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Transformative Biodiversity Governance in Agricultural Landscapes: Taking Stock of Biodiversity Policy Integration and Looking Forward

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13.1 Introduction

Agricultural land systems, covering about 40 percent of the world's ice-free terrestrial surface, are the single largest contributor to biodiversity loss worldwide (Chapin et al., 2000; IPBES, 2018a; 2019). Agricultural practices have been linked to staggering losses in critical ecosystems such as tropical forests and ecologically functional species such as pollinators, raising concerns of losing biodiversity as both an intrinsic global value and as a central pillar of food security and ecosystem functions (IPBES, 2016; Laurance et al. 2014; Ramankutty et al., 2018). Conserving biodiversity in this sector is crucial beyond this intrinsic value (see Chapter 2), since biodiversity in agricultural landscapes supports ecosystem services that sustain human well-being through provisioning services such as food production, regulating services including flood and climate control or stabilization, and supporting services such as pollination and soil fertility (IPBES, 2016; 2018b; 2019; Scherr and McNeely, 2008; Tscharntke et al., 2012). There are a wide range of approaches proven to enhance synergies and reduce conflicts between biodiversity, food production and livelihood objectives, such as agroecology, permaculture, organic agriculture, agroforestry and "nature-inclusive" agriculture (Bouwma et al., 2019; Chapin et al., 2000; Chappell and LaValle, 2011; Runhaar, 2017; Scherr and McNeely, 2008). Climate change, the projected rise in global food demand and changing diets are projected to further increase pressures on food systems and land use (FAO, 2017a). The challenge for transformational policies is to disincentivize unsustainable practices while incentivizing biodiversity-friendly food production approaches. While healthy diets (Chapter 5) and animal welfare (Chapter 9) are also fundamental components of future food systems, this chapter focuses on governance of agricultural land use.

Conserving and enhancing biodiversity in agriculture is central to some of the most prominent international environmental agreements and conventions. The Convention on Biological Diversity (CBD) aims to ensure sustainable management and biodiversity conservation (Aichi Target 7 of the 2011–2020 Strategic Plan) and keep resource extraction within sustainable limits (Aichi Target 4). The impending Post-2020 CBD Global Biodiversity Framework (GBF), which is expected to be approved in 2022, is also expected to reflect the importance of sustainable agriculture. The importance of agricultural biodiversity has been reconfirmed by the 2015 United Nations Sustainable Development Goals (SDGs), particularly SDG15 (Life on Land), SDG2 (Zero Hunger) and SDG8 (Sustainable Production and Consumption). In 2017, the UN Framework Convention on Climate Change also initiated a work stream aiming to promote sustainable agricultural systems (UNFCCC, 2017).

Within these international conventions, as well as in national-level governance frameworks, an increasingly important way to promote biodiversity conservation in agricultural landscapes is through the *mainstreaming* of biodiversity[1] into public and private governance of the agricultural sector, a strategy that was specifically advocated in the CBD's 2011–2020 Strategic Plan. This chapter analyzes the progress in mainstreaming biodiversity into public and private sector agricultural policies worldwide by employing the concept of *biodiversity policy integration* (BPI). BPI analyzes the consideration of biodiversity in all sectors and levels of policymaking and implementation, providing a conceptual approach to identify leverage points for transformative change. In this chapter, we analyze BPI in agricultural landscapes, which adds to the toolbox of the transformative biodiversity governance framework. We review available literature on BPI in agricultural policies in developed countries (with a focus on the European Union [EU]) and developing countries (with a focus on tropical countries). Recognizing the important role of nonstate actors in biodiversity governance, we also include private sector governance in our analysis, defined here as rules and standards developed and monitored by firms or nongovernmental organizations (Grabs et al., 2020).

This chapter proceeds as follows. We first provide an overview of trends and threats to biodiversity, highlighting the necessity to integrate biodiversity in the governance and management of agricultural landscapes (Section 13.2). We then introduce our analytical approach (BPI) and how it relates to the broader literature on environmental policy integration and mainstreaming (Section 13.3), before analyzing to what extent and how biodiversity is integrated into agricultural governance in developed and developing countries (Section 13.4). Based on these analyses, we discuss four central leverage points for transformative biodiversity governance in agricultural landscapes and reflect them with the analytical dimensions of this book (Section 13.5), before concluding with key lessons (Section 13.6).

13.2 Current Trends and Key Threats to Biodiversity

This section focuses on two principal mechanisms through which agriculture impacts biodiversity: land use change for agricultural expansion and management choices on agricultural land – that is, intensification, specialization and enlargement of farms (Ramankutty et al., 2018). After introducing these issues within the broader contemporary debate, we discuss central arguments for segregated ("land-sparing") versus integrated ("land-sharing") approaches.

[1] Article 6b of the Convention on Biological Diversity (CBD) requires parties to "Integrate, as far as possible and as appropriate, the conservation and sustainable use of *biological diversity* into relevant sectoral or cross-sectoral plans, programmes and policies" (my emphasis).

13.2.1 Land Use Change

Land use change for the production of feed, fuel, biofuels and livestock is one of the major drivers of biodiversity loss (IPBES, 2019; MEA, 2005). Between 2000 and 2010, 80 percent of deforestation worldwide was directly attributable to the agricultural sector (Hosonuma et al., 2012). Agriculture currently occupies 38 percent of the world's terrestrial land surface, with about 12 percent devoted to crops and about 25 percent to livestock rearing and grazing (Foley et al., 2011). Of the area used for cereal production, 31 percent is devoted to animal feed (Mottet et al., 2017). Although land clearing has slowed since the 1950s relative to the previous century in temperate latitudes, it has shifted to tropical highly biodiverse forests in Latin America, Southeast Asia and Africa (IPBES, 2019; Ramankutty et al., 2018). In addition to loss of ecosystems and their intrinsic value, deforestation of biodiverse, tropical forests reduces carbon sinks, which are important for mitigating climate change (Bunker et al., 2005; IPCC, 2014).

The causes of agricultural expansion into intact ecosystems differ by region. In Africa, subsistence and small-scale farming drives the majority of expansion and deforestation (IPBES, 2019; Seymour and Harris, 2019). In contrast, deforestation in South America (particularly in the Amazon) and Southeast Asia is primarily driven by commercial agriculture supplying international markets, most notably since the 1990s (Hosonuma et al., 2012; IPBES, 2019; Seymour and Harris, 2019). Though the majority of agricultural commodities are consumed domestically, global trade of a select few agricultural commodities – notably soybeans (of which the majority is used for animal feed globally), beef and palm oil – is a major external driver of ecosystem loss (DeFries et al., 2013; Green et al., 2019; Henders et al., 2015; Meyfroidt et al., 2013). As a prominent example, oil palm plantations supplying global markets have been responsible for over 80 percent of agricultural land expansion in South Asia since the 1990s (Gibbs et al., 2010). Countries that consume these commodities are thus contributing to ecosystem and biodiversity loss, as recognized in recent attempts to reduce "imported deforestation" (Bager et al., 2021). The long-term effects of land use change are often underestimated as – particularly in biodiversity-rich regions – species continue to be lost even if the agricultural land has been abandoned (Gibson et al., 2011).

13.2.2 Management Choices

Agriculture has undergone significant structural changes since the Second World War. New farming practices falling under the paradigm of "industrial agriculture" were strongly subsidized by governments, particularly in developed countries and in some developing countries, as part of the "Green Revolution." This "agricultural modernization" relied heavily on mechanization, genetic alterations of crops (e.g. hybridization, genetically modified organisms) and the use of chemical inputs to increase productivity (Bosc and Belières, 2015; Duru et al., 2015). Three overarching and interrelated trends can be distinguished: intensification, specialization and scale enlargement (Aubert et al., 2019; Poux and Aubert, 2018).

Intensification refers to increasing productivity on a given parcel of land through the heavy use of inputs (such as pesticides and fertilizers). Though this may increase profits, and in some cases also food security, it generally drives biodiversity loss as it is currently practiced (Batáry et al., 2017; Hendershot et al., 2020; Rasmussen et al., 2018). Studies point to the detrimental impacts on biodiversity in general, and on soil biodiversity and insects in particular, especially through mechanization and pesticide use (see, for example, Orgiazzi et al., 2016; Sanchez-Bayo and Wyckhuys, 2019; Seibold et al., 2019; Tsiafouli et al., 2015). Globally, pesticide sales and use continue to increase, with hundreds of older generation pesticides that are highly toxic to vertebrates and invertebrates still being used in developing countries, although banned in many developed countries (Schreinemachers and Tipraqsa, 2012). Through run-off, pesticides and fertilizers also have biodiversity impacts reaching far beyond the farm (Beketov et al., 2013; Van Dijk et al., 2013; Yamamuro et al., 2019). Solutions related to increasing efficiency, such as precision agriculture, can contribute to sustainability and food security through the reduction of inputs (IPCC, 2019). However, recent work shows that implementation remains a problem (Lindblom et al., 2017). Moreover, such solutions do not address many of the underlying problems of conventional intensification, including the need for energy-intensive inputs (Kremen, 2015).

Secondly, *specialization* describes a shift away from diversified crop production to monocultures and a separation of crops and livestock systems. At the macro level, specialization is driven by the logic of economies of scale and the creation of regional or national comparative advantages in trade (Abson, 2019). As a prominent example, Brazil has developed a significant comparative advantage in soybean production by using soybeans as a "flex crop" with multiple processing pathways that differentiate the product into a food grain, livestock feed or fuel (Oliveira, 2016). However, these regional advantages come at a cost – extreme specialization of food and agriculture is a major driver of the decline in biodiversity at genetic, species and ecosystem levels (FAO, 2019; IPBES, 2019). While agronomic research and technical expertise have focused on the production of a few key staple crops (wheat, corn and rice initially, now followed by oilseeds, e.g. soybeans and rapeseed), technical knowledge on other crops remains low (FAO, 2019; Magrini et al., 2016). Furthermore, specialization conflicts with the idea of multifunctional production and its potential for contributing to food security (Bommarco et al., 2018; Misselhorn et al., 2012), climate-smart landscapes (Scherr et al., 2012) and viable farming income, despite potential trade-offs in efficiency (Lakner et al., 2018).

Lastly, *scale* enlargement entails a trend toward fewer but larger farms. Although there is still a wide variety of farm types and sizes around the world, a productivist ideology has led farms to increase in size overall in order to benefit from economies of scale, which enables cost reductions and helps farmers remain competitive (Duffy, 2009). This strategy is capital- and input-intensive, requiring high investments in machinery and chemical inputs that are only considered worthwhile if farm output is high, lowering costs per unit of production (McIntyre et al., 2009). Concentration across the agri-food industry, and the resulting control exerted by a small number of companies on farmers, has further encouraged a consolidation and enlargement trend (Folke et al., 2019; IPES-Food, 2017). Scale enlargement contributes to biodiversity loss principally through the destruction of semi-natural landscape features, such as hedges, field margins and permanent prairies, which maintain heterogeneity and connectivity of habitats at the landscape level (Poux and Aubert, 2018; Tscharntke et al., 2012).

13.2.3 Land-Sharing and Land-Sparing in a Telecoupled World

For many decades, the dominant global discourse on food security has resulted in the notion that there is direct competition for land between biodiversity conservation and agricultural production and that the two are incompatible (Butler et al., 2007; Henle et al., 2008; Steffan-Dewenter et al., 2007; Tscharntke et al., 2012). This has led to a simplified framing in which "land-sparing" (segregating intensive agriculture from conservation lands) and "land-sharing" (more extensive agriculture that contributes to conservation) are viewed as a dichotomy, though neither of them singularly has the full potential to address the challenge of sustainable agriculture (Kremen, 2015). Instead, we argue that a combined approach of both large, protected regions *and* wildlife-friendly farming areas is critical to conserving biodiversity (Kremen, 2015; Kremen and Merenlender, 2018).

The land-sparing logic argues that effective biodiversity conservation on nonagricultural land (see Chapter 11) depends on the separation of agricultural land from protected areas, necessitating the intensification of production on agricultural land to "free up" land for conservation. However, since the effectiveness of protected areas correlates with the pressures from its surroundings (Kremen and Merenlender, 2018; Watson et al., 2014), conservation in these designated areas will still depend on the management of external or internal pressures. Therefore, the idea of completely separating the interactions between biodiversity conservation and agricultural production areas is conceptually flawed, as landscape structures are shaped by cultural dynamics and human–nature interactions, as well as geographical and climate conditions, making ecological and productive systems mutually interdependent (Fischer et al., 2011; 2014). In addition to localized detrimental impacts of intensive farming, the land-sparing approach can also have far-reaching impacts on biodiversity: Land-sparing in one area can have spill-over effects that drive relocation and expansion of production in other regions, rather than leading to an overall reduction of biodiversity threats (Meyfroidt, 2018; Meyfroidt et al., 2013; Rudel et al., 2009). Even in regions where the extension of agricultural land use remains relatively constant (such as within the EU), the "imported land" needed to satisfy consumer demand continues to grow (Asici and Acar, 2016, Teixidó-Figueras and Duro, 2014; Yu et al., 2013). This shows that consumption decisions and agricultural management in a globalizing world are "telecoupled" (Friies et al. 2016; Sun et al., 2017). Therefore, while protected areas remain crucial to maintaining biodiversity, the land-sparing approach requires policy integration.

In contrast, land-sharing recognizes agriculture as "both the greatest cause of biodiversity loss *and the greatest opportunity for conservation*" (Hendershot et al, 2020: 393, emphasis added). Land-sharing approaches recognize the need and potential for agricultural land to help protect biodiversity through a range of practices, as agricultural expansion and its (inadequate) management drive biodiversity loss. While this is a good idea in theory, the above-described trajectories show that land conversion and management choices continue to invade important ecosystems and fail to produce sound ecological structures. At the same time, the separation of sufficiently large areas seems necessary for the conservation of certain ecosystem values and habitats (Kremen and Merenlender, 2018; Watson et al., 2014).

Hence, while a conceptual separation of land-sparing and land-sharing can help to identify socio-ecological trade-offs, it has largely failed in identifying solutions for addressing them (Fischer et al., 2014). We argue that in transformative biodiversity governance, area-based (land-sparing) *and* integrated (land-sharing) approaches offer a complementary toolkit to address direct and indirect drivers of biodiversity loss in agricultural landscapes, and that biodiversity policy integration is crucial in both of these approaches.

13.3 Conceptual Framework for Biodiversity Policy Integration

Biodiversity policy integration (BPI) is an analytical tool derived from the broader literature of environmental policy integration (EPI) (Zinngrebe, 2018). EPI can be defined as “the incorporation of environmental objectives in non-environmental policy sectors such as agriculture, energy and transport” and can be considered transformative because of its “aim to target the underlying driving forces, rather than merely symptoms, of environmental degradation” (Persson et al., 2018: 113). Governance elements and processes that support EPI have been widely studied, particularly in European and OECD countries (see e.g. Jordan and Lenschow, 2010; OECD, 2018; Persson et al., 2018; Runhaar, 2016; Runhaar et al., 2014; 2018; 2020, Visseren-Hamakers, 2015). This literature shows that no single instrument can realize policy integration, but rather, EPI needs a suite of complementary instruments and mechanisms (Persson and Runhaar, 2018; Runhaar et al., 2020).

In this chapter, we use BPI as an analytical tool deriving from EPI literature, with a focus on biodiversity (Zinngrebe, 2018). To date, empirical analyses of policy integration between agriculture and biodiversity are scarce. A Web of Science search for the terms “agriculture” AND “policy integration” AND “biodiversity” resulted in six articles, all of which are included in the analysis in this chapter (Karlsson-Vinkhuyzen et al., 2017; 2018; Söderberg and Eckerberg, 2013; Somorin et al., 2016; Zinngrebe, 2018, Zinngrebe et al., 2017). Other combinations of search terms were also explored: “biodiversity” OR “mainstreaming biodiversity” AND “production landscapes,” “agricultural policy,” “coherence,” “inclusion,” “social capital” and “capacity.” These also returned few hits of direct relevance that included concrete examples. Redford et al. (2015) note that publications by practitioners involved in public and private biodiversity mainstreaming programs and projects are severely deficient in the peer-reviewed literature, particularly those focused on developing countries. Therefore, to capture relevant gray literature, we also applied the following Google searches. “mainstreaming biodiversity” AND “production landscapes” (yields sixty-seven results) and “mainstreaming biodiversity” AND “agricultural policy” (yields ninety results). Titles and abstracts were screened to select relevant publications.

In order to analyze the extent to which biodiversity considerations have been incorporated in agricultural policies, we distinguish five dimensions of BPI (see Figure 13.1) (Zinngrebe et al., 2018; for similar approaches see Kivimaa and Mickwitz, 2006 and Uittenbroek et al., 2013):

1. ***Inclusion*****:** the extent to which the objective of biodiversity conservation is included in political sectors. This is measured by the extent to which a sector has reframed a biodiversity objective into sector-specific targets and specific biodiversity indicators.
2. ***Operationalization*****:** the extent to which a sector has adopted or adjusted policy instruments and monitoring and enforcement mechanisms to implement biodiversity objectives (see also Runhaar, 2016), and the uptake of biodiversity values in internal evaluation processes.
3. ***Coherence*****:** the extent to which objectives and policy instruments within a sector complement rather than contradict each other. This is measured by the extent to which policies within a sector are internally consistent and direct sector activities toward biodiversity objectives.
4. ***Capacity*****:** the level of institutional development, available resources and political mechanisms that ensure the implementation of instruments identified in the "operationalization" dimension, as well as the extent to which other actors are supported by their organization ("social capital") (Zinngrebe et al., 2020).
5. ***Weighting*****:** the importance given to biodiversity objectives in relation to other political objectives. Weighting further analyzes whether biodiversity, as natural capital, is regarded as substitutable by other forms of capital and whether ecological limits are recognized.

In the next section, we use this analytical framework to analyze the current state of BPI in agricultural governance along the five dimensions. However, we note that while the BPI framework assesses the level of integration at a specific point in time, transformative governance is adaptive, requiring dynamic policy design and institutional reconfigurations to iteratively improve BPI performance. In Section 5, we draw on our BPI analysis to reflect on enabling factors and barriers and discuss them in relation to the transformative governance analytical framework of this book.

13.4 Taking Stock: Assessing the Level of Biodiversity Policy Integration in Agricultural Governance

13.4.1 Inclusion

In many developing countries with available studies, biodiversity is not an explicit target in agricultural policies (Zinngrebe, 2018; Zinngrebe et al., 2020). While most Parties to the CBD identify the need for both ex-situ and in-situ biodiversity conservation, only 3 percent have mainstreamed biodiversity in their agricultural policies, plans and programs (Lapena et al., 2016). Among the exceptions is Kenya, where the Ministry of Agriculture in Busia County has set a performance target for establishing a biodiversity policy (Hunter et al.,

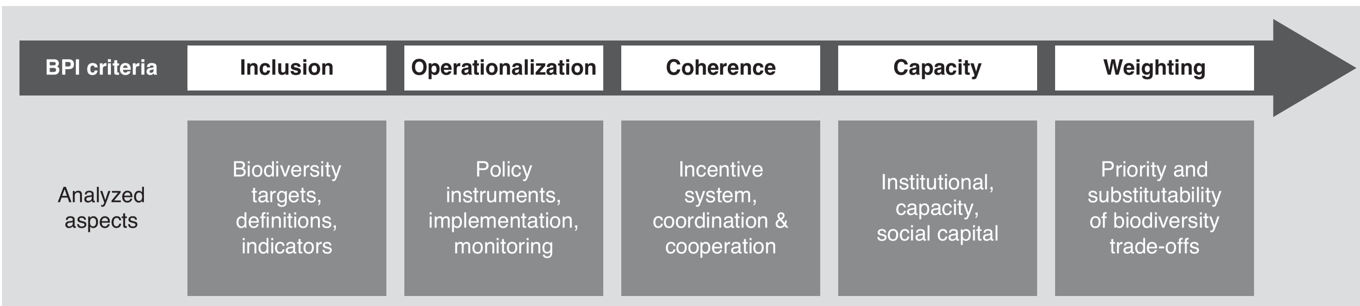

Figure 13.1 Five dimensions of biodiversity policy integration (reprinted from Zinngrebe, 2018).

2018). Similarly, Costa Rica has a biodiversity law setting general standards (although in rather generic terms) to also be considered in agricultural landscapes, which has been regarded as "one of the most comprehensive efforts to implement . . . the Convention on Biological Diversity" (Miller, 2006: 359). Despite few government-led policy initiatives to advance BPI in developing countries, international organizations have been active in pushing for integrated instruments and planning procedures, which we include in the following sections.

In the EU, various policies have aimed to integrate biodiversity objectives into the agricultural sector to differing degrees. Most recently, the European Green Deal includes a "Farm to Fork" strategy that explicitly aims to reverse biodiversity loss by aiming for a "neutral or positive impact" within agri-food systems (EC, 2019; 2020a). As an additional element, the EU Biodiversity Strategy for 2030 includes area-based targets aimed at protecting 30 percent of its terrestrial area, with "at least 10 percent of utilized agricultural area under high diversity landscapes," and a life-cycle assessment assuming responsibility for outsourced environmental impacts as well as a reduction of the overall EU's global footprint (EC, 2020b, section 2.2.2). The key legal instruments underpinning the EU's conservation policies date back several decades: the Birds and Habitats Directives established the Natura 2000 network, which covers almost 18 percent of the EU's terrestrial surface area (Bouwma et al., 2019). Almost 90 percent of all Natura 2000 sites are subject to agriculture or forestry activities, making BPI highly relevant (Tsiafouli et al., 2013). The Habitats and Birds Directives do not, however, include targets or indicators related to land use systems or ecosystem services. Instead, they have the objective of maintaining healthy habitats for selected species (Bouwma et al., 2019). Similarly, the European Common Agricultural Policy (CAP) speaks more generally of "sustainable management of natural resources and climate action" in the 2013–2020 period and uses a farmland bird index and High Nature Value farmland index as proxies for biodiversity (EC, 2013). Since 2018, a proposal by the European Commission that includes a strategic objective on the protection of biodiversity, enhancement of ecosystem services and preservation of habitats and landscapes (Target F, EC, 2018) has been negotiated by EU institutions. While this proposal takes a comprehensive approach to envisioning sustainability in agriculture, the proposed indicators target farm management and land use in general and have been assessed as insufficient for monitoring biodiversity (Pe'er et al., 2020).

Overall, countries face challenges in translating international biodiversity targets into nationally determined targets (Chandra and Idrisova, 2011; Velázquez Gomar, 2014). In an analysis of 144 national biodiversity strategies and action plans (NBSAPs) developed by countries that signed the CBD, 72 percent of developing countries and 58 percent of developed countries acknowledge agriculture explicitly as a threat to biodiversity conservation (Whitehorn et al., 2019). Despite this, only 23 percent of the developing and 33 percent of the developed countries address the question of trade-offs between agriculture and conservation (Whitehorn et al., 2019). More tellingly, almost no national agricultural plan cross-references the countries' NBSAPs (Pe'er et al., 2019; Zinngrebe, 2018). This means that although these NBSAPs may be well developed by environmental ministries and include agriculture-related targets, these goals do not reach the actors they need to engage, such as agricultural ministries and the network of actors in the agricultural sector. In some agricultural policies, the need for considering "sustainability," the "environment" or certain land use practices are mentioned, but without linking it to specific ecological criteria or policy instruments (Zinngrebe, 2018).

13.4.2 Operationalization

The operationalization of biodiversity-related objectives into policies differs strongly between developing and developed countries. In many developing countries, operationalization of policy instruments is poorly executed (e.g. Carew-Reid, 2002; Huntley, 2014); regulatory frameworks are weak, poorly implemented or nonexistent (Huntley, 2014) and some countries have started to develop their environmental governance framework only in the past decade (e.g. Vijge, 2018). Nevertheless, some advancement in operationalization is visible, particularly in Latin America, including Costa Rica, Mexico, South Africa, Australia and Brazil (Harvey et al., 2008; Huntley, 2014; Somarriba et al., 2012).

Costa Rica made significant advancements in the institutionalization of payment for ecosystem services schemes, aimed at enhancing forest biodiversity on agricultural land (Sanchez-Azofeifa et al., 2007). However, these payment schemes are regarded as insufficiently funded in the long-term and to complement but not substitute regulatory interventions by governments (Schomers and Matzdorf, 2013; Wunder et al., 2008). In South Africa, the national Biodiversity Act sets bioregional plans, biodiversity assessments and biodiversity action plans as legal instruments for BPI operationalization at the regional spatial scale (Botts et al., 2020). Additionally, "conservation farming" is supported by stringent regulation, involvement of nongovernmental organizations and farmer communities, effective communication with farmers and scientific and technical support for farmers (Donaldson, 2012). In Brazil, operationalization focuses on specific tools such as national plans promoting agroecology and organic production (Biodiversity International 2016), an "agrobiodiversity index" assessing private sector performance (Tutwiler et al., 2017) and a national school food program mandating 30 percent of federal funds toward procurement from family farms using agroecological production approaches (Johns et al., 2013).

In the private sector, producers and companies have started responding to the demand for deforestation-free commodities. Initiatives such as the Consumer Goods Forum, Tropical Forest Alliance, the New York Declaration on Forests, the Amsterdam Declaration Partnership, various beef and soy moratoriums and voluntary commitments under the Business for Nature coalition are, however, nonbinding and coexist with nonsustainable policies (Stabile et al., 2020).

In Europe, the main biodiversity-related instruments of the 2014–2020 CAP are direct subsidies to farmers conditioned on fulfilling "greening" obligations (Ecological Focus Areas) and cross compliance, as well as voluntary agri-environmental and climate measures (AECMs). These specific "deep green measures" have been found to produce strong local impacts (Batáry et al., 2015; Pe'er et al., 2017). However, the weak performance of "greening" (Pe'er et al., 2016) and the low allocation of funding to AECMs are central arguments for identifying the CAP's toolbox as weak "green architecture" (Pe'er et al., 2019). The new Post-2020 CAP proposal will continue to link direct payments to weak, unspecific targets (similar to cross compliance), while allowing for EU member states to use voluntary "eco-schemes" to support specific landscape features (Pe'er et al., 2020). Simultaneously, area-based instruments linked to the EU Birds and Habitats Directives are being used. However, evaluations of Natura 2000 indicate that only about a third of the sites have developed specific management plans for biodiversity conservation and only 4 percent show an improvement of habitats (Bouwma et al., 2019; EEA, 2015). Literature suggests that effective implementation of Natura 2000 sites depends on a joint implementation with policies such as agri-environmental measures (Bouwma et al., 2019; Lakner et al., 2020).

13.4.3 Coherence

Even in cases where conservation is included as one of the targets in agricultural policies, and when policies have been appropriately reconfigured to achieve those targets, they may still run counter to specific biodiversity conservation policies in the environmental sector. Often, decisions about trade-offs between productivity and conservation are avoided or not explicitly addressed, and a patchwork of incoherent policies result in a lack of incentives for biodiversity-friendly farming.

One barrier to coherent agri-environmental policies is a lack of horizontal coherence, notably, a lack of coordination between ministries and agencies at the national level. Insights from Indonesia, Uganda, Peru and Honduras show that while different regulatory processes for agricultural landscapes exist for the governmental sphere and for sustainability markets in the private sector, they are incoherent and generally favor conventional practices, rather than biodiversity-sound management systems such as agroforestry (Zinngrebe et al., 2020). Even in Costa Rica, which has relatively strong environmental laws and regulations, incoherent policies have been reported (Brockett and Gottfried, 2002; Lansing, 2014). One general issue is that ministries of finance and planning – which generally hold decision-making power on large-scale investment allocations – are often not in regular consultation with the ministries responsible for biodiversity governance (Swiderska, 2002).

Besides a lack of horizontal coherence (i.e. between sectoral policies at one level of governance) there is also often a lack of vertical coherence (i.e. between national and subnational biodiversity strategies). Vertical coherence is especially pertinent in developing countries, since many are in the process of decentralizing their governance systems (Carew-Reid, 2002; Hunter et al., 2016; Swiderska, 2002). The few existing studies indicate that vertical integration across political levels for the implementation, enforcement and monitoring of biodiversity conservation in agricultural landscapes is generally low (e.g. Zinngrebe, 2018). Nevertheless, the example of local stakeholder networks in Ethiopia illustrated that despite low coherence at the national level, local collaboration can lead to coherent management approaches (Jiren et al., 2018). In Rwanda, the successes of watershed management plans in enabling dialogue and policy coordination across ministries of agriculture, fisheries and rural and social development at both local and national levels are another promising exception (FAO, 2017b). Based on selected case studies from countries within Africa and Latin America, the FAO (2017b) highlights that management models that take an ecosystem-based approach can serve as a lever for coordination, integration and synergies, though this has not been sufficiently applied to improve coherence. In South Africa for instance, bioregional plans enhance both coherence in local land use planning and across core sectoral strategies at the national level (Botts et al., 2020). Deliberations in trade-off options between conservation and other goals is part of the planning process for this purpose (Redford et al., 2015). The international Biodiversity for Food and Nutrition Project, funded by the Global Environment Facility, shows how, in Brazil, Kenya, Turkey and Sri Lanka, a sound evidence-base on how biodiversity supports nutritional outcomes, and the establishment of multistakeholder and multisectoral steering committees, improves coherence across agriculture and food policies (Beltrame et al., 2016; 2019).

The EU is a strong advocate of policy coherence across sectors, as acknowledged in a large number of official EU documents. However, while most EU policies are coherent at the level of objectives, they provide incoherent incentives at the implementation stage, and therefore have not managed to effectively or efficiently reverse declining biodiversity trends (Pe’er et al., 2017). For example, while the EU Birds and Habitats Directives aim to conserve biodiversity, the CAP’s fundamental targets, defined by the Treaty of Rome in 1957, direct agricultural policy toward increased productivity, low food prices and supporting farmers’ incomes. Another example of incoherence in the CAP is the aforementioned Ecological Focus Areas, which obligates each farm of more than fifteen hectares to dedicate 5 percent of its land to conservation activities. In reality, this instrument primarily results in measures with a low contribution to biodiversity, such as catch crops and nitrogen-fixing crops (Cole et al., 2020; Pe’er et al., 2017). Watering down ecological standards in federal implementation processes, as well as misconceptions about farmers’ motivations to engage in biodiversity conservation, reduce the CAP’s potential to contribute to conservation (Brown et al., 2020). In the EU proposal for a post-2020 CAP (EC, 2018), direct payments will continue to dominate and low ecological targets continue to persist (Pe’er et al., 2020). Overall, studies show that despite the EU’s rhetoric for policy coherence, large inconsistencies in the instruments and implementation of EU policies remain (De Schutter et al., 2020; Nilsson et al., 2012).

Within the EU, there are also strong calls for enhancing coherence of EU policies with non-aid policies that impact developing countries. These calls have grown since the 1990s, when Europe’s need for agricultural biodiversity and production land substantially increased and was therefore transferred to other parts of the world. This policy blind-spot results in the EU’s contribution to tropical deforestation and biodiversity loss in developing countries (Fuchs et al., 2020). However, while the EU and member states such as Denmark, the Netherlands, Sweden and the UK (which was an EU member at the time of analysis) have tested approaches for policy coherence for development, implementation performance has been weak (Carbone, 2008; see also Pendrill et al., 2019). Civil society actors have created a proposal to streamline EU policies into a "Common Food Policy" for Europe (De Schutter et al., 2020; IPES-Food, 2019). Blueprints describe an integrated food policy framework that promotes healthy diets and sustainable food systems through coherence across policy areas and governance levels, including by aiming to relocalize food production and to reduce dependence on global food imports (De Schutter et al., 2020; IPES-Food, 2019). It remains to be seen to what extent the integrated approach of the European Green Deal, and its "Farm to Fork" strategy, can translate such suggestions into practice.

13.4.4 Capacity

While there is generally higher institutional capacity in developed countries relative to developing countries, the aforementioned division between the institutional processes of the environmental and agricultural sectors undermines social capital for BPI in most countries.

In developing countries, the capacities to develop biodiversity (and other environmental) policies are limited to environmental ministries or departments. In Indonesia, Uganda, Honduras and Peru, social capital and capacities for training, financial support and regulation exist, but are not targeted at ecologically sound forms of production (Zinngrebe et al., 2020). The availability of institutional capacities is further undermined by unclear mandates between government agencies, high turnover among government officials resulting in discontinuous policy formulation and execution, and a lack of experienced biodiversity research institutions or centers of excellence (Zinngrebe, 2018; Zinngrebe et al. 2020). In the public policy arena, there is a lack of knowledge on and awareness of the linkages between biodiversity and agriculture or food security (Beltrame et al., 2016; Chandra and Idrisova, 2011). This is largely due to lack of training, funding, incentives for experts to work in the environmental field (Chandra and Idrisova, 2011), biodiversity-focused science–policy interfaces, and institutionalized mechanisms for the participation of Indigenous Peoples and local communities (which hold critical local ecological knowledge) in monitoring, reporting and verification initiatives (Vanhove et al., 2017). Mexico tackles these issues via multistakeholder roundtables, consisting of agricultural, rural development and research agencies, Secretaries of States, academia, NGOs and private actors, which coordinate sector activities, financing and science-policy mechanisms at the national and state level (Tutwiler et al., 2017). In Uganda, the agricultural ministry, under the direction of the Ministry of Finance, Planning and Economic Development, has to allocate a portion of their budget to conservation activities (IIED, UNEP-WCMC, 2015). Their staff receive training and a dedicated conservation expert from the environmental ministry to help prepare plans, while policy actors use learning lessons from the ground to inform the national macroeconomic framework (IIED, UNEP-WCMC, 2015). In South Africa, implementation of the Biodiversity Act is supported by pilot projects, regular monitoring and a national science-policy institute and multiagency committees, which align partnerships and cofinancing (Botts et al., 2020).

Within the EU, implementation of agricultural and biodiversity policies is supported by institutions at the European, national and subnational levels. However, lack and variance of capacity among different members states has also been identified as a barrier to implementation of agricultural policy proposals that contribute to environmental protection (Erjavec et al., 2018). Political decision-making and implementation processes of theoretically synergistic policies are designed and implemented by separated policy regimes (Pe'er et al., 2020), undermining social capital and potential synergies. Capacity problems are further enhanced by budgetary imbalances between agricultural and environmental instruments. Although the CAP is the EU policy with the highest budget (€58.4 billion in 2020), the majority of this is dedicated to direct income support. As a result, most of the budget in the 2015–2020 CAP (approximately €40 billion in 2017) was spent on direct payments that support land-intensive and biodiversity-threatening forms of farming, such as intensive animal breeding and monocultures (Pe'er et al., 2019). Furthermore, though Natura 2000 has demonstrated improvements in biodiversity within agricultural areas, funding per hectare is considerably lower than for greening or agri-environment climate measures (Pe'er et al. 2017), hardly compensating farmers for resulting costs from forgone incomes due to management restrictions and lower rents, and thus not providing sufficient incentive for adoption by farmers (Bouwma et al., 2019). Additionally, contradictory technical advice by agricultural extension services and administrative hurdles have hampered effective implementation of biodiversity measures (Zinngrebe et al., 2017).

13.4.5 Weighting

Even where biodiversity policy objectives are present and have been operationalized through concrete instruments with allocated capacity, political discourses are dominated by productivist narratives. The political framing in which food production must increase above all else provides little incentive to phase out agricultural subsidies that support the dominant model but are harmful to biodiversity (Bouwma et al., 2019; Fouilleux et al., 2017; Roche and Argent, 2015). In 2015, OECD countries provided $100 billion in direct and indirect subsidies that stimulated intensive agricultural production (OECD, 2019: 73). Although certification and other schemes are partly driving growth in organic and sustainable practices, the overwhelming policy bias and dominance of conventional agricultural methods gives these practices limited scope for truly scaling-up (Aubert et al., 2018).

In developing countries, both policies and politics also prioritize agricultural intensification and expansion (Wilson and Rigg, 2003; Zinngrebe et al., 2020). Biodiversity narratives in Peru show that even conservationists do not dare to talk about limits to production carrying-capacity. Adverse impacts on ecological functionality and related pollution and water-management issues remain untargeted key drivers for biodiversity loss (Zinngrebe, 2016a; 2016b). Another example is China, where, though the Law of Agriculture provides for wetlands conservation, the priority is placed on the draining and cultivation of wetlands for food security, resulting in lower priority and trade-offs for biodiversity (Ongley et al., 2010). Despite successful instruments for supporting agrobiodiversity and integrated natural resource management, agricultural expansion and intensification dominates decision-making considerations (Laurance et al., 2014).

Similarly, in the EU, the political discourse and resulting policies are oriented toward increasing productivity for human nutrition (Erjavec et al., 2009; Freibauer et al., 2011; IPES-Food, 2019). Despite the emergence of new discourse elements targeting multi-functionality and liberal markets, central policy elements support productivity (Alons and Zwaan, 2016; Erjavec and Erjavec, 2015). Following this policy design, even the implementation of conservation mechanisms, such as Ecological Focus Areas, is biased toward measures supporting increased productivity of agricultural lands (e.g. cash crops and nitrogen-fixing crops) (Pe'er et al., 2016). This is one of the stated reasons for why the CAP has not managed to reverse biodiversity loss (Pe'er et al., 2017). Some argue that the CAP is also not likely to do so in the near future, considering the content of current proposals for a post-2020 CAP (Pe'er et al., 2019). This strongly conflicts with the European Green Deal, which explicitly aims to halt biodiversity loss due to agriculture (EC, 2019).

13.5 Looking Forward: Toward Transformative Biodiversity Governance in Agricultural Landscapes

The previous section highlighted the overall very modest advances of BPI in agricultural landscapes. Given that the majority of global and national biodiversity targets are vague and the agricultural sector is not held accountable for its biodiversity performance, there is little guidance for investments in operationalization and capacity-building. Likewise, biodiversity policies are mostly "added on" to regulations of agricultural landscapes, receiving a low share of support compared to that for conventional farming systems focused on productivity. Given the significant agri-food system lock-ins and incumbent power dynamics, more effective BPI will not be implemented spontaneously – rather, the required shifts will need leadership at various levels (Oliver et al., 2018; Runhaar et al., 2020). We argue that *political will* is required as a key driving force to overcome lock-ins and improve BPI performance (see Figure 13.2). In the following paragraphs, we present four central leverage points specifying the dimensions for the transformation of biodiversity governance for agricultural landscapes.

A first transformative factor is the creation of a coherent *sustainability vision based on inclusive biodiversity governance*, which will guide implementation and induce accountability among implementing agents. As we showed in the previous section, the BPI dimensions of *inclusion* and *coherence* suffer from a lack of clear orientation, and the *weighting* is geared toward specific production-oriented interests. Decisions on agricultural policy are often dominated by small but well-organized interest groups that marginalize values of biodiversity conservation and downplay societal mandates such as the biodiversity targets under the CBD (Brown et al., 2020, Pe'er et al., 2019). Stakeholder groups differ in the way they envision appropriate use of land and nature, leading to different, often disconnected, discourses that are not equally reflected in policy design and implementation processes (Velázquez Gomar, 2014; Zinngrebe, 2016a). Questions of accountability and legitimacy of planning will depend on the extent to which potentially conflicting values are acknowledged and diverse value systems and perceptions are reflected in democratic planning and participatory implementation processes

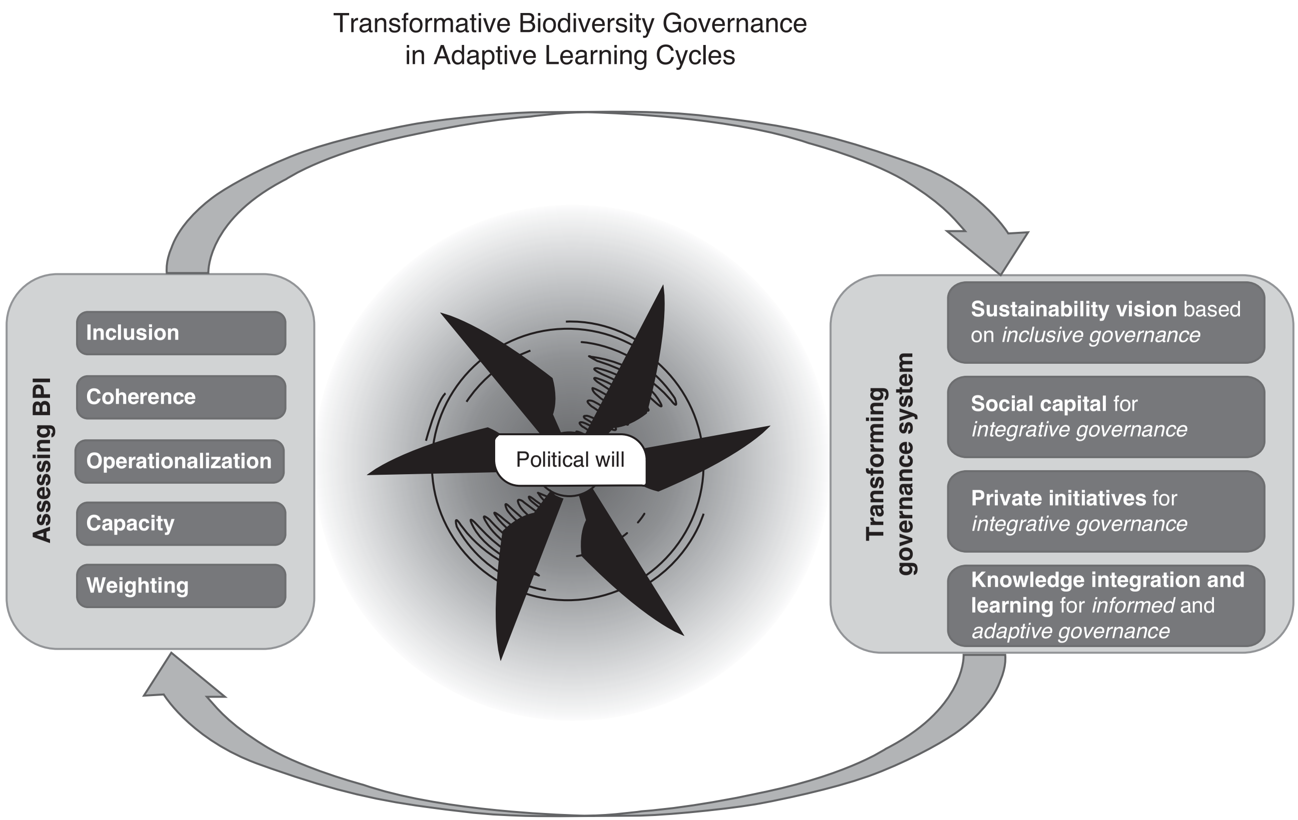

Figure 13.2 Improving the BPI level through transformative governance in adaptive learning circles.

(Díaz et al., 2018; Runhaar et al., 2020; Termeer et al., 2013; Zinngrebe, 2016b). Likewise, a positive perspective of what "sustainable agricultural landscapes" entail in a given context helps to orient the decisions and activities of political and nonpolitical actors. There are various alternatives to the dominant productivist model, including agroecology, sustainable intensification, agroforestry, and "nature-inclusive" agriculture (Brouder et al., 2015; IPCC, 2019; Loos et al., 2014; Perfecto and Vandermeer, 2010; Plieninger et al., 2020; Tscharntke et al., 2012; van Noordwijk, 2019; Zinngrebe et al., 2020). Agroforestry, as a specific example of an agroecological approach, has the potential to support ecosystem functions and biodiversity in both developed (Torralba et al., 2016) and developing countries (van Noordwijk, 2019). More concretely, objectives can be formulated around agroecological infrastructure such as hedges, trees and other seminatural habitats that protect multiple taxonomic groups and ecosystem services (Barrios et al., 2018; Fagerholm et al., 2016; Gonthier et al., 2014; Plieninger et al., 2019; 2020; Poux and Aubert, 2018; Torralba et al., 2018). Scenarios form an effective method for a participatory visioning process involving policymakers and other actors to deliberate options for land use and assess their implications for food security within a land-constrained world facing climate change (e.g. Aubert et al., 2019).

A second transformative factor that gives more weight to biodiversity in decision-making on trade-offs is *social capital for integrative governance*. Especially in developing countries, institutional *capacities* for implementing policies are severely lacking and often result in institutional gaps between policy integration "on paper" and the implementation of concrete policy instruments (Runhaar et al., 2020). Overlapping and unclear competences also create "responsibility gaps" in which no actor actually takes leadership in regulation or wider governance (Sarkki et al., 2016). Efforts to improve mainstreaming and fill these gaps have not resulted in institutional reconfigurations favoring effective implementation (Herkenrath, 2002; Prip and Pisupati, 2018). However, environmental impact assessments of large agricultural projects, or approval and monitoring of agroforestry concessions, can improve the operationalization of conservation objectives (Slootweg and Kolhoff, 2003; Zinngrebe, 2018). In Europe, both agricultural and environmental policies are well developed, but not institutionally connected in decision-making and implementation structures (Pe'er et al., 2019). Involving farmers in local implementation processes and partnerships with conservationists is an important strategy for improving biodiversity conservation leadership and outcomes in both developing (Harvey et al., 2008) and developed countries (Buizer et al., 2016; Pe'er et al., 2019; Persson et al., 2016). A collaborative process of aligning policy packages of information, regulation and finance can help overcome fragmentation between political actors and produce coherent incentive systems for conservation practices (Zinngrebe et al., 2020). Such a collaborative process should not only advance top-down implementation of (inter)national regulatory frameworks, but also cover a diverse range of locally based agricultural management practices. The IPBES Global Assessment (2019), for example, highlights a wide number of studies documenting the importance of small agricultural landholdings[2] in contributing to biodiversity conservation in different ecosystems (Batáry et al., 2017; Belfrage et al., 2015; Fischer et al., 2008).

[2] In this case, defined as under two hectares.

A third point of leverage is harnessing *private initiatives for integrative governance*. Private sector and market-based mechanisms can help with *operationalization*, provide new sources for institutional *capacity*, and increase *coherence* with farming interests (see Chapter 5). Engaging private actors is critical, particularly due to the rise and extent of private governance in the agricultural sector globally. Private actors can help incentivize biodiversity-friendly agriculture through various market opportunities, finance mechanisms, and public–private partnerships and other cooperative mechanisms. For example, numerous cases of the landscape approach have shown cooperation between governmental and private actors, such as co-funding from corporate actors in the maintenance of ecosystem services (Van Oosten, 2013). Private agricultural standards (including voluntary programs, such as various organic certifications) have become an integral part of agri-food chain governance (Henson and Reardon, 2005; Verbruggen and Havinga, 2017). Sustainability certifications (potentially) open new markets (FAO, 2017b) and provide opportunities for the scaling-up of environmental sustainability criteria, including for biodiversity (Runhaar et al., 2017). Particularly in countries that import large quantities of agricultural goods with high biodiversity impacts, government procurement of certified agricultural products can support and incentivize private sector actors in achieving biodiversity goals (Fransen, 2018). The use of economic instruments by firms, such as payment for ecosystem services, can also help provide financial incentives for other actors to engage in biodiversity-friendly farming and production processes (Donaldson, 2012; Harvey et al., 2008; Sanchez-Azofeifa et al., 2007).

However, to improve biodiversity outcomes, private initiatives need to be accompanied by political regulation and cooperation between private and public actors (Folke et al., 2019, Lambin et al., 2018; Runhaar et al., 2017; 2020). So far, land use change and management choices exercised by powerful transnational corporations have had a range of detrimental consequences for biodiversity (Folke et al., 2019). In the agri-food sector, consolidation is extremely high among corporations controlling fertilizers, agrochemicals and seeds, as well in the production of specific commodities such as coffee, bananas, soy, palm oil and cocoa (Folke et al., 2019). Private initiatives and certification schemes connecting consumer support for sustainable production systems have not yet proven effective in reversing detrimental environmental impacts (Dietz et al., 2019; Lambin et al., 2018; Pendrill et al., 2019). Experiences with green certification show that private standards need to be complemented with adequate regulatory frameworks to avoid deforestation and other detrimental effects to biodiversity, while simultaneously providing sufficient economic incentives for farmers (Dietz et al., 2019; Lambin et al., 2018).

Knowledge integration and learning for informed and adaptive governance is necessary to develop context-specific policy solutions for complex societal challenges. This can help in identifying suitable strategies for *operationalization* and (targeted) *capacity*-building. Experiences in participatory land use planning have shown how different knowledge systems can be integrated at the community level to build adaptive capacity and adopt more sustainable land use practices (Rodríguez et al., 2018). While the EU has a wide range of instruments for conservation in agricultural landscapes, it does not yet use all available knowledge to inform the improvement of these instruments from one funding period to the next (Pe'er et al., 2020). Social capital can facilitate the input and reflection of available knowledge (Zinngrebe et al., 2020). Policy learning based on available experiences has the potential for overcoming complete policy failure and fragmentation (Feindt, 2010; Zinngrebe, 2018). Feindt (2010) argues that stronger institutionalized support for policy integration, balanced representation and wider societal engagement is needed to hold back powerful actors from dominating the policy arena to defend the status quo. Certain levels of flexibility and a complementary structure of CAP support and Natura 2000 instruments have shown synergistic effects in increasing the willingness of farmers to adopt conservation measures (Lakner et al., 2020). In addition, the integration of local knowledge has been shown to improve both farmers' engagement in reflexive learning processes and policy performance, in the EU context on the CAP's agri-environmental measures (Goldman et al., 2007; Prager et al., 2012) and in developing countries, for example in the context of conservation farming in South Africa (Donaldson, 2012) or in Mesoamerican landscapes (Harvey et al., 2008).

13.6 Conclusion

Low levels of biodiversity policy integration in agricultural policy in both developing and developed countries is a determining factor in the continued biodiversity loss within agricultural landscapes and beyond. While land-sparing approaches have proven to be indispensable for the conservation of certain components of biodiversity (Le Saout et al., 2013; Watson et al., 2014), a more integrated land-sharing approach is necessary to enable a transformation of current trajectories toward sustainable farming, in order to bend the curve of biodiversity loss while also ensuring food security, climate resilience, enhanced animal welfare and improved rural livelihoods.

With the exception of EU policies, in most countries, specific biodiversity-related objectives are missing in agricultural policies. Worldwide, the underlying drivers of biodiversity loss from agriculture are not sufficiently addressed. In particular, the objective of phasing out policies supporting threats to biodiversity and a strongly productivist-oriented agricultural sector overpowers the idea of sustainable agriculture. Instead of coherent targets and complementary institutional structures, conservation has generally been treated as an add-on to business-as-usual agricultural policy. Trade-offs considering biodiversity and ecological limits are seldom explicitly recognized in agricultural policies, and no country expresses a long-term vision for the development of sustainable agricultural landscapes. Political discourses remain centered on prioritizing intensive food production, thereby marginalizing the potential functions of agricultural landscapes for biodiversity conservation. Based on our BPI analysis, we extract the following recommendations for transformative biodiversity governance:

1. Inclusive governance needs to genuinely incorporate multiple stakeholder views and perceptions, and negotiate and develop clear, coherent visions and definitions of sustainable agriculture to legitimate policies and decision-making.

2. Integrative governance can be improved by building social capital as a means to creating favorable actor constellations and institutional structures incentivizing and prioritizing biodiversity-sound practices.
3. Integrative governance can benefit from complementing public and private initiatives in coherent governance structures.
4. Informed and adaptive governance requires a continuous and participatory reflection of governance systems to guide institutional learning processes toward sustainable agricultural landscapes.

We argue that the Post-2020 Global Biodiversity Framework should focus on the transformation of agricultural governance systems by concretely addressing key leverage points and providing specific guidance for member states to address country-specific drivers and potentials for sustainable innovation through biodiversity policy integration. Eventually, however, the dynamic of this transformative process will be conditioned by political will and active leadership at all levels.

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