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Africa in World Agricultural Trade: Recent Trends and Carbon Footprint

Sunday Odjo, Abdrahmane Berthe, and Mouhamadou Hady Diallo

Introduction

Agriculture, deeply embedded within the cultural and economic fabric of African societies, is a linchpin for the continent's socioeconomic advancement. With its diverse array of climatic conditions, Africa hosts a spectrum of agricultural practices, ranging from traditional subsistence farming to modern commercial enterprises. However, alongside agriculture's pivotal role in livelihoods and economic growth, the sector poses a challenge as a significant contributor to greenhouse gas (GHG) emissions. Against this backdrop, a nuanced understanding of the intricate relationship among agricultural activities, emissions, and international trade emerges as crucial for balancing sustainable development within Africa and global climate change mitigation efforts.

In an era marked by the urgent imperative to address climate change and curb GHG emissions, the role of agriculture has come under intense scrutiny (Smith et al. 2014). The global agriculture sector, intricately interwoven with international trade, underscores the multifaceted environmental complexities inherent in agricultural production and distribution. Climate change significantly impacts global agrifood trade dynamics, influencing production patterns, market accessibility, and economic resilience (Bozzola, Lamonaca, and Santeramo 2023; Gouel and Laborde 2021; Lamonaca, Bozzola, and Santeramo 2024). These effects are compounded by climate-induced shifts in crop yields, water availability, and temperature regimes, altering both supply and demand dynamics across international markets. Notably, agricultural goods traded across borders "carry" the emissions generated during their production and transportation. This notion of emissions embodied in exports and imports has garnered increasing attention in contemporary literature (Davis and Caldeira 2010). Recent studies emphasize the significant interlinkages between climate change and emissions embedded in trade within the agrifood sector. For example, Santeramo, Ferrari, and Toteti (2024) explore the intricate balance required to achieve climate change and environmental goals without resorting to protectionist measures, emphasizing the complexities of international trade policies in mitigating emissions. Li et al. (2023) highlight that despite efficiency gains along global supply chains, changes in global food consumption patterns have contributed to increased GHG emissions, underscoring the need for sustainable trade practices to mitigate environmental impacts.

Estimating the carbon footprint associated with international agricultural trade poses considerable methodological challenges, primarily due to the complex nature of supply chains and the role of trade in intermediate goods (Peters et al. 2011). Intermediate goods, integral to the agricultural trade network, traverse the globe, creating environmental impacts that are tricky to quantify and allocate. Global value chains (GVCs) are pivotal in shaping these methodological challenges, influencing the flow of inputs and outputs across borders, and contributing to emissions embedded in traded goods (UNCTAD 2013). GVCs also dictate the geographic distribution of production stages and emissions profiles throughout the supply chain, from production to consumption (Gereffi, Humphrey, and Sturgeon 2005).

In addition, Africa's agricultural landscape is characterized by a mosaic of production technologies and practices that vary significantly across regions and countries. These disparities encompass differences in farming techniques, land use patterns, energy efficiency, and emissions intensity. Consequently, the carbon footprint of traded agricultural products is deeply influenced by these regional nuances (Dasgupta et al. 2002).

Our research endeavors to unravel the complexities inherent in international agricultural trade, with a specific lens on the African context. Africa's role within the global agricultural trade network not only shapes its own development trajectory but also has profound implications for global environmental sustainability. The primary objective is to provide a comprehensive

understanding of Africa's contribution to the global carbon footprint within the realm of agricultural trade.

The remainder of the chapter is organized as follows. The following section analyzes Africa's involvement in global agricultural trade in value terms, exploring the continent's performance and relationships with other world regions through analysis of trade flows. The next section looks at the carbon content and emissions transfers associated with these same trade flows. The final section summarizes the main findings and concludes.

Overview of Africa's Agricultural Trade: Emerging Trends and Patterns

This section focuses on Africa's agricultural trade performance relative to other world regions. Recent trade trends and patterns are investigated through the calculation of growth rates and regional contributions and the identification of major traded products, primary trade partners, and main players in world agricultural markets.

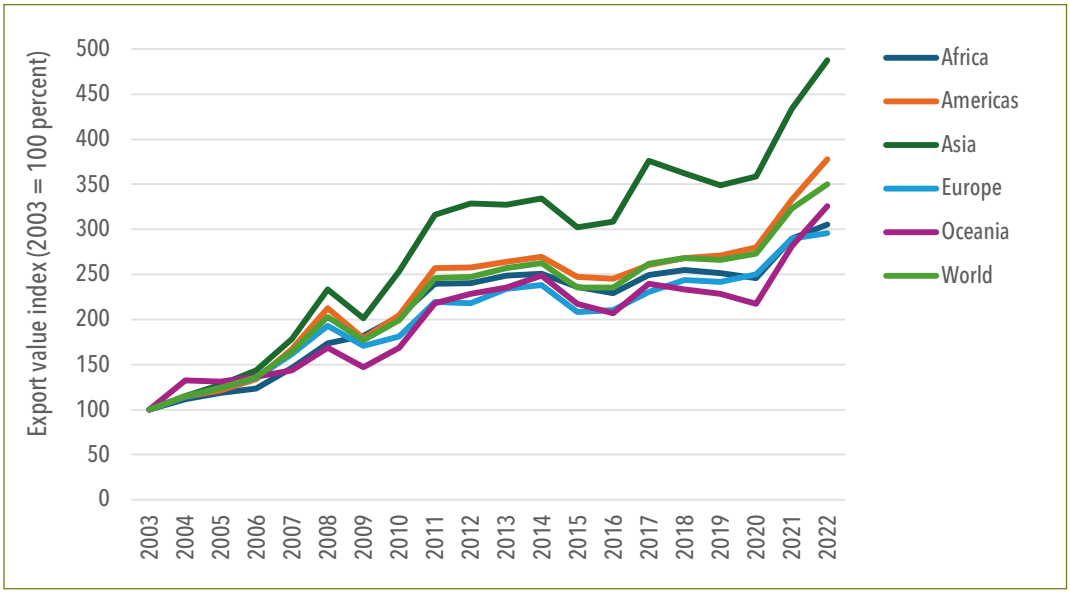
Recent growth trends

Globally, agricultural exports have been on the rise, although they vary considerably across different regions of the world. Taking 2003 as the base year, consistent growth in agricultural exports is observed until 2022 (Figure 2.1). However, this progression is often marked by peaks followed by declines, highlighting the fragility of economies in the face of external shocks. The years 2008 and 2009 particularly illustrate the contraction in world trade in response to factors such as the global financial crisis.

