



When private governance impedes multilateralism: The case of international pesticide governance

Fiona Kinniburgh 

*Department of Governance, School of Social Sciences and Technology, Technical University of Munich, Munich, Germany
Institute for Advanced Study, Technical University of Munich, Garching, Germany*

Henrik Selin 

*Institute for Advanced Study, Technical University of Munich, Garching, Germany
Frederick S. Pardee School of Global Studies, Boston University, Boston, Massachusetts, USA*

Noelle E. Selin 

*Institute for Advanced Study, Technical University of Munich, Garching, Germany
Institute for Data, Systems, and Society, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA
Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA*

Miranda Schreurs 

Department of Governance, School of Social Sciences and Technology, Technical University of Munich, Munich, Germany

Abstract

Private standards play an increasingly important governance role, yet their effects on state-led policymaking remain understudied. We examine how the operation of private agricultural standards influences multilateral pesticide governance with a particular focus on the listing of substances under the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, a treaty-based information-sharing mechanism that allows countries to refuse hazardous chemical imports. We find that private agricultural standard-setting bodies use the Rotterdam Convention's pesticide list to develop their own lists of banned substances. This alters the Rotterdam Convention's intended role, impeding efforts to add substances to the treaty, as attempts by private actors to impose stricter governance than state actors can undermine the potential for international state-based governance to become more stringent. We characterize this as a “confounding interaction” whereby institutional linkages between actions by public and private actors with broadly aligned goals results in unexpected negative consequences for governance.

Keywords: certification schemes, global governance, international environmental agreements, private authority, private standards, sustainability.

1. Introduction

Private governance—the enactment of state-like governance functions by non-state actors—has come to challenge the role of the state in an increasingly complex global governance landscape (Haufler, 2001; Renckens, 2020). Private voluntary standards in the form of product and/or process requirements set by non-state actors play a growing role across a variety of resources and sectors, including in international food production (Henson, 2008). This rise of private standards has fueled debates about the role and effectiveness of private authority compared to public regulation (Cashore et al., 2004; Falkner, 2003; Vogel, 2008). This is also relevant to sustainability transitions, understood as “fundamental transformation processes through which established socio-technical systems

Correspondence: Fiona Kinniburgh, Department of Governance, School of Social Sciences and Technology, Technical University of Munich, Richard Wagner Straße 1, 80333 Munich, Germany. Email: fiona.kinniburgh@hfp.tum.de.

*Conflict of interest: The authors have no conflicts of interest to declare.

Accepted for publication 5 March 2022.

shift to more sustainable modes of production and consumption” (Markard *et al.*, 2012, p. 956). The United Nations and other actors pushing for sustainability advocate leveraging private governance to this end (Green, 2013; Renckens, 2020). A 2020 report from the International Trade Center (ITC), the joint agency of the World Trade Organization and the United Nations Conference on Trade and Development, states: “By adopting voluntary standards, the private sector can complement governments and international organizations in the pursuit of sustainable development” (Bissinger *et al.*, 2020, p. 36). Various governments have encouraged the uptake of private standards, including by incorporating procurement requirements for privately certified sustainable products in trade policies or other public policies (D’Hollander & Marx, 2014; Vogel, 2008).

When encouraging the development of private standards, national governments, intergovernmental organizations, and civil society representatives that promote sustainability often explicitly or implicitly assume that such standards will complement public measures. Yet, research on relationships between public and private authority and the ways in which private standards help solve, or exacerbate, sustainability issues is relatively new. This research has focused mainly on a few sectors, notably forestry and fisheries, and on the interactions between transnational private actors and national governments (Grabs *et al.*, 2021; Green & Auld, 2017; Hale, 2020). There is therefore a need to further analyze interactions between private standard-setting bodies and public policymaking fora—including potential for negative feedback effects—and to draw lessons to inform academic and policy discussions on the (potential) role of private standards in advancing sustainability. To this end, we focus on the case of international pesticide governance, a sustainability issue that is garnering greater public attention due to concerns about pesticide use on human health and ecosystems (Selin, 2010; UNEP, 2021).

Many hazardous pesticides are widely distributed in the environment, contributing to a decline of biodiversity, and are present as residues in food where they may pose risks to consumers (UNEP, 2021). They also pose severe health threats to farming and proximate residential communities: A recent survey found that over 40 percent of an estimated 860 million agricultural workers worldwide suffer from unintended acute pesticide poisoning, in addition to a wide range of adverse health impacts which are associated with chronic occupational and residential exposure (UNEP, 2021). There are three main global chemicals treaties which govern hazardous pesticides: the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the 2001 Stockholm Convention on Persistent Organic Pollutants (POPs). Both the Montreal Protocol and the Stockholm Convention ban the production, use, and trade of pesticides listed under each respective treaty. In contrast, the Rotterdam Convention facilitates information sharing on the transnational shipment of pesticides through a “prior informed consent” (PIC) procedure, allowing parties to refuse imports of pesticides listed under the treaty. On the private side, nongovernmental organizations (NGOs) and firms influence pesticide use through a wide range of voluntary standards, which restrict or ban the use of specific pesticides within supply chains.

In efforts to advance sustainability, the governance of hazardous pesticides has taken on new importance. Global governance of hazardous pesticides is increasingly shaped by a combination of the continuing implementation of the three main chemicals treaties and the growth of private voluntary agricultural standards. In this article, we analyze how the introduction and expansion of multiple private agricultural standards influence the implementation of global chemicals treaties addressing hazardous pesticides. We particularly focus on how actions and decisions taken by increasingly ambitious private standard-setting bodies influence multilateral decisionmaking under the Rotterdam Convention, and discuss the ways in which interactions between private standard-setting bodies and the Conference of the Parties (COP) to the Rotterdam Convention affect international pesticide governance more broadly. We address two interrelated research questions: First, how do private agricultural standard-setting bodies and parties involved in international treaty-based pesticide governance interact? Second, what are the effects of these interactions on pesticide governance?

The next section summarizes key insights from the literature on interactions between private standards and public policy and governance. Section 3 outlines the main global pesticide treaties, focusing particularly on the Rotterdam Convention, and provides examples of different private agricultural standards. Section 4 addresses the first research question, showing how a growing number of private standard-setting bodies have banned the use of pesticides listed under the three main global chemicals treaties as part of their individual and collective efforts to build political legitimacy and scientific credibility. Section 5 addresses the second question, arguing that, despite

some reinforcing regulatory effects, overlaps in the pesticides covered by private agricultural standards and the Rotterdam Convention also have unexpected effects on Rotterdam Convention negotiations. Section 6 draws insights into theoretical and practical understandings of relationships between private and public governance, characterizing interactions between private agricultural standard-setting bodies and the Rotterdam Convention COP as an example of a “confounding interaction.” The concluding section summarizes our main findings and identifies areas for future research.

2. Analyzing interactions between public and private actors and authority

Typically, “public” governance refers to state-centric governance while “private authority” has been conceptualized as the “performance of functions traditionally associated with national governments and inter-governmental organizations—rule-setting, dispute resolution, and public good provision—by private actors” (Cashore et al., 2021, p. 4). Private standards are requirements initiated and driven by private actors for products or for the processes underlying their production (Henson, 2008). The rise of private standards—and active promotion by their supporters—raises the question of what roles public and private actors *should* play, especially in addressing sustainability problems by deciding how these problems (and therefore potential solutions) are defined. To inform such normative questions, it is critical to understand the roles public and private actors *currently* play in different governance contexts, and the ways in which these interactions between public and private actors do, or do not, collectively contribute to achieving sustainability-relevant outcomes. Although a growing area of scholarship examines the role of non-state actors in multilateral environmental negotiations on, for example, climate change (Hale, 2016) and the ways international standards can complement public authority (Green & Auld, 2017), effects of the rise of private standards on multilateral processes has received little attention outside of legal scholarship on the World Trade Organization (Negi, 2020).

Recent literature has laid a conceptual foundation for analyzing public–private relationships and interactions. Eberlein et al. (2014) highlight the need to examine interactions involving public and private actors as dynamic *processes* in which there may be multiple phases. They propose a framework for examining interactions among actors in transnational business governance, focusing on six dimensions of interaction: (i) who or what interacts; (ii) the drivers and shapers of interactions; (iii) the mechanisms and pathways of interactions; (iv) the character of interactions; (v) the effects of interactions; and (vi) how interactions change over time. This framework is helpful for guiding empirical analysis of different aspects of actor relationships and interactions. The authors also propose a first typology for the “character” of interactions, identifying four main types: competition, coordination, cooptation, and chaos. This framework has been applied in a review of voluntary sustainability standards (Lambin & Thorlakson, 2018) and further developed in an overview of the literature on interactions between private authority and public policy (Cashore et al., 2021). Sustainability standards, which we address further in the next section, comprise “requirements that producers, traders, manufacturers, retailers or service providers may be asked to meet, relating to a wide range of sustainability metrics, including respect for basic human rights, worker health and safety, the environmental impacts of production, community relations, land use planning and others” (Lambin & Thorlakson, 2018, p. 370).

Cashore et al. (2021) distinguish between three main types of public–private interactions (which build upon Eberlein et al.’s (2014) “character” of interactions)—*complementary*, *competitive*, and *coexistent*—and several subtypes of interactions under each of these three main types. *Complementary* interactions occur when public and private actors work toward a common outcome and can take the form of collaboration, coordination, or isomorphism. Collaboration involves active and conscious partnership between public and private actors, such as in the case of public–private partnerships and multi-stakeholder organizations. Coordination involves independent governance efforts by public and private actors toward common goals without direct communication or explicit partnership. Isomorphism occurs when public and private governance take similar forms independently of each other, for example through common adherence to best practices. *Competitive* interactions involve antagonism among public and private actors competing in a limited governance space. This can happen through substitution or cooptation. Substitution may occur when firms adopt standards as a strategy to pre-empt or avoid government regulation or civil society campaigns. Public actors can coopt private governance by taking over private initiatives such as organic food standards, or crowd out private standards by adopting regulations. *Coexistent* public and

private governance occupies a middle ground between the first two forms of interactions. Two sub-types of co-existent interactions are institutional layering, when public and private actors set up institutions that address different parts of a governance process, and chaos, when interactions between public and private bodies are unpredictable, undirected, and display no clear pattern. Interactions between public and private governance actors may change form over time or assume multiple forms at the same time. A collaborative process can become competitive (Renckens, 2021) or an interaction can be simultaneously complementary and competitive (Ponte *et al.*, 2021), for example.

We use the six dimensions of interaction identified by Eberlein *et al.* (2014) in sections four and five to guide our analysis of relationships between private standard-setting bodies and treaty-based bodies in the area of international pesticide governance. We highlight the heterogeneity of public and private actors, enabling an analysis of their varied and potentially opposing intentions and interests as well as the ways in which interactions shape decisionmaking. We differentiate not only among private actors with goals that are broadly aligned with the chemicals treaties—i.e., different types of standard-setting bodies—but also among industry actors, such as the pesticide or agricultural industries, which may also influence the multilateral process to pursue a different set of private goals. The analysis is informed by three main types of data. First, information was gathered through participant observation at the joint Basel, Rotterdam, and Stockholm Conventions COP in April–May 2019 and the Rotterdam Convention Chemical Review Committee meeting in October 2019. Second, semi-structured interviews were conducted with country delegates, NGO representatives, past and present members of the Rotterdam Convention secretariat, and private sector actors, including from the pesticide industry and private agricultural standard-setting bodies. All interviews, in anonymized form, are listed in Appendix A (Table A1). Third, the analysis draws on public information on different private agricultural standards from certification bodies' and retailers' websites and documents, as well as data from a survey of supermarkets in the United Kingdom conducted by Pesticide Action Network UK (Pesticide Action Network UK, 2019, unpublished data).¹ We further discuss our selection of specific private agricultural standards in the following section.

3. International public and private pesticide governance

A first step toward understanding governance interactions is examining who or what interacts and what drives and shapes these interactions. We summarize here the public regulatory space and private governance mechanisms in international pesticide governance. We begin by focusing on the three main global chemicals treaties that cover hazardous pesticides as a public multilateral regulatory space, paying particular attention to the operation and implementation of the Rotterdam Convention. We then detail how private agricultural standards function as private governance mechanisms, highlighting their heterogeneity and growing importance in international pesticide governance.

The Montreal Protocol, the Rotterdam Convention, and the Stockholm Convention are the three major global treaties that address select pesticides (see Table 1). These multilateral agreements are subject to widespread participation by countries from all over the world. By early 2022, 197 countries and the European Union (EU) were parties to the Montreal Protocol while 184 countries and 164 countries were parties to the Stockholm Convention and the Rotterdam Convention, respectively (the EU is also a party to both these treaties). Among the world's largest economies, and pesticide producers and users, the United States stands out as a notable non-party to both the Stockholm Convention and the Rotterdam Convention (though it is a party to the Montreal Protocol). Over time, the parties to the Stockholm Convention and the Rotterdam Convention have increased the number of pesticides covered by each treaty. The Stockholm Convention list of pesticides has been expanded from 8 to the current 18 while the Rotterdam Convention list has grown from 19 to 36 (including severely hazardous pesticide formulations [SHPPFs]). The Montreal Protocol, which addresses ozone-depleting substances, covers only one pesticide.

All three global chemicals treaties include their own individual lists of pesticides that are subject to specific requirements, and each treaty includes a separate mechanism that allows these lists to be expanded over time. However, the treaties differ in their regulatory approaches. The Montreal Protocol and the Stockholm Convention obligate parties to phase-out or severely restrict the production, use, and trade of listed chemicals within a determined time frame. The only pesticide covered by the Montreal Protocol is methyl bromide, and this pesticide is

Table 1 Major international treaties addressing pesticide production, use, and trade

Treaty	Adoption	Entry into force	Number of parties (as of early 2022)	Number of pesticides initially listed	Number of pesticides currently listed (as of early 2022)	Control mechanisms for listed chemicals	Process for adding chemicals	Pesticides currently listed (as of early 2022)
Montreal Protocol of the Vienna Convention	1987	1989	198	0	1	Parties obligated to phase out chemical over specified time period (with use exemptions for certain chemicals)	Amendments to the agreement	<ul style="list-style-type: none"> Methyl bromide (with limited critical use exemptions for agriculture)
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	1998	2004	165	22	36	Parties required to follow prior and informed consent procedure for trade of listed chemicals	<p>Nominations triggered through two or more national regulatory actions by parties; nominated chemicals are reviewed by the Chemical Review Committee and approved by consensus by the COP</p> <p>PIC list (Annex III)</p> <ul style="list-style-type: none"> 2,4,5-T and its salts and esters Alachlor Aldicarb Aldrin Azinphos-methyl Binapacryl Captafol Carbofuran Chlordane Chlordimeform Chlorobenzilate DDT Dieldrin Dinitro-ortho-cresol (DNOC) and its salts (such as ammonium salt, potassium salt, and sodium salt) Dinoseb and its salts and esters Dustable powder formulations containing a combination of benomyl at or above 7%, carbofuran at or above 10%, and thiram at or above 15% (SHPF†) EDB (1,2-dibromoethane) Endosulfan Ethylene dichloride Ethylene oxide Fluoroacetamide HCH (mixed isomers) Heptachlor Hexachlorobenzene Lindane (gamma-HCH) Mercury compounds, including inorganic mercury compounds, alkyl mercury compounds, and alkyloxyalkyl and aryl mercury compounds 	<ul style="list-style-type: none"> Methamidophos Methyl-parathion (emulsifiable concentrates [EC] at or above 19.5% active ingredient and dusts at or above 1.5% active ingredient) (SHPF†) Monocrotophos Parathion Pentachlorophenol and its salts and esters Phorate Phosphamidon (soluble liquid formulations of the substance that exceed 1000 g active ingredient/L) (SHPF†) Toxaphene (Camphchlor) Tributyl tin compounds Trichlorfon

(Continues)

Table 1 Continued

Treaty	Adoption	Entry into force	Number of parties (as of early 2022)	Number of pesticides initially listed	Number of pesticides currently listed (as of early 2022)	Control mechanisms for listed chemicals	Process for adding chemicals	Pesticides currently listed (as of early 2022)
Stockholm Convention on Persistent Organic Pollutants (POPs)	2001	2004	185	8	18	Parties required to phase out or severely restrict production and use of chemical over specified time period	Nominations submitted by individual parties; proposed additions reviewed by the Persistent Organic Pollutants Review Committee according to criteria for persistent organic pollutants and approved by the COP (majority voting possible in case of disagreement)	<p>Elimination (Annex A)</p> <ul style="list-style-type: none"> • Aldrin • Alpha hexachlorocyclohexane (alpha HCH) • Beta hexachlorocyclohexane (beta HCH) • Chlordane • Chlordecone • Dicofof • Dieldrin • Endrin • Heptachlor • Hexachlorobenzene • Lindane • Mirex • Pentachlorobenzene • Pentachlorophenol and its salts and esters • Technical endosulfan and its related isomers • Toxaphene <p>Severe restriction (Annex B)</p> <ul style="list-style-type: none"> • Dichlorodiphenyltrichloroethane (DDT) • Perfluorooctane sulfonic acid (PFOS), its salts, and perfluorooctane sulfonyl fluoride

† SHPF refers to “Severely hazardous pesticide formulation.” SHPF nominations are based on a notification from a single developing country indicating domestic problems with a pesticide (see details in Section 3). Source: UNEP/FAO (n.d.-f, n.d.-g).

still subject to a limited number of use exemptions in the agricultural sector. The Stockholm Convention, with 18 pesticides listed as of early 2022, is the principal treaty for banning or severely restricting the production, use, and trade of pesticides identified as POPs, which pose risks through their toxicity, persistence, and ability for long-range environmental transport. Currently, parties must take measures to eliminate the production, use, and trade of 16 pesticides, and two other pesticides are under severe use restrictions (as well as strong limits to domestic production and trade, particularly with other parties).

In contrast to the bans on chemicals' production, use, and trade introduced by the Montreal Protocol and Stockholm Convention, the "governance by disclosure" approach of the Rotterdam Convention focuses on transparency as a driver for national policy action in the context of international pesticide trade (Jansen & Dubois, 2014). The Rotterdam Convention institutionalizes a PIC procedure for hazardous chemicals covered by the treaty. Under the PIC procedure, the government of a country where a firm that wants to export a chemical on the PIC list is located must ask the government of the country where the importing firm is based for import approval before the trade can proceed. This places the legal burden on exporting parties, which are required to ensure that exports do not occur if importing parties have not consented. A party that rejects the import of specific pesticides on the PIC list must also prohibit domestic production of that substance. The Rotterdam Convention's focus on transparency, stemming from a similar focus of the earlier voluntary information-sharing mechanism (Kummer, 1999; Selin, 2010), was the outcome of a political compromise during contentious treaty negotiations. Some actors—notably major environmental NGOs including Greenpeace and some developing countries mainly in Africa—fought for banning the manufacture and/or export of hazardous pesticides (Victor, 1998; Interview 10). However, strong opposition from the pesticide industry as well as many pesticide-producing and pesticide-using countries ultimately led to a non-banning approach focusing on the use of the PIC list to control trade (Selin, 2010; Victor, 1998).

There are four main pathways by which pesticides are nominated for possible addition to the PIC list (Fig. 1, step #1). All parties are required to submit a notification to the Rotterdam Convention Secretariat of any national ban or severe restriction on the use of a chemical that is adopted for human health and/or environmental reasons. Under the first three pathways (step #1, a–c in Fig. 1), a pesticide is nominated once the Secretariat has received notifications of: (a) at least two national bans, (b) at least two severe restrictions, or (c) at least one restriction and one national ban by two different parties. These three pathways require that notifications come from at least two out of seven different geographical regions identified under the Rotterdam Convention (the seven PIC regions are Africa, Asia, Europe, Latin America and the Caribbean, the Near East, North America, and the Southwest Pacific) (UNEP/FAO, 2010a). A fourth pathway involves nominations based on a notification from a single developing country indicating domestic problems with a pesticide (d in Fig. 1). These are classified as "severely hazardous pesticide formulations." The SHPF pathway aims to accommodate developing countries in two principal ways. First, it recognizes that developing countries may have lower regulatory capacity than

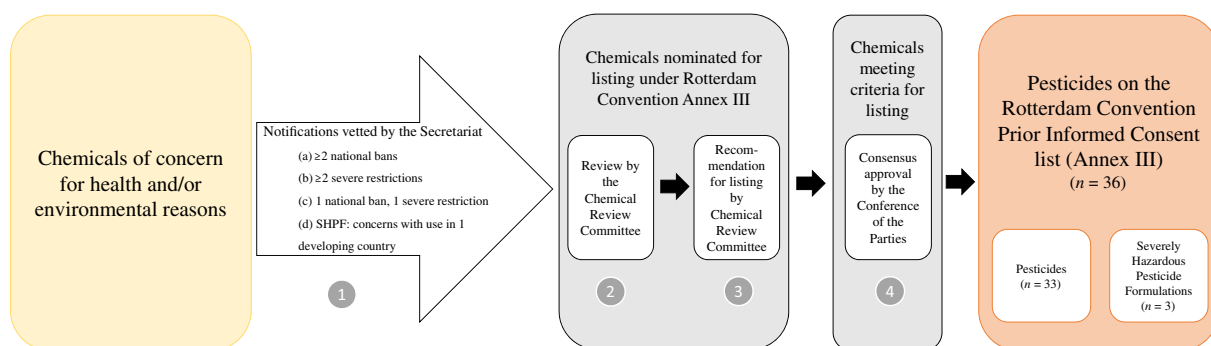


Figure 1 Processes for pesticide nomination and addition to the Rotterdam Convention Prior Informed Consent (PIC) list. According to the FAO (2004), a "severe restriction" is a partial ban, or restriction on all but one or two relatively small uses of the substance. A "severely hazardous pesticide formulation" (SHPF) is subject to a special nomination procedure based on domestic problems with the pesticide under its current conditions of use. The numbers in parentheses (*n*) refer to the number of pesticides listed under each category as of early 2022. Source: UNEP/FAO (n.d.-f).

industrialized countries. Second, it acknowledges that actual conditions of use differ in developing countries: protective equipment may be worn less because it is expensive, not readily available, or uncomfortable due to a warm climate (Boedeker *et al.*, 2020).

The Secretariat to the Rotterdam Convention vets all notifications to ensure that all required information is included (Fig. 1, step #1). Next, complete nominations are passed on to and are reviewed by the Chemical Review Committee (Fig. 1, step #2), consisting of 31 government-designated experts in chemical management. These experts, who serve for a term of four years, are confirmed by the Rotterdam Convention COP based on criteria decided at the first COP meeting (Kohler, 2019; UNEP/FAO, 2010b). The Chemical Review Committee is mandated to verify whether each nominated pesticide meets the criteria for inclusion on the PIC list as set out in the treaty annexes. These criteria differ depending on whether a pesticide is nominated based on regulatory actions by two parties or use problems in a single developing country. If the Chemical Review Committee agrees to recommend a nominated chemical for listing on the PIC list, that recommendation is forwarded to the COP (Fig. 1, step #3). Finally, the COP must approve all additions to the PIC list by consensus (Fig. 1, step #4). This opens up the possibility for a single party to block a proposed addition (McDorman, 2004)—which has occurred multiple times in recent years.

Simultaneous to the development of the main global chemicals treaties, private standards have come to play an increasingly important role in the governance of agricultural supply chains. A wide range of private standards co-exist in the agri-food sector, including activist-backed standards, industry-backed standards, and multi-stakeholder initiatives (Henson, 2008; Lambin & Thorlakson, 2018). Activist-backed voluntary standards addressing environmental and social harms from production processes were initiated by NGOs such as the Rainforest Alliance in the 1980s (Djama *et al.*, 2011). In the 1990s, a broad range of industry-backed standards emerged. Industry-backed standards may address environmental and social aspects of sustainability, but these standards are often primarily created to address issues of food safety and other quality attributes, managing supply chain risks, enhancing reputation, and gaining market shares (Bissinger *et al.*, 2020; Busch, 2000; Fulponi, 2006; Henson & Reardon, 2005). These include standards developed or led by major food companies (such as Unilever) and commercial food retailers (such as Walmart, Tesco, or Lidl), which also sell own-brand products. Multi-stakeholder initiatives (such as Cotton Made in Africa) include a wide variety of stakeholders, including retailers or other commercial actors such as exporters or banks as well as environmental NGOs (Djama *et al.*, 2011).

Private standards can be more important than public national regulations in determining farming practices due to their growing importance in agricultural supply chain management—notably in countries with weaker public regulations. Adhering to private standards has become a condition of entry for a growing number of producers of agricultural products into an increasing number of transnational supply chains, despite the “voluntary” (i.e., non-regulatory) nature of these standards. This is a result of their growing importance in food supply chain management, together with increasing vertical integration in global value chains and greater international market concentration among a smaller number of large buyers (Djama *et al.*, 2011; FAO, 2017; Henson, 2008; Henson & Humphrey, 2009, 2011; McCluskey, 2007). Vertical integration enables retailers and major food companies to control their suppliers more directly, while concentration among these buyers reduces overall competition and market options for producers. Thus, many agri-food supply chains are “buyer-driven,” allowing leading firms to dictate terms of production. These changes in market conditions have left many farmers with few options for market access aside from the major buyers, who have significant leverage for production conditions over farmers (Gereffi, 1996; Rastoin, 2000, 2008).

Private standard-setting bodies have become key actors in pesticide governance as they set criteria for agricultural production—including, for some standards, hazardous pesticides that cannot be used. Different private standard-setting bodies and their respective stakeholders determine their own criteria for controlling or banning the use of a particular pesticide (Interviews 13, 16). Many NGO-led certification schemes have their own standard-setting committees that make use of extensive consultation processes when determining the scope, context, and timelines of standards (Interview 16). They decide which pesticide uses are to be restricted and under what circumstances, and regularly review past decisions and consider new restrictions. Many private agricultural standards have a “core” reference list of banned pesticides. In addition, standard-setting bodies make decisions on a case-by-case basis regarding whether a specific pesticide may be used or if it must be phased out, based on

consultations with stakeholders and based on different criteria including feasibility for producers (Interviews 13, 16). Some private standard-setting bodies also coordinate their decisions through umbrella organizations, such as the International Social and Environmental Accreditation and Labeling (ISEAL) Alliance in the realm of sustainability.

Our analysis focuses mainly on 11 major NGO-led agricultural sustainability standards and multi-stakeholder initiatives due to these standards' inclusion of pesticide control measures and data availability. There is currently no centralized database on all private agricultural standards, but the Standards Map of the ITC tracks the expansion of sustainability standards, including in the agricultural sector. Our selection of private agricultural sustainability standards is based on those covered by the most comprehensive report to date on markets of major products covered by sustainability standards by ITC's Meier *et al.* (2020). We focus on all of the private agricultural sustainability standards covered by this report aside from those for organic agriculture, since organic agriculture does not allow the use of synthetic pesticides. The 11 standards comprise a subset of the broader class of private standards which address agricultural issues. For these standards, the ITC reports detailed data for eight widely traded agricultural commodities: coffee, bananas, cotton, soybeans, palm oil, sugarcane, tea, and cocoa. Our selection is consistent with the standards covered in previous meta-analyses of sustainability certification schemes (DeFries *et al.*, 2017; Tayleur *et al.*, 2017). In addition, we use qualitative survey data on UK retailers from the Pesticide Action Network (PAN) to inform our analysis (Pesticide Action Network UK, 2019).

Commodities certified by private sustainability standards still occupy a relatively small part of the global agricultural market, but many of these standards are growing rapidly in their coverage of the overall market, as they are no longer serving only niche markets. The eight agricultural commodities included in the 11 selected standards in 2018 covered between 2 percent (soybeans) and 27 percent (cocoa) of the total global land area for these crops (Meier *et al.*, 2020). The combined land area covered by these eight agricultural commodities grew by over 50 percent between 2014 and 2018, to a combined area of at least 19 million hectares (Meier *et al.*, 2020). Growth rates have been particularly high for certain commodities: from 2014 to 2018, certified cotton acreage (which covers the largest area among certified commodities globally) grew by 173 percent, followed by cocoa (+90 percent) and sugarcane (+75 percent). In contrast, the total area of coffee produced that was covered by these 11 standards shrunk by 12 percent during the same time period (Meier *et al.*, 2020).

4. Interactions between public and private actors in international pesticide governance

The growth in private sustainability standards raises questions regarding the mechanisms and pathways of interactions between private-standard setting bodies and public decisionmaking bodies in the global governance sphere. In this section, we address our first research question, examining how private agricultural standard-setting bodies and parties involved in international treaty-based pesticide governance interact. We pay particular attention to how decisions by private standard-setting bodies influence multilateral policymaking by parties to the Rotterdam Convention.

The lists of chemicals covered by the Montreal Protocol, the Stockholm Convention, and the Rotterdam Convention, as developed by the parties to these treaties, are part of the core list of banned pesticides for many private agricultural standards (Table 2). The use of the Stockholm Convention and Montreal Protocol lists of controlled pesticides as ban lists by private standard-setting bodies aligns with those treaties' own goals of phasing out the production, use, and trade of hazardous chemicals. In addition, private standard-setting bodies' inclusion of pesticides controlled by the two treaties on their individual ban lists can increase the geographical scope of these bans by also affecting agricultural producers in non-parties to the two treaties (in cases where pesticides controlled by the treaties are not banned by national authorities in non-parties). Fewer private standards use the Montreal Protocol list. However, since this treaty includes only one pesticide with limited remaining uses and applicability for these standards under the existing critical use exemptions, its more limited adoption is not surprising. Unlike the other two global chemicals treaties, though, the Rotterdam Convention was not designed as a banning instrument. The use of the Rotterdam PIC list as a ban list means that any new listing on the PIC list—regardless of whether the nomination was based on bans, severe restrictions, or local problems with use in a single country—leads to a ban for all producers complying with 10 of the 11 major private standards worldwide (see Table 2). For example, listing either carbosulfan (nominated by a single country as a SHPF; see step #1, pathway

Table 2 Adoption of international chemical treaty listings as a ban list by selected private standards

Standard	Background information for selected commodities				Chemicals lists used			Additional citations
	Year founded	Number of countries in which the standard has certified producers	Member of the IPM Coalition†	Commodities included	Rotterdam Convention	Stockholm Convention	Montreal Protocol	
Global Coffee Platform (formerly the 4C Association)	2003	28	✓	Coffee	✓	✓	✓	4C Association et al. (2016), ITC (2020)
Better Cotton Initiative (BCI)	2009	14‡	✓	Cotton	✓	✓	✓	Better Cotton Initiative (2018), ITC (2020)
Bonsucro	2011	10	✓	Sugarcane	✓	✓	✓	4C Association et al. (2016), ITC (2020)
Cotton Made in Africa	2005	10‡		Cotton	✓	✓	✓	Cotton Made in Africa (2014, 2021)
Fairtrade International§	1997	75	✓	Bananas, cocoa, coffee, cotton, sugarcane, tea	✓	✓	✓	4C Association et al. (2016), Fairtrade (n.d.)
Global GAP	1997	136		Bananas				N/A
Proterra	2006	39		Soybeans, sugarcane	✓			Proterra (2018)
Rainforest Alliance¶	1987	70	✓	Bananas, cocoa, coffee, palm oil, tea	✓	✓	✓	4C Association et al. (2016), Rainforest Alliance (2021a) RSPO (2018)
Roundtable on Sustainable Palm Oil (RSPO)	2004	16		Palm oil	✓			
Roundtable on Responsible Soy (RTRS)	2006	9		Soybeans	✓	✓	✓	ITC (2020), RTRS (2017)
UTZ Certified¶¶	1997	87	✓	Cocoa, coffee, tea	✓	✓	✓	4C Association et al. (2016), Auld (2010)

†The Integrated Pest Management (IPM) Coalition is a working group of the ISEAL Alliance formed in 2016 which “aims to reduce and eventually eliminate the use of highly hazardous pesticides, and to promote more sustainable alternatives. It also aims to harmonize approaches to pesticides between ISEAL member standards” (IPM Coalition, n.d.). ‡The 10 countries in which Cotton Made in Africa certifies producers are also recognized as meeting the benchmarked standard of the Better Cotton Initiative, which as a result counts 24 countries as members. The two are considered separately in our analysis to maintain consistency with the data and methodology in Meier et al. (2020). §Fairtrade International officially formed in 1997 but merged existing fair-trade initiatives, including the world’s first fair trade certification mark (the Max Havelaar label), launched in 1988 (Fairtrade, n.d.). ¶The 1997 initiation date marks the foundation of UTZ Kapeh (Auld, 2010), which became UTZ Certified in 2002. Rainforest Alliance merged with UTZ Certified in 2018, forming a new organization that carries forward the Rainforest Alliance name (Rainforest Alliance, 2021b). We distinguish between the two since data are still reported separately in Meier et al. (2020). Data regarding the number of countries in which these two certifications have producers are from 2018. Source: Meier et al. (2020), IPM Coalition (n.d.), and individual standards’ websites and reports listed in the additional citations column.

d in Fig. 1) or acetochlor (nominated through two bans each affecting many countries in two different regions; see step #1, pathway a in Fig. 1) would similarly result in an automatic use ban for certified producers.

Dynamics among private standard-setting bodies play an important role in affecting the overall uptake of the PIC list among a broader range of standards. This includes collective action and peer-to-peer learning, which can lead to greater harmonization and adoption of collectively established best practices, as well as competitive dynamics among standards (Fransen, 2015; Lambin & Thorlakson, 2018; Loconto & Fouilleux, 2014). ISEAL has a working group dedicated to decreasing the use of highly hazardous pesticides, the Integrated Pest Management (IPM) Coalition, in which 6 of the 11 standard-setting bodies participate (Table 2). In 2016, this group released a statement committing to banning pesticides listed under the Rotterdam Convention (as well as the Stockholm Convention and the Montreal Protocol), specifying that “if the international convention lists are updated, each of us will also update our banned lists accordingly as soon as possible” (4C Association et al., 2016). As an interviewee at one private agricultural standard-setting body involved in the IPM Coalition explained, “Because we are a voluntary standard, our mission is to improve cotton production over the baseline. [...] And when you need to decide what pesticides to target, it does make sense to build on [the PIC list]” (Interview 13). The interviewee also emphasized the importance of competitive dynamics among sustainability standards. Both competition among standard-setting bodies and their need for political legitimacy are increasing in light of the rapid proliferation of private standards and mounting pressures from NGOs and consumers concerned with food system sustainability issues (Lambin & Thorlakson, 2018). Before ISEAL made a collective decision to ban PIC-listed chemicals, aligning with the pesticide standards set by peers within the ISEAL Alliance was a key motivating factor in driving the standard-setting bodies’ decision to transition from the use of the PIC list as a non-mandatory criterion to a mandatory ban since these peers had already done so (Interview 13). These competitive dynamics may explain why other ISEAL members outside of the IPM Coalition have also adopted the PIC list.

Private standard-setting bodies’ collective action strategies, including the incorporation of pesticides covered by the three global chemicals treaties on their own ban lists, are part of their ongoing strategic need to construct and maintain political legitimacy, in part based on scientific credibility (Bernstein & Cashore, 2007). Previous research suggests that the construction of political legitimacy among stakeholders (including farmers and industry and civil society organizations as well as consumers) is a critical component of private actors’ ability to gain authority through “non-state market-driven governance” (Cashore, 2002; Partzsch et al., 2019; van der Ven, 2019). Private bodies setting sustainability standards (such as ISEAL) use collective action to create “meta-standards” as one part of this process, engaging external public and private actors in the standard-setting process to gain scientific credibility vis-à-vis donors, companies, and consumers as a “gold standard” in sustainability (ISEAL Alliance, 2021; Loconto & Fouilleux, 2014; Interview 13). Interviewees from standard-setting organizations and the pesticide industry explained that the adoption of the PIC list is also part of this process, as private standard-setting bodies generally lack in-house scientific expertise regarding each of the issues on which they are potentially setting guidelines due to capacity and resource constraints (Interviews 9, 13, 16).

Private standard-setting bodies differ in the extent to which they defer to lists from the international treaties in their own decisionmaking processes and generally use the PIC list as only one source for their decisionmaking. Even so, as stated by a representative of PAN, the PIC list is considered “the core list for all standards. Usually it’s the Stockholm Convention, the Rotterdam Convention, and maybe the WHO [criteria for ‘extremely hazardous’ (1a) and ‘highly hazardous’ (1b) chemicals], but those [pesticides] are the ones they are the toughest on” (Interview 14). Because many private agricultural standard-setting bodies do not make a distinction between the three main global chemicals treaties, the PAN representative viewed the Rotterdam Convention PIC list as just “another list that standards or companies could just take off the shelf and apply” (Interview 14). Another interviewee from CropLife International similarly considered the PIC list as an example of different “resources that can be used as proxies for [standard-setting bodies’] decision-making” (Interview 9). The following shows how the PIC list’s symbolic and practical role is interpreted by PAN, which is pushing for stronger global action on pesticides: “the Rotterdam Convention is about identifying problematic pesticides and sharing information [...] and there was a lot of consensus that these pesticides are the problem pesticides” (Interview 14). As another interviewee from a standard-setting body noted:

It is an easy solution for us to refer to those because then we don't have to organize that consensus ourselves because this is effectively an outcome of a consensus already. We imply in our standards that all of this work—guidance, conventions—that has been issued by UN agencies that is relevant to our work (WHO, FAO, ILO, mostly) comes with a high level of credibility. (Interview 13)

The above statement reveals how the PIC list is (mis)interpreted by some private standard-setting bodies as a reflection of an international “consensus” on hazards related to each pesticide, rather than as an acknowledgment that a pesticide has been included on the PIC list to control international trade according to specific criteria which may reflect a variety of underlying national and regional regulations, conditions, and problems. Representatives of standard-setting bodies interviewed were unaware of details of the negotiation dynamics in the Rotterdam Convention (Interviews 13, 16). One representative of a private standard-setting body also emphasized that stakeholders involved in that organization’s consultation processes (such as producer networks, traders, and marketing organizations) see the PIC list as a “neutral” input, in contrast with how they view recommendations for banning issued by NGOs such as PAN (Interview 13). The representative argued: “PAN’s list is PAN’s own interpretation of the Highly Hazardous Pesticide concept. We would not consider that. PAN is not considered by our stakeholders as a neutral body” (Interview 13). Other standard-setting bodies do incorporate external scientific expertise and advice from NGOs in their decisionmaking process, but final decisions on which pesticides to ban are made internally, according to a representative of Fairtrade International (Interview 16).

In addition to the NGO-led and multi-stakeholder sustainability standards in Table 2, retailers play a role in transforming the PIC list into a ban list. First, some retailers are adopting the PIC list as a standard for their own-brand products (Pesticide Action Network UK, 2019, unpublished data; Interview 5). Supermarkets use different criteria to decide which active substances to prohibit, restrict, or monitor. For example, in the United Kingdom, both Tesco and Sainsbury’s include the PIC list as a criterion for hazard classifications, while Asda and Marks & Spencer automatically ban PIC-listed substances (Asda, n.d.; Marks & Spencer, 2018; Pesticide Action Network UK, 2019). Retailers sometimes take these measures due to NGO pressure to decrease the use of pesticides in their supply chains (Interview 14). Given the size, concentration, and market power of a relatively small number of transnational food retailers, these internal standards are dominant in terms of the volume of agricultural production they influence globally through buyer-driven supply chain models (Fuchs et al., 2011). Retailers’ uptake of the PIC list thus further extends the geographic scope of agricultural commodities affected by pesticide restrictions and bans beyond those instituted by multi-stakeholder and civil society-led certification schemes.

Retailers are also increasing their sourcing of externally certified agricultural commodities. This includes buying produce from ISEAL Alliance members such as Fairtrade (Pesticide Action Network UK, 2019). Many UK retailers report that the proportion of ISEAL-certified products they sell has grown over the past five years, and many have plans or policies in place to continue increasing such procurement in the future (Pesticide Action Network UK, 2019). The retailer consortium GlobalGAP is the only standard in Table 2 that has not adopted the PIC list, instead relying on national legislation for its decisionmaking processes. One potential explanation for this is its unique initial design as a retail consortium standard for which consumer labeling was initially not allowed (Henson & Humphrey, 2010), unlike all of the other standards in Table 2. GlobalGAP is not part of the ISEAL Alliance, and, until April 2021, was principally a business-to-business label that was not explicitly sustainability focused. GlobalGAP’s members include many powerful retailers such as Walmart, Aldi, and Lidl, whose motivations for adhering to GlobalGAP relate more to market drivers such as competitive advantage than mission drivers such as minimizing environmental problems (Mook & Overdeest, 2021). In the next section, we discuss how the adoption of the PIC list by some standard-setting bodies affects the multilateral decisionmaking process independently of its degree of adoption by different standards.

5. Private governance impeding treaty-based governance

The increase in the scope and stringency of private agricultural standards raises questions about how this development may shape multilateral efforts to strengthen global treaty-based pesticide governance. In this section, we address our second research question of how interactions between private agricultural standard-setting bodies

Table 3 Pesticides approved by the Rotterdam Convention's Chemical Review Committee whose addition to Annex III did not reach consensus in the Conference of the Parties

Pesticide	Category	First regulatory action notification (PIC region)	Second regulatory action notification (PIC region)	Meeting at which pesticide was considered and blocked	Meeting at which pesticide was approved	Parties that raised objections to listing during a COP
Endosulfan	Pesticide	EU (Europe)	CILSS‡ countries (Africa)	COP-4 (2008)	COP-5 (2011)	Brazil, China, India, Iran, Pakistan, United States
Trichlorfon	Pesticide	EU (Europe)	Brazil (Latin America & the Caribbean)	COP-7 (2015)	COP-8 (2017)	India
Carbosulfan	Pesticide	EU (Europe)	CILSS countries (Africa)	COP-8 (2017)	Not approved	Brazil, India, Indonesia, Kenya
Fenthion	SHPF†	Chad (Africa)	N/A†	COP-7 (2015)	Not approved	Ethiopia, Kenya, Sudan, Uganda
Paraquat	SHPF	Burkina Faso (Africa)	N/A	COP-6 (2013)	Not approved	Chile, Guatemala, Honduras, India, Indonesia
Acetochlor	Pesticide	EU (Europe)	CILSS countries (Africa)	COP-9 (2019)	Not approved	Argentina, Chile

†SHPF refers to “Severely hazardous pesticide formulation.” SHPF nominations are based on a notification from a single developing country indicating domestic problems with a pesticide (see details in Section 3). ‡CILSS: Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (Permanent Interstate Committee for Drought Control in the Sahel). CILSS comprises Benin, Burkina Faso, Cape Verde, Chad, Côte D'Ivoire, Gambia, Guinea Bissau, Mali, Mauritania, Niger, Senegal, and Togo. Inter alia, this group of Sahelian countries coordinates their pesticide approval processes and has submitted joint notifications of regulatory actions. *Source*: IISD (2008, 2011, 2013, 2015, 2017, 2019), UNEP/FAO (n.d.-a, n.d.-b, n.d.-c, n.d.-d, n.d.-e, 2014).

and parties involved in international treaty-based governance affects pesticide governance. To this end, we explore characters of interactions, the effects of interactions, and how interactions may change over time.

Private standard-setting bodies' banning of hazardous pesticides could be seen as complementary to the objectives of the global chemical treaties. By contributing to the implementation, monitoring, and compliance stages of the regulatory process, private agricultural standards may reinforce the goals of decreasing the human health and environmental impacts of hazardous chemicals—the broader goal of many governance instruments (including global chemicals treaties). This overlap in decisions taken by private standard-setting bodies and parties to multilateral chemical agreements in practice results in an increase in the number of people and ecosystems which are less exposed to hazardous pesticides. This suggests the existence of synergies between private and public governance, in particular as certain private agricultural standards increase in scope and stringency. However, the effects of relationships between public and private actors in the area of pesticide governance are changing over time.

In the case of the Rotterdam Convention, private standard-setting actors' adaptation of the PIC list to their own ends has started to affect treaty decisionmaking processes, slowing down the addition of more pesticides to the PIC list and thereby potentially weakening the Rotterdam Convention's effectiveness. At each COP since 2008, various parties to the Rotterdam Convention have begun blocking the addition of several chemicals approved by the Chemical Review Committee to the PIC list, starting with endosulfan (Table 3). During this time, the Chemical Review Committee approved the listing of five more pesticides that were subsequently blocked by a small number of parties during COP meetings (see Table 3 and steps 3 and 4 in Fig. 1). At COP-9 in 2019, all four pesticides considered for inclusion on the PIC list were blocked—including paraquat, which had been considered at four consecutive COPs (Earth Negotiations Bulletin, 2019). For each of these pesticides, the COP

reached consensus that the criteria for listing had been met; in each case, however, a small number of parties objected and prevented these pesticides from being added to the PIC list (Table 3).

The growing political contention surrounding blocked pesticides since the late 2000s has led to a debate among Rotterdam Convention parties and other stakeholders around the effects of adding chemicals to the PIC list. In 2015, the COP established a working group to examine how to improve the listing process, after four out of the five nominated chemicals were not approved for listing at COP-7 that same year (UNEP/FAO, 2016). This working group attributed the lack of consensus for listing to “a variety of factors,” including that “there might be a *misconception* amongst certain Parties that listing constitutes an outright ban on the use of the chemical” (UNEP/FAO, 2016; emphasis added). This point about a prevailing misconception was reiterated in a number of interviews with NGO representatives, government representatives, and staff at the Rotterdam Convention Secretariat (Interview 1, 15, 17, 18). However, this point was also strongly refuted by one national delegate to the COP: “Everyone reads the convention. The convention does not ban” (Interview 7). Instead, many parties are concerned about whether or not a new listing of a pesticide on the PIC list affects pesticide trade, prices, and use following actions by national governments (possibly impacting both producers and users).

Empirical studies show some evidence of market effects on commercially valuable pesticides following a listing on the PIC list (Núñez-Rocha & Martínez-Zarzoso, 2019; Whiting *et al.*, 2017). These effects may include a reduction in trade volumes or market prices, though impacts vary for different listed pesticides and importing countries. The presence of some market effects may be explained by the fact that at least three kinds of actions by national governments can lead to reduced trade in PIC listed pesticides: party refusals of imports through the PIC procedure, national bans based on PIC listings, and intergovernmental work phasing out PIC-listed pesticides. Whiting *et al.* (2017) highlight the difficulty of differentiating the effect of listing a chemical under the Rotterdam Convention from other long-term trends affecting each pesticide’s use and trade, as well as the difficulty of undertaking such analyses due to a lack of publicly available data. Moreover, as highlighted by several interviewees, trade effects should be “irrelevant” to the listing of a pesticide under the broader objectives of the Rotterdam Convention (Interviews 3, 4, 15). Nonetheless, the fear of potential trade or price effects may give pesticide-producing countries economic incentives to block the addition of new pesticides.

While countries with large pesticide manufacturers may have economic incentives to prevent the addition of more pesticides to the PIC list, data show that the countries which have blocked listings of additional pesticides at Rotterdam Convention COPs in recent years generally have not been major producers of the specific pesticides being considered for listing (see Table 3). Although internationally comparable data on pesticide production is difficult to obtain, we draw this conclusion based on self-reported data from parties to the Secretariat (UNEP/FAO, *n.d.-a*, *n.d.-b*, *n.d.-c*, *n.d.-d*, *n.d.-e*, 2014). Several parties where some of the world’s largest pesticide producing firms are located, notably the EU and Switzerland (with the United States being a non-party to the Rotterdam Convention), have even actively pushed for additions to the PIC list of pesticides that chemical firms within their territories produce. The notable exception was endosulfan, for which Indian firms are major producers; India was the major party opposing the addition of endosulfan to the PIC list (IISD, 2008). The listing only succeeded following intensive NGO campaigning showing the detrimental effects of use within the country where farmers are major users of endosulfan (Interview 4).

The adoption of the PIC list as a ban list by private agricultural standard-setting bodies partially invalidates the argument that a PIC listing does not equal a ban, complicating the debate among parties and other stakeholders around the effects of adding a chemical to the PIC list. Countries have blocked negotiations for trade interests more directly related to pesticide production in the past (such as India with endosulfan), but in these cases the role of their national interests is so conspicuous that it is a difficult position to maintain diplomatically, because the PIC mechanism emphasizes the sovereign right of each party to make its own trade-related decisions. However, the mistranslation of the PIC list by private agricultural standard-setting bodies lends more weight to arguments related to negative trade and economic impacts made by some parties who seek to block listings. It also increases incentives for both pesticide-producing/exporting countries and pesticide-consuming countries to oppose a listing. Private standard-setting bodies’ bans of PIC-listed pesticides may impact a larger number of countries relative to individual countries rejecting imports of PIC-listed pesticides or adopting national use bans. Decisions by standard-setting bodies affect agricultural production in all countries in which certified producers operate as well as the home countries of pesticide manufacturers. This includes non-parties to the Rotterdam and

Stockholm Conventions. For example, agricultural producers and pesticide manufacturers in the United States may be impacted by changes to private agricultural standards that both limit the use of a pesticide in the United States and decrease exports of US pesticide manufacturers.

The growing scope and importance of private agricultural sustainability standards influence the traditional sovereign rights of national governments to make decisions related to domestic pesticide use. While a party to the Rotterdam Convention could consent to the import of a PIC-listed pesticide because such use is not prohibited under national law, that pesticide may still be *de facto* banned for use on certified agricultural land within that country as a result of decisions by private standard-setting bodies. This indirectly challenges parties' sovereign right to make decisions about pesticide imports and use, also subverting the logic of allowing each party to make their own decisions on the possible import of PIC-listed chemicals which allowed the Rotterdam Convention to come into existence in the first place. This erosion of national sovereignty may be of particular relevance for developing countries that may not welcome transnational private governance initiatives for a variety of reasons, including due to perceived threats to their sovereignty (Marques & Eberlein, 2021; Schouten & Hospes, 2018).

Countries where use bans under private agricultural standards would have a large impact on the production of a specific agricultural commodity may be particularly sensitive to the addition of new pesticides to the PIC list. This is especially relevant if the area covered by private agricultural standards is growing. For example, a Brazilian delegate to the Rotterdam Convention COP cited potential impacts of listing carbosulfan (a pesticide that has been blocked for approval by the COP for two consecutive meetings) on the country's cotton-producing sector, which is highly dependent on this pesticide (Interview 11). Over 90 percent of Brazil's cotton was certified under Better Cotton Initiative (BCI) in 2018.² In anticipation of a potential BCI ban on the use of carbosulfan, the Brazilian cotton industry lobbied the government to block its listing (Interview 11). Similarly, at COP-9 in 2019, an Indonesian delegate expressed concern about listing paraquat due to its potential influence on the palm oil industry, which also has a large share of privately certified producers. Representatives of the pesticide industry consider the adoption of the PIC list by private standard-setting bodies to be the effect of listing pesticides under the Rotterdam Convention that countries are most concerned with (Interviews 5, 9, 12). One national delegate echoed that private standard-setting bodies' use of the PIC list has been a motivation for parties' blocking additional listings (Interview 11). The high degree of industry concentration (as a proportion of profit or sales, market share, production, or trade volume) of other key commodities covered by private agricultural sustainability standards—notably palm oil, cocoa, soybeans, bananas, and coffee—can also increase industry incentives and resources to mobilize against regulatory actions that may increase their costs of commodity production, including the addition of a pesticide to the PIC list (Folke *et al.*, 2019).

Concerns by commodity users related to pesticide access and associated lobbying efforts are likely to grow over time since many of the pesticides in consideration for addition to the PIC list remain commercially valuable and in widespread use (Interview 5). Many of the 22 pesticides initially on the PIC list were already widely banned, but recent and proposed additions to the list include a growing number of pesticides that are in extensive use and have significant market value. The Rotterdam Convention Secretariat has received notifications of final regulatory action for over 200 pesticides from one region and for which one more notification from another region would warrant its review by the Chemical Review Committee (UNEP/FAO, 2019). Of these notifications, over 80 percent are bans and only 16 percent severe restrictions. At the Chemical Review Committee meeting in September 2021, seven pesticides were on the meeting agenda — more than at any previous meeting (UNEP/FAO, 2020). Many countries, however, have struggled to submit notifications that fully meet the specific procedural requirements set out in the Rotterdam Convention Annexes. With this in mind, the Food and Agriculture Organization of the United Nations has been working with countries to increase their regulatory capacities and ability to submit complete notifications. It is thus reasonable to expect that the number of complete PIC list nominations will continue to grow.

In the context of recent blockages of additions to the PIC list, the Rotterdam Convention decisionmaking process has come under scrutiny by various parties aiming to increase the treaty's effectiveness. This includes parties, such as the EU and Switzerland, which are actively pushing for PIC list additions to enhance the international control of hazardous chemicals. In 2017, a group of African countries³ submitted a proposal to amend Article 22 of the Rotterdam Convention to change this decisionmaking process, as the effectiveness of the treaty depends on the ability to add chemicals over time (UNEP/FAO, 2017). Arguing that the Rotterdam Convention's

Table 4 Summary of dimensions of public–private interactions in international pesticide governance following Eberlein et al. (2014)

Dimension of interaction	Public–private interactions in international pesticide governance
Who or what interacts	<ul style="list-style-type: none"> • Parties to chemicals treaties • Private standard-setting bodies and their respective stakeholders
Drivers and shapers	<ul style="list-style-type: none"> • Goal to protect human health and the environment from hazardous pesticides • Processes for adding chemicals to treaties • Transnational supply chains • Scope and context of private agricultural standards
Mechanisms and pathways	<ul style="list-style-type: none"> • Standard-setting bodies adopt the Rotterdam Convention PIC list as a ban list
Type of interaction	<ul style="list-style-type: none"> • Confounding interaction
Effects of interaction	<ul style="list-style-type: none"> • Reductions in use of PIC-listed pesticides • Changes in Rotterdam Convention parties' interests with respect to listing new chemicals on the PIC list • Increasing difficulty in adding chemicals to PIC list • Potential reduction in effectiveness of the Rotterdam Convention
Change over time (from time of chemical treaties' adoption to 2022)	<ul style="list-style-type: none"> • From inclusion of small number of little-used, highly hazardous pesticides on the Rotterdam Convention PIC list to COP considering the addition of many widely used pesticides with high market value • From a global market context in which private agricultural standards played a marginal role to a context in which the reach of private standards is widespread and continually growing

Source: Authors.

effectiveness is undermined by the consensus-based listing process and opposition to listing from a small number of countries, this group proposed an amendment that would allow parties to list chemicals with a three-fourths majority vote as a last resort if all other efforts to reach consensus have been exhausted. This is equivalent to the current procedure for adding new annexes to the Rotterdam Convention and is also the same as the procedure for chemical additions under the Stockholm Convention (Interview 4). However, the amendment was opposed by several countries and dropped for consideration at future meetings (IISD, 2019). Such an amendment would likely have allowed for the addition of more pesticides than is possible through consensus-based decisionmaking. It could also have had mixed implications for private standards: though supporting the phase-out of hazardous pesticides, it may have created complications for standard-setting bodies' implementation of many new bans as these bodies already face difficulties in phasing out currently banned pesticides in some countries (Interview 13).

6. Discussion

This article examines how a rise in private agricultural standards influences multilateral decisionmaking processes under global chemical treaties and in particular the Rotterdam Convention. Table 4 summarizes the empirical results of our study following the six dimensions of interactions outlined by Eberlein et al. (2014). We show how private agricultural standard-setting bodies have adopted their own ban lists based on pesticides listed by parties to the three main multilateral agreements addressing pesticides, including the Rotterdam Convention PIC list. These actions by private standard-setting bodies may at first appear to be both complementary and competitive in character relative to actions taken by bodies under the chemicals treaties, as a reduction in the use of hazardous pesticides by farmers adhering to private standards is consistent with treaty-related goals of protecting the environment and human health. However, private standards' use of the PIC list to develop their own ban lists also changes the Rotterdam Convention parties' interests with respect to the listing of new chemicals on the PIC list. This is because this transparency mechanism related to the international trade of hazardous pesticides becomes a *de facto* ban list for pesticide use by farmers complying with certain private agricultural standards. This, in turn, has negatively impacted the ability of the parties to the Rotterdam Convention to reach consensus on adding more pesticides to the PIC list, potentially reducing the Rotterdam Convention's effectiveness over time.

Our results are of direct relevance for theorizing public–private interactions, for understanding important dynamics in Rotterdam Convention negotiations, and for understanding private standard-setting processes. First, our findings have implications for theorizing interactions between public and private actors in international governance. Insights from public and private pesticide governance reinforce arguments in the literature suggesting that temporal dynamics play a critical role in defining the nature of interactions (Cashore et al., 2021; Eberlein et al., 2014). Building on the notion that public–private interactions must be examined as a process, we have shown how relationships change dynamically, particularly in the context of global treaties designed to allow for ratcheting up controls over time. Simultaneous to negotiations regarding additions to the PIC list, the rapid expansion of private agricultural standards that are sustainability focused makes them a stronger potential “threat” to pesticide producers and users. This can lead to stronger lobbying of national governments who are parties to the chemical treaties, both by national industries and by non-parties affected by pesticide additions who participate at the negotiations as observers. Their appeals may carry stronger rhetorical weight when a non-banning mechanism has been translated into a ban by transnational private actors.

Our findings reveal dynamics in relationships between public and private authority in the area of pesticide governance that do not fit neatly within a single interaction “type” in Cashore et al.’s (2021) theoretical framework. Although, as noted above, private standards share a broad objective with the chemicals treaties of protecting human health and the environment from hazardous chemicals, the interaction that we document cannot be considered complementary as it does not involve active pursuit of a similar goal on behalf of public and private actors (such as in the case of collaboration or coordination), nor the convergence of similar governance mechanisms under the pursuit of dissimilar goals (such as in the case of isomorphism). Since representatives from the standard-setting bodies interviewed were unaware of the negotiation dynamics in the Rotterdam Convention and private standard-setting bodies are not intentionally or antagonistically interacting with treaty-based bodies, this suggests a more indirect form of interaction than competition. Due to their shared overarching goals, governance efforts by private standard-setting bodies and treaty bodies cannot be considered to be coexistent either, as this type of interaction is characterized by divergent governance goals and strategies in a shared governance space.

Adding to the three types of interactions defined by Cashore et al. (2021), we use the term *confounding* to describe a new, fourth type of interaction in which indirect interactions between public and private actors with broadly aligned goals result in unexpected counteracting feedback effects. As demonstrated by our analysis, a confounding interaction occurs when public and private governors share overarching objectives, but private actors seeking to gain legitimacy by adopting certain components of public governance inadvertently affect public regulatory decisionmaking processes and provoke consequences that are contrary to their own goals. Such unintended consequences involving institutional linkages between (international) public law and private standards may be more likely in cases where the shared problem definition among public and private actors is broad. Confounding interactions may be mediated by intermediary actors such as NGOs pushing for more stringent private standards, which can play a role in alerting private actors of specific public governance processes or instruments.

Our findings highlight the importance of considering actors’ intentionality and the heterogeneity among private actors in analyses of their interactions with public regulatory processes, consistent with previous research on sustainability governance (Lambin & Thorlakson, 2018; Verbruggen & Havinga, 2017). A growing literature, for example, examines the conditions in which competition between standards leads to a “race to the bottom” or “race to the top” and consolidation or differentiation among standards (e.g., Overdevest, 2010). Even among those private standards we analyze, standard-setting bodies differ in the extent to which they defer to lists from the international treaties in their own decisionmaking processes. Some private standards have banned the use of many more pesticides than those on the international treaty lists, while others appear to rely on the international lists more heavily. Organizational and political economy perspectives on standards, such as those applied by Brunsson et al. (2012), highlighting the heterogeneity and dynamic aspects of standards could help explain how different standard-setting bodies make decisions on different issues (e.g., which pesticides to ban) and the factors that influence these decisions (such as competition among standards) (Dietz & Grabs, 2021). Such perspectives are currently underrepresented in the regulation literature.

Second, our findings help explain recent negotiation blockages under the Rotterdam Convention. Several parties opposing new listings of pesticides on the PIC list may do so out of a concern that such a listing would

automatically result in a use ban of listed pesticides by private standard-setting actors. This use of the PIC list by private standard-setting bodies can enhance economic concerns for parties with strong agricultural sectors which have a large portion of commodities grown adhering to private standards. This is especially true as pesticides recently considered for addition to the PIC list are in more widespread use than most of those pesticides that were initially added to the PIC list, and private agricultural standards' importance continues to grow. These dynamics both increase the potential for lobbying from powerful pesticide manufacturers and users and potentially undermine the sovereignty of parties wishing to allow the use of PIC-listed pesticides within their national borders. Although private actors' adoption of the PIC list as a ban may be considered favorably by actors advocating for more stringent global pesticide controls, it contradicts one of the foundational principles which allowed the Rotterdam Convention to come into existence.

Third, our findings call attention to the ways in which private standards' own legitimating strategies are often intertwined with state-based decisionmaking. Private standards are sometimes presented by scholars as "technical" and "transcendent" of politics in a way that allows them to move faster than government regulation (Bartley, 2011). Yet, much literature has shown how standards reflect political dynamics of norm creation involving different interest groups during standard-setting processes, in the private as well as the public realm (Büthe & Mattli, 2014). We demonstrate how many private agricultural standards use international decisionmaking processes to bolster their own political legitimacy- and scientific credibility-building processes. Adopting internationally agreed-upon lists allows standards to avoid the lengthy and politically charged consultation process which may accompany adding pesticides individually. Pesticide regulation differs across countries precisely because it reflects value-laden interpretations of what kinds of risks are acceptable for society (Jasanoff, 1999). Appealing to "technoscientific values" (such as independence and objectivity, e.g., through the use of evidence from external experts) by relying on outcomes of internationally agreed processes allows private standard-setting bodies to eschew the responsibility and ensuing politics that surround controversial decisions associated with regulating pesticides (Arcuri & Hendlin, 2020; Bain *et al.*, 2010).

Private standard-setting bodies are equipped with processes to add pesticides to their ban lists independently of the Rotterdam Convention. The PIC list is only one component of such lists; it was adopted because stakeholders considered it to be a legitimate input. Research on standard-setting bodies highlights the variability of internal politics affecting their legitimation strategies and decisionmaking processes (Loconto & Fouilleux, 2014; Schleifer, 2019). Some standard-setting bodies are more constrained to balancing the interests of their internal stakeholders than others, and thus may depend more strongly on external processes to bolster their own legitimacy. Activist-backed standards may have more leeway to ratchet up than industry or multi-stakeholder initiatives, even if the latter purport to prioritize sustainability goals. Fairtrade International, for example, already bans a wide number of pesticides not included on the PIC list as a result of competition dynamics among standard-setting bodies and internal efforts to increase ambition. This and other examples (such as in organic agriculture; Fouilleux & Loconto, 2017) show how some private actors institutionalize stringent standards which build upon, but go beyond, national or supranational public standards. Such an approach involves using alternative sources of authority for evaluating pesticides to ban within their supply chains, such as independent scientific expertise. Making banning decisions based on scientific input nonetheless involves value-based judgments regarding which specific criteria to prioritize and which knowledge to base decisionmaking on. Standard-setting bodies with more leeway to incorporate independent scientific expertise may therefore have more potential to ratchet up ambition on pesticide restrictions independently of multilateral processes.

7. Conclusion

Our analysis highlights the need for scholars and policymakers to more fully consider complex interactions between public and private actors that may lead to unintended consequences within the current institutional patchwork of global governance. Using the case of pesticide governance, we show how private agricultural standard-setting bodies indirectly affect the multilateral decisionmaking processes of the Rotterdam Convention by adopting the PIC list to develop their own lists of banned substances. This alters the Rotterdam Convention's intended role, impeding efforts to add substances to the treaty by influencing the interests of some Rotterdam Convention parties with respect to the listing of new chemicals on the PIC list. This case illustrates how attempts

by private actors to impose stricter governance than state actors can undermine the potential for multilateral governance to become more stringent. Adding to the *complementary*, *competitive*, and *coexistent* interaction types defined by Cashore et al. (2021), we use the term *confounding* to describe this type of interaction in which institutional linkages between public and private actors who share broadly aligned goals results in unexpected and negative feedback effects. As demonstrated by our analysis, a confounding interaction can occur when private actors seeking to gain legitimacy by adopting certain components of public governance inadvertently affect treaty-based regulatory decisionmaking processes.

Similar dynamics of confounding interactions whereby private actors aiming for more stringent action unintentionally impact public decisionmaking processes could also exist in other sustainability areas beyond pesticide governance. Future research could examine the potential for confounding interactions in other international environmental issue areas. Such interactions may occur as a result of broad problem definitions and simultaneous efforts by public and private actors with heterogeneous interests to address these goals and ratchet up ambition through diverging and sometimes overlapping means. Additional empirically based analyses of interactions between private standard-setting bodies and multilateral decisionmaking under specific treaties or in other international fora could help to further clarify and expand upon interaction types and mechanisms theorized in the governance literature and to inform public policy debates on the potential role(s) of private standards in advancing sustainability. Better understanding the heterogeneity and motivations of private actors as well as power dynamics relative to the public sector is also critical to help inform discussions on bolstering sustainability outcomes more broadly. The potential for private governance to create feedback effects on public policymaking demonstrates the importance for researchers and policy-makers to more fully consider the roles of public and private sector actors in addressing sustainability issues in the global governance sphere.

Acknowledgments

The authors are very grateful to the representatives of national delegations, international organizations, NGOs, and industry associations that we interviewed specifically for this article. We also thank the Rotterdam Convention Secretariat for sharing its compilation of data on party import responses and final regulatory actions and Pesticide Action Network UK for sharing data from its retailer survey. We are grateful to Jennifer Allan and Florentine Koppenborg for helpful comments and discussion, and to the three anonymous reviewers for valuable input and suggestions.

This work has been supported by the Technical University of Munich Institute for Advanced Study, funded by the German Excellence Initiative and the European Union Seventh Framework Programme under grant agreement n° 291763.

Endnotes

- ¹ Pesticide Action Network UK shared specific data from this survey with the authors upon email request; it is currently unpublished.
- ² Based on BCI-certified area in 2018 (1,121,000 hectares) (Meier et al., 2020) and total post estimates for harvested area in 2018/2019 (1,200,000 hectares) (USDA, 2018).
- ³ The group of countries comprised the governments of Botswana, Cameroon, Ghana, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Swaziland, Tanzania, and Zambia.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

- 4C Association, Bonsucro, Fairtrade, Rainforest Alliance, SAN, UTZ Certified, & RSB. (2016). *Commitment to banning the ingredients from all three international conventions*. <https://web.archive.org/web/20210811124413/http://rsb.org/wp-content/uploads/2017/02/15-10-16-Intent-to-ban-ingredients-from-international-conventions-FINAL2.pdf>
- Arcuri, A., & Hendlin, Y. H. (2020). Introduction to the symposium on the science and politics of glyphosate. *European Journal of Risk Regulation*, 11(3), 411–421.
- Asda. (n.d.). *Plant protection products (pesticides)*. <https://web.archive.org/web/20210811124826/http://s7d2.scene7.com/is/content/asdagroceries/Asda.com/7.%20Sites/Environment/Asda-PlantProtectionProducts-report.pdf>
- Auld, G. (2010). Assessing certification as governance: Effects and broader consequences for coffee. *Journal of Environment and Development*, 19(2), 215–241.
- Bain, C., Ransom, E., & Worosz, M. (2010). Constructing credibility: Using technoscience to legitimate strategies in agrifood governance. *Journal of Rural Social Sciences*, 25(3), 160–192.
- Bartley, T. (2011). Transnational governance as the layering of rules: Intersections of public and private standards. *Theoretical Inquiries in Law*, 12(2), 517–542.
- Bernstein, S., & Cashore, B. (2007). Can non-state global governance be legitimate? An analytical framework. *Regulation & Governance*, 1(4), 347–371.
- Better Cotton Initiative. (2018). *Better Cotton: Principles and criteria*. <https://web.archive.org/web/20210811134605/https://bettercotton.org/wp-content/uploads/2014/01/Better-Cotton-Principles-and-Criteria-V-2.0.pdf>
- Bissinger, K., Brandi, C., Cabrera de Leicht, S., Fiorini, M., Schleifer, P., Fernandez de Cordova, S., & Ahmed, N. (2020). *Linking voluntary standards to Sustainable Development Goals*. ITC.
- Boedeker, W., Watts, M., Clausen, P., & Marquez, E. (2020). The global distribution of acute unintentional pesticide poisoning: Estimations based on a systematic review. *BMC Public Health*, 20(1), 1–19.
- Brunsson, N., Rasche, A., & Seidl, D. (2012). The dynamics of standardization: Three perspectives on standards in organization studies. *Organization Studies*, 33(5–6), 613–632.
- Busch, L. (2000). The moral economy of grades and standards. *Journal of Rural Studies*, 16(3), 273–283.
- Büthe, T., & Mattli, W. (2014). The politics of setting standards for financial reporting. In *The new global rulers* (pp. 99–125). Princeton University Press.
- Cashore, B. (2002). Legitimacy and the privatization of environmental governance: How non-state market-driven (NSMD) governance systems gain rule-making authority. *Governance*, 15(4), 503–529.
- Cashore, B., Auld, G., & Newsom, D. (2004). *Governing through markets*. Yale University Press.
- Cashore, B., Knudsen, J. S., Moon, J., & van der Ven, H. (2021). Private authority and public policy interactions in global context: Governance spheres for problem solving. *Regulation and Governance*, 15(4), 1166–1182.
- Cotton Made in Africa. (2014). *List of prohibited pesticide active ingredients under the CMIA verification system*. <https://web.archive.org/web/20210819134647/https://cottonmadeinafrica.org/wp-content/uploads/2020/03/List-of-prohibited-pesticide-active-ingredients.pdf>
- Cotton Made in Africa. (2021). *Project Regions*. <https://web.archive.org/web/20210811135124/https://cottonmadeinafrica.org/en/project-regions/>
- DeFries, R. S., Fanzo, J., Mondal, P., Remans, R., & Wood, S. A. (2017). Is voluntary certification of tropical agricultural commodities achieving sustainability goals for small-scale producers? A review of the evidence. *Environmental Research Letters*, 12(3), 1–11.
- D'Hollander, D., & Marx, A. (2014). Strengthening private certification systems through public regulation: The case of sustainable public procurement. *Sustainability Accounting, Management and Policy Journal*, 5(1), 2–21.
- Dietz, T., & Grabs, J. (2021). Additionality and implementation gaps in voluntary sustainability standards. *New Political Economy*, 27, 203–224.
- Djama, M., Fouilleux, E., & Vagneron, I. (2011). Standard-setting, certifying and benchmarking: A governmentality approach to sustainability standards in the agro-food sector. In P. Gibbon, S. Ponte, & J. Vestergaard (Eds.), *Governing through standards* (pp. 184–209). Palgrave Macmillan.
- Eberlein, B., Abbott, K. W., Black, J., Meidinger, E., & Wood, S. (2014). Transnational business governance interactions: Conceptualization and framework for analysis. *Regulation and Governance*, 8(1), 1–21.
- Fairtrade International. (n.d.). <https://web.archive.org/web/20220309163207/https://www.fairtrade.net/about/fairtrade-international>
- Falkner, R. (2003). Private environmental governance and international relations: Exploring the links. *Global Environmental Politics*, 3(2), 72–87.
- FAO (Food and Agriculture Organization of the United Nations). (2004). *Chemicals in the Rotterdam Convention*. <https://web.archive.org/web/20220402172422/https://www.fao.org/3/y5423e/y5423e03.htm>
- FAO (Food and Agriculture Organization of the United Nations). (2017). *The future of food and agriculture – Trends and challenges*. FAO.
- Folke, C., Österblom, H., Jouffray, J. B., Lambin, E. F., Adger, W. N., Scheffer, M., Crona, B. I., Nyström, M., Levin, S. A., Carpenter, S. R., Anderies, J. M., Chapin, S., III, Crépin, A. S., Dauriach, A., Galaz, V., Gordon, L. J., Kautsky, N., Walker, B. H., Watson, J. R., ... de Zeeuw, A. (2019). Transnational corporations and the challenge of biosphere stewardship. *Nature Ecology and Evolution*, 3(10), 1396–1403.
- Fouilleux, E., & Loconto, A. (2017). Voluntary standards, certification, and accreditation in the global organic agriculture field: A tripartite model of techno-politics. *Agriculture and Human Values*, 34(1), 1–14.
- Fransen, L. (2015). The politics of meta-governance in transnational private sustainability governance. *Policy Sciences*, 48(3), 293–317.

- Fuchs, D., Kalfagianni, A., & Havinga, T. (2011). Actors in private food governance: The legitimacy of retail standards and multistakeholder initiatives with civil society participation. *Agriculture and Human Values*, 28(3), 353–367.
- Fulponi, L. (2006). Private voluntary standards in the food system: The perspective of major food retailers in OECD countries. *Food Policy*, 31(1), 1–13.
- Gereffi, G. (1996). Global commodity chains: New forms of coordination and control among nations and firms in international industries. *Competition & Change*, 1(4), 427–439.
- Grabs, J., Auld, G., & Cashore, B. (2021). Private regulation, public policy, and the perils of adverse ontological selection. *Regulation and Governance*, 15(4), 1183–1208.
- Green, J. F. (2013). *Rethinking private authority*. Princeton University Press.
- Green, J. F., & Auld, G. (2017). Unbundling the regime complex: The effects of private authority. *Transnational Environmental Law*, 6(2), 259–284.
- Hale, T. (2016). “All hands on deck”: The Paris agreement and nonstate climate action. *Global Environmental Politics*, 16(3), 12–22.
- Hale, T. (2020). Transnational actors and transnational governance in global environmental politics. *Annual Review of Political Science*, 23(1), 202–220.
- Haufler, V. (2001). *A public role for the private sector: Industry self-regulation in a global economy*. Carnegie Endowment for International Peace.
- Henson, S. (2008). The role of public and private standards in regulating international food markets. *Journal of International Agricultural Trade and Development*, 4(1), 63–81.
- Henson, S., & Humphrey, J. (2009). The Impacts of Private Food Safety Standards. <https://web.archive.org/web/20210819135813/http://www.fao.org/3/i1132e/i1132e.pdf>
- Henson, S., & Humphrey, J. (2010). Understanding the complexities of private standards in global agri-food chains as they impact developing countries. *Journal of Development Studies*, 46(9), 1628–1646.
- Henson, S., & Humphrey, J. (2011). Codex Alimentarius and private standards. In B. van der Meulen (Ed.), *Private food law: Governing food chains through contract law, self-regulation, private standards, audits and certification schemes* (pp. 149–174). Wageningen Academic Publishers.
- Henson, S., & Reardon, T. (2005). Private agri-food standards: Implications for food policy and the agri-food system. *Food Policy*, 30(3), 241–253.
- IISD (International Institute for Sustainable Development). (2008). Summary of the fourth meeting of the Conference of the Parties to the Rotterdam Convention: 27–31 October 2008. *Earth Negotiations Bulletin*, 15(168), 1–12.
- IISD (International Institute for Sustainable Development). (2011). Summary of the fifth meeting of the Rotterdam Convention on Prior Informed Consent: 20–24 June 2011. *Earth Negotiations Bulletin*, 15(188), 1–14.
- IISD (International Institute for Sustainable Development). (2013). Summary of the meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions: 28 April–10 May 2013. *Earth Negotiations Bulletin*, 15(210), 1–42.
- IISD (International Institute for Sustainable Development). (2015). Summary of the meetings of the Conferences of the parties to the Basel, Rotterdam and Stockholm Conventions: 4–15 May 2015. *Earth Negotiations Bulletin*, 15(230), 1–38.
- IISD (International Institute for Sustainable Development). (2017). Summary of the meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions: 24 April–5 May 2017. *Earth Negotiations Bulletin*, 15(252), 1–33.
- IISD (International Institute for Sustainable Development). (2019). Summary of the meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions: 29 April–10 May 2019. *Earth Negotiations Bulletin*, 15(269), 1–30.
- IPM Coalition. (n.d.) *IPM Coalition*. <https://web.archive.org/web/20210819140328/https://www.ipm-coalition.org/>
- ISEAL Alliance. (2021). *ISEAL Credibility Principles*. <https://web.archive.org/web/20210910154806/https://www.isealalliance.org/defining-credible-practice/iseal-credibility-principles>
- ITC. (2020). *The state of sustainable markets – 2020*. <https://sustainabilitymap.org/trends>
- Jansen, K., & Dubois, M. (2014). Global pesticide governance by disclosure: Prior informed consent and the Rotterdam Convention. In A. Gupta & M. Mason (Eds.), *Transparency in global environmental governance* (pp. 107–131). MIT Press.
- Jasanoff, S. (1999). The songlines of risk. *Environmental Values*, 8(2), 135–152.
- Kohler, P. M. (2019). Institutionalizing norms of global science advice. In *Science advice and global environmental governance* (pp. 131–158). Anthem Press.
- Kummer, K. (1999). Prior informed consent for chemicals in international trade: The 1998 Rotterdam Convention. *Review of European Community and International Environmental Law*, 8(3), 322–329.
- Lambin, E. F., & Thorlakson, T. (2018). Sustainability standards: Interactions between private actors, civil society, and governments. *Annual Review of Environment and Resources*, 43, 369–393.
- Loconto, A., & Fouilleux, E. (2014). Politics of private regulation: ISEAL and the shaping of transnational sustainability governance. *Regulation and Governance*, 8(2), 166–185.
- Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, 41(6), 955–967.
- Marks & Spencer. (2018). *Marks & Spencer Policy: Pesticide policy*. <https://web.archive.org/web/20210811141905/https://corporate.marksandspencer.com/documents/plan-a-our-approach/foods/foods-pesticides-policy.pdf>
- Marques, J. C., & Eberlein, B. (2021). Grounding transnational business governance: A political-strategic perspective on government responses in the global south. *Regulation and Governance*, 15(4), 1209–1229.
- McCluskey, J. J. (2007). Public and private food quality standards: Recent trends and strategic incentives. In J. Swinnen (Ed.), *Global supply chains, standards and the poor: How the globalization of food systems and standards affects rural development and poverty* (pp. 19–25). CAB International.

- McDorman, T. L. (2004). The Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade: Some legal notes. *Review of European Community and International Environmental Law*, 13(2), 187–200.
- Meier, C., Sampson, G., Larrea, C., Schlatter, B., Voora, V., Dang, D., Bermudez, S., Wozniak, J., & Willer, H. (2020). *The state of sustainable markets 2020: Statistics and emerging trends*. ITC.
- Mook, A., & Overdeest, C. (2021). What drives market construction for fair trade, organic, and GlobalGAP certification in the global citrus value chain? Evidence at the importer level in The Netherlands and the United States. *Business Strategy and the Environment*, 2021, 1–13.
- Negi, A. (2020). The World Trade Organization and sustainability standards. In A. Negi, J. Pérez-Pineda, & J. Blankenbach (Eds.), *Sustainability standards and global governance* (pp. 39–59). Springer.
- Núñez-Rocha, T., & Martínez-Zarzoso, I. (2019). Are international environmental policies effective? The case of the Rotterdam and the Stockholm Conventions. *Economic Modelling*, 81, 480–502.
- Overdeest, C. (2010). Comparing forest certification schemes: The case of ratcheting standards in the forest sector. *Socio-Economic Review*, 8(1), 47–76.
- Partzsch, L., Zander, M., & Robinson, H. (2019). Cotton certification in sub-Saharan Africa: Promotion of environmental sustainability or greenwashing? *Global Environmental Change*, 57, 101924.
- Pesticide Action Network UK. (2019). Supermarket pesticide policy survey 2019.
- Ponte, S., Noe, C., & Mwamfupe, A. (2021). Private and public authority interactions and the functional quality of sustainability governance: Lessons from conservation and development initiatives in Tanzania. *Regulation and Governance*, 15(4), 1270–1285.
- Proterra. (2018). *ProTerra Standard: Social Responsibility and Environmental Sustainability*. <https://web.archive.org/web/20210819141440/https://www.proterrafoundation.org/wp-content/uploads/2019/02/ProTerra-Standard-V04-final-26-02.pdf>
- Rainforest Alliance. (2021a). *About the Rainforest Alliance*. <https://web.archive.org/web/20210811142128/https://www.rainforest-alliance.org/about/>
- Rainforest Alliance. (2021b). UTZ Certification (Now Part of the Rainforest Alliance). <https://web.archive.org/web/20210819142854/https://www.rainforest-alliance.org/utz/>
- Rastoin, J.-L. (2000). Une brève histoire de l'industrie alimentaire. *Économie Rurale*, 255(1), 61–71.
- Rastoin, J.-L. (2008). Les multinationales dans le système alimentaire. *Revue Projet*, 307(6), 61–69.
- Renckens, S. (2020). *Private governance and public authority: Regulating sustainability in a global economy*. Cambridge University Press.
- Renckens, S. (2021). Disaggregating public-private governance interactions: European Union interventions in transnational private sustainability governance. *Regulation and Governance*, 15(4), 1230–1247.
- RSPO. (2018). *Principles and criteria for the production of sustainable palm oil*. <https://web.archive.org/web/20210819141845/https://rspo.org/publications/download/5ab40fb9d7c79f5>
- RTRS. (2017). *RTRS Standard for Responsible Soy Production*. <https://web.archive.org/web/20210819141936/https://responsiblesoy.org/wp-content/uploads/2019/08/RTRSStandardResponsibleSoyproductionV3.1ING-LOW.pdf>
- Schleifer, P. (2019). Varieties of multi-stakeholder governance: Selecting legitimation strategies in transnational sustainability politics. *Globalizations*, 16(1), 50–66.
- Schouten, G., & Hospes, O. (2018). Public and private governance in interaction: Changing interpretations of sovereignty in the field of sustainable palm oil. *Sustainability*, 10(12), 17–20.
- Selin, H. (2010). *Global governance of hazardous chemicals: Challenges of multilevel management*. MIT Press.
- Taylor, C., Balmford, A., Buchanan, G. M., Butchart, S. H. M., Ducharme, H., Green, R. E., Milder, J. C., Sanderson, F. J., Thomas, D. H. L., Vickery, J., & Phalan, B. (2017). Global coverage of agricultural sustainability standards, and their role in conserving biodiversity. *Conservation Letters*, 10(5), 610–618.
- UNEP (United Nations Environment Programme). (2021). *Environmental and health impacts of pesticides and fertilizers and ways of minimizing them (Summary for policymakers)*. <https://web.archive.org/web/20210819142457/https://www.unep.org/resources/report/environmental-and-health-impacts-pesticides-and-fertilizers-and-ways-minimizing>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (2010a). *PIC Regions*. <http://www.pic.int/Countries/PICRegions/tabid/1070/language/en-US/Default.aspx>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (2010b). *Establishment of the Chemical Review Committee*. <https://web.archive.org/web/20210811142433/https://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-COP.1-RC-1-6.En.pdf>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (2014). *Draft Decision Guidance Document for Fenthion (ultra low volume (ULV) formulations at or above 640g active ingredient/L)*. <https://web.archive.org/web/20220310112854/http://www.pic.int/Default.aspx?tabid=4340>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (2016). *Intersessional work on the process of listing chemicals in Annex III to the Rotterdam Convention: Background Note*. <https://web.archive.org/web/20210811143112/http://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-Workshop-Latvia-03-Background-20160703.En.docx>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (2017). *Explanatory notes from the Parties proposing the amendments to Articles 16 and 22 of the Rotterdam Convention*. <https://web.archive.org/web/20220309140813/http://www.pic.int/TheConvention/ConferenceoftheParties/Meetings/COP8/Overview/tabid/5311/language/en-US/Default.aspx>

- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (2019). *Notifications of final regulatory action for chemicals not listed in Annex III and waiting a matching notification of final regulatory action from another PIC region (as of 12 June 2019)*. <https://web.archive.org/web/20210811143504/https://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-FRA-Single-Notifications.En.pdf>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (2020). *Seventeenth meeting of the Chemical Review Committee (CRC.17)*. <https://web.archive.org/web/20220309141036/http://www.pic.int/TheConvention/ChemicalReviewCommittee/Meetings/CRC17/Overview/tabid/8605/language/en-US/Default.aspx>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (n.d.-a). *Decision Guidance Document: Endosulfan*. http://www.pic.int/Portals/5/DGDs/DGD_Endosulfan_EN.pdf
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (n.d.-b). *Decision Guidance Document: Trichlorfon*. <http://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-CRC.9-3-Rev.1.En.pdf>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (n.d.-c). *Decision Guidance Document: Carbosulfan*. <http://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-CRC.12-3-Rev.1.En.pdf>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (n.d.-d). *Draft Decision Guidance Document: Liquid formulations (EC and SL) containing paraquat dichloride at or above 276 g/L, corresponding to paraquat ion at or above 200 g/L*. <http://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-CRC.8-9-Rev.1.En.pdf>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (n.d.-e). *Decision Guidance Document: Acetochlor*. <http://www.pic.int/Portals/5/download.aspx?d=UNEP-FAO-RC-CRC.14-3-Rev.1.En.pdf>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (n.d.-f). *Annex III Chemicals*. <http://www.pic.int/TheConvention/Chemicals/AnnexIIIChemicals/tabid/1132/language/en-US/Default.aspx>
- UNEP/FAO (United Nations Environment Programme and Food and Agriculture Organization). (n.d.-g). *All POPs listed in the Stockholm Convention*. <http://chm.pops.int/TheConvention/ThePOPs/AllPOPs/tabid/2509/Default.aspx>
- USDA. (2018). *Brazil: Cotton and Products Annual*. https://web.archive.org/web/20210811144353/https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Cotton+and+Products+Annual_Brasilia_Brazil_4-3-2018.pdf
- van der Ven, H. (2019). *Eco-labels and the credibility puzzle in transnational governance*. In *Beyond greenwash: Explaining credibility in transnational eco-labeling*. Oxford University Press.
- Verbruggen, P., & Havinga, T. (2017). Hybridization of food governance: An analytical framework. In P. Verbruggen & T. Havinga (Eds.), *Hybridization of food governance: Trends, types and results* (pp. 1–28). Edward Elgar.
- Victor, D. (1998). “Learning by doing” in the chemicals and pesticides trade regime. In L. Gasser (Ed.), *The implementation and effectiveness of international environmental commitments: Theory and practice* (pp. 221–281). MIT Press.
- Vogel, D. (2008). Private global business regulation. *Annual Review of Political Science*, 11(1), 261–282.
- Whiting, R., Kreißig, J., Power, O., Sun, T., Mondragon, Y., & Anke, J. (2017). *A study of the effect of listing chemicals in Annex III to the Rotterdam Convention*. European Commission. <https://web.archive.org/web/20210819143730/https://op.europa.eu/en/publication-detail/-/publication/4d2a2b30-b92f-11e7-a7f8-01aa75ed71a1>

APPENDIX**Table A1** List of interviews

Interview	Organization	Type of actor	Date
1	Toxics Link	NGO	2 May 2019
2	Delegate, Nigeria	Government	3 May 2019
3	UNEP (formerly)	Intergovernmental	6 May 2019
4	Pesticide Action Network	NGO	6 May 2019
5	CropLife International	Private sector: pesticide industry	6 May 2019
6	Pesticide Action Network	NGO	9 May 2019
7	Delegate, Africa region	Government	20 May 2019
8	Pesticide Action Network	NGO	3 June 2019
9	CropLife International	Private sector: pesticide industry	4 June 2019
10	Pesticide Action Network (formerly)	NGO	7 June 2019
11	Delegate, Latin America and the Caribbean region	Government	9 October 2019
12	Bayer	Private sector: pesticide industry	11 October 2019
13	Anonymous	Private agricultural standard-setting body	9 January 2020
14	Pesticide Action Network	NGO	13 January 2020
15	Secretariat of the Rotterdam Convention	Intergovernmental	15 January 2020
16	Fairtrade International	Private agricultural standard-setting body	30 January 2020
17	President of the Rotterdam Convention, COP-9	Intergovernmental	10 November 2020
18	Delegate, Switzerland	Government	10 November 2020

Abbreviations: COP, Conference of the Parties; NGO, nongovernmental organization; UNEP, United Nations Environment Programme.