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Against the grain? A historical institutional analysis of access governance of plant genetic resources for food and agriculture in Ethiopia

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Abstract

Farmers' and breeders' access to a genetic diversity is essential for food system sustainability. The implementation of international agreements regulating access to plant genetic resources for food and agriculture (PGRFA) varies substantially between countries. Here, we examine why some countries implement a restrictive access governance regime, taking Ethiopia as a case. Drawing on commons theory and historical institutional analysis, we analyze historical, political, and economic factors that have shaped Ethiopia's access regime. Based on interviews with key actors and stakeholders and document analysis, we identify three overarching ideational and material factors that can explain Ethiopia's current policy: (a) the influence of narratives about Ethiopia as a biodiversity treasure trove on the Ethiopian cultural identity; (b) the economic importance of agriculture based on PGRFA with origin in the country; and (c) the political influence of the genetic resource movement that promotes farmers' rights as a counter measure to stringent intellectual property rights (IPR), and on-farm PGRFA management as complimentary to ex situ conservation and formal seed system development. The Ethiopian case illustrates that countries' governance of access to PGRFA must be understood in connection with,

and not in isolation from, IPR regimes and the historical, political, and cultural role of PGRFA in the country in question.

KEYWORDS
Access and Benefit Sharing (ABS), Commons governance, Intellectual Property Rights (IPR), International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

1 | INTRODUCTION

Sustainable food production depends on cultivated and wild plant genetic resources for food and agriculture (PGRFA) for crop improvement. Farmers and breeders need access to plant genetic resources (PGRs) from both within and outside their borders; indeed all countries rely on crop diversity that originated on territories under other jurisdictions (Khoury et al., 2016; Palacios, 1997). Despite the empirical evidence for the interdependence and the benefits of well-adapted crop varieties, access to genetic resources is restricted in several ways, and in ways that differ between different user groups. The limitation can be practical, economic, political, or legal—or a combination of these. Three types of laws and regulations explicitly restrict access to PGRs. These are (a) intellectual property rights (IPRs) on cultivars; (b) access and benefit sharing (ABS) regulations related to the Nagoya Protocol of the Convention on Biological Diversity (CBD), and to the Multilateral System for ABS under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)—hereafter referred to as the MLS; and (c) plant health regulations. IPRs only apply to new varieties while the two latter apply to all PGRFA exchanged across national borders.

Concerns over the negative effect of IPRs on farmers' interests and needs in relation to seeds is a long-standing research theme and a bone of contention in public debates (Aoki, 2008; Borowiak, 2004; Correa, 2015). IPRs such as patents, plant breeders' rights acts, and even contract law for the protection of new plant varieties are becoming increasingly stringent and restrictive on access, causing concern to advocates of farmers' rights and plant breeders alike (Bandyopadhyay, 2018; Correa, 2015; Dutfield, 2017, 2018; Luby, Kloppenburg, Michaels, & Goldman, 2015; Wan & Perry, 2019). Less debated in the public are the potential and actual negative effects of different ABS regulations on PGRFA, however their effects on basic biodiversity and applied life sciences research are of considerable concern in the research community (Bjørnstad, Tekle, & Göransson, 2013; Neumann et al., 2018; Prathapan, Pethiyagoda, Bawa, Raven, & Rajan, 2018; Rourke, 2018). The most wide-ranging ABS regulations are those of the Nagoya protocol, which apply to all biodiversity and associated traditional knowledge covered by the CBD.[1] The CBD reconfirmed the resolution 1803 (XVII) on the "Permanent Sovereignty over Natural Resources" adopted by United Nations General Assembly at its 17th session in 1962 and established the principle that nation states have "sovereign rights" over the biodiversity within their jurisdiction (Nijar, 2011; Safrin, 2004).

The principle of nation states' sovereign rights over PGRs within their jurisdiction "reshaped and transformed the global genetic commons" into something states could claim ownership over (Roa-Rodríguez & Dooren, 2008). Arguably, the CBD objective about "fair and equitable benefit sharing" came about due to increased use of IPRs to protect the ownership of the products based on biodiversity (Byerlee & Dubin, 2010; Fowler, 2002). The debates at the time of negotiation of the CBD focused on the asymmetrical power relation between genetic resource "providers" and "users," typically referring to countries in the Global South as providers and countries in the Global

[1]As of June 2019, the Nagoya Protocol had 117 contracting parties out of 196 contracting parties to the CBD: https://www.cbd.int/abs/nagoya-protocol/signatories/default.shtml

North as users. This notion inspired many countries in the Global South to demand more equitable ABS rules globally and to implement stricter policies nationally (Correa, 1995; Fowler & Hodgkin, 2004; Halewood, López Noriega, & Louafi, 2013b; Roa-Rodríguez & Dooren, 2008).

Thus, restrictive access policies can be seen as a reaction from countries in the Global South toward an increasing enclosure of various genepools by IPRs, with little or no economic benefit flowing back to the countries in whose jurisdiction the genetic resources originated (Andersen, 2017; Timmermann & Robaey, 2018; Tsioumani, 2018). Through access policies and sui generis IPR laws, these countries intend to recognize the importance of farmers' varieties, and to provide appropriate mechanisms for ABS (Robinson, 2008). The other intention is to prevent the misappropriation of farmers' varieties, and safeguard farmers' rights to freely save, use, exchange, and sell all seeds (Lewis-Lettington, 2008a, 2008b). As such, sovereign rights over PGRFA are being used as a freedom to determine the condition under which access occurs (Correa, 1995, 2015). This freedom soon became other actors' restriction as international germplasm access was limited following the CBD ratification (Correa, 2005; Falcon & Fowler, 2002; Sullivan, 2004).

The ITPGRFA was negotiated as an attempt to balance fair and equitable benefit sharing with a rational system for facilitated access to genetic resources. In addition to agreements on sovereign rights, farmers' rights and benefit sharing, the ITPGRFA's MLS aims to increase access to PGRFA for crop improvement programs (Byerlee & Dubin, 2010). Research shows that the availability and exchange of germplasm has indeed increased following the adoption of the ITPGRFA (e.g., Dulloo et al., 2013) when compared with research results from before its adoption (e.g., Dudnik, Thormann, & Hodgkin, 2001).

According to some legal experts, the ITPGRFA and its MLS are "high-water marks for how countries can work together under the United Nations to tackle complicated transnational conservation and access issues" (Halewood, López Noriega, & Louafi, 2013a). However, the same analysts are the first to acknowledge that the MLS is working suboptimally, and that there are some major "design issues" limiting full engagement of all actors (Dedeurwaerdere, 2012; Halewood et al., 2013b). Many countries, even member countries, have shown reluctance to implement the multilateral system, and access to genetic resources from institutions in these countries is restricted or nonexisting. The continuation of restrictive access regimes among some contracting parties is a source of tension and debate in the biannual Governing Body meetings of the ITPGRFA (Finkel, 2009). Ethiopia is often mentioned as an example of a country that does not provide access according to the MLS. In this article, we take Ethiopia as a case and ask: Why do countries, in spite of the empirical evidence for interdependence and mutual benefits of open access to genetic resources, implement a restrictive governance regime for access to genetic resources?

Ethiopia is internationally recognized as a hotspot for wild and cultivated plant genetic diversity and is a vocal actor in international biodiversity governance fora. The country is a party to the CBD, the Nagoya Protocol, and the ITPGRFA. Furthermore, Ethiopia is home to many national and local projects for PGRFA conservation and sustainable use in accordance with the objectives of the ITPGRFA (e.g., Alemu, 2011a; Balemie & Singh, 2012; Dalle & Walsh, 2015; Fukuda, 2011; Mulesa & Ortiz, 2015; UNDP, 1994). As mentioned above, Ethiopia's fame as a center of important crop diversity is accompanied by a reputation for strict access regulation. This reputation is for the most part informally shared in the PGRFA community, but it also sometimes percolates into statements and anecdotes in the research literature, media reports, and the gray literature. Plant breeders have singled out Ethiopia and a few other countries (i.e., China, India, Iran, and Turkey) for not complying with ITPGRFA norms regarding access, or for restrictive access policies toward PGRFA users outside their territories (Finkel, 2009; Gewin, 2019; Kate & Laird, 2002; Kloppenburg & Kleinman, 1987). For instance, a scientist from Kew Botanical Gardens was cited in an article in *Scientific American* as saying:

> *The country where coffee originated curates a large collection of coffee plants that exist nowhere else in the world. But the government keeps them under lock and key and will not allow foreign researchers access. There's been a lot of bad blood between Ethiopia and the coffee industry (…) it's no wonder they're guarded about their genetic resources (Rosner, 2014).*

Along the same vein, in a feature story in *Science* from 2009, scientists working in an international research center and breeding program singled out Ethiopia as one of the most restrictive countries when it comes to access to genebank material: "Ethiopian durum wheats could help thwart a fungus (Ug99) now sweeping the globe, but Ethiopia is reluctant to share seeds" (Finkel, 2009). In their review of the global availability of PGRFA, Fowler and Hodgkin (2004) reported: "Ethiopia provided virtually no samples to foreign researchers or institutes but distributes about 2000 a year internally."

Since Ethiopia is a party to the Plant Treaty, the reputation for being a country with a "closed genebank" (Finkel, 2009; Gewin, 2019, p. 1376) equates to noncompliance with the rules of the multilateral system. This is not the only international seed-related policy in which Ethiopia is going against the grain. Indeed, compared with most other countries, Ethiopia has a less liberal seed market, less involvement of multinational seed companies (MoA, 2019b; Scoones & Thompson, 2011), less stringent IPR laws (Alemu, 2016), and seed policies that accommodate a "pluralistic" seed sector (Otieno, Reynolds, Karasapan, & López Noriega, 2017).

The objective of this article is to describe and analyze Ethiopia's governance of PGRFA access and its implications for different users. We analyze historical, political, and economic factors that have shaped the country's conservation and utilization strategies, policies, and laws.

By outlining the historical trajectory of PGRFA conservation for plant breeding and germplasm transfer, we show how the path has changed from ex situ to in situ conservation/on-farm management in the late1980s, following Ethiopia's worst drought and famine. We discuss how increased awareness from local on-farm projects and international activism in favor of farmer-based conservation, coupled with growing distrust of stringent IPRs, as well as massive germplasm requests from outside, contributed to restrictive national practices in providing access for international users. The rest of the paper is structured as follows. We start by introducing the theory and methods underpinning the study. Second, we provide an analysis of the development of Ethiopia's current PGRFA governance system, with a particular focus on access to PGRFA for national and international users. Third, we explore the long-term historical political and institutional developments and their influence on Ethiopia's current policies and practices. Finally, we conclude with a summary of the main findings of the study and highlight the importance of the historical institutional approach to understand differences among countries in PGRFA governance.

2 | THEORY AND METHODS

To understand Ethiopia's position on access to and management of PGRFA, we draw on Halewood et al. (2013a) analytical approach, conceptualizing PGRFA as a "new commons." Halewood et al. (2013a) conceptualization of PGRFA relates to Ostrom (1990) commons theory in general, and "new commons" theory in particular (Hess & Ostrom, 2007b). The first has commonly been applied to the management of "traditional" common-pool resources (e.g., irrigation, pasture, fish) that are rivalrous[2] and nonexcludable[3] in a limited geographical area and involving a limited number of actors (Hess, 2008; Hess & Ostrom, 2007a; Stern, 2011). The new commons term refers to commons such as PGRFA that are partially man-made (result of human-environment interaction) and global in coverage (Halewood et al., 2013a).

Contracting parties to the ITPGRFA designed the current MLS in response to these new commons features of PGRFA. The MLS is based on a recognition of countries' sovereign rights over their respective PGRFA, in harmony with the CBD, but through the MLS countries have used this sovereign right to pool and share PGRFA held in their

[2]A rivalrous good is a common-pool resource whose size or characteristics makes it costly, but not impossible, to exclude potential beneficiaries from obtaining benefits from its use (e.g., fishing grounds).

[3]A nonexcludable good is a common-pool resource whose use by one person diminishes the ability of another person to benefit from it (e.g., pasture or grazing land).

jurisdictions (Halewood, 2013). In an institutional analysis of Ethiopia's access governance, we draw in particular on two concepts from this literature: the distinction between a "new commons" approach and a "hyperownership" approach to PGRFA governance, and the concept of design issues. Halewood et al. (2013a) argue that although most member states and Consultative Group on International Agricultural Research (CGIAR) centers have moved away from "common heritage" thinking or free access and embraced the "new commons" approach, some countries espouse a "hyperownership" approach, exercising extensive national government control over a wide and increasing range of PGRFA. Drawing on Ostrom's (1990, pp. 90–102) concept of design principles of commons governance, Halewood et al. (2013a) highlight two "design issues" in the ITPGRFA's MLS which currently are affecting engagement of actors in the system: (a) unclear boundaries and inability to enforce reciprocity; and (b) the hybrid nature of financial benefit sharing in the MLS, which is somewhere between a multilateral and bilateral approach. The first design issue refers to the "free-rider" situation in which nonmembers have access to material from the MLS even if they do not participate in the system. The second design issue refers to the way monetary benefit sharing is "de-linked" from the countries, communities or legal individuals from whom the material was collected (multilateralism) while the requirement to share the monetary benefits is directly linked to the IPR holders and their sale of the varieties incorporating PGRFA from the system (bilateralism). According to Halewood et al. (2013a) analysis, these two design issues can explain why parties show reluctance to fully participate in the governance regime of the MLS.

Expanding on the institutional analysis and the focus on design principles, we explore the historical and political context in which Ethiopia's position on governance of PGRFA access has developed. Historicizing institutional development allows us to bring out how the "prior history of conflict or cooperation; the incentives for stakeholders to participate; power and resource imbalances; leadership and institutional design; shared understanding and trust" (Ansell & Gash, 2008) have shaped the present governance regime. Our empirical material includes interviews, database information and analysis of a range of literature and policy documents. We draw on peer-reviewed articles, gray literature, archival studies, policy, and legal documents in English and Amharic languages, including relevant reports archived online from international biodiversity and PGRFA related negotiations (IISD, 1993–2019; UPOV, 1973–2019), and GENSYS database (GCDT, 2019). Our narrative analysis utilizes key informant interviews ($N = 26$) with key actors and stakeholders, conducted during fieldwork in Ethiopia from October 2017 to March 2018, as well as government of Ethiopia's public statements and documents, including statements at international negotiations.

3 | ETHIOPIAN PGRFA AND ITS GOVERNANCE

3.1 | Ethiopia's relationship to PGRFA and binding international agreements

Ethiopia is a high biodiversity country (FDRE, 2012a),[4] and PGRFA form the basis of its economy and food security. Economically, Ethiopia's exports are almost entirely agricultural commodities based on PGRFA, with coffee, oilseeds, and pulses being the largest foreign exchange earners (Taffesse, Dorosh, & Gemessa, 2012; Wale & Mburu, 2006). The country's farming sector is dominated by smallholder subsistence farming (Mellor, 2014), and depends on a considerable proportion of seed inputs that are derived from locally accessible planting materials (Bishaw, Sahlu, & Simane, 2008; Sahlu, Simane, & Bishaw, 2008; Spielman & Mekonnen, 2018). PGRFA have been important for improving agricultural productivity and farm-level resilience to agricultural production shocks, especially for farmers facing highly variable production conditions (Cavatassi, Lipper, & Hopkins, 2006; Di Falco &

[4]FDRE in this paper stands for Federal Democratic Republic of Ethiopia.

Chavas, 2009; Di Falco, Bezabih, & Yesuf, 2010; Di Falco, Chavas, & Smale, 2007; Lipper, Cavatassi, & Winters, 2005; Zander & Gemessa, 2011).

Ethiopia has strong public agricultural research and development institutions, including the national genebank of the Ethiopian Biodiversity Institute (EBI). As of June 2019, EBI holds 86,599 accessions, of which 79,354 are conserved as base/active collections under cold storage, and the remaining 7,245 are maintained in field genebanks,[5] including 5,644 accessions of coffee germplasm conserved in two agroecological areas (FDRE, 2012a). Internationally, PGRFA originating from Ethiopia is recognized as an important reservoir for crop improvement, and international conservation institutions have prioritized the country for extensive germplasm collections and conservation (Asfaw, 1999; Engels, Hawkes, & Worede, 1991; Sylvain, 1958). In the 446 genebanks reporting their holdings through the GENESYS database, there are 60,110 accessions of different crop species collected from Ethiopia and conserved in CGIAR and other national genebanks worldwide (Figure 1). There is some duplication between what is held in EBI and in the other genebanks reported in Figure 1; but since EBI does not publish its data through GENESYS, the degree of overlap is unknown.[6]

PGRFA is a resource that is kept high on the political agenda of the government of Ethiopia (FDRE, 1997a, 1998a, 2012a, 2014). Table 1 and Figure 2 provide an overview of central policies and developments in Ethiopia relating to PGRFA. The country has ratified binding international agreements related to the conservation, sustainable use, access to and benefit sharing from use of PGRFA, including the CBD in 1994 (FDRE, 1994), the ITPGRFA in 2003 (FDRE, 2003), and the Nagoya protocol on Access and Benefit-sharing in 2012 (FDRE, 2012b). Ethiopia has taken a keen interest in the global negotiations of these agreements (Gebre Egziabher, Matos, & Mwila, 2011; Richerzhagen, 2013; Yifru, 2003; Zerbe, 2007), and played a leadership role within the African Group, as illustrated by the following statement of Ethiopia's former chief negotiator for CBD and ITPGRFA, Dr. Tewolde B. Egziabher:

> *The intimacy of African [Ethiopian] delegations with the agricultural systems of the smallholder farmers enabled the African Group to have a marked impact on the negotiations of the ITPGRFA in spite of Africa's financial poverty which could have limited our chances of having preparatory meetings (Gebre Egziabher et al., 2011).*

It was with this knowledge of smallholder farming that the African environmental negotiators of Agenda 21 entered the international negotiations (Frison, López, & Esquinas-Alcazar, 2011, p. xvi). Ethiopia influenced the African Group's position during the negotiation (Zerbe, 2005), and through the process that led to development of the African Model Law,[7] a sui generis IPR model law adopted by the African Union (OAU, 2000). This process has been instrumental to promulgate the Ethiopian position on PGRFA in Africa (Zerbe, 2005).

Historical records of Ethiopia's participation in international negotiations show that debates related to PGRFA governance have focused on IPRs that restrict farmers' access to PGRs, and possibilities of increasing benefit sharing from commercial actors to farmers and communities (Gebre Egziabher et al., 2011; Zerbe, 2005, 2007). Concern over IPRs potential negative effects on farmers' rights is one of the main reasons that Ethiopia is not party to UPOV. However, the country has recently initiated a national process to become member of the World Trade Organization (WTO) and accede to its Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement.

[5]Official data from the EBI, per June 2019.

[6]Our historical analysis indicates that germplasm collected before the establishment of the Ethiopian genebank (PGRC/E) in 1976 and conserved in national genebanks outside Ethiopia may not exist at EBI except in the case of repatriation. However, Ethiopian germplasm conserved in CGIAR genebanks can be duplicates due to collaboration that has existed between Ethiopia and IBPGRI/CGIAR since the establishment of PGRC/E.

[7]The African Model Law for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources adopted by the African Union was first drafted by Dr. Tewolde B. Gebre Egziabher, the chief negotiator on international environmental agreements for Ethiopia in the 1990s and early 2000s. He led the African Group during negotiations that lead to adoption of CBD and the revision of the International Undertaking on Plant Genetic Resources that culminated with the adoption of ITPGRFA in 2001.

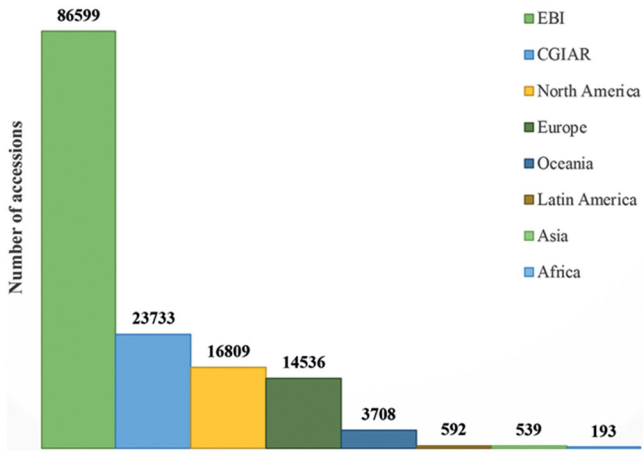

FIGURE 1 Overview of Ethiopian PGRFA conserved in genebanks worldwide. The accessions represent a wide range of taxa that were collected and conserved in the national genebank at EBI from 1976 to 2019 (*N* = 86,599). They also represent accessions distributed to CGIAR genebanks and national genebanks around the world for long-term conservation and use until early 1990 (*N* = 60,110). *Source:* EBI for accessions conserved in Ethiopian genebank and GENESYS online database for accessions conserved outside Ethiopia (GCDT, 2019). CGIAR, Consultative Group on International Agricultural Research; EBI, Ethiopian Biodiversity Institute; PGRFA, plant genetic resources for food and agriculture [Color figure can be viewed at wileyonlinelibrary.com]

3.2 | National access legislations: Toward an hyperownership approach

As shown in Table 1, the debate surrounding IPRs has been central to the development of national policies and legislations in Ethiopia. We see an early convergence between Ethiopia's active participation in international environmental negotiations that led to the adoption of the CBD and the ITPGRFA, and national policy development processes for PGRFA governance. Already in the early 1990s, Ethiopia started to include additional clauses in policies and laws related to PGRFA, such as the National Seed Industry Policy and the proclamation to provide for the establishment of the National Seed Industry Agency (FDRE, 1992, 1993b). Similar provisions were included in the draft bill for the establishment of the National Biodiversity Board to invoke restrictions on exports of PGRs (Rosendal, 2000, p. 241). At the time, these inclusions were a matter of urgency to control export of germplasm until the legislative issued laws for the ratification of the CBD, regulation of access, and establishment of a competent authority on biodiversity matters. In so doing, Ethiopia became one of the first countries to issue restrictive access policies and start moving toward state ownership of PGRFA (Lewis-Lettington, 2008a), contributing to the international trend in the early 1990s of restricting the global commons (Byerlee & Dubin, 2010).

During this period, Ethiopia underwent a regime shift from socialism to federal democratic state, and a new constitution was introduced (FDRE, 1995b). The constitution declared that the ownership of natural resources resides with the state and the people, to maintain coherence with the international guiding principles of states' sovereign rights to control the access to biological material under their jurisdiction. The government also made a decision to upgrade the Plant Genetic Resource Center/Ethiopia (PGRC/E) or the national genebank to the Institute of Biodiversity Conservation and Research (IBCR)—hereinafter EBI[8]—as "an autonomous body" of the Federal Government on biodiversity matters (FDRE, 1998b). The environmental policy (FDRE, 1997a) and national

[8]The institutional rearrangement and coordination has changed since the creation of PGRC/E and the center assumed different names: Institute of Biodiversity Conservation and Research (IBCR) in 1998, Institute of Biodiversity Conservation (IBC) when the government removed its research mandate in 2004 and EBI in 2015. The answerability of EBI has also changed from Ethiopian Agricultural Research Organization in 1998 to Ministry of Agriculture and Rural Development in 2004 to Ministry of Environment, Forest and Climate Change in 2015 and to the Environment, Forest and Climate Change Commission under the Office of the Prime Minister in October 2018.

TABLE 1 Overview of goals, targets, and positions relating to PGFRA governance in Ethiopia's national policies and laws

Policy framework	Global commons perspective	National ownership perspective
National Seed Industry Policy (FDRE, 1992)	• Encourages the participation of farmers in germplasm conservation, seed production, and distribution • Aims to ensure the collection, conservation, evaluation, and use of PGRs by national research and development programs	• Affirms farmers' rights to share benefits arising from the use of local varieties they have developed over generations
A National Seed Industry Agency Establishment Proclamation (FDRE, 1993b)		• The Agency was mandated to "issue regulations and procedures regarding import and export of seeds; and prepare a list of non-restricted and restricted crops, varieties and hybrids for use of foreign seed companies and joint ventures."[a]
Draft bill for the establishment of National Biodiversity Board (FDRE, 1993a)		• "No plant genetic resources shall leave the country without permission, either in the form of licensing, or contract" (Rosendal, 2000, p. 241)
The Constitution of the Federal Democratic Republic of Ethiopia (FDRE, 1995b)	• Asserts the importance of peoples' rights to full participation in the planning and implementation of environmental policies and development plans • Stipulates law enactment for the conservation and sustainable utilization of natural resources for healthy ecosystem and the wellbeing of the people	• Establishes that the ownership of natural resources lies with the state and the people of Ethiopia • Stipulates the deployment of these resources for the benefit and development of the people
Environmental Policy of Ethiopia (FDRE, 1997a)	• Ensures community participation and use of their traditional methods and knowledge to promote in situ systems as the primary target for conservation and sustainable use of wild and domesticated biological diversity; also promotes ex situ systems	• Ensures that the import, export, and exchange of genetic resources is subject to legislation, for example, to ensure the safeguarding of community and national interests, the fulfilling of international obligations (CBD) and national plant quarantine regulation
Patent law—Inventions, Minor Inventions and Industrial Designs (FDRE, 1997b)	• Prohibits the exclusive appropriation of any life form or patentability of "plant varieties" and "essential biological processes" for the production of plants	
National Policy on Biodiversity Conservation and Research (FDRE, 1998a)	• Asserts the importance of community participation to ensure that Ethiopia's biological resources are conserved, developed,	• Asserts national sovereignty over genetic resources and develops mechanisms (ABS, biosafety, plant breeders' and

(Continues)

TABLE 1 (Continued)

Policy framework	Global commons perspective	National ownership perspective
	managed, and sustainably utilized for the country's overall socioeconomic development	farmers' rights regulations) to ensure the effective control of the movement and management of genetic resources • Supports the implementation of international conventions (CBD), agreements and obligations on biodiversity to which Ethiopia is a party based on national legislation • Ensures that local farming communities share the benefits that accrue from the use of indigenous germplasm
National Biodiversity Strategy and Action Plan (IBC, 2005)	• Ensures the conservation and sustainable utilization of Ethiopia's biodiversity and ecosystems for improving food security and alleviating poverty	• Asserts national sovereignty over genetic resources and establishes targets to develop laws and regulations to control access to genetic resources and ensure equitable benefit-sharing
Access to Genetic Resources and Community Knowledge, and Community Rights (FDRE, 2006a) and Council of Ministers Regulation (FDRE, 2009)	• Intends to facilitate farmers' and communities' access to ex situ and in situ/on-farm PGRFA • Provides a special access permit for the same resources (for noncommercial purpose) for national public research institutions and intergovernmental institutions based in Ethiopia to enhance research and development of the country	• Establishes that the ownership of genetic resources lies with the state and that the ownership of community knowledge lies with those communities • Asserts that access to PGRFA is subject to (a) prior informed consent of the competent authority (EBI); (b) benefit sharing agreement; and, (c) for international users, a letter from the competent authority of the applicant's domicile assuring that it shall uphold and enforce the access obligations[b]
The second Growth and Transformation Plan/GTP II (FDRE, 2016)	• Ensures community participation to increase conservation and sustainable use of biodiversity	• Aims to increase access and benefit sharing licenses to meet food security goals and economic growth
National Biodiversity Action Plan (EBI, 2015)	• Sets target to increase by 35% access to potential genetic materials for research and development or for noncommercial purpose	• Sets target to increase by 39% access to potential genetic materials for access and equitable benefit sharing or for commercial purpose
Plant Breeders' Rights Proclamation (FDRE, 2006b, 2017)[c]	• Recognizes the enormous contribution of smallholder farmer and pastoral communities in conserving PGRFA, and provides them the right to save, use, exchange, and sell farm-saved seed	• Gives plant breeders the right to protect new plant varieties, and exclusive rights to produce for market and/or sell the protected seed or the propagating material of the protected variety

(Continues)

TABLE 1 (Continued)

Policy framework	Global commons perspective	National ownership perspective
	of any variety (including protected varieties) at noncommercial scale	
Draft National seed policy (MoA, 2019a)[d]	• Ensures conservation and sustainable use of PGRFA, promotes diverse seed systems, protects community knowledge and farmers' and pastoralists' rights in agreement with international agreements • Require participation of farmers and pastoralists in the identification, registration, conservation, and sustainable utilization of traditional varieties as well as development of new plant varieties	• Asserts national sovereignty over genetic resources and stresses the need to ensure benefit sharing from these resources for the stewards • Aims to establish a traceability mechanism for identification of PGRFA used in new plant varieties that plant breeders wish to protect

Abbreviation: ABS, Access and Benefit Sharing; CBD, Convention on Biological Diversity; EBI, Ethiopian Biodiversity Institute; PGR, Plant Genetic Resource; PGRFA, Plant Genetic Resources for Food and Agriculture.
[a]The proclamation was enacted mainly to promote implementation of National Seed Policy objectives. But an additional clause was included as a matter of urgency to control export of germplasm until the Access law was enacted.
[b]The access obligations include disclosure of the origin of the genetic resource and/or community knowledge used for developing commercial products in cases of application for commercial property protection and sharing of the benefits derived from the commercial product.
[c]Revised in 2017 to conform with WTO's TRIPS agreement.
[d]Revised in 2019 to accommodate policies and regulations adopted during the last two decades.

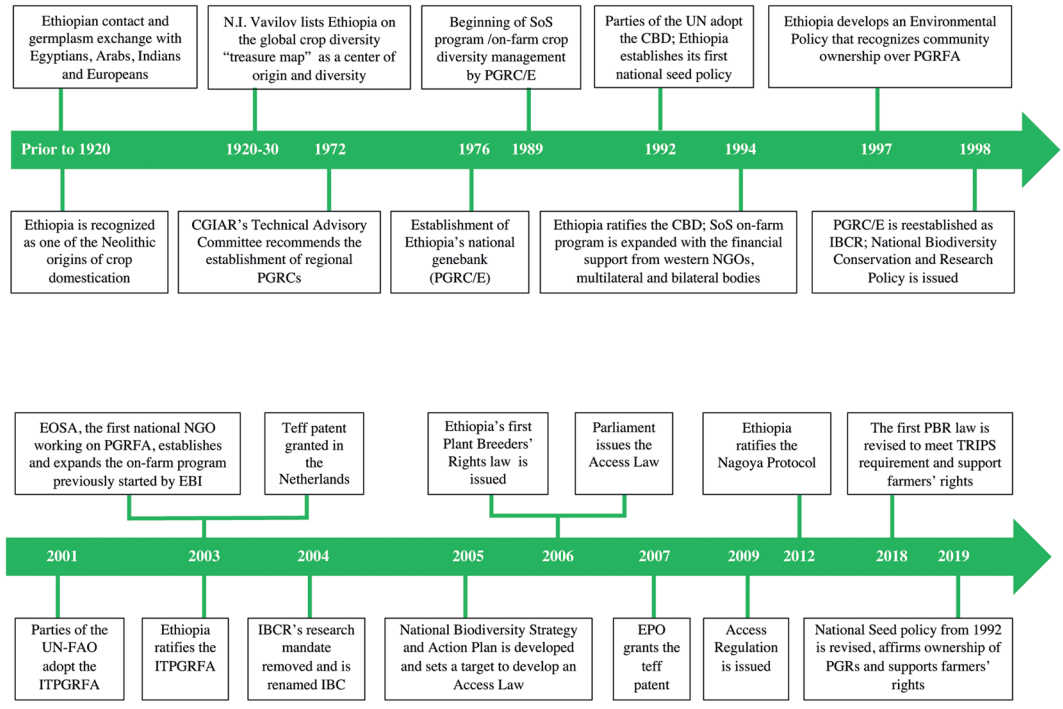

FIGURE 2 Timeline of major historical landmarks of the plant genetic resources movement in Ethiopia [Color figure can be viewed at wileyonlinelibrary.com]

biodiversity conservation and research policy (FDRE, 1998a) were the first formal documents to clearly assert national sovereignty over genetic resources within the country's jurisdiction. These policies outlined the need to promulgate necessary legislations and regulations on ABS, biosafety, and plant breeders', farmers', and community rights. Later in 2005, the national biodiversity strategy and action plan (IBC, 2005) established clear targets for creating these laws and regulations. This led to the implementation of two access legislations: the Proclamation to provide for Access to Genetic Resources and Community Knowledge, and Community Rights—hereinafter the Access Law (FDRE, 2006a)—and the Council of ministers Regulation on Access to Genetic Resources and Community Knowledge, and Community Rights—hereinafter the Access Regulation (FDRE, 2009).

According to the access legislations, EBI is mandated to issue permits for export and import of genetic resources, to develop directives and guidelines on ABS (e.g., IBC, 2012b), to promote high-value genetic resources for benefit sharing and to advise the government (FDRE, 2004). To implement this, EBI created a new directorate for genetic resource ABS in addition to four other directorates for conservation and sustainable use (crop and horticulture, forest, animal, and microbial). The access laws are designed based on the African Model Law (Ekpere, 2000; OAU, 2000) and the Bonn Guidelines on ABS (CBD, 2002) that were developed to assist parties, governments, and other stakeholders to commit to the triple objective of conservation, sustainable use, and fair and equitable sharing of benefits deriving from the use of genetic resources. Ethiopian policy makers and technocrats consider that the Nagoya Protocol on ABS, which Ethiopia ratified 6 years later after its access law was issued (FDRE, 2012b), is in harmony with the ABS objective of MLS under the ITPGRFA. As the statement below shows, they believe that these laws are key to regulate access and export of germplasm out of Ethiopia and ensure equitable benefit sharing for its people:

> *We developed our Access Law before the Nagoya Protocol was adopted and fortunately, the Protocol was very much in line with our access law. The MLS under the ITPGRFA has no problem in principle. We think the Nagoya Protocol is fairer than the MLS of the ITPGRFA, and we prefer to use it for genetic resource transfer.*[9]

Ethiopian access legislations are unique in Africa in that they aim to harmonize access regulation and implementation of breeders', farmers', and community rights by combining elements of the CBD and ITPGRFA. Lewis-Lettington (2008a) has argued that the legislations are biased toward the implementation of the CBD, but that they also include provisions aimed to simultaneously implement the MLS of the ITPGRFA. We agree with this argument. For example, PGRFA users can opt either for the Standard Material Transfer Agreement (SMTA) of the Treaty or for the Material Transfer Agreement (MTA) of the Nagoya protocol. However, the operation is different. Through the legislations, Ethiopia recognizes the importance of access to PGRFA; however, Ethiopia's main priority is to maximize benefits from germplasm export using ABS agreements. According to Gebre Egziabher et al. (2011):

> *Most African countries [including Ethiopia] do not consider access to PGRFA as a major benefit of the MLS mainly due to their limited financial and/or technological capacity to utilize PGRFA, both conserved in their own genebanks and those they could access from other countries.*

As a result, Ethiopia rarely uses SMTA of the MLS of the ITPGRFA for authorizing access to PGRFA, as explained by our informant at EBI:

> *At EBI, we use both SMTA and MTA for genetic resource transfer and ABS. However, most of the agreements, especially ABS agreements for commercial purposes, are signed using MTA of the Nagoya*

[9]Personal interview with a government official of the EBI (Addis Ababa, January 24, 2018).

protocol. Very few agreements are made using SMTA, and it is mostly for germplasm transfer for breeding, education and training purposes.[10]

In practice, the preferred option are bilateral ABS agreements as provided for by the Nagoya Protocol, since these are made directly with commercial actors and allow the government to obtain monetary benefits that can be used to strengthen the national capacity for ex situ conservation and on-farm management of PGRFA.[11] This is because the MLS de-links the germplasm provider country and its PGRFA stewards from direct benefit sharing from a commercial actor. Furthermore, the appropriateness of a competitive project proposal approach to meet challenges related to distributional equity have been the subject of debate in the past few years (Louafi, 2013). This constitutes one of the design problems identified by Halewood et al. (2013a), which we discuss later in this paper.

The outstanding question surrounding this strategy lies in how Ethiopia can create a market for its genetic resources and implement benefit sharing (especially monetary benefit sharing) from use of these resources. We turn to this question in the next section, distinguishing between access for national users of Ethiopia's PGRFA (i.e., Ethiopian local communities, national public research institutions, intergovernmental institutions, companies, and other users based in Ethiopia) and access for international (nonresident) users.

3.3 | A PGRFA access paradox?

The Access Law grants exemption from obtaining permits for customary PGRFA use by and among Ethiopian local communities (FDRE, 2006a, Article 4). This exemption is meant to facilitate farmers' access to ex situ collections conserved at the national genebank and strengthen the link between the genebank and on-farm management of crop diversity by farmers,[12] an approach that has existed in Ethiopia since before the enactment of the access legislations (Westengen, Skarbø, Teshome & Berg, 2018; Worede, 1998). In addition, national public research institutions, including universities and intergovernmental institutions based in Ethiopia, get a special access permit (not exemption) for facilitated access to PGRFA to enhance research and development of the country, that is, for the noncommercial purpose (Article 15). However, they are required to ensure participation of relevant local institutions as a precondition for access.[13] Two key informants describe the rationale for giving facilitated access for local PGRFA users as follows:

The most precious resource we have is genetic resources. We believe that Ethiopia has unique genetic resources, although our knowledge of them is incomplete, and we have not used all of them meaningfully for the country's development—socially and economically. These resources are the basis of all our economic relations, in particular coffee, beans and oilseeds are a few important export crops to mention. Therefore, we believe that we need to maximize use of these important resources locally and manage them carefully.[14,15]

Facilitated access for local PGRFA users is an effort to implement national targets for food security and economic growth as outlined in the country's growth and transformation plan (FDRE, 2016). As a result, the enactment of the Access Law maintains the same access to PGRFA for national users as before, except adding

[10]Personal interview with a government official of the EBI (Addis Ababa, January 24, 2018).

[11]Personal interview with a government official of the EBI (Addis Ababa, January 24, 2018).

[12]Personal interview with a government official of the EBI (Addis Ababa, January 24, 2018).

[13]Personal interview with a government official of the EBI (Addis Ababa, January 24, 2018).

[14]Personal interview with a government official of the Ministry of Environment, Forest and Climate Change (Addis Ababa, January 15, 2018).

[15]Personal interview with a government official of the Ministry of Environment, Forest and Climate Change (Addis Ababa, January 15, 2018).

administrative burden, and, in the case of access for commercial purpose, the requirement to share benefits. The government of Ethiopia also expects that nonmonetary benefits (i.e., knowledge, skill, products and technologies, equipment, and infrastructure) will increase due to the requirement for intergovernmental institutions and companies based in Ethiopia to ensure participation of local institutions in their research (Article 19).

For international PGRFA users, the access legislations stipulate several conditions, which make access much more restrictive.[16] First, no international users shall access genetic resources or community knowledge unless in possession of a written access permit granted by EBI based on prior informed consent (FDRE, 2006a, Article 11). Second, to obtain the access permit, international users "must present a letter from the competent authority of (their) national states or that of (their) domicile assuring that it shall uphold and enforce the access obligations of the applicant." The intention is to transfer the responsibility for implementing specific ABS agreements made with international users to the authority in the applicant's own country (Article 12.4). For instance, in cases of change in use of genetic resources (e.g., from research to commercial purpose, requiring IPR protection), the applicant's country is expected to ensure the applicant's compliance with Prior Informed Consent and Mutually Agreed Terms of the provider country, and share benefits with the donor country based on the MTA (Nijar, 2011, p. 24). Third, after the permit is granted, international users must be accompanied by personnel from EBI or another relevant Ethiopian institution during exploration and collection of PGRFA and associated traditional knowledge (FDRE, 2006a, Article 12). In addition, local communities, regional administration units at different levels, postal service institutions, quarantine control institutions, and customs officers bear specific responsibilities to control access based on the permit provided by EBI (FDRE, 2006a, Article 28–30). While this surveillance can be viewed as distrust toward international PGRFA users, EBI argues that it is an effort to implement the obligation to ensure Prior Informed Consent with the local communities.[17] The final condition that makes access to Ethiopian materials stringent is the rigorous penalty for infractions, which ranges from 3 months to 12 years of imprisonment or a fine of 5,000 to 100,000 ETB,[18] depending on the type of genetic resources involved (e.g., endemic or nonendemic) and the "circumstance and the gravity of the offence" (FDRE, 2006a, Article 35).

One top government official explains Ethiopia's restrictive policy measures concerning access for international PGRFA users as a reaction to shortfalls in transparency, trust and accountability at the international level:

> *Some people overstate Ethiopia's position and blame us for a global challenge we have common responsibility for. The preconditions for users of our germplasm are fulfilment of the requirements specified in our Access Law and the international agreements. We do not understand the basis for some of their accusations. Ethiopia's door has been, and will always be, open for all PGRFA users. However, we follow a precautionary approach. In other words, we need to have awareness and develop trust before we give germplasm to international PGRFA users. Unfortunately, we do not see that western countries are ready for honest, transparent and accountable ABS arrangements. Rather they increase our suspicion from time to time by delaying decisions we need to make about benefit sharing. They do this by denying clear, responsible and accountable commitments in ABS agreements. Our best example is the patent granted by the European Patent Office (EPO) on Ethiopian* teff *in Europe. International agreements can govern us, but not gentlemen's agreements. Western actors often push the international agreements to the side and try to have a gentlemen's agreement. The conditions for the agreements we make on access, and the support we get for conservation of PGRFA, are different. But, they want to link and mix everything in bilateral and other agreements.*[19]

[16]In addition to the Access legislations, EBI developed an access guideline (IBC, 2012b) for detailed information on various procedures for access.

[17]Personal interview with a government official of the Ministry of Environment, Forest and Climate Change (Addis Ababa, January 15, 2018).

[18]At the time of writing, 1USD = 28.5 ETB.

[19]Personal interview with a government official of the Ministry of Environment, Forest and Climate Change (Addis Ababa, January 15, 2018).

EBI officials indicated to us that between 1976 and 2018, a total of 200,234 accessions of different crop species were distributed to international (20%) and national (80%) PGRFA users for crop improvement programs and research purposes. However, we could not obtain more detailed information about germplasm distribution from EBI to examine whether access to Ethiopian germplasm by different users changed following the enactment of the Access Law in 2006.

We see that Ethiopia, like many other countries in the Global South, holds deep distrust toward the current systems. This is due to past experience of extremely divergent views between the Global North and South during negotiation on farmers' rights and ABS at the international level (Gebre Egziabher et al., 2011; Gebreselassie, 2009; Joseph, 2010; Tully, 2003; Zerbe, 2007). It is also due to the lessons Ethiopia learned from failed ABS agreements after a Dutch company patented genetic resources of its cultural keystone crop species, *teff* (see Andersen & Winge, 2012; Dalle, 2010). However, this same strategy for restricting access appears to have also limited the monetary benefits gained. Indeed, Ethiopia has not yet received monetary benefit sharing using either SMTA or MTA, which, according to an informant at EBI, may lead to a relaxing of the regulations:

> *At the beginning, everybody thought there would be many companies that could be interested in our PGRFA. In the past years, we have signed a few ABS agreements with local companies who shared monetary benefits with local communities for accessing wild plant genetic resources for industrial application. There has been no monetary benefit from PGRFA. Because of this, an internal process started in September 2018 to revise the Biodiversity Policy and the Access Law. There will be many changes. One of the major changes will be to remove the requirement for a letter from international users' competent authority of (their) national states for granting access permits.*[20]

3.4 | Balancing plant breeders' rights and farmers' rights: Complementarity for the new commons

We have shown that the Ethiopian access legislations have imposed increasing restrictions for international users' access to PGRFA, while national users' access has remained largely unchanged. At a national level, Ethiopia also does well in terms of protecting the rights of farmers, through two legislations that deal with IPRs. The first is the Inventions, Minor Inventions and Industrial Designs proclamation of Ethiopia—hereinafter the patent law (FDRE, 1995a). This law prohibits patentability of "plant varieties" and "essentially biological processes" for the production of plants (Chapter 2, Article 4.1b). The Ethiopian government position is clear in that patenting lifeforms is prohibited, and the lack of patent application confirms this position.[21]

The second law, issued by the government in 2006, is the Plant Breeders' Rights Proclamation—hereinafter the PBR law (FDRE, 2006b). This law was revised in 2017 (FDRE, 2017) to better harmonize with the TRIPS requirement for "effective" sui generis[22] IPRs protection of plant varieties due to the country's plan to accede to the WTO.[23] These laws and other legal frameworks related to PGRFA access were reiterated in the government seed system development strategy (MoA & ATA, 2013) and harmonized in a recent draft seed policy documents (MoA, 2019a). In general, the purpose of the PBR law is twofold. Primarily, it aims to encourage breeding of new varieties of plants and to attract the private sector, as a complement to the dominant public research and parastatal

[20]Skype interview with a government official of the EBI (May 1, 2019).

[21]Personal interview with a government official of the EBI (Addis Ababa, January 24, 2018).

[22]The TRIPS agreement of the WTO permit member countries to refrain from stringent plant variety protection laws, namely patent and adopt an effective sui generis system of protection. Known literally as "its own kind" or "unique," a sui generis system is an IPR system that is enforceable, nondiscriminatory with respect to the country of origin of the applicant and granting protection of new plant varieties (Repetto & Cavalcanti, 2000).

[23]Personal interview with a government official of the Ministry of Agriculture (MoA; Addis Ababa, February 1, 2018).

seed companies, particularly for the emerging flower and horticulture industry (Alemu & Ayele, 2018; Beko, Hospes, & de Jonge, 2016). In addition, it aims "to maintain the centuries old customary knowledge and practice of saving, using and exchanging seed by farmers (…) to conserve agrobiodiversity (…) for future use to develop new plant varieties [while] side by side promoting plant breeders' rights" (FDRE, 2017: Preamble; Lewis-Lettington, 2008b). Similar to the Access Law, Ethiopia's PBR law was developed based on the African model law (Ekpere, 2001), designed to put a check on expansive PBRs and to ensure rights of communities, farmers, breeders, and access to biological resources and benefit sharing. As sui generis rights (Louwaars, 1998), the new PBR law (FDRE, 2017) recognizes farmers' rights to noncommercial use of protected varieties. Smallholder farmers, whose livelihoods depend predominantly on agriculture, use family labor, and own 10 ha of land or less "shall have the right to save, use, exchange and sell farm-saved seed of any variety on the non-commercial marketing" (Article 2.13 and 7.1). In addition, "any farmer shall have the right to save and use farm-saved seed of any variety of food crops and other species that directly [supports] his/(her) livelihoods" (Article 7.1 and 7.2). Moreover, breeders' exemptions allow the use of protected varieties for further breeding, research, and educational purpose (Article 6.2 and 6.3). From this point of view, we do not find the Ethiopian PBR law is "inhibitive and a failed instrument in providing sufficient guarantee for farmers' rights" as argued in recent studies (Gobena & Rao, 2019a, 2019b).

Unlike many individual African countries and the African Intellectual Property Organization with its 17 members, the government of Ethiopia has no plan to join UPOV and adopt its 1991 act,[24] which provides expansive plant breeders' rights. As one top government official phrases it, this position is due to national socioeconomic priorities:

> *Ethiopia is interested to accede to WTO, not UPOV. It is very clear that UPOV stands for the private sector interests (…) it is a Union for plant breeders and seed industry, and it suits multinationals and developed countries. However, WTO is the main body for global trade rules between all nations. Therefore, we are interested in domesticating WTO's TRIPS, as it requires a system of "effective" sui generis for plant variety protection. TRIPS is flexible, and it suits our needs to support public seed sector and national small and medium private companies. We are aware that our export market can expand for some products if we become a UPOV member. However, we have more pressing priorities than just market in limited plant products. In fact, we used UPOV's tools for developing our PBR law where it suited our situation. But not all of it. UPOV does not support the idea of giving full rights to farmers to use all seeds. This is contrary to our biodiversity policy, seed policy, seed sector strategies, plans and PBR law. Joining UPOV 91 means putting millions of Ethiopian smallholder farmers' livelihoods and the country's food security in jeopardy. So, we have a problem with UPOV, and it is improper for Ethiopia's situation.*[25]

The Ethiopian patent and PBR laws tend to support the new commons approach by prohibiting patent on lifeforms and making protected varieties accessible for smallholder farmers instead of the stringent ownership trend through IPRs. The legislations also conceptualize farmers' rights as an important protection for smallholder agricultural production and food security. Indeed, the government is committed to implement farmers' rights (Feyissa, 2006) and its policy of pluralistic seed system that aims to ensure complementarity of formal and farmers' seed systems (MoA and ATA, 2013; Otieno et al., 2017). This makes Ethiopia exceptional with regard to a global survey recently conducted by the ITPGRFA Secretariat that concluded that the conflict between national and international policies (e.g., MTAs, IPRs, and Farmers' Rights) is one of the major bottlenecks in the Treaty's MLS (Kell, Marino, & Maxted, 2017). Ethiopia's effort to create synergy between its Access Law and PBRs Law is, thus, an attempt to resolve this conflict, which has been created by overlapping international policies. For instance, the

[24]The 1991 act is the only UPOV act open for new membership and the older version of the UPOV acts are not open for new countries who want to join the Union.

[25]Personal interview with a government official of the MoA (Addis Ababa, February 1, 2018).

World Intellectual Property Organization's (WIPO) patent system has been unwilling to include ABS mechanisms under the MLS of ITPGRFA and the CBD, nor has it found other ways to actively approach the interface between commercial use of PGRFA and ABS (Andersen et al., 2010). Similarly, the UPOV system has not taken clear measures to put in place obligations on users of PGRFA. In 2013, the Governing Body of the ITPGRFA (through the Treaty's Secretary) requested UPOV and WIPO to jointly identify possible areas of interrelations among their respective international instruments (FAO, 2013b). Since then, negotiations and consultation have been on-going without results (Medaglia, Oguamanam, Rukundo, & Perron-Welch, 2019). As a result, countries like Ethiopia have attempted to resolve conflicts between national and international policy by developing national IPR protection systems that require disclosure of origin or legal provenance of source material for IPR applications.

4 | HISTORICAL, POLITICAL, AND ECONOMIC FACTORS INFLUENCING PGRFA ACCESS GOVERNANCE IN ETHIOPIA

We have seen that from the early 1990s until the present, Ethiopia decided to go against the grain by establishing restrictive access policies and a sui generis PBR law. In this section, we explore the historical, political, and economic factors that have influenced Ethiopia's governance of access to PGRFA. We identify three main factors that underlie this position: the influence of narratives about Ethiopia as a biodiversity treasure trove on the Ethiopian cultural identity; the economic importance of agriculture in general and of agriculture based on genetic resources with origin in Ethiopia in particular and; the emergence of an alternative on-farm PGRFA movement and its influence on policies relating to IPR and access.

4.1 | From Vavilov to self-awareness as a biodiverse country

Since the first foreign plant explorers arrived in Ethiopia in the 16th century, many historians and archeologists have identified Ethiopia as one of the Neolithic centers of crop domestication (Engels & Hawkes, 1991). Evidence drawn from archeology, biogeography, genetics, linguistics, cultural anthropology, and other contemporary social science studies of seed use confirm ancient cultivation of crops originating in Ethiopia (Boardman, 1999; D'Andrea, Lyons, Haile, & Butler, 1999; Diamond, 1999; Ehret, 1979; Finneran, 2007; Harlan, 1969; Harris, 1967; Harrower, McCorriston, & D'Andrea, 2010; Lyons & D'andrea, 2003; McCann, 1995; Munson, Harlan, De Wet, & Stemler, 1980; Simoons, 1965; Zohary, Hopf, & Weiss, 2012). Ethiopia's place on the global crop diversity "treasure map" was solidified by the contributions of Russian plant breeder N. I. Vavilov, who collected over 50,000 seed samples of different crop species in 50 expeditions throughout Africa, the Americas, Asia, Europe, and Mediterranean area (Pistorius, 1997). He visited "Abyssinia" (current Ethiopia) in 1926 and encountered a uniquely high plant diversity and considered the country as one of the centers of origin and diversity for several food crops (Vavilov 1926). Domesticated crops for which Ethiopia is best known as a center of origin include anchote (*Coccinia abyssinica*), arabica coffee or buna (*Coffea arabica*), Enset (*Ensete ventricosum*), teff (*Eragrostis tef*), niger seed or noug (*Guizotia abyssinica*), and gesho (*Rhamnus prinoides*) (Altieri & Koohafkan, 2017, pp. 2–3; D'Andrea, 2008; Diriba, 2018, pp. 83–86; Edwards, 1991; Ehret, 1979).

Later, other scholars revisited Vavilov's concept of center of origin and they confirmed that Ethiopia is the center of origin for the above crops while being the center of diversity for crops that originated elsewhere (Harlan, 1971, 1998; Hawkes, 1998). The latter include barley, emmer wheat, sorghum, finger millet, faba bean, linseed, sesame, safflower, chickpea, lentil, cowpea, flaxseeds, grass pea, and fenugreek (Abdi, 2011; Engels & Hawkes, 1991; Frankel, Brown, & Burdon, 1995, p. 58–59; Harlan, 1969, 1975b, p. 36; Ladizinsky, 2012; von Wettberg et al., 2018; WCMC, 1992; Zohary, 1970). For barley and emmer wheat, the diversity in Ethiopia was considered to be

higher than in their centers of origin (Engels, 1991; Harlan, 1971). Likewise, Ethiopia shelters important gene pools of crop wild relatives for many species, including cereals, pulses, oilseeds, vegetables, tubers, fruits, spices, stimulants, and fibers species (EBI, 2015, pp.16–21; Edwards, 1991; von Wettberg et al., 2018). Although very few cereals originated in Africa, half of the continent's contribution to global cereal crop species diversity (i.e., large-seeded grass) comes from Ethiopia (Diamond, 1999, p. 126; McCann, 2011).

Western visitors often described the genetic diversity of crops in Ethiopia as enormous, unique, unusual, incredible, and amazing treasures of nature (Harlan, 1969; Hummer, 2015; Nabhan, 2009, pp. 93–112). Today, this romantic image of Ethiopia's genetic resources makes an introductory paragraph in official statements, news articles (The Economist, 1998), scholarly literature (Knowles, 1969; Samberg, Shennan, & Zavaleta, 2013), political ideology books (Ahmed, 2019, p. 209), and country reports to the secretariats of the CBD and ITPGRFA (EBI, 2015; IBC, 2012a). This has created curiosity for many crop diversity enthusiasts and commercial actors. For instance, Harlan (1969) cites a narrative paragraph from the description given by N. I. Vavilov after his expedition to Ethiopia:

> *On the whole terrestrial globe, the Abyssinian Centre is distinguished by its diversity of forms of hulled barley, violet-grained wheat, original races of peas, peculiar races of oats and by a series of cultivated endemic plants (…) Ethiopia is primarily a land of field crops (…) which exist in amazing diversity of varieties.*

Visitors' often sentimental expressions about Ethiopia's crop diversity mirror what Tibebu (1996) asserts as a Western image of Ethiopia's isolation, where varied geography[26] is cited to explain why Ethiopia is an unconquered land of millennial independence and civilization (Milkias & Metaferia, 2005). Specifically, Ethiopia's endowment of rich genetic diversity is frequently related with the early civilization of its people, which resided in several isolated places and started crop domestication (Crummey, 1983; D'Andrea, 2008; Jaenen, 1958; Velissariou, 1954; WCMC, 1992).

Outsiders' testimonials of the uniqueness of Ethiopia's plant diversity and the country's ancient history and independence (Milkias & Metaferia, 2005; Rubenson, 1978; Tibebu, 1996) often establish the background for Ethiopians' own discussions and scientific writings related to PGRFA. Indeed, these testimonials have been key for the country's genetic resource scientists, technocrats, and politicians to become aware of the global importance of their country's germplasm (Dubale & Teketay, 2000; Engels & Hawkes, 1991; Gebrekidan, 1973; Harlan, 1969). For instance, Ethiopians commonly express pride over their seed heritage by citing the example of how the yellow dwarf virus resistant barley from Ethiopia was crossed with a Californian cultivar and saved Californian farmers $160 million per year (Hammer & Teklu, 2008; Montenegro de Wit, 2016; Nabhan, 2009).

This self-awareness as a biodiversity-rich country is a quotidian sentiment among Ethiopians that affects their perception in terms of policies and practices on PGRFA. Dr. Melaku Worede, a renowned geneticist and plant breeder, expressed how this awareness influenced his career in his acceptance speech at the Right Livelihood Award ceremony (Worede, 1989):

> *I started to actively work on PGRs some 23 years ago, the motivation to do so goes back to my Freshman Year in College, some 32 years ago. It started when a visiting Professor, from Oklahoma University, USA, to whom, during delivery of a speech he was giving on Agriculture, I asked why the big, well-developed countries are not giving us their superior varieties of crops so that we produce more in Ethiopia? He answered by telling a story of a crew that was sailing on a sea, out of water supply. In desperate need for water, the crew kept on calling for help with the radio. Being advised to drop the bucket right where they were, the crew was surprised to know what they were sailing on was fresh water – and the answer given to*

[26]Geographical diversity such as inaccessible terrain, rocky plateau, rolling plains, impenetrable high and rugged mountain fortress, deep gorges, valleys, and surrounding deserts.

> *my question was, drop your bucket right where you are. I always kept this important advice in mind in subsequent years as I conducted research, taught genetics and plant breeding and as the director of the national genebank. The Award bestowed upon me is a tremendous support and encouragement to my country and myself (…) with a view to provide in sustainable way useful germplasm to breeding programmes both in Ethiopia and the world community at large.*

In this narrative, we see how an American professor's comment about Ethiopia's immense crop genetic diversity kindled Worede's own self-awareness about the global importance of Ethiopia's genetic resources, an insight that he taught to other Ethiopians, something that many other technocrats and policy experts continue to do to this day.

In 2010, Mr. Sileshi Getahun, state minister of Ethiopia's MoA said the following in his speech at the global consultation meeting on farmers' rights in Addis Ababa (Andersen & Winge, 2010):

> *Ethiopia was named one of the 12 centers of crop diversity in the world by N.I. Vavilov, and the communal use of PGRFA has contributed to the existing diversity of farmers' varieties (…) farmers play a central role in the conservation, sustainable use and diversification of crop varieties. Selection and utilization have been part of the culture for generations, and farmers' varieties have been important sources of material for breeding. But farmers have not benefitted from the commercialization of these resources (…) the government sees the protection of the country's genetic resources is important. Towards this end the government has enacted the Environmental Policy, the National Policy on Biodiversity Conservation and Research, the Plant Breeders' rights and Community Rights to equitably participate in benefit-sharing in its laws and policies.*

In 2013, in an interview with the secretariat of ITPGRFA he said (FAO, 2013a):

> *Many countries are benefiting from barley and other crops from Ethiopia. In the same way, Ethiopia and other African countries are strongly dependent upon crops such as maize and sugarcane that originated from other continents. For our mutual benefit it is, therefore, necessary that we cooperate as good and equal partners in a way that builds trust to manage PGRFA in a sustainable manner.*

Such self-awareness of PGRFA endowment, sovereign ownership over these resources and the principle of sovereign equality of countries is central for Ethiopian actors. These perceptions in turn shape national policies, strategies, and laws as well as Ethiopia's engagement with its international partners. Today, several Ethiopian policies and laws related to seeds and genetic resources are different from other African countries. Very few seed companies operate in seed distribution due to lack of a liberalized seed market policy in Ethiopia (Alemu, 2011b; MoA, 2019b; Scoones & Thompson, 2011). The government has chosen a policy that promotes pluralistic seed systems aiming at implementing farmers' rights and on-farm management of crop diversity (Alemu, 2016; Otieno et al., 2017). Ethiopian negotiators have influenced early regional and international negotiations in favor of national control over own genetic resources, promoting farmers', and community rights (Chasek, McGraw, & Prather, 1996; de Fontaubert, Ivers, Megateli, & Prather, 1997; Fry, Ivers, Megateli, & Prather, 1998; Gebre Egziabher et al., 2011). Thus, for Ethiopians the issue of PGRFA, especially fair and equitable utilization, has always been important in international discussions. Technocrats and policy makers strive for ensuring sovereign ownership rights, and some of them openly confronted great powers in international negotiations (Gebre Egziabher, 2000; GRAIN, 2001). This position has also resulted in changes concerning conservation strategies in Ethiopia. In the next section, we examine how the ex situ conservation focus from the 1960s to early 1980s was associated with a “commons” ownership notion.

4.2 | Countering genetic erosion and supporting conventional plant breeding: The arrival of ex situ conservation

Inspired by Vavilov's work, many expeditions were conducted in Ethiopia to collect local varieties with the intention to find suitable genetic defenses against plant diseases and other desirable quality characteristics in the center of origin and diversity. For instance, a network of scientists in Western Europe (especially the United Kingdom), United States, Australia, and the Soviet Union (USSR) introduced genetic diversity from Ethiopia for their national plant breeding and genetic study in the 1940s and 1950s. According to Sidorov (1960), drought-resistant forms of wheat, barley, finger millet, pearl millet, and sorghum from Ethiopia were recommended for introduction as breeding material in the USSR. In addition, niger seed was introduced as an oil crop in southern USSR based on a study conducted on crop plants of Ethiopia. At the time, an organized group of scientists such as the European Society for Research and Plant Breeding from Europe and scientists from the United States took initiative to establish national plant introduction stations. These stations became not only centers for germplasm exchange in countries of the Global North, but also the basis for building modern genebanks later in the 1960s and 1970s (Pistorius, 1997).

Plant breeding on, and genetic studies of, Ethiopian germplasm was encouraging, in that genes conferring resistance to several plant diseases and many desirable quality characters of economic importance were discovered (Asfaw, 1999; Borrell, 2012; Charrier, 1980; Frankel, 1977; Gebre-Mariam, 1986; Harlan, 1976, 1977; Jørgensen, 1976, 1977; Mekbib, 1986; Mengistu & Gebrekidan, 1980; Negassa, 1985; Qualset, 1975; van der Graaff, 1981). For instance, Harlan (1976) documented genes regulating high lysine and protein contents in Ethiopian barley and sorghum. A comprehensive list of such early research results on several crops from Ethiopia is found in Negassa (1985).

While genetic gains were made from Ethiopian germplasm to develop improved varieties, scientists also recognized the risk of displacement of local genetic diversity by a few improved varieties, and thus predicted the inevitable consequence of genetic erosion as early as 1936. Harlan and Martini (1936, p. 317) wrote: “when new barleys replace those grown by the farmers of Ethiopia or Tibet, the world will have lost something irreplaceable.” Starting in the 1960s, the wider adoption of modern varieties and mono-cropping with new hybrid strains was seen as the biggest threat to genetic diversity and received recognition from the Food and Agriculture Organization of the United Nations (FAO; Fenzi & Bonneuil, 2016; Scarascia-Mugnozza et al., 2002). Alluding to Vavilov's work on the world's centers of origin and genetic diversity, many scientists, including those involved in early exploration and germplasm collection in Ethiopia, expressed the dangers of genetic erosion. At the time, these scientists saw displacement of local varieties by new uniform varieties on an international scale as the biggest threat for global crop diversity (Chedd, 1970; Fowler & Mooney, 1990; Frankel, 1970; Harlan, 1972, 1975a; Miller, 1973; Montenegro de Wit, 2016; Wade, 1974). This concern dominated the 1960s and 1970s discussions among PGR scientists (mainly breeders and geneticists) and they constantly called for the collection and ex situ conservation of significant gene pools in centers of origin and diversity (Fenzi & Bonneuil, 2016). During this period (also today), Ethiopia was seen as the most important center of genetic diversity for durum wheat and barley due to genetic erosion happening in other parts of the world (Edwards, 1991).

This awareness at the international level led to a meeting in Beltsville, Maryland in 1972, where an ad hoc Technical Advisory Committee (TAC) of the CGIAR presented a global plan of action for collection, evaluation, and conservation of PGRs in line with an earlier proposal made by FAO. The TAC also recommended the establishment of a global network of Plant Genetic Resources Centers that would equally involve countries in the Global South and North (Bommer, 1991). Ethiopia was one of the priority countries selected by the TAC to establish such a center for collection, evaluation, and conservation of PGRs in East Africa and adjacent regions. The proposal to support establishment of the PGRC/E—now EBI—was accepted by German bilateral aid in 1976 and an agreement was signed between the Ethiopian Institute of Agricultural Research (EIAR) for the government of Ethiopia and the German Agency for Technical Cooperation (GTZ) for the government of Germany (Engels, 1984). In addition to

collection, evaluation and conservation, the agreement included a provision for the exchange of germplasm with other institutions in and outside Ethiopia for plant breeding and genetic studies. The export of Ethiopian germplasm was further facilitated through collaboration with the International Board for Plant Genetic Resources (IBPGR).[27]

It is important to note that the purpose of ex situ conservation during the establishment of EBI and the decade that followed was to serve the breeding, delivery, and adoption of modern varieties through conventional plant breeding programs and formal seed systems (PGRC/E, 1986). EBI was mainly providing germplasm to the EIAR and breeders abroad, especially in the CGIAR centers. The 10-year anniversary report of the PGRC/E (1986) states that:

> *Specific, or pointed, collecting missions have been conducted in various regions of the country and, based on recognized breeding demands, have dealt primarily with the major cereals, oil crops and pulses. EBI conducted such missions jointly with plant breeders representing various national and international universities and agricultural institutions. The multiplication of the collected germplasm is carried out on the respective breeding stations in close cooperation with the concerned breeder.*

This shows that the respective breeding stations and breeders determined priority crops and the conservation approach which followed, which was exclusively ex situ. Ex situ conservation became even more important to Ethiopia when the adoption of improved varieties (especially bread wheat) resulted in drastic displacement of local varieties (e.g., durum wheat) during the first attempt to bring Green Revolution to Ethiopia (Cohen, 1975; Demissie & Habtemariam, 1991). Similarly, at this time, EBI hinted about its plan to establish in situ conservation sites or "nature reserves" for coffee, forage, and forest species (PGRC/E, 1986) due to high deforestation and recalcitrance of their seeds to long-term storage (Frankel et al., 1995, p. 166). EBI established a coffee field genebank (field ex situ) the following decade and started a similar conservation plan for on-farm management of field crops in the late 1980s. In the next section, we examine how in situ started in Ethiopia and how this is associated with a shift from a commons approach toward the present "hyperownership" approach in Ethiopian PGRFA access governance.

4.3 | The emergence of an in situ approach: Competing pathways to PGR management

The emergence of in situ/on-farm management approach had a direct link to a severe drought that occurred in Ethiopia in the mid-1980s. PGR scientists and technocrats at EBI thought they were not doing enough to respond to the devastating drought and famine (Asfaw, 1999; Westengen, Hunduma, & Skarbø, 2017, p. 15; Worede, Tesemma, & Feyissa, 1999). This coincided with growing concerns within the international scientific community about the remoteness of genebanks and ex situ collections from farmers and dynamic farming systems, and increasing advocacy for in situ conservation (Altieri & Merrick, 1987). PGRFA scientists and technocrats within Ethiopia were self-critical of their own ex situ conservation strategy, which was unable to strengthen farmers' seed systems by injecting germplasm from the genebank (Fowler & Mooney, 1990, p. 206; Worede, Tesemma, & Feyissa, 2000). Thus, in the late 1980s, PGRFA scientists at EBI and their Canadian NGO partners, the Rural Advancement Fund International (RAFI) and Unitarian Service Committee of Canada (USC-Canada, called SeedChange since October 2019) started an in situ and on-farm management initiative "conservation through use" (WCMC, 1992, pp. 547–548; Worede, 1992). This happened three decades after the same alternative was turned down by FAO in favor of ex situ conservation, despite its promotion by prominent scientists such as Erna Bennett (Fenzi & Bonneuil,

[27]IBPGR (later renamed as IPGRI and now Bioversity) was an international scientific organization created in 1974 under the aegis of the CGIAR centers to establish national PGR programs and advance the global conservation and use of PGR for the benefit of present and future generations. CGIAR itself was established in 1971 from a growing network of International Agricultural Research Centers.

2016; Pistorius, 1997). Recalling how the PGR conservation pathway turned to accommodate in situ/on-farm, the then-director of EBI, Dr. Melaku Worede said:

> *The drought and famine that struck Ethiopia during the mid-1980s was a disaster, especially in the north-eastern (Welo) and northern (Tigray) parts of the country. Very few farmers did dig and hide their seeds underground before they migrated to the central, southern and western parts of the country. Many of the farmers were forced to either consume or sell their seeds in exchange for other commodities. When enough rain came two years later, and the people moved back to their homestead, they had nothing to plant. They had to depend on the grain and seed aid. That was another crisis, as the relief seeds planted did not fit the local agro-ecological conditions and resulted in crop loss. Then we asked ourselves: what are we doing if we cannot help our farmers during such a disaster? (…) we should do something. Since EBI was answerable to EIAR, we informed them. However, they told us that seed multiplication and distribution was not within EBI's mandate, and the Ethiopian Seed Corporation [now Ethiopian Seed Enterprise] was the one responsible. We refused and started Seed of Survival (SoS) program in 1989 with the financial support of USC-Canada, where we introduced great diversity of sorghum and maize from our collections at the genebank into farmers' seed system in Welo and Tigray (…) durum wheat and chickpea in the east central part of the country i.e. in east Shoa.*

The story told by Melaku illustrates the direct relevance of genebanks to strengthen farmers' seed systems and EBI's refocus on local management and the use of PGRFA. The aim of EBI became not only ex situ conservation to support formal plant breeding, but also the dynamic combination of ex situ conservation and on-farm management that utilizes farmers' practices and their social institutions. EBI's on-farm management project was not an easy operation indeed. Researchers and the management at the EIAR did not like that the in situ/on-farm initiative promoted the use of landraces among subsistence farmers. EIAR insisted that the main task of EBI should be ex situ conservation and making germplasm available for formal breeding, and that the promotion of varieties—and specifically modern varieties—was the mandate of EIAR, and not EBI's. Moreover, EBI scientists started advocating for in situ conservation and on-farm management together with civil society organizations at the international level, which we discuss below. This angered EIAR's management due to their research interest and collaboration with CGIAR centers, which at the time were supported mainly by ex situ conservation activities.[28]

Due to this conflict, EIAR, who had oversight over EBI, reduced the budget allocation to the genebank. However, EBI used external funding from USC-Canada to continue the SoS program, which reached out to 30,000 farmers (Chossudovsky, 2000) until it was closed down by the government in 1998. At the time, the genebank staff felt that the closing of the SoS program was due to the conflict with EIAR management.[29] But the in situ/on-farm initiative did not stop. A similar program supported by the Global Environment Facility started in 1994, and continued the program activities (IBC, 2007; UNDP, 1994), as did an Ethiopian NGO called Ethio-Organic Seed Action (EOSA) that was established by former EBI staff in 2003. EOSA has sustained the SoS program with the support of USC-Canada and the Development Fund of Norway until now. Other bilateral organizations (NORAD, GTZ, and CGN) and multilateral funders (FAO, UNDP, Bioversity International, and UNESCO) also supported in situ conservation and on-farm management of PGRs in Ethiopia (see Figure 2). These in situ conservation initiatives have been positive in terms of deploying varieties from the genebank to different farming systems (IBC, 2007; Worede, 1998). Although somewhat limited to specific localities, the in situ conservation and on-farm management of PGRs has become a common approach in Ethiopia due to continuous promotion by EBI and its international partners.

[28]Personal interview with former official of the EBI (Addis Ababa, February 23, 2018).

[29]Personal interview with a technical staff of a nongovernmental organization, Ethio-Organic Seed Action (Addis Ababa, January 31, 2018).

The approach also expanded to other countries in Africa, Asia, and Latin America where USC-Canada started supporting community-based food and seed security programs through deploying ex situ material and supporting in situ conservation (Worede, 1998). Ethiopia became a resource center to host trainees and share experiences in on-farm management through several international training workshops organized by USC-Canada in the 1990s for practitioners from about 30 countries (Dalle & Walsh, 2015). Renowned proponents of on-farm management of PGRs such as Melaku Worede of Ethiopia and Pat Mooney of Canada promoted the SoS program internationally, which later expanded to other countries and attracted several other donors in support of in situ/on-farm management of PGRs and farmers' seed systems as an alternative to formal seed system (Stegemann, 1996; Vernooy, Shrestha, & Sthapit, 2015).

This shows a gradual shift from a purely ex situ conservation development path to one which includes the on-farm management of genetic diversity to strengthen farmers' seed systems, both within Ethiopia and internationally. At a national level, EBI has played a key role and holds a sense of ownership over the in situ movement. This has motivated Ethiopian PGR scientists to promote in situ conservation and on-farm management of PGRFA, and has raised the relevance of EBI in the national seed policy dialogue and seed system development strategies (MoA and ATA, 2013; Worede, 1992; Worede et al., 2000). This has been one important factor that has influenced Ethiopia's position on IPR, in particular the concern to balance breeders' and farmers' rights. The shift from purely ex situ toward inclusion of a complementary in situ/on farm management approach is also an important part of the explanation for the implementation of an access governance regime that is liberal for national users, but restrictive for international users.

4.4 | Germplasm exchange: The international cooperation-distrust paradox

As we have seen from the history of ex situ conservation and as is apparent from the genebank holdings in Figure 1, for a long time Ethiopia shared its genetic resources openly and freely. Until the late 1980s, international plant explorers, tourists, diplomats, business people, and scientists who wanted to collect and take germplasm with them were free to do so. The national genebank continued this practice formally in the 1970s and 1980s. The following statement from EBI's 10-year anniversary report (PGRC/E, 1986) shows that germplasm transfer was based on a simple request, free and without any formal agreement:

> *Ethiopia adheres to the principle of free exchange of germplasm in accordance with its national policy. Germplasm is dispatched to or exchanged with foreign countries if a mutual interest in such an exchange exists. Germplasm requests should be forwarded to the Director of EBI with a detailed explanation of what is required. The coordination of germplasm distribution on the national level is also the responsibility of this unit.*

In terms of benefits, Ethiopia got direct support for basic infrastructure and human resource development at the national genebank from international collaborators.[30] In addition, Ethiopia benefited from the introduction of new germplasm materials such as rice (Alemu et al., 2018) and collaborative plant breeding efforts between CGIAR and EIAR, which helped to build national capacity in agricultural research (e.g., Gebre-Mariam, 1991; Wegary et al., 2011; Worku et al., 2002).

Concerns about the free exchange of germplasm were first recognized after the signing of the agreement between GTZ and EIAR for the establishment of PGRC/E (now EBI) in 1976. The agreement included a provision about the collection and exchange of germplasm with other institutions in and outside Ethiopia for plant breeding

[30]Personal interview with a former official of the EBI (Addis Ababa, February 23, 2018).

and genetic studies (Engels, 1984). At the time, massive transport of germplasm out of the country was controversial among genebank staff. This is because it was felt that there was not enough information where the exported germplasm was going, how it was used and for what purpose. Some people at EBI started to question and express suspicion about what benefits Ethiopia could gain from germplasm export:

> *We were excited about the establishment of the national genebank and the beginning of well-organized collection and conservation activities. The German expats proposed extensive collection of priority crops during the first phase of our agreement. The germplasm collection continued while the construction of the genebank was underway. Copies of each collected sample were sent to Germany and the remaining copies were stored in jute sacks in a temporary office at Arat Kilo in the main office building of the social security. The retained copies were all damaged due to improper storage conditions. At the time, no one questioned the massive export of germplasm to Germany. We were not aware, and we did not ask why we sent germplasm massively and how it was used. It should have been possible to have a sort of benefit sharing arrangement from use of Ethiopian germplasm, not only from Germany but also from other western countries who had access to our germplasm. The awareness about its use for developing commercial crops in Germany and elsewhere came much later when Ethiopians started to travel, see and hear success stories linked to materials acquired from Ethiopia. The question that many people asked was, why distribute Ethiopian germplasm from Germany to all rich countries, while the other countries benefiting from the germplasm were not supporting Ethiopian efforts. We needed much more support at the time.*[31]

In addition to this massive export of germplasm, another factor that heightened awareness about benefit sharing was the connection between genebank scientists and civil society actors during the development of the in situ PGR approach (see Table 2 for a precis on change of actors' perceptions and PGRFA governance in Ethiopia). This can be seen in the context of international debates that emerged in the 1970s and 1980s about IBPGR's political neutrality as coordinator of germplasm collection and exchange between countries (Fowler & Mooney, 1990; Lacy, 1995; Louafi, Bazile, & Noyer, 2013; Silva, 1997). At the time, IBPGR and CGIAR were supported through the World Bank by the government of the United States and the Ford and Rockefeller Foundations, and questions were raised about how germplasm collected by IBPGR was being used (Fenzi & Bonneuil, 2016; Louafi et al., 2013). Later in the 1980s, when the in situ approach was emerging in Ethiopia, some of these international critics were in contact with Ethiopian genebank scientists. These contacts played a significant role in creating awareness about commercial actors' interests in Ethiopian PGRs and their strategy to secure IPRs on commercial products. For instance, Pat Mooney, a Canadian activist who helped establish the SoS program with EBI, has been central in influencing the worldview of many delegates from the Global South (including Ethiopians). This was especially evident during the early renegotiation of the voluntary International Undertaking on Plant Genetic Resources for Food and Agriculture in the 1980s that led to the adoption of the legally binding instrument, the ITPGRFA in 2001 (Oberthür & Rosendal, 2014). Mooney (2011) states:

> *We were able to identify exactly how much germplasm of which crops every country in the world had either donated or received (…) overwhelmingly the South was a massive contributor of free germplasm, and that the North was actively using the germplasm to develop new varieties protected by IPR (…) I was able to go to literally every delegation in Africa, Asia and Latin America and hand them a note (…) showed them how much germplasm [their] country had donated and how much it had received—including a list of the countries to which their germplasm had gone.*

[31]Personal interview with former official of the EBI (Addis Ababa, February 23, 2018).

TABLE 2 Historical overview of change in actors' perceptions and PGRFA governance in Ethiopia.

	Plant explorers' discovery of "landraces" or "peasant seeds" and introduction of crops (16th century–1926)	Unfolding awareness as a biodiverse nation and representation on the global crop diversity "treasure map" (1926–1955)	Creating regional/national PGR center for conservation of raw material for breeding as natural commons and to manage genetic erosion (1955–1992)	From natural commons and free access to sovereign ownership a and control paradigm or private goods and restricted access (Since 1993)
Narrative frames	*Image of Ethiopia as isolated and inaccessible*: inaccessible terrain, rocky plateau, impenetrable mountain fortress, valleys, and surrounding deserts made it possible to hide its unique plants from rest of the world for a long time	*World's center of origin and diversity*: N. I. Vavilov found Ethiopia to be endowed with uniquely high plant genetic diversity for several food crops	*FAO policy on conservation*: one of the global environmental problems, that is, genetic erosion, can only be countered by establishing regional/national plant genetic resource centers, first in centers of origin	UN-CBD and UN-FAO concept of PGRs as the result of natural selection processes and the careful selection and inventive developments of farmers over millennia
	Archeological and historical studies: place Ethiopia within Neolithic cultures with agriculture antiquities; show that Ethiopia's unique indigenous peasant seeds are the result of selection of better-adapted indigenous plants and domestication	*Important pool of genes*: amazing diversity of varieties that have immense importance to the world for plant disease resistance, stress tolerance, and yield increase *Primitive Agriculture needs modernization*: Ethiopia's peasants need modern varieties	*Increasing distrust to FAO policy on crop diversity management*: South (e.g., Ethiopia) as the diversity provider and North as the manager and developer of genetic resources is exploitation	Sovereign right of Ethiopia to have control over and exploit its own genetic resources
			In situ *conservation and on-farm management*: deployment of ex situ collection for farmers as seed relief and for drought tolerance	Fair and equitable sharing of benefits from the use of Ethiopia's genetic resources and traditional knowledge
				Ethiopia can increase access to its PGRs to collect revenue for farmers and local communities
Institutional goal	Enhancing exploration and identification of plant diversity	Exploring for new varieties and crops	Multiplying and distributing ex situ collections to drought-affected areas to complement production of high-yielding and uniform varieties	Developing biodiversity policies for conservation and research
	Studying culinary diversity, ethnolinguistic uses and food processing technologies	Collecting and extracting pool of genes as raw material for crop adaptation and improvement	Rescue collection of local crop diversity from drought-affected	Developing effective national law and regulation for ABS to promote the

(Continues)

TABLE 2 (Continued)

	Plant explorers' discovery of "landraces" or "peasant seeds" and introduction of crops (16th century–1926)	Unfolding awareness as a biodiverse nation and representation on the global crop diversity "treasure map" (1926–1955)	Creating regional/national PGR center for conservation of raw material for breeding as natural commons and to manage genetic erosion (1955–1992)	From natural commons and free access to sovereign ownership a and control paradigm or private goods and restricted access (Since 1993)
			areas and in areas of high varietal displacement	use of biodiversity for economic development
	Extracting genes for adaptation and use	Introducing new varieties for use by peasants for higher yield, better disease resistance, and other stress factors	Reducing massive export of germplasm to limit misappropriation as well as engaging in international negotiations for farmers' rights, fair access and equitable benefit sharing agreements	Strengthening in situ conservation and on-farm management for sustainable agriculture and food security
	Introducing new crops from other parts of the world for increased production			Developing effective Sui Generis system for PVP, that is, PBR law and balance with FRs
National and global commons status	Common heritage of humankind	Common heritage of humankind	PGRs as public good for new variety development	Participatory agenda for PGR management
	Free access to the pool of genes	Free access to pool of genes	Balance between IPR and farmers' rights by creating awareness at national level and by putting pressure at international level as part of countries from the Global South and with the help of NGOs (e.g., RAFI)	Ethiopia exercises sovereign right over its PGRs through regulating access
	Balanced two-way exchange of PGRs	Massive germplasm export to other countries and introduction of new plant varieties to Ethiopia		Farmers and local communities as custodians of agrobiodiversity and associated traditional knowledge are rewarded
Actors	Foreign professionals: botanical explorers, archeologists and other travelers	Professional actors: state institutions, foreign explorers, plant collection expeditions and breeders	EBI cooperation with Germany and IBPGR/FAO/CGIAR on ex situ management	EIAR, CGIAR, GCDT on ex situ collection, management and use
	Local leaders of ancient kingdom	Peasants volunteering to give samples of their seeds and adapting newly introduced varieties	National agricultural research institutions' cooperation with CGIAR for developing new plant varieties	EBI, multilateral institutions (IPGRI/Bioversity International, GEF, Benefit Sharing Fund of ITPGRFA), NGOs (EOSA, MELCA, REST, USC-Canada, and Norwegian

(Continues)

TABLE 2 (Continued)

	Plant explorers' discovery of "landraces" or "peasant seeds" and introduction of crops (16th century–1926)	Unfolding awareness as a biodiverse nation and representation on the global crop diversity "treasure map" (1926–1955)	Creating regional/national PGR center for conservation of raw material for breeding as natural commons and to manage genetic erosion (1955–1992)	From natural commons and free access to sovereign ownership a and control paradigm or private goods and restricted access (Since 1993)
				Development Fund) on in situ/on-farm
			EBI cooperation with farmers and USC-Canada to promote Farmers' Rights and on-farm management of PGRs (SoS program)	Farmers, community seed bank groups, local community
				Commercial actors for PGR trade
System	Exploration and documentation	Documentation and reporting exploration results	Ex situ conservation	Ex situ conservation
		Collection, introduction, experimentation and adaptation at national plant introduction stations and ex-situ conservation	On-farm management	In situ conservation
			Advocacy and negotiation for farmers' rights, fair access and equitable benefit sharing	On-farm community management: PVS, CSB and restoration

Abbreviations: ABS, access and benefit sharing; CBD, convention on biological diversity; CGIAR, Consultative Group on International Agricultural Research; CSB, community seed bank; EBI, Ethiopian Biodiversity Institute; EIAR, Ethiopian Institute of Agricultural Research; EOSA, Ethio-Organic Seed Action; FAO, Food and Agriculture Organization; FR, farmer's right; GEF, Global Environment Facility; IBPGR, International Board for Plant Genetic Resources; IPR, Intellectual Property Right; ITPGRFA, International Treaty on Plant Genetic Resources for Food and Agriculture; NGO, nongovernmental organizations; PGR, plant genetic resource; PVP, plant variety protection; PVS, participatory variety selection; RAFI, Rural Advancement Fund International; USC-Canada, Unitarian Service Committee of Canada.

[a]The ownership approach refers to the right of farmers or communities to be rewarded individually or collectively for plant genetic resources obtained from their fields and used in commercial varieties and/or protected by intellectual property rights.

The Ethiopian genebank scientists were convinced that allowing access to germplasm that would then be used by commercial actors for capital accumulation was wrong.[32] This created a growing awareness about the need for fair and equitable benefit sharing, both at the national level, and—through the lessons learned from the in situ/on farm movement—for Ethiopian farmers. Although CBD and ITPGRFA later created mechanisms to regulate ABS, as described earlier, negative experiences in which such agreements were not respected (e.g., the *teff* patent), have acted to solidify earlier suspicions into a feeling of distrust, as the following informant explains:

> *The negotiated intentions of the Treaty's MLS and the implementation have not been compatible. Initially the focus was on how to manage and use CGIAR genebank holdings and how developing countries can benefit from these stocks of germplasm. Nevertheless, it is still serving those who benefited most from before. On top of that, the West is interested to expand Annex I crops of the MLS before we have a functioning benefit sharing arrangement. It also undermines the Nagoya Protocol by making it irrelevant for PGRFA. This has degraded our trust towards actors in developed countries. The motive does not seem to be fair and mutual benefits, because it mainly benefits the rich countries. This is wrong both technically and politically.*[33]

From this statement we see that Ethiopia's shift in PGRFA governance is due to a growing distrust. This distrust explains Ethiopia's inclination toward an hyperownership approach while formally signing on to "new commons" governance under the MLS of ITPGRFA. It is also linked to the apparent paradox of Ethiopia's access regulation that is liberal toward national users and restrictive toward international users. Our historical institutional analysis displays these linkages and shows how actors' perceptions, institutional goals and status of commons governance have changed over time (see Table 2).

Our analysis shows that the restrictive nature of Ethiopia's current access policies and legislations partly can be explained by the first design problem of the MLS identified by Halewood et al. (2013a); a lack of clearly defined boundaries and monitoring of rules and use. The fact that institutions managing international crop and forage collections under the Treaty's framework (e.g., CGIAR genebanks) and some member states (e.g., European countries) voluntarily provide material to nonparties has frustrated countries like Ethiopia. Furthermore, the MLS is not capable of enforcing rules to ensure reciprocal obligation of all participants to ensure contributions from nonmembers or "free riders" for PGRFA conservation work in provider countries.

Our study also points to the influence of the second design issue identified by Halewood et al. (2013a); the blurred boundary between bilateralism and multilateralism in the MLS in which users are allowed to realize proprietary benefits (through IPRs) while providers' benefits are supposed to be multilaterally distributed. Through the multilateral system, PGRFA users make a direct payment to the benefit sharing fund that is administered by the Governing Body and the Secretariat of the Treaty; countries can only access these funds by competing in calls for proposals for projects on PGRFA conservation. This is problematic because to date, only a limited number of voluntary payments (Rosendal & Andresen, 2016)—and one mandatory payment tied to accessed MLS materials (FAO, 2018)—have been made into the fund. As a result, calls for proposals have been very competitive and provider countries have no assurance of accessing financial benefits through the MLS. The fact that the Treaty's multilateralism breaks the direct link between PGRFA provider countries and users in terms of monetary benefit sharing can partly explain why some countries like Ethiopia prefer the bilateral MTA of the Nagoya protocol to the multilateral SMTA of the ITPGRFA.

Apart from the design issues, Ethiopia's restrictive practice on access to the country's PGRFA has also been triggered by the failure of the ABS agreements linked to the Dutch *teff* patent (Andersen & Winge, 2012). Between 2003, when the patent was first filed, and 2006, when Ethiopia issued its own Access Law, the country barely used

[32]Personal interview with a former staff of EBI (Addis Ababa, January 31, 2018).

[33]Personal interview with a government official of the Ministry of Environment, Forest and Climate Change (Addis Ababa, January 15, 2018).

any form of material transfer. Looking at the historical events and processes that have shaped Ethiopian actors' perceptions and governance of access to PGRFA (see Table 2), we find that the failure of international institutions to resolve tensions between IPR and ABS agreements is the major underlying reason for access restriction at the national level. The current suspicion and distrust may continue to prevail until a tension (perceived and real) between the ABS regimes under ITPGRFA and CBD is resolved, and larger monetary benefit sharing from the MLS of the Treaty is realized and acknowledged by the parties.

5 | CONCLUSIONS

Our analysis of the historical development of access to and management of PGRFA in Ethiopia has shown that the country has taken a different route to the governance of PGRFA compared to most other countries in the Global South. The country has issued comprehensive policies and legislations within the existing ABS and IPR frameworks to ensure national control over their genetic resources, promote farmers' and community rights, and encourage in situ conservation and on-farm management of PGRFA. Ethiopia's policies and legislations lean toward an hyperownership approach, which aims to maximize benefit sharing from international users through the use of bilateral access agreements, as opposed to the "new commons" approach.

With regard to historical factors, our findings are consistent with Nabhan's (2009) assertion that Vavilov inspired Ethiopian scientists and policy makers to conserve and have control over their seed heritage more than in any other country where he conducted his expeditions. Vavilov and other plant explorers inspired awareness of Ethiopia as a biodiverse nation clearly situated on the global crop diversity "treasure map." This heightened awareness among Ethiopians of the global significance of their genetic resources is an ideational factor that has affected policies and practices on PGRFA governance. At the same time, there can be no doubt about the material importance and value of genetic resources for Ethiopia's agriculture and economy. Furthermore, the fact that EBI began in the late 1980s to work on on-farm management of PGRFA to strengthen farmers' seed systems and has further sought to balance farmers' and breeders' rights in their national policies and legislations, reflects the central role that PGRFA play in ensuring national food security and economic growth.

Earlier studies have found that restrictive practices on access to PGRFA emerged following the adoption in 1992 of CBD, which recognizes sovereign rights to PGRFA (Falcon & Fowler, 2002; Halewood, 2013; Roa-Rodríguez & Dooren, 2008). Although Ethiopia began introducing legislation to restrict access to genetic resources following CBD (from 1993), our historical analysis of Ethiopia's PGRFA governance shows that the shift toward an hyperownership approach began as early as the late 1970s. This was due to growing concern over IPR restrictions on the use rights of smallholder farmers to protected plant varieties, and the lack of financial benefits through benefit sharing agreements from commercialization of PGRFA. Our study also shows that Ethiopia's positioning on these two issues was reinforced through alliances forged with civil society in the 1970s and 1980s, as part of the growing international movement against IPRs and for on-farm management of PGRFA. Thus, rather than being a cause for restrictive policies, the adoption of CBD in 1992 formalized existing concerns within Ethiopia over IPRs, benefit sharing, and farmers' rights by recognizing sovereign rights to PGRFA.

Most studies to date examine the effects of ABS or IPR legislations on access to PGRFA separately (Bjørnstad & Westengen, 2019). Our study analyzed both legislations simultaneously, which provides a better understanding of national PGRFA governance and its implication for different users. The Ethiopian ABS legislation, that is liberal toward national PGRFA users and restrictive toward international users, is directly linked to the country's Plant Breeders' Law. It provides farmers an easy access to ex situ collections and the right to freely use protected plant varieties for noncommercial purpose. At the same time, it requires commercial actors to disclose the origin of genetic material for their IPR applications for ease of traceability and enforcing benefit sharing obligations. This has been an attempt by Ethiopian government to use its national PGRFA legislation to address what they perceive as unresolved conflicts between IPRs and ABS agreements in international policies. The Governing Body of ITPGRFA

has continuously requested Contracting Parties to submit measures/practices and lessons learned on the implementation of farmers' rights and MLS since its first meeting in 2006 (FAO, 2019). In this regard, we find the Ethiopian policy approach to balancing IPRs and farmers' rights to be an important input for the ongoing negotiations on the interrelation between IPR institutions (UPOV and WIPO) and international treaties concerning genetic resources (the CBD and ITPGRFA).

Ethiopia's current access regime must be seen in connection with, and not in isolation from, international IPR regimes, as well as the historical, economic, political, and cultural role of PGRFA in the country. To establish the necessary trust, and arrive at mutually acceptable and beneficial governance arrangements in international policy fora, it is not sufficient with empirical evidence of the concrete benefits of PGRFA exchange, it is also important to understand the historical and political context of different national governance regimes.

In terms of theory and methods, the commons conceptualization by Halewood et al. (2013b) helps to understand PGRFA governance by focusing on the frameworks of international agreements, specifically by looking at access regimes practiced by countries before and after the CBD. This framework has also been useful to identify design problems related to the functioning of international agreements, for example, the MLS of ITPGRFA. However, a historical approach as we have used here is another useful method that can elucidate the factors contributing to specific PGRFA governance situations. Research on PGRFA governance at the national level thus requires us to look beyond the frameworks of the CBD and other international agreements, to consider the particular historical, political, and institutional factors within each country.

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