Despite experiencing steady growth, Africa lags behind the Americas and Asia in agricultural export growth.[1] Asia emerges as the region with the fastest growth in agricultural export value over recent decades. Africa ranks third, showing a consistent upward trajectory but one that is less pronounced than that of the Americas. Notably, export value increased threefold in Africa between 2003 and 2022, compared to nearly fivefold in Asia.

1 Growth is computed as the annual percentage change in the US dollar value of agricultural exports.

Figure 2.1 Trends in agricultural export value, by world region, 2003–2022

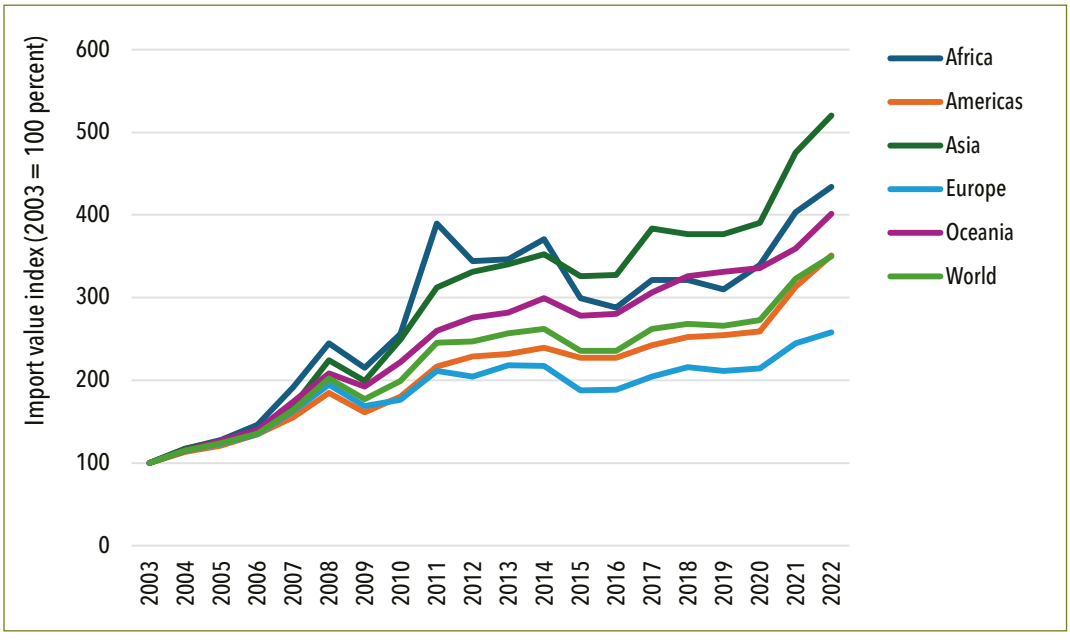


Source: Authors' calculations based on the AATM 2024 database.

Note: (1) Agricultural export value includes intracontinental export flows. (2) The export value index is determined as the ratio of the current value of exports to their value in 2003 and is expressed as a percentage.

Africa recorded the second fastest agricultural import growth after Asia (Figure 2.2). Following a collapse in 2015, Africa's agricultural import value has followed an upward trajectory since 2017, increasing in 2022 to more than four times its level in 2003. The decline in global trade in 2015 is common to all world regions and can be attributed to economic sanctions imposed by the European Union (EU) and the United States on Russia, including bans on food imports.

Figure 2.2 Trends in agricultural import value, by world region, 2003–2022



Source: Authors' calculations based on the AATM 2024 database.
Note: (1) Agricultural import value includes intracontinental import flows. (2) The import value index is determined as the ratio of the current value of imports to their value in 2013 and is expressed as a percentage.

Table 2.1 explores the balance of agricultural trade—that is, the difference between agricultural exports and imports. Africa, like Asia, has run a deficit over the years. In contrast, the Americas and Oceania have sustained a surplus, and Europe has evolved from a deficit to a surplus. As a share of continental gross domestic product (GDP), Africa's deficit is larger than that of Asia (around 1.1 percent and 0.8 percent, respectively), and the surplus is larger for Oceania than for the Americas (around 2.8 percent and 0.7 percent, respectively). Africa's deficit increased over the past two decades, but the increase was much slower in recent years. The deficit growth slowed from 32.9 percent in the 2008–2012 period to 13.5 percent in 2018–2022. Asia has witnessed a similar trend of deceleration in deficit growth, while Oceania and the Americas have seen a deceleration in surplus growth. Europe has achieved a remarkable trend reversal, progressing from fast deficit reduction to a slightly slower surplus expansion.

Table 2.1 Size and growth of agricultural trade balance, 2008–2022

	Annual value (US$ billions)		Percentage of GDP (%)		Annual growth rate (%) of deficit or surplus	
Region	**2008–2012**	**2018–2022**	**2008–2012**	**2018–2022**	**2008–2012**	**2018–2022**
Africa	−23.8	−27.8	−1.14	−1.06	32.9	13.5
Americas	168.4	207.3	0.76	0.70	12.5	7.9
Asia	−150.6	−268.1	−0.71	−0.79	18.2	7.7
Europe	−30.7	38.4	−0.15	0.17	−18.2	14.4
Oceania	36.7	50.2	2.63	2.84	12.0	8.6

Source: Authors' calculations based on the AATM 2024 database for trade data and the World Bank's World Development Indicators for GDP data.

Table 2.2 shows the regional patterns and trends in world agricultural trade in recent years (2018–2022). Africa recorded significant growth in agricultural trade, with export growth rates of 4 percent and import growth rates of 7 percent. Despite this progress, Africa's participation in the global market remains relatively modest, at only 4 percent of global exports and 6 percent of global imports. The Americas and Europe dominate the export market (31 percent and 41 percent, respectively), while Asia and Europe lead the import market (35 percent and 39 percent, respectively). While Africa and Oceania have comparable shares of global agricultural exports, Oceania represents a much lower share of imports. Export growth is remarkably faster in Oceania, while its import growth is slower compared with growth trends in Africa. Growth in exports from Africa is mainly driven by products originating in the North Africa and Southern Africa subregions, which have grown at around 6 percent.[2] Similarly, dynamics in Africa's global imports are led by imports destined to East and North Africa, which grew at 13 percent and 5 percent, respectively.

2 Table A2.1 in the appendix to this chapter lists the countries in each of Africa's subregions. The country grouping by continental region and geographical subregion used in this chapter follows the United Nations' country classification: https://unstats.un.org/unsd/methodology/m49/

Table 2.2 Breakdown of world agricultural trade, 2018–2022

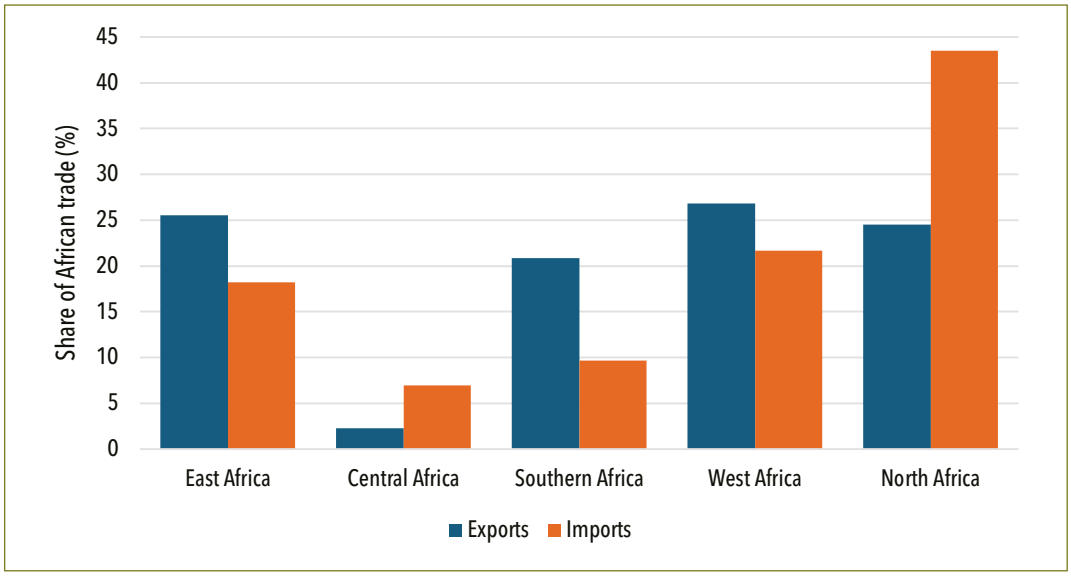
Region/subregion	Share of global exports (%)	Export growth rate (%)	Share of global imports (%)	Import growth rate (%)
Africa	4.0	4.3	5.6	6.5
East Africa	1.0	4.9	1.0	13.3
Central Africa	0.1	4.1	0.4	9.3
Southern Africa	0.8	5.7	0.5	3.5
West Africa	1.1	2.0	1.2	6.7
North Africa	1.0	6.0	2.4	4.5
Americas	30.6	7.9	19.1	7.9
Asia	19.7	5.7	35.2	6.6
Europe	41.3	5.3	38.7	4.9
Oceania	4.4	7.1	1.3	5.6
World	100	6.2	100	6.2

Source: Authors' calculations based on the AATM 2024 database.
Note: Growth rates are the average of annual changes over the period 2018–2022.

A quasi-balanced distribution of exports exists in four out of five African subregions (20–27 percent each), but the export share of Central Africa is 10 times smaller than that of the other subregions (Figure 2.3a). However, a noticeable difference arises in imports, with North Africa leading at 43 percent, trailed by West and East Africa (22 percent and 18 percent, respectively). As mentioned, North Africa imports more agricultural products than the rest of the continent. Several factors may explain this phenomenon. First, North Africa is in close geographic proximity to key regions, including Europe and the Middle East/Asia, which together contribute more than 60 percent of global agricultural trade. Second, North Africa has the continent's largest economy, with a regional GDP of US$985.4 billion in 2022. It is dominated by Egypt ($476.7 billion), followed by Algeria ($225.6 billion) and Morocco ($130.9 billion). West Africa has the second largest economy, with a regional GDP of $768.3 billion, led by Nigeria ($472.6 billion), Ghana ($74.3 billion), and Côte d'Ivoire ($70.2 billion).[3]

3 Regional GDP values are calculated from country GDP in current US dollars obtained from the World Development Indicators database and using the UN country classification summarized in Table A2.1 in the appendix to this chapter.

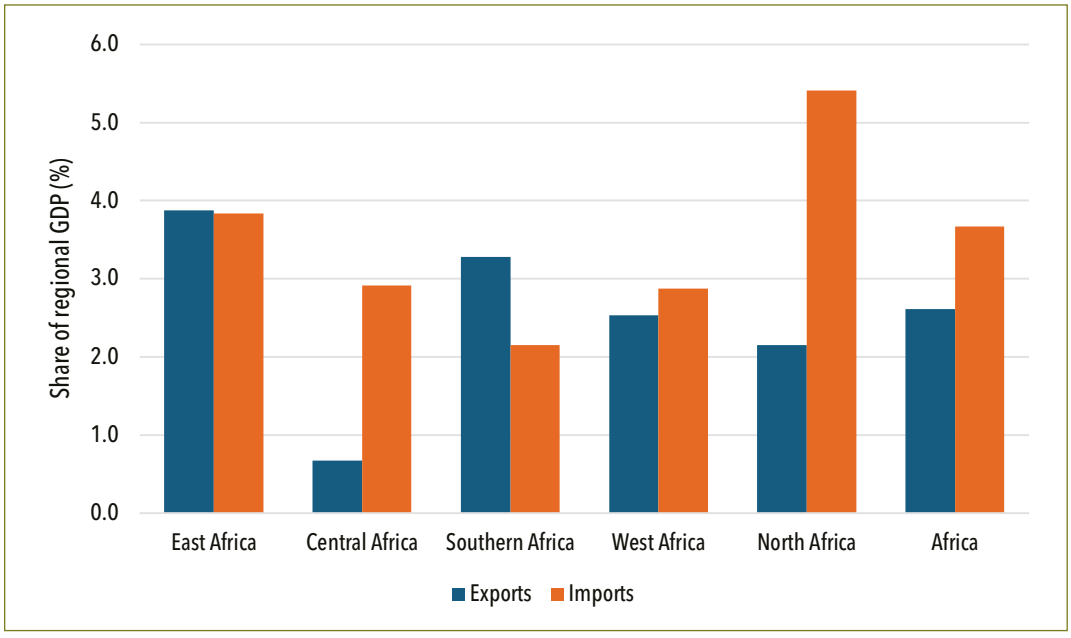
Figure 2.3a Regional breakdown of Africa's agricultural trade, 2018–2022



Source: Authors' calculations based on the AATM 2024 database.

Figure 2.3b analyzes the agricultural performance of Africa's subregions in world markets through the lens of the trade-to-GDP ratio. Exports as a share of GDP are largest in East Africa and smallest in Central Africa, at 3.9 percent and 0.7 percent, respectively. In that respect, Southern Africa is more export oriented than West and North Africa. Conversely, North Africa records the largest imports-to-GDP ratio (5.4 percent) and Southern Africa the lowest (2.1 percent). With imports-to-GDP ratios of 2.9 percent, Central and West Africa are less dependent on imports than East Africa, where the ratio is 3.8 percent.

Figure 2.3b Agricultural trade as a share of GDP, 2018–2022



Source: Authors' calculations based on the AATM 2024 database.

To refine this picture, the next subsection investigates which product categories and countries contribute most to Africa's recent trends in world agricultural markets.

Leading African products and traders in world markets

The top 10 product categories exported by Africa represent nearly 80 percent of the region's total agricultural exports (Table 2.3). Edible fruits and nuts make up the largest share of African agricultural exports, with a market share of more than 20 percent. This category is followed closely by cocoa and its preparations, contributing 15 percent, and coffee, tea, mate, and spices, and spices, contributing 8 percent. The latter two categories, combined with cotton, are the top three African exports, with a high market share in global agricultural trade. More precisely, cotton accounts for only 3 percent of African agricultural exports, while Africa represents up to 12 percent of the world cotton export market. Moreover, these products are highly competitive, as indicated by their high revealed comparative advantage (RCA) index, especially cocoa and cotton.[4] It is noteworthy that two product categories are found to be noncompetitive in world markets, with a RCA of less than1: animal or vegetable fats and oils; and beverages, spirits, and vinegar. These categories have emerged among the top 10 exports because they are largely destined for intra-African markets.

Most of Africa's top exports have recorded a rapid growth rate in recent years, except for cocoa and preparations, tobacco and substitutes, and sugars and sugar confectionery, which have contracted. Oilseeds and oleaginous fruits, and cotton in particular, are not only competitive exports but are also expanding at double-digit growth rates. Africa's exports of cocoa and preparations contracted by 2 percent annually between 2018 and 2022. However, cocoa is the most competitive African export, and the continent still accounts for 20 percent of the world market. This situation underscores the challenges facing Africa's major export products, including price volatility. For instance, between 2016 and 2023, the global monthly price of cocoa surged to its peak in October 2023, reaching approximately US$3,692 per metric ton. Over that period, it fluctuated within the range of approximately $1,900–2,700 per metric ton.[5] Meanwhile, over time, the decline in exports of products with a high comparative advantage like cocoa might result in decreased market share. However, expansion of the export of products with no comparative advantage might indicate opportunities for their diversification and enhanced competitiveness.

4 The revealed comparative advantage index for a product is calculated, following Balassa (1965), as the ratio of a product category's share in Africa's agricultural exports to the same category's share in world agricultural exports, using the formula $RCA_{kt} = \frac{\sum_j X_{jkt}}{\sum_j \sum_k X_{jkt}} \Big/ \frac{\sum_i X_{ikt}}{\sum_i \sum_k X_{ikt}}$, where j is an African country, i is every country across the world, and X_{ikt} and X_{jkt} are country i and j's exports of an agricultural product category k in period t. RCA_{kt} values are then averaged over the period 2018–2022. A value greater (smaller) than 1 indicates that Africa has a (no) comparative advantage for exporting products in category k.

5 https://www.statista.com/statistics/498496/global-cocoa-price/

Table 2.3 Africa's leading agricultural export commodities, 2018–2022

Commodity	Export share (%)	Revealed comparative advantage index	Africa's share in world exports (%)	Export growth rate (%)
Fruits and nuts, edible	21.3	2.4	9.6	4.3
Cocoa and cocoa preparations	15.1	4.9	19.7	−2.3
Coffee, tea, mate, and spices	8.4	2.6	10.3	6.1
Vegetables and certain roots and tubers	7.7	1.7	6.6	6.5
Oilseeds and oleaginous fruits	7.3	1.0	3.9	14.6
Tobacco and manufactured tobacco substitutes	5.0	1.7	6.6	−3.1
Animal or vegetable fats and oils	5.0	0.7	2.6	16.7
Sugars and sugar confectionery	3.6	1.2	4.8	0.0
Cotton	3.4	3.1	12.2	12.6
Beverages, spirits, and vinegar	3.1	0.4	1.5	4.8
Total	79.9			

Source: Authors' calculations based on the AATM 2024 database.
Note: Growth rates are the average of annual changes over the period 2018–2022.

Africa's major imports consist largely of products for which the continent has no RCA, except for sugars and sugar confectionery and tobacco and manufactured tobacco substitutes (Table 2.4). The top 10 most imported product categories represent 81 percent of Africa's total agricultural imports. Cereals, animal or vegetable fats and oils, and sugars and sugar confectionery together account for 50 percent. This highlights the challenges Africa faces in satisfying the region's rapidly growing domestic demand (due to rising income, demography, and urbanization) with limited local production capacity. Africa remains a major partner in world markets, capturing 20 percent of cereal imports and 14 percent of sugar and sugar confectionery imports. Oilseeds and oleaginous fruits, which account for 4 percent of Africa's agricultural imports bill, have a very rapid growth rate of nearly 18 percent. This indicates the region's increasing dependence on world markets for this product. It is also noteworthy that animal or vegetable fats and oils and beverages, spirits, and vinegar are found among both top import and export product categories.

Table 2.4 Africa's major agricultural import commodities, 2018–2022

Commodity	Import share (%)	Revealed comparative advantage index	Africa's share in global imports (%)	Import growth rate (%)
Cereals	31.5	0.3	20.1	7.6
Animal or vegetable fats and oils	11.9	0.7	8.8	11.0
Sugars and sugar confectionery	7.7	1.2	14.4	3.4
Dairy produce, eggs, and honey	5.9	0.2	5.6	5.6
Meat and edible meat offal	4.9	0.1	3.2	1.7
Preparations of cereals, flour, starch, or milk	4.2	0.3	4.7	6.3
Miscellaneous edible preparations	3.9	0.4	4.2	7.3
Tobacco and manufactured tobacco substitutes	3.8	1.7	7.2	5.3
Beverages, spirits, and vinegar	3.7	0.4	2.6	7.2
Oilseeds and oleaginous fruits	3.5	1.0	2.7	17.7
Total	80.9			

Source: Authors' calculations based on the AATM 2024 database.
Note: Growth rates are the average of annual changes over the period 2018–2022.

Table 2.5a presents the top exporting subregion for each major export product category. West Africa alone supplies 87 percent of African exports of cocoa and cocoa preparations, which corresponds to 17 percent of global exports in this product category. Similarly, West Africa is the primary source of the continent's exports of cotton as well as other oilseeds and oleaginous fruits, with 8 percent and 1 percent of world market shares, respectively. East Africa stands out as Africa's leading exporter in two product categories: coffee, tea, mate, and spices (9 percent of global exports); and tobacco and manufactured tobacco substitutes (1 percent). North Africa is the major origin of African exports in the category of vegetables and roots and tubers, supplying 4 percent of global exports. Southern Africa is the primary source of African exports in the categories of sugars and sugar confectionery and edible fruits and nuts, at 2 percent and 1 percent, respectively, of the corresponding global markets.

Table 2.5a Major African exporters of the most exported products, by subregion, 2018–2022

Product	Top exporting subregion	Share of African exports (%)	Share of global exports (%)
Fruits and nuts, edible	Southern Africa	37.4	3.6
Cocoa and cocoa preparations	West Africa	87.0	17.1
Coffee, tea, mate, and spices	East Africa	90.0	9.2
Vegetables and certain roots and tubers	North Africa	63.1	4.2
Oilseeds and oleaginous fruits	West Africa	34.1	1.3
Tobacco and manufactured tobacco substitutes	East Africa	79.1	5.3
Animal or vegetable fats and oils	North Africa	44.2	1.2
Sugars and sugar confectionery	Southern Africa	38.8	1.9
Cotton	West Africa	65.7	8.0
Beverages, spirits, and vinegar	Southern Africa	77.4	1.2

Source: Authors' calculations based on the AATM 2024 database.

Table 2.5b provides a more precise picture with the leading exporting country for each major exported product category. With 55 percent of African exports of cocoa and cocoa preparations, Côte d'Ivoire alone secures 11 percent of the global market for this product category. South Africa, Kenya, and Benin each holds at least 3 percent of the global market of a major export category. West Africa emerges as the leading exporting subregion for oilseeds and oleaginous fruits, with 1 percent of the world market, while Sudan, in East Africa, is the leading exporting country, capturing almost 1 percent of the market.

Table 2.5b Major African exporters of the most exported products, by country, 2018–2022

Product	Top exporting country	Share of African exports (%)	Share of global exports (%)
Fruits and nuts, edible	South Africa	36.7	3.5
Cocoa and cocoa preparations	Côte d'Ivoire	54.8	10.8
Coffee, tea, mate, and spices	Kenya	29.7	3.0
Vegetables and certain roots and tubers	Morocco	34.6	2.3
Oilseeds and oleaginous fruits	Sudan	19.7	0.8
Tobacco and manufactured tobacco substitutes	Zimbabwe	33.2	2.2
Animal or vegetable fats and oils	Tunisia	25.1	0.7
Sugars and sugar confectionery	South Africa	21.8	1.1
Cotton	Benin	24.3	3.0
Beverages, spirits, and vinegar	South Africa	70.6	1.1

Source: Authors' calculations based on the AATM 2024 database.

Tables 2.6a and 2.6b investigate the leading African players in import markets. North Africa stands out as the largest player in 6 of the 10 most imported product categories identified. For instance, the subregion accounts for 50 percent of cereal imports at the continental level and 10 percent at the global level. West Africa is the leading destination of Africa's imports of food preparations, while Southern Africa is the largest destination of the continent's imports of beverages, spirits, and vinegar. At the country level, Egypt is the largest importer of cereals, fats and oils, meat and offal, and oilseeds and oleaginous fruits (Table 2.6b). Algeria, Nigeria, South Africa, and Libya also emerge as primary destinations for products among Africa's most imported product categories. These insights illustrate the strong dependence of some African countries on imports of essential agricultural products, hence their exposure and vulnerability to global supply chain disruptions, like those faced during the COVID-19 pandemic and the Russian–Ukraine war (Badiane et al. 2022; Bouët, Odjo, and Zaki 2020, 2022).

Table 2.6a Largest African importers of the most imported products, by subregion, 2018–2020

Product	Top importing subregion	Share of African imports (%)	Share of global imports (%)
Cereals	North Africa	50.0	10.0
Animal or vegetable fats and oils	East Africa	36.8	3.2
Sugars and sugar confectionery	North Africa	38.6	5.6
Dairy produce, eggs, and honey	North Africa	53.8	3.0
Meat and edible meat offal	North Africa	39.0	1.3
Preparations of cereals, flour, starch, or milk	West Africa	38.5	1.8
Miscellaneous edible preparations	West Africa	32.6	1.4
Tobacco and manufactured tobacco substitutes	North Africa	43.9	3.1
Beverages, spirits, and vinegar	Southern Africa	29.5	0.8
Oilseeds and oleaginous fruits	North Africa	83.1	2.2

Source: Authors' calculations based on the AATM 2024 database.

Table 2.6b Largest African importers of the most imported products, by country, 2018–2020

Product	Top importing country	Share of African imports (%)	Share of global imports (%)
Cereals	Egypt	24.7	5.0
Animal or vegetable fats and oils	Egypt	11.9	1.0
Sugars and sugar confectionery	Algeria	10.6	1.5
Dairy produce, eggs, and honey	Algeria	25.6	1.4
Meat and edible meat offal	Egypt	30.9	1.0
Preparations of cereals, flour, starch, or milk	Nigeria	11.4	0.5
Miscellaneous edible preparations	South Africa	10.1	0.4
Tobacco and manufactured tobacco substitutes	Libya	14.3	1.0
Beverages, spirits, and vinegar	South Africa	18.5	0.5
Oilseeds and oleaginous fruits	Egypt	50.6	1.4

Source: Authors' calculations based on the AATM 2024 database.

The preceding analysis illustrates the patterns of specialization of African subregions and countries with respect to the major leading export and import products. It indicates that Africa plays a crucial role in supplying as well as importing certain agricultural products, despite a tiny overall share of global agricultural trade. It also shows the diversity of RCAs in various agricultural products among African subregions and countries.

Africa's major trade partners

Tables 2.7 and 2.8 explore Africa's primary partners in agricultural trade. For each major export product category, Table 2.7 identifies the destination that receives the largest share of Africa's exports in that category. In general, the shares of such top destinations are not more than 25 percent, except for China, whose share represents 37 percent of Africa's exports of oilseeds and oleaginous fruits. This reflects the relative diversification of the destinations of African agricultural exports. A minimum of 11 but not more than 21 countries outside Africa are destinations of at least 1 percent of the continent's exports in the different product categories. Low values of the Herfindahl-Hirschman Index (HHI)[6] confirm the relative diversity of the destinations of Africa's exports in the product categories under consideration. A more detailed analysis at the Harmonized System (HS) 6-digit level of product definition might reveal higher HHI values—that is, a more concentrated export market structure for certain specific products. Africa's export market for oilseeds and oleaginous fruits is the least diversified, with an HHI value of 0.153, while that of beverages, spirits, and vinegar, with an HHI value of 0.028, is the most diversified. A diversified export market is important to reduce an exporter's dependence on and vulnerability to policy changes or external shocks affecting its trade partners that could result in more stringent export barriers.

6 The Herfindahl-Hirschman Index of export (import) market diversification measures the dispersion of export (import) value across all destinations (origins). For each product category , we calculate the index of Africa's export (import) market diversification using the formula $HHI_k = \sum_{i=1}^{N_k} s_{ik}^2$, where i is an export destination (import origin) of product category k , N_k is the number of destinations (origins), and s_{ik} is the share of destination (origin) i in Africa's global exports (imports) of k on average over the period 2018–2022. If Africa exports to (imports from) a very few partners, the index will be close to 1. Conversely, if Africa trades with a huge number of partners with small market shares, the index will be close to $1/N_k$, with N_k ranging from 111 to 173 destinations (origins) for the different product categories under analysis. Hence, HHI_k varies between $1/N_k$ (high market diversification) and 1 (high market concentration).

Table 2.7 Top destinations of African agricultural exports, 2018–2022

Product	Top export destination		Number of non-African destinations with market share > 1%	HHI of Africa's export market diversification
	Country	Market share (%)		
Fruits and nuts, edible	Viet Nam	10.0	17	0.049
Cocoa and cocoa preparations	Netherlands	25.3	17	0.097
Coffee, tea, mate, and spices	United States	13.3	21	0.046
Vegetables and certain roots and tubers	France	15.1	14	0.054
Oilseeds and oleaginous fruits	China	36.9	18	0.153
Tobacco and manufactured tobacco substitutes	China	19.6	15	0.053
Animal or vegetable fats and oils	Spain	9.7	15	0.029
Sugars and sugar confectionery	South Africa	12.8	13	0.031
Cotton	Viet Nam	19.7	11	0.091
Beverages, spirits, and vinegar	United Kingdom	8.3	14	0.028

Source: Authors' calculations based on the AATM 2024 database.
Note: HHI = Herfindahl-Hirschman Index.

Table 2.8 reveals the same diversification in sources of Africa's imports of agricultural products, with 9 to 19 countries supplying at least 1 percent of the continent's imports of a product in the different product categories. This is reflected in the low HHI values of Africa's import market diversification. Africa's import market for sugars and sugar confectionery is the least diversified, with an HHI value of 0.228. With more than 30 percent of Africa's import market, Brazil emerges as the top source of sugars and sugar confectionery as well as meat and edible meat offal. In contrast, the import market of miscellaneous edible preparations is the most diversified, with an HHI value of 0.047. South Africa is the largest supplier of Africa's imports, with a market share of only 10.6 percent. The United States is the top origin of oilseeds and oleaginous fruits. Other primary partners individually supply between 11 percent and 30 percent of Africa's market.

Comparing HHI values in Tables 2.7 and 2.8 for the product categories that Africa both exports and imports, it appears that Africa's import markets for such products are less diversified than the corresponding export markets. Such products are in the categories of oilseeds and oleaginous fruits; tobacco and manufactured tobacco substitutes; animal or vegetable fats and oils; sugars and sugar confectionery; and beverages, spirits, and vinegar. To illustrate, for sugars and sugar confectionery, the HHI of the diversification of the continent's import market (0.228) is seven times larger than that of its export market (0.031). Diversifying import sources is crucial for food security and for mitigating supply disruptions that could arise in some source countries.

Table 2.8 Top origins of African agricultural imports, 2018–2022

Product	Top import origin		Number of non-African origins with market share > 1%	HHI of Africa's import market diversification
	Country	Market share (%)		
Cereals	Russia	16.8	19	0.076
Animal or vegetable fats and oils	Indonesia	26.0	15	0.145
Sugars and sugar confectionery	Brazil	42.9	9	0.228
Dairy produce, eggs, honey	New Zealand	18.9	19	0.070
Meat and edible meat offal	Brazil	30.9	16	0.142
Preparations of cereals, flour, starch, or milk	France	11.1	17	0.053
Miscellaneous edible preparations	South Africa	10.6	16	0.047
Tobacco and manufactured tobacco substitutes	UAE	29.4	12	0.110
Beverages, spirits, and vinegar	South Africa	17.0	15	0.066
Oilseeds and oleaginous fruits	United States	39.4	13	0.181

Source: Authors' calculations based on the AATM 2024 database.
Note: HHI = Herfindahl-Hirschman Index; UAE = United Arab Emirates.

Major intra-African trade players

The most traded products between African countries pertain to the same categories as the leading products in Africa's global trade, with two exceptions. Cotton is an important product category in Africa's global trade but not in intra-African trade. Conversely, preparations of cereals, flour, starch, or milk are more important in intracontinental trade than in Africa's global trade. Tables 2.9 and 2.10 inform on the degree of diversification of intra-African export destination and import sources for these top traded product categories. The primary destinations of these products generally account for less than 25 percent of intracontinental exports, except for Egypt, which is the destination of 32 percent of intracontinental exports in the category of coffee, tea, mate, and spices (Table 2.9). At least 15 countries are destinations for 1 percent or more of intra-African exports in the different product categories. This is an indication of high diversification of the intracontinental destination of agricultural exports, as also revealed by low HHI values. The destination for products in the category of coffee, tea, mate, and spices is the least diversified, with an HHI value of 0.138, compared with the destination for miscellaneous edible preparations, which is the most diversified (an HHI value of 0.035).

Table 2.9 Top destinations of intra-African agricultural exports, 2018–2022

Product	Top intra-African export destination		Number of intra-African destinations with market share > 1%	HHI of intra-African export destination diversification
	Country	Market share (%)		
Animal or vegetable fats and oils	Zimbabwe	11.3	25	0.049
Sugars and sugar confectionery	South Africa	22.9	22	0.089
Beverages, spirits, and vinegar	Botswana	12.2	22	0.062
Cereals	Zimbabwe	16.8	15	0.091
Miscellaneous edible preparations	Mozambique	7.1	30	0.035
Tobacco and manufactured tobacco substitutes	Egypt	8.3	25	0.040
Vegetables and certain roots and tubers	Somalia	23.7	23	0.084
Coffee, tea, mate, and spices	Egypt	31.5	17	0.138
Preparations of cereals, flour, starch or milk	Botswana	8.6	29	0.037
Fruits and nuts, edible	Morocco	17.8	22	0.078

Source: Authors' calculations based on the AATM 2024 database.
Note: HHI = Herfindahl-Hirschman Index.

Intra-African import sources are less diversified than export destinations (Table 2.10). Compared with destination countries, fewer source countries account for at least 1 percent of intra-African imports of the most traded product categories. For instance, 17 such source countries exist for animal or vegetable fats and oils (Table 2.10) compared with 25 destination countries (Table 2.9). In addition, a significant share of intracontinental trade is shipped from the leading exporter of every product category. South Africa, the primary exporter of several product categories, accounts for 56 percent of supplies of beverages, spirits, and vinegar and for 48 percent of cereals. The lower degree of diversification of intra-African import sources compared with export destinations is reflected in the higher HHI values in Table 2.10 compared with those in Table 2.9. The intra-African import sources for animal or vegetable fats and oils and for tobacco and manufactured tobacco substitutes are the most diversified, with HHI values of 0.105 and 0.107, respectively, while import sources for beverages, spirits, and vinegar is the least diversified, with an HHI value of 0.327.

Table 2.10 Major sources of intra-African agricultural imports, 2018–2022

Product	Top intra-African import source		Number of intra-African sources with market share >1%	HHI of intra-African import source diversification
	Country	Market share (%)		
Animal or vegetable fats and oils	South Africa	23.0	17	0.105
Sugars and sugar confectionery	Eswatini	24.3	14	0.124
Beverages, spirits, and vinegar	South Africa	55.7	14	0.327
Cereals	South Africa	47.6	10	0.290
Miscellaneous edible preparations	South Africa	38.1	10	0.203
Tobacco and manufactured tobacco substitutes	South Africa	15.5	12	0.107
Vegetables and certain roots and tubers	Ethiopia	32.2	11	0.179
Coffee, tea, mate, and spices	Kenya	40.3	16	0.202
Preparations of cereals, flour, starch or milk	South Africa	38.6	15	0.186
Fruits and nuts, edible	South Africa	39.3	13	0.193

Source: Authors' calculations based on the AATM 2024 database.
Note: HHI = Herfindahl-Hirschman Index.

Africa and the world's top exporters

For each of Africa's most exported product categories, Table 2.11 identifies the country that accounts for the largest share of world exports on average (2018–2022). The United States is the world's top exporter of cotton and of edible fruits and nuts. Its share of global cotton exports (36 percent) is three times larger than Africa's (12 percent). However, Africa's participation in the world export market for fruit and nuts (9.6 percent) is comparable to that of the United States (9.5 percent). Brazil is the leading exporter worldwide in three export product categories, including oilseeds and oleaginous fruits, for which Brazil's market share (32 percent) is a remarkable eight times larger than Africa's (4 percent); and Brazil's contribution to global exports of sugars and sugar confectionery is almost five times larger than Africa's. Nevertheless, Africa's performance in the global export market of coffee, tea, mate, and spices (10 percent) is roughly comparable to Brazil's (12 percent). The other leading exporters worldwide are Germany[7] for cocoa and cocoa preparations exports, Mexico for vegetable and certain tuber exports, Poland for tobacco, Indonesia for fats and oils, and France for beverages, spirits, and vinegar. Compared with Africa, these countries individually capture a larger share of the global exports market, except for Germany.

7 It is worth noting that Germany does not produce cocoa beans, but its cocoa processing industry is well known, with several chocolate brands that source cocoa beans globally to produce dark chocolate.

Table 2.11 Africa compared with the world's leading exporters, 2018–2022

Product	World's top exporter		Africa's share of global exports (%)
	Country	Share of global exports (%)	
Fruits and nuts, edible	United States	9.5	9.6
Cocoa and cocoa preparations	Germany	11.5	19.7
Coffee, tea, mate, and spices	Brazil	11.7	10.3
Vegetables and certain roots and tubers	Mexico	11.4	6.6
Oilseeds and oleaginous fruits	Brazil	32.0	3.9
Tobacco and manufactured tobacco substitutes	Poland	9.4	6.6
Animal or vegetable fats and oils	Indonesia	21.2	2.6
Sugars and sugar confectionery	Brazil	19.3	4.8
Cotton	United States	36.2	12.2
Beverages, spirits, and vinegar	France	16.0	1.5

Source: Authors' calculations based on the AATM 2024 database.

This section reviewed Africa's participation in world agricultural trade in recent years. While it might be deemed low in terms of trade values and shares of global trade, it is remarkable in its growth trends and the diversification of its trade partners, which are spread across all continents. This presence in international trade entails some environmental costs. Most notably, trade is associated with GHG emissions through production, processing, and transportation activities. The next section explores the trends and patterns in Africa's agricultural trade-related carbon footprint.

Carbon Emissions Content of Africa's Agricultural Trade

This section begins by analyzing the trends in GHG emissions transfers from and to Africa via the continent's participation in international trade of agricultural products. It compares Africa with other world regions with respect to their involvement in GHG emissions trade, taking into account their demographic and economic size differences. The section then investigates the main partners of Africa's GHG emissions trade, comparing emissions originating in agriculture and other sectors of the economy.

Data on the GHG emissions embodied in trade flows are obtained from the Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).[8] The database consists of a multiregion input–output table (MRIO) model that provides a time series of high-resolution IO tables with matching environmental and social satellite accounts. It is based on data drawn from a wide range of national and international sources. It documents the intersectoral transfers among 15,909 sectors across 190 countries over the period 1990 to 2022, including data on countries' total GHG footprints and details on countries (and sectors) in which that footprint originates.

Using a simplified 26-sector structure, the current analysis differentiates the first six sectors—with agriculture covering all crop production, livestock, forestry, and hunting activities—and aggregates the remaining 20 sectors into a "rest of the economy" sector.[9] The data available

8 See https://www.worldmrio.com/footprints/carbon/

9 The full Eora Global Supply Chain Database is available only with paid licenses. Free access to the database is granted to a simplified version with a 26-sector structure, as in Table A2.2 in the appendix to this chapter

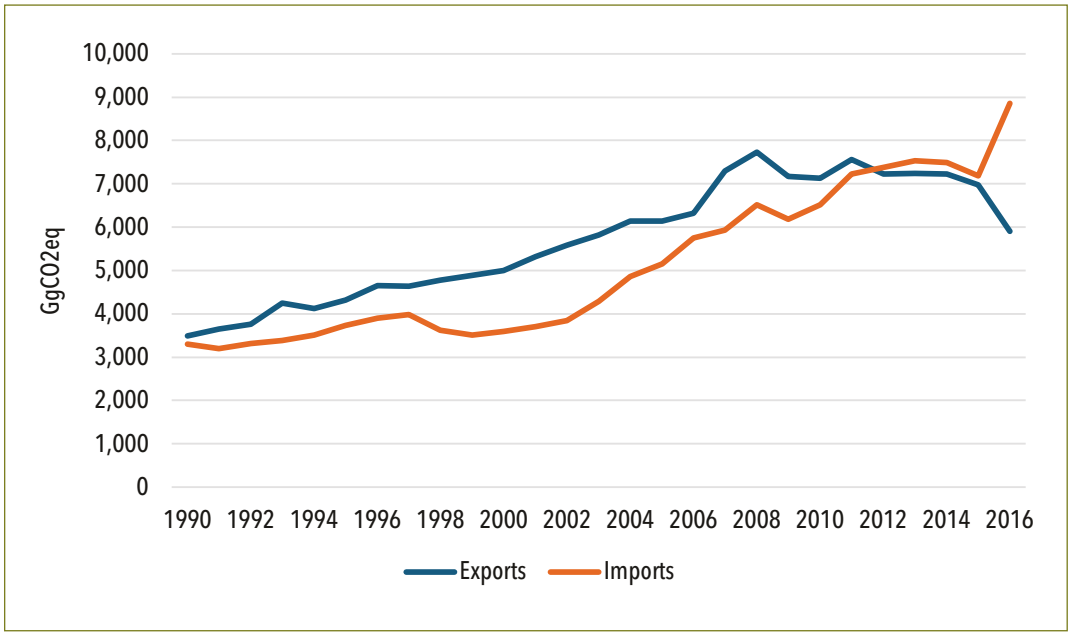
for the sectoral analysis of GHG emissions trade are limited to the period 1990–2016. All types of GHGs are combined and expressed in carbon dioxide (CO_2) equivalent terms. Despite these limitations, the analysis provides useful insights into the carbon footprint implications of Africa's participation in global agricultural trade.

Africa's role in global GHG emissions embodied in agricultural trade

Africa's contribution to global carbon emissions associated with agricultural trade has steadily expanded since the 1990s. Figure 2.4 reveals an upward trajectory in carbon emissions embedded in Africa's exports of agricultural goods, commencing at 3,490 gigagrams of CO_2 equivalent ($GgCO_2eq$) in 1990, peaking at 7,731 $GgCO_2eq$ in 2008, and decreasing to 5,910 $GgCO_2eq$ in 2016. The emissions embodied in imports of agricultural goods into Africa increased continuously while remaining below the level of emissions embedded in exports until 2012, when Africa became a net importer of agricultural GHG emissions. This trend underscores the escalating environmental impact associated with Africa's agricultural imports. The carbon emissions embodied in Africa's agricultural trade began to increase faster in imports compared with exports in the early 2000s: emissions embedded in imports increased at an annual rate of 9.3 percent in the 2002–2006 period, compared with 3.6 percent for exports (Table 2.12). A decade later, these growth rates fell to 4.6 percent and −4.6 percent, respectively. The decrease in growth of emissions embodied in Africa's agricultural exports reflects the trend in emissions embedded in global agricultural trade, which decelerated from 6.3 percent in 2002–2006 to 0.6 percent in 2012–2016. In addition, these trends echoed the slowdown of agricultural export growth in current US dollar value terms between 2012 and 2016, particularly in 2015 and 2016, when African exports contracted by 5.8 percent and 3 percent, respectively, and global exports decreased by 10 percent in 2015 and grew by only 0.08 percent in 2016.[10] More detailed data on GHG emissions associated with individual agricultural export products would allow us to investigate the extent to which the decline in emissions in 2012–2016 is due to changes in export product composition, in addition to changes in export size.

10 Growth in agricultural export values at global and African levels are calculated from the AATM 2024 database.

Figure 2.4 Evolution of GHG emissions embedded in Africa's agricultural trade, