and thus the types of foods purchased can influence value chain and producer behavior. They may also offer programs to support family farms or small and medium-sized enterprises in food value chains to reduce inequality. For example, a policy to purchase only organic produce and/or from family farms would send strong signals to the food system.

Macro and trade related policies can also affect incentives to practice agroecology principles in several ways. First, trade and macro policies establish relative prices across commodity and between domestic and international outlets. Second, agricultural chemical inputs are sourced almost exclusively from abroad for most countries. The overall economic health of a country and its citizens is typically associated in an

increasing interest in food safety and food quality (Ortega and Tschirley 2017), thus creating the demand for agroecological approaches to food production. Governments that recognize the importance of the food and agricultural sectors in their budgeting processes can provide needed public hard and soft investments to facilitate food system transformations into more desirable states. Trade policies will include standards on acceptable chemical residues based on up-to-date evidence on food imports, that certain production processes have met environmental (or other) certification standards, or higher tariffs on items that the country wishes to reduce the use of (e.g. less nutritious foods, certain agro-chemicals).

A few other important policies have been grouped in a cross-cutting category. This includes strategies, policies or laws that are explicitly designed to promote agroecology principles and to monitor the systemic change. These recognize the multifaceted nature of agroecology and will often provide mechanisms for coordination of actions across several pertinent sectors. For such policies to be effective, they typically must be accompanied by enabling investments such as human capacity building. Policies and investments in higher level education and in research for agroecology is another cross-cutting theme that supports the building of capacity and also provides for the ability to undertake research to support the adaptation of agroecology principles into practices. Public research to improve farming principles and practices that contribute to a healthy environment is critical as it not necessarily high priority for private research. Moreover, such research needs to be decentralized and devolved in order to respond to different local conditions and make use of local knowledge. Finally, national strategies, plans and investments are increasingly oriented to meeting targets agreed to by national governments. It is important to include environmental, nutritional and social indicators among those used to assess performance.

In addition to classifying policy by thematic area, they can also be grouped by how they are intended to function. Three major types are:

- Persuasion/sensitization through information and educational campaigns (e.g. enhancing agroecology messaging in extension systems);
- Incentives (taxes, subsidies, tradeable permits, liability for externalities) which can also can be based on actions or results such as payments for ecosystem services schemes (e.g. improving availability of affordable organic nutrient sources)
- Command and control (e.g. regulations, standards, procurement) and can be based on actions or results; (e.g. requirement for schools to serve foods produced using agroecological methods).

As one moves down this list (from sermons to carrots to sticks), the level of public 'heavy-handedness increases' as do the implications on society for non-acceptance or non-compliance with the policy. In the case of information campaigns there is no cost to the individual consumer, producer or business whose behavior doesn't change. In the case of incentives, the same actors would likely forego some benefit that would accompany the change in behavior, though it may not offset the perceived costs of the change. Under regulations, non-compliance is usually met with a penalty. Each of these types can be effective depending on the context, but the devil is often in the details. Incentives may only work if they are sufficiently high and regulations work if there is a good monitoring system and significant levels of fines. Governments will utilize each of these methods to drive behavior towards desirable outcomes. See more on this in the section on effectiveness of policies below.

3.2 Policies enacted by governments that facilitate agroecology transitions

In this section we highlight examples of strategies, policies, rules and laws as well as policy measures and instruments that have been enacted by governments (mainly at national level) with the specific intent to facilitate a transition to one of the production related principles of agroecology[3]. The reason for this focus is firstly that policies related to other principles such as local & bottom-up participation and land and resource governance have well established policy processes that began and continue to thrive without direct linkage to an agroecology agenda. Second, policy advances in those policy areas alone (e.g. improved land tenure security) may not necessarily induce greater uptake of agroecological practices. Nonetheless, we do mention a few of these types of policies where the intention of a link to agroecology was more apparent.

As will be seen below, there are numerous policies which have been enacted by national and local governments (and also by regional bodies such as the European Commission). The classification of examples given below draws from the intent of the policy rather than the actual effect of the policy, mainly because most policies are recent and have not been well analyzed. It should also be noted that a given policy may affect behaviors of different actors, e.g. farmers, consumers and/or businesses and therefore some policy examples could be mapped to multiple rows of the table. A case in point is a government food procurement program (e.g. for healthy foods) which can simultaneously stimulate production and consumption in desirable ways as well as providing opportunities for food service companies. To avoid repetition, we have mapped examples into just one of the policy typology classifications.

3.2.1 Broad national agroecology policies and plans

Among countries that have enacted the most explicit and ambitious agroecology policies are Brazil, France, Nicaragua, Senegal, and India. Brazil passed the National Policy on Agroecology and Organic Production – (Pnapo) in 2012, aiming to integrate, articulate and adapt policies, programs and actions from different ministries. The main mechanism for implementation was the National Plans on Agroecology and Organic Production (Planapo) which advanced 125 actions in its first edition (2013-2015) and 194 in the second (2016-2019). One of the more successful components of Planapo was the Ecoforte program which galvanized funding for agroecological oriented projects conceived at local levels (see Box 1 for more details). In addition, several Brazilian states have passed their own policies and plans on agroecology and organic production to reinforce the aims of the national policy (Guéneau et al. 2019).

Box 1 – The Ecoforte Program (Programa de Fortalecimento de Ampliação das Redes de Agroecologia, Extrativismo e Produção Orgânica) in Brasil

In Brazil, the National Policy of Agroecology and Organic Production (PNAPO) was approved in 2012 and, one year later, started the phase I (2013-2015) of the National Plan of Agroecology and Organic Production (PLANAPO), articulating 125 actions from different ministries. The vast majority of these actions already existed as specific policy instruments that were not primarily

[3] These production related principles relate to use of external inputs, recycling, diversification, biodiversity, soil health, animal health and synergies of ecological elements.

focused on agroecological transition. Created in 2013, the Ecoforte Program was among the few new policies of the Planapo specifically orientated to agroecological transition. Its objective is to support territorially-based projects of agroecological transitions by means of transfer of public resources to social organizations supporting the development of sustainable farming and gathering practices. The Program was the result of the confluence between social movements' proposal and the initiative of the General Secretariat of the Presidency of the Republic, which was responsible for coordinating the Plan and the actions of the different ministries. Since it came from this Secretariat, the Program was not included in the budget of any particular Ministry. The resources came from the public bank's social foundations (Banco do Brasil and BNDES), which assured flexibility for use it in different actions, but at the cost of being very fragile in terms of its institutional basis. The main instruments of the program were calls for projects supporting territorial networks related to agroecological transition. The projects have to be based on an integrated network of "reference units" (places for demonstration of techniques, processes, methodology or productive systems), which should therefore be aimed at intensifying sustainable management practices. Through these units it became possible finance, by means of the same instrument, investments in tangible assets (including machinery, equipment, vehicles and facilities) and services such as technical assistance, education and training. Most projects focused on practices related to: agricultural production; commercialization; food processing; production of ecological seeds and other inputs; certification; water security technologies; and animal production.

Source: **Paulo Niederle** (UFRGS), based on Schmitt, C. et al. (2020).

France passed "*La loi d'avenir pour l'agriculture, l'alimentation et la foret*" (the Future Law for Agriculture, Food and Forest) in 2014. A key objective of the law is to promote and perpetuate agroecological production systems through public policies. In this sense, in 2012 the country had already started a national strategy called *Projet Agro-écologique* (previously *Produisons Autrement*), which included the MCAE (*Mobilisations Collectives pour l'Agroecologie*) Program. As described in Box 2, this program provided funding to build knowledge on agroecology through multiple actors.

BOX 2 – The MCAE Program in France

The MCAE (*Mobilisations Collectives pour l'Agroecologie*) Program aimed at supporting farmers or multi-actors groups at the territorial scale with the objective of promoting forms of agriculture with a high economic and environmental performance. Created in 2013, this was one of the new policy instruments articulated by the national strategy called *Projet Agro-écologique* (previously *Produisons Autrement*), launched in December 2012, and followed by a law adopted in 2014. Despite being a national program, its governance privileges the regions, where multi-actors committees formed by state representatives and social organizations are in charge of choosing which projects and organizations will be supported. The program funded collective activities such as experimentation of agroecological practices, training, facilitation, and dissemination of techniques and knowledge (maximum of 100.000€/project, in total 6,5M€). Among the 103 beneficiaries, in addition to the traditional actors of agricultural development (chambers of agriculture and cooperatives), the program supported several groups involved in diverse forms of ecological agriculture, from conservation agriculture to organic farming. Alternative agricultural and rural development organizations, innovative partnerships between farmers and municipalities, and newcomers in the landscape of agricultural development such as specialized consulting groups, were also among the beneficiaries. This program exemplifies a policy instrument that, in contrast to more conventional producer-oriented policies, has proved to be innovative for three main reasons: its target is not individual farmers but groups with a multi-actor and systemic approach, it has territorial mechanisms of governance, and it allows the actors to build their own trajectory of agroecological transition.

Source: **Claire Lamine (INRAE, Ecodev, Avignon)**, based on Lamine, Barbier & Derbez (2020).

In 2011, Nicaragua passed Law 765: The Agroecological and Organic Production Law. The law called for the establishment of various institutions to support agroecology, including a public certification process (Fréguin-Gresh, 2017). The Nicaraguan Technical Mandatory Standard 11 037-12 followed in 2013 to create technical, financial, marketing, and institutional guidelines for agroecological production (Le coq et al, 2019). In addition, among instruments created to support transition to agroecology, the Nicaraguan Institute of Agricultural Technology (INTA) started the Sustainable Agricultural and Livestock Productivity Development Program (PASOS), a program to support "innovation farms" to promote dissemination of agroecology in support of its own law on agroecology and organic farming (see Box 3).

Box 3 – The Sustainable Agricultural and Livestock Productivity Development Program (PASOS) in Nicaragua

In 2011, Nicaragua passed the Law 475 for the Promotion of Agroecology and Organic Agriculture. The Ministry of Agriculture (MAG) was supposed to implement it, but, at that moment, there were neither instruments nor specific budget. As one of the new instruments that had to be created, PASOS Program was launched by the Nicaraguan Institute of Agricultural Technology (INTA) in order to support small and medium scale farmers with technologies aimed at forest restoration, soil regeneration, water reservoirs and biodiversity conservation. By means of this project, INTA supported 600 "Research and Technological Innovation Farms" (FIIT). These units have become a place for exchanges and knowledge dissemination, embracing not a "diffusion of technologies" approach, but a combination of knowledge and know-how from farmers themselves (*campesino-a-campesino*), in constant interaction with technicians. Even though PASOS was ended in 2018, awareness-raising and practical training activities continue to be carried out by the FIITs with the support of INTA technicians with their own human and financial resources. In terms of the main effects for agroecological transition, the program contributed to consolidate the bases of recovery, preservation and renewable valorization of the farm's natural resources in particular for highly degraded land; diversification of production for own-consumption and for the sale of surpluses of healthy and quality food; reduction of chemical inputs use; conservation and management of seeds locally adapted (with community seed banks).

Source: **Sandrine Fréguin-Gresh (CIRAD)**, based on Freguin-Gresh & Sabourin (2019)

Over the past four decades, several policies, projects, programs and action plans have been carried out by the government of Senegal to make agriculture more sustainable and to protect the environment and natural resources. While the term "agroecology" appears late in these initiatives, the principles and practices of agroecology are present as priorities (Belmin, 2020). The ecovillage program (Box 4) is a good example of agroecological initiatives led by the government of Senegal. In May 2019, the president Macky Sall declared agroecological transition as a priority of his government and created the Senegal Emerging Green Plan. Although ambitious from an environmental point of view, the plan embraced only a few measures directly related to agroecology, such as reforestation, recycling initiatives and policies to reduce food waste. However, following the government statement in favor of agroecology, several social organizations, movements and networks came together in an alliance called "Dynamics for an Agro-Ecological Transition in Senegal" (DyTAES), which has been organizing advocacy efforts to improve the Green Plan ever since (Bottazzi & Boillat, 2021).

Box 4 – The Ecovillages Program in Senegal

The Ecovillages Program provides aid for the development of agroecological villages, with a low carbon footprint, and resilient in the face of climate change. This program was created in 2008 and is still active to this day. It is carried out under the supervision of the Ministry of the Environment and Sustainable Development (MEDD). The Ecovillages Program supports: (i) access to solar hydro-agricultural infrastructure (pumps, etc.); (ii) access to improved energy efficient stoves using biofuels and solar energy; (iii) construction of thermoregulatory habitats made with durable materials (e.g. compressed soil); (iv) land development for agriculture (anti-salt dikes, retaining dikes, micro-irrigation, wells); (v) training of villagers in agroecology and agroforestry. In 2019, 400 ecovillages were transformed or undergoing transformation in Senegal. There are an average of 500 inhabitants per village. The Ecovillages Program is supported by the GEN Africa network (Global Ecovillages Network) and it relies on different types of funding (subsidy, donations, self-funding). The Senegalese State has injected 600 million FCFA (or 1.1 million USD) per year into this program since 2009. The other financial partners are the UNDP and the GEF (they have given around 16 million dollars), Japan via JICA (5 million dollars), and other private sector actors.

Source: **Raphael Belmin (CIRAD – ISRA)**, based on Vincennes (2019).

In the case of India, while there is no explicit policy for agroecology at national level, the state of Andhra Pradesh, which accounts about 53 million inhabitants is advancing its own initiative. Now known as “Andhra Pradesh Community-managed Natural Farming” (APCNF), previously (till 2019) as “Andhra Pradesh Zero Budget Natural Farming” (AP-ZBNF), this agroecological movement was launched by the local government in 2016, with the objective to convert 6 million farmers and 8 million hectares to agroecology farming by 2027. The objective of this initiative is to curb the deep employment, nutritional, ecological and agrarian crisis that prevails in India by: reducing the costs and risks of cultivation ; increasing yields; producing safe and nutritious food, free of chemicals; reversing emigration of youths from villages; enhancing soil health and water conservation ; regenerating coastal ecosystems and biodiversity (Box 5).

Box 5 – Andhra Pradesh Community-managed Natural Framing (APCNF)

APCNF has pioneered the adoption of technical and organizational innovations whose primary objective is to increase farmer income, health and happiness. Technical innovations are based on four core principles: (1) *Jeevamrutham* (“elixir of life”): inoculum that stimulates soil micro- and macro-organisms; (2) *Beejamrutham* (“ferment of immunity”): coating for seeds to protect them and stimulate their growth; (3) *Achhadana*: constant coverage of the soil with diverse crops and crop residue mulches; (4) *Waaphasa* (“microclimate”): aerated soil humus that harnesses water vapour. Supported by this sort of initiative, over the last five years, the natural farming in Andhra Pradesh has quickly advanced. According to the RySS (farmers empowerment corporation), in April 2020, 695,000 farmers were practicing ‘natural farming’ on 190,000 ha spread over 3011 villages. The APCNF is supported by two federal funds – the RKVY (initiated in 2007 to stimulate States’ public investment in agriculture and allied services) and the PKVY (launched in 2015 to support organic farming and improve soil health) –, and, by a grant from the APPI (a foundation of the Indian billionaire Azim Premji).

Source: **Bruno Dorin (CIRAD, UMR CIRED, Montpellier; CSH, UMIFRE MAE-CNRS, New Delhi)**, based on Dorin (2021).

In each case, the main underlying policy has recognized that a transition to agroecology requires actions across multiple domains and accordingly, to coordinate those actions. Despite these bold policy actions, sustaining implementation has been challenging, especially as political leaders have changed. We discuss policy implementation in section 4.

3.2.2 Producer oriented policies

Within Europe, the Common Agricultural Policy (CAP) is the most important piece of legislation governing agriculture. It is a very broad instrument and is frequently amended or updated. One trend over time has been to "green" the CAP which has resulted in around 50% of support payments being conditional on hybrid agri-environmental constraints ("cross-compliance" requirements), and another 10% of support is paid under voluntary agri-environmental schemes in recent years (OECD, 2017).The CAP has evolved in other environmentally favorable ways, such as the increasing recognition of agroforestry systems in arable land and the qualification of those for CAP payments under Pillars 1 and 2 (see European Parliament Briefing). The potentially transformative European Biodiversity Strategy to 2030 was published in 2020. It is very ambitious, establishing results-based climate and environmental indicators and targets. The strategy promotes precision agriculture, organic farming, agroecology, agroforestry, low-intensive permanent grassland, and stricter animal welfare standards.[4] It will aim to transform at least 10% of agricultural land area to high-diversity landscape features. It calls for a target that a minimum of 25% of the EU's agricultural land must be organically farmed by 2030, which sends a positive signal for an agroecological transition.

In the United States, the 2018 Farm Bill has instructed the Department of Agriculture to incentivize farmers to adopt soil health practices through programs such as the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP). The EQIP provides financial assistance to farmers who adopt or install conservation practices (e.g. cover crops, conservation tillage, filter strips and barriers to keep livestock from streams) on land in agricultural production. Between 2006 and 2016, the number of acres receiving EQIP payments for cover cropping more than quadrupled, although from a low base. The CSP supports farmers for up to 10 years in ongoing and new conservation efforts for producers who meet stewardship requirements on working agricultural and forest lands. Between 2010 and 2015, the number of acres receiving CSP payments for at least one soil health practice or enhancement grew from just under 7 million to more than 30 million acres (out of about 400M total acres in crop land). The average incentives per farm in these programs are between $14,000 – $17,000 annually (Wallander and Fooks 2019). Another US program, the Conservation Reserve Program (CRP) provides 10- to 15-year contracts to remove land from agricultural production. The acreage cap under the 2018 Farm Act for this program is 27 million acres. Most of the land enrolled in the CRP was in crop production prior to CRP enrollment and it was planted to grass or trees.

Numerous countries have enacted policies or regulations to influence the use of agricultural chemicals. In general, governments have moved to reduce the use of pesticides and herbicides, or at least certain types of them. The 2020 Farm to Fork Strategy of the European Commission will act to reduce by 50% the overall use of –

4 Many countries have advanced legislation to enhance farm animal health and welfare. The Netherlands, for example, passed the Animals Act 2011 (Wet dieren) formally recognizes animal sentience and the intrinsic value of animals and animal care must be based on the principles of the Five Freedoms of Animal Welfare.

and risk from – chemical pesticides by 2030 and reduce by 50% the use of more hazardous pesticides by 2030. It will facilitate this through a new directive on pesticide use and a nutrient management plan. Mexico passed a decree in 2020 to phase out the use of glyphosate herbicide over the 2021-24 period. Taking a different approach, several European countries including Denmark, Finland, France and Norway had raised taxes on agricultural chemicals to reduce their use, though one study found only a weak effect due to a relatively low tax rate and inelasticity of demand (Hardelin and Lankoski 2018). Countries also establish maximum levels of chemical residues in foods, domestic and imported, and enforce this through monitoring and testing of foods to influence behavior of farmers.

While several of the examples noted above are directed towards natural resource management, others that have arisen outside of a country's major agricultural policy framework include several that relate to agroforestry, including India's National Agroforestry Policy of 2014, which recognizes agroforestry as a viable system eligible for financing and strengthens public investment in agroforestry towards meeting India's green targets. Kenya is developing a new national agroforestry policy to supersede its 2009 Agriculture (Farm Forestry) Rules.

Resource tenure policies are also important for incentivizing agroecology with clear long-term rights to land favoring the adoption of many agroecology principles. Although there are many sources of insecurity of land and how to overcome those in the literature (see Holden et al. 2013, Place et al. 2021) one of the clearest cases where tenure will create challenges for agroecology is where short term renting of land is a common feature of agriculture. In some cases, such as in Ethiopian regional laws, the durations of rentals from one farmer to another are not allowed to exceed three years, while rentals to investment farmers using mechanized practices can be much longer. In the United States, while renting of farmland is very common (almost 40% of land) most of the area rented is under longer term relationships with landlords. There is one program – the Transition Incentive Program – that encourages longer term renting of land which is already part of the US Conservation Reserve Program.

3.2.3 Consumer oriented policies

The main types of policies that may favor agroecological transitions are those that encourage the consumption of nutritious foods or discourage consumption of unhealthy foods[5]. Among these are information campaigns and taxation policy and various programs such as nutritional dimensions of social protection programs. Almost all countries invest in raising consumer awareness of nutrition and healthy diets and some have created more formal strategies. For example, India promulgated the National Nutrition Strategy in 2016 and then support it financially through a National Nutrition Mission in 2018. South Africa similarly passed a National Food and Nutrition Security Plan in 2017. In terms of taxes and subsidies for providing incentives to consumers, recent actions to increase the price of high sugar content foods and drinks have been taken, such as in Chile and Mexico in 2014 who raised and established taxes on sugar sweetened beverages in 2014.

Social protection programs are being implemented in almost all countries with the main aim being to help the poorest populations to maintain a minimum level of food consumption and nutritional attainment through cash or in-kind transfers. A significant

5Labelling and quality standards are other measures that seem obvious, but those are discussed under market oriented policies below since they are directed to multiple actors throughout the value chain.

number of countries or school districts have established standards for foods served at schools. Many of these programs have recently tried to enhance nutritional aspects over basic hunger needs through nutrition sensitive programming (e.g. in Bangladesh, Mali) such as having community health workers provide training to program participants. Another orientation of social protection programs that may support agroecology are the public works dimensions of the programs which often prioritize the rehabilitation of natural resources (e.g. in Ethiopia's Productive Safety Net Program, India's Mahatma Gandhi Rural Employment Guarantee Scheme, or South Africa's Public Works Program). These tend to focus on common land area rehabilitation, which may then create more opportunities for agroecology practices around integrated pest management or recycling of nutrients.

3.2.4 Market and food environment-oriented policies

In this category are policies and other directives that don't always fit neatly into a producer or consumer orientation and may in fact help to create markets where they are under-developed. Governments may try to encourage more production or consumption of foods produced under agroecological methods, but they may also step in to provide a 'market' for such commodities stimulating both production and consumption sides. Procurement of healthy, organic or even agroecologically-produced foods for public institutions (or programs) such as schools is one example. The Tutto per Qualit school feeding program in Rome was established in 2001 and now focuses on purchasing locally produced organic foods for over 100,000 meals per day (Messina and Bossi 2015). Rio de Janeiro has a similar policy that instructs public institutions to buy local foods, with a focus on family farms using agroecological practices.

Labelling and certification of production processes that have met certain environmental standards, e.g. to be sustainable or organic, or to denote origin of food, have proliferated in the past couple of decades, both public and private. Organic or sustainability labelling is especially common for commodities traded to high income countries where there is a larger consumer market willing to pay for these attributes. These labels are then maintained throughout the value chain by a variety of actors. Chile enacted the Food Labelling and Advertising Law in 2016 which sets requirements on labelling of foods by industry actors to be more transparent, maximum levels of calories, sugars and fats for some products and restrictions on advertising of non-nutritious foods.

Another type of intervention is to catalyze the development of 'missing' markets notably in the area of ecosystem services which may then provide additional rewards to farmers and others who can produce those services. Payments for ecosystem services are thus commonplace, even though they may not be large in size. Costa Rica and Nicaragua provide incentives for farmers to practice coffee agroforestry instead of monoculture coffee to support biodiversity and climate change ecosystem services. A stick, rather than a carrot market approach is New Zealand's 2019 Climate Change Response Bill in 2019 that will begin pricing emissions from fertilizer use in 2025.

Other markets that are underdeveloped which would support agroecological principles are around making more available farmer crop varieties or landraces through markets as well as promoting markets for organic nutrient supplies (e.g. compost, herbaceous legume seed). There have been some developments to recognize farmer landraces in Nepal (registration of varieties of rice and beans) and on establishing a quality declared seed brand for farmer seeds (e.g. in Uganda). In European countries there is already a

significant proportion of waste – from urban and rural areas – which is composted or recycled. But in developing countries, these markets for waste by products are still nascent for the most part. India, which is reckoned to be the largest producer of solid waste in the world, has put in place a number of mechanisms to encourage re-use of manure and food waste, including supporting the supply of these products in pilot villages and enticing the interest of fertilizer companies to market the compost.

3.2.5 Macro and trade-oriented policies

Tariff and non-tariff trade measures can influence the practice of agroecology. Following domestic policies, countries may restrict the importation of certain agricultural inputs it may deem to be toxic or hazardous, or may raise the tariffs on such products to reduce their use in the country. In practice, a large proportion of agricultural inputs are imported and in order to boost food production and keep costs lower for farmers, tariffs on agricultural inputs are typically not high (in 2019, average tariffs on fertilizer were a very low 3.8% according to OEC) . Food imports are more likely to be subject to tariff or non-tariff barriers to protect domestic farmers or to meet quality standards for consumers. In the European Union, United States and other countries, tolerance or maximum residue levels for pesticides on imported foods. These types of regulations are more challenging to implement in practice as it is costly to test food products coming across the border.

3.2.6 How well do recent policies in support of agroecology align with its principles?

We analyzed how well the strategies, policies and plans captured by our global scan addressed the 13 principles of agroecology, recognizing that our scan of policies was not exhaustive. Although we did not restrict the examples to those that explicitly mentioned agroecology, there were a good number that did. We focused on identifying policies agroecology principles at the agroecosystem level (reduced input use, soil health, animal health, recycling, biodiversity, synergy among components, diversification) and thus it is no surprise that those principles were more often targeted than others. However, it is interesting that apart from measures restricting use of chemical inputs, most policies had an explicit intention to promote more than one of the principles of agroecology. Despite this positive finding, evidence of multisector coherence and coordination to support agroecology is scant and overall, the state of development of policies in support of agroecology principles can be described as partial and fragmented. There is a clear need for greater horizontal integration across sectors, which is often very challenging because agriculture, forestry, water, energy, environment and trade are often in different ministerial dockets.

Table 2: Examples of Actual Policies in Support of Agroecology Transitions

Policy Theme	Specific Examples of Enacted Policies
Consumer Oriented Policy	
Taxes	Mexico – sugar sweetened beverage tax (2014) Chile –raised tax on high sugar sweetened drinks and lowered tax on drinks with low sugar content in 2014
Social protection/safety nets	South Africa Public Works program gives some priority to environmental objectives

	Ethiopia's Productive Safety Net Program, India's Mahatma Gandhi National Rural Employment Guarantee Scheme (both from 2005 onwards)
Nutritional and health assistance	Nourishing India: National Nutrition Strategy (2016) India National Nutrition Mission (2018) Chile's Food Labelling and Advertizing Law (2016)
Producer Oriented Policy	
Production support	Mexico 2020 ruling to phase out of glyphosates over the 2021-24 period. India's pilot zero natural farming EU Farm to Fork strategy aims to cut by 50% use of chemical pesticides by 2030. EU Biodiversity Strategy to 2030 calls for 25% of agricultural land to be under organic farming. Nicaragua Technical Mandatory Standard establishes institutions and programs to assist farmers with AE. Indonesia Law 22 of 2019 sets environmental goals for agriculture and promotes diversification. Netherlands Animal Act 2011 provides rules for treatment of farm animals
Natural resource management	EU Biodiversity Strategy to 2030. Sets environmental results targets. National Agroforestry Policy of India 2014 – recognizes agroforestry as a legitimate farming system and enables its upscaling through Indian missions. US Transition Incentive Program encourages expiring Conservation Reserve Program farmers to make leases of at least 5 years to others who will continue the conservation methods
Market and Food Environment Oriented Policy	
Direct Market Participation	School feeding in Rome (Tutto per Qualit) Brasil's policy on acquisition of Family Farm Foodstuff sets for public institutions to buy from family farms using AE practices.
Regulation of markets / actors	Chile's Law of Food Labelling and Advertizing (2016) -- requires labels, rules on advertising of non-nutritious foods and sets maximum levels of calories, sugars, fats…
Catalyzing new markets	New Zealand Climate Change Response bill (Emissions trading reform) 2019 will begin pricing emissions including from fertilizer use by 2025.
Macro and Trade Oriented Policy	
Trade related measures	EU, US and other countries have tolerance or maximum residue levels for pesticides on imported foods. Actual testing and enforcement is more challenging.
Cross Cutting Oriented Policy	
National agroecology policies	France - La loi d'avenir pour l'agriculture, l'alimentation et la foret Nicaragua - Law 765: The Agroecological and Organic Production Law Brasil - National Policy on Agroecology and Organic Production (Política Nacional de Agroecologia e Produção Orgânica - Pnapo)
Institutional and organizational measures	Graduate degrees at university level (in a few universities, examples being Wageningen University and Research, University of Wisconsin)

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3.3 Effectiveness of policies in support of agroecology transitions

Although there are many studies on the effects of agroecological practices on several important objectives such as biodiversity, ecosystem services, food security and production (e.g. Barral et al 2015; Dainese et al 2019; Bezner Kerr et al., 2021), there are no rigorous studies of how the various policies noted above have contributed to increased use of agroecology practices and principles or the subsequent impacts of those practices and principles. This is due primarily to the recent enactment of these policies and, therefore, the limited timeframe that they have had to operate. There are however two strands of literature that are relevant to this question. The first concerns the extent of implementation of these policies for which some analyses have been made, including in the case studies reported below. On the one hand, an assessment of 104 integrated landscape initiatives across Latin America and the Caribbean, shows that all these multi-objective efforts (i.e. conservation, livelihoods, governance, and sustainable production) invested in agroecological over conventional intensification (Carmenta et al., 2020). On the other hand, Sabourin et al. (2018) note that despite progress towards agroecological investment and enabling policies in Latin America and the Caribbean, implementation of these policies has been blunted by their embedding within programs largely supporting conventional agriculture. It has also been observed that various investment plans to support agroecology are sensitive to change of government, as notable in Brazil. This is fairly representative globally of small scale successes have resulted from policy actions, but agroecology remaining on the margins both in terms of policy frameworks and agricultural practice.

The second strand of relevant literature is on the effectiveness of related environmentally-friendly agricultural regulations, programs, and incentive mechanisms on shifting behaviors and environmental outcomes (as well as economic outcomes). A review of 62 studies (Kleijn et al. 2006) on the effects of the agri-environment schemes operating in the late 1900s, in five European countries, on biodiversity found that the majority showed increases in all the taxa studied (plants, insects, and birds); however, a few cases found that biodiversity had decreased in all taxa studied (6%) or some of the species studied (17%). Claasen et al. (2004) found that the US Conservation Reserve Program (encouraging withdrawal of acreage from production and requiring adoption of conservation systems) reduced wind and water-based soil erosion by hundreds of millions of tons over a 15-year period. Myriad other programs put into place by governments have not been well studied (Brooks and Place 2018).

A study by Deboe (2020) finds that, generally speaking, environmental regulations appear to be more successful in achieving measurable improvement in environmental outcomes than do other approaches to induce behavioral change (e.g. payments to influence adoption of environmentally friendly approaches). But even these are not a guarantee for success if they require functional monitoring systems. These are particularly challenging for poor countries. Governments also do not wish to put too many regulations in place as they create cost burdens for producers and therefore may be unpopular. With respect to voluntary agri-environmental schemes (AES), there are numerous programs in existence. Studies seem to conclude that schemes which are results-oriented (e.g. payment for a valued ecosystem service) attain better environmental outcomes than do schemes which are action-oriented (e.g. payment for adoption of a practice), partly due to the greater flexibility of innovation allowed by this approach and partly due to the uncertain relationships between actions and results (e.g. how much biodiversity will occur from tree planting). There are also concerns about the cost-effectiveness of such schemes and still much to learn about their effectiveness.

3.4 Key policies that impede agroecological transitions

It is not the intention of this brief to provide a detailed analysis of policies that impede transitions to agroecology, but it is important to acknowledge their existence and importance. In doing so, it is a reminder that despite many examples of policies that support agroecology, there are many other often more significant policies or investments that work against the practice of agroecology (Sinclair et al., 2019).

A first impediment is that there are strong vested interests among actors profiting from current agricultural and food systems who resist disruptive change. In the United States, the average sized farm (of about 200 hectares) spends over $100,000 per year on seeds, fertilizers and other chemicals (Dreibus 2019). Thus, the private sector has a strong interest to maintain current production practices. They also invest considerable funds in making their products as attractive as possible and their share of total agricultural research and development spending is growing rapidly in middle- and high-income countries (Pardey et al. 2016). In the United States, the private sector accounted for 74% of food and agricultural R&D (Heisey 2019).

Governments have supported high input agricultural production through various types of support. A major avenue is direct subsidization of inputs, mainly fertilizers, especially in Asian and African countries. A study of ten African countries found that they distributed a combined 1,671,000 MT of subsidized fertilizer in 2014, enough to influence the agricultural practices of millions of farmers (Jayne et al 2018)). Governments have benefited politically from input subsidy programs such as Zambia (Mason et al 2017) and Malawi (Dionne and Horowitz 2016) and have often resisted significant reforms. Likewise, many government programs, for example relating to rural advisory services, have been oriented to provide advice on basic agronomic practices but have often been found to be weak in providing information on natural resource management (e.g. Nkonya et al. 2017 for West Africa and Berhane et al. 2018 for Ethiopia).

The increasing significance of the private sector in agricultural research and development spending also means that technologies embedded in marketed products have advanced significantly, leaving the public sector to shoulder the responsibility for research on agricultural principles and practices for environment and natural resources, human nutrition and food safety (e.g. for the United States see Heisey 2019). Strengthening research in agroecology will require significant commitment, as it depends not only on re-allocation of research funds, but the development of quality scientists in agroecological disciplines (see Caquet et al., 2020 and Cote et al., 2019).

4 Implementation and coherence

Several studies about agroecological transitions have pointed to three common features in the perceptions that actors directly involved with these processes have about the “best policies” (Sambuichi et al., 2017; Schmitt et al., 2020). The first concerns the engagement of civil society organizations at different stages, from policy formulation to evaluation. It is crucial to get buy-in, that will influence the effectiveness of uptake. The second is associated with the idea that decisions about appropriate modalities for policy implementation must be taken in the territories or landscapes where they will be implemented, often delimited by sub-national / local jurisdictions, so that policies can be applied in ways appropriate to local conditions. There is a missing middle between the intentions and commitments of international conventions (e.g. UNFCCC, UNCCD and CBD), national commitments (e.g. AFR100) and action on the

ground because it is rare to find either policy instruments of social capital at the local landscape scales that ecosystem services first manifest and so can be managed, including considering trade-offs and synergies in how different land use impacts them (Pagella and Sinclair, 2014). Finally, an implication of this, is the third feature, which concerns the institutional flexibility required to adapt policy instruments to the particularities of each social and ecological context.

These three elements bring to the fore the importance of facilitating autonomy and subsidiarity of decision making to institutions responsible for implementing public policy closest to the local level, in order to have programs of action (instruments, rules, budget, etc.) that are adapted to local context. The second conclusion is that the capacities of the “street-level bureaucrats” (Lipsky, 1969), as well as their interpretations of public problems, needs a special attention as it can trigger or hamper success and policy effectiveness, depending on their power over local oligarchies, for example.

Among these capabilities, the literature on agroecologically-conducive policies draws attention to the importance of the "relational capabilities" (Evans, 1994), specially to the social skills some actors demonstrate coordinating processes of social participation (Sabourin et al., 2020). This is a critical issue since the success of the policy depends not only on the existence of efficient bureaucracy, but on attraction towards and acceptance by producers, so that the production of a common interpretation by all actors involved about the public problems to be faced and the best way to achieve it, crucially impact the effectiveness of policy instruments. Furthermore, the availability of resources for implementation of polices at local level are often a critical issue.

Indeed, studies that analyze the dynamics of “exemplary territories” of the agroecological transition (IFOAM, 2017; SABOURIN et al., 2018; van den Berg, 2021), usually highlight the social skills of certain actors needed to produce engagement in collective projects. These “brokers” connect the networks needed to implement AE policies and, in theory, leverage their collective powers. However, there is still much to understand in respect of to what extent and how this generates effective agroecological transition pathways. On the one side, even if we know that social participation is critical for policy design and implementation, we need to understand better how different models of participation are linked to diverse policy implementation outcomes.

These questions require a better understanding of the governance arrangements of public policies. In other words, in addition to instruments, norms or budgets, the analysis must interpret how the different models of territorial organization operate. The MCAE Program, in France, and the Ecoforte Program, in Brazil, are two examples of agroecological transition initiatives that transferred some of the policy implementation decisions to the territories. However, there are very significant differences regarding both what the “territories” historically represent for the socio-political logic in each country, and the dynamics of reconstruction of these territories through the action of public policies. There are also challenges of the persistence of policies over time, such as the CAP in Europe (and its national and sub-national declinations), and political volatility such as in the example of Brazil (Sabourin et al., 2020). In general, devolution of responsibility for natural resource management from national to local levels, has often not been accompanied with requisite authority to make rules and control revenue from their use (Chomba et al., 2016).

Briefly, what we are suggesting here is that the analysis of public policies must go beyond the formal aspects to understand how the actors who implement the policies translate the initial objectives and implement the frameworks and instruments. Furthermore, it is essential to pay attention not only to the isolated action and effects of each policy, but to how an array of diverse sectoral policies interact and operate overall

in each territory, since one incentive can easily be antagonistic to another one. It will therefore be important to understand the synergistic effects and also the incompatibilities. In many territories there is still a misconception that "the more policies the better". However, the literature on territorial development has already demonstrated the existence of policies whose effects are canceled by others, as occurs, for example, when rural credit programs encourage the purchase of industrial inputs while other programs intend to stimulate the production of organic inputs - not to mention the contradictory effects in relation to consumer-oriented public health policies.

Overall, for agroecological approaches to be adopted across whole food systems, there is a need for both horizontal (across sector) and vertical (across scale) integration of policy formulation and implementation, which is a major challenge to how the governance of agriculture and natural resources is currently structured in most countries.

5 Concluding thoughts

In early June 2021, during its forty-eighth session, the Committee on World Food Security endorsed "Policy recommendations on agroecological and other innovative approaches." The aim of the CFS policy document is to orientate all stakeholders in developing different routes of transitions to agroecology and other sustainable and healthy agri-food systems. These recommendations refer to HLPE's 13 principles of agroecology but, being concise and global by design, fall short of specific, locally adapted policy measures that governments could undertake. This paper aims to be a first attempt to look at this gap by highlighting specific examples of policy measures adopted by a wide range of countries to promote one or more of these principles. There is much we know but there is also much to find out in terms of effectiveness of policies for genuine agroecological transitions: this paper, therefore, also calls for further action-oriented research.

Until now only a few countries have made the move to a bold, broad and orchestrated set of policy reforms resulting in specific and significant commitments to enable agroecological transition from inception to adoption of all 13 principles. However, some countries have put in place significant policy measures in support of such transitions, that address directly or indirectly one or more of the principles .

For a country that seeks to engage in agroecological transition, the issue of selecting appropriate policies for the range of contexts that pertain in that country is critical. Countries are at different starting points and indeed may (or should) have different visions for their food and agricultural systems. Countries need to understand the broad array of policy measures available. Then, they can learn from other countries about what has worked or not, the effectiveness and the failures of the policy – and, mainly, the different factors affecting policy outcomes. Finally, they need to understand the conditions for a successful policy, meaning what were the elements that made the policy conducive to successful adoption and scaling up of agroecology principles and practices, including the underlying elements related to state capacity, but also social participation.

This paper also identified critical scientific knowledge gaps for better formulating, implementing, monitoring and assessing the ensemble of enabling policies for agroecological transitions, based on the current and past experiences from different countries. In addition, there remains additional knowledge gaps that would enable policy makers to more confidently take decisions on food and agricultural system

transitions. These include larger scale research to understand better the challenges, opportunities and impacts of the wider use of agroecology.

Among these challenges, given the objectives of the UNFSS and the agenda 2030 for sustainable development, it is urgent to produce evidence that can guide transitions in regions where changing from industrial agri-food systems is not the main issue. In much of sub-Saharan Africa the green revolution has had little traction, many farmers use few inputs and land degradation proceeds because of a lack of investment in regenerative practices. Here there is a need for agroecological intensification using natural processes and agrobiodiversity as a driver to sustainably increase production. There is a need for robust evidence on the effectiveness of agricultural practices and consumption patterns for AE transitions. And there is a need for evidence about enabling policies, to unlock key constraints to AE transitions which are found in the economic environment around farms, the way production and value chains are currently organized and regulated. Although the sustainability of these systems in the long term is the subject of lively debate, the universe of policy instruments and designs that can support a transition to agroecology in these contexts, is still to be researched and explored.

As shown by the successful conclusion of the evidence-based and multistakeholder debates in CFS at international level, progress in this domain can be tackled by putting in place new scientific platforms working together with actors at national and sub-national level, through mechanisms for convening key stakeholders around discussions of food and agriculture transformation for policy coherence, long term support and implementation at multiple levels (i.e. farm – national).

Therefore, we hope that this paper can appropriately feed into the UN Food System Summit discussions, as well as orient future research at global, regional and national levels on coherent multisectoral policies for agroecological transitions, an agenda that is linked to many key global issues (food security, nutrition, sustainable food systems, climate change, biodiversity, etc.) and therefore central to the implementation of the SDGs.

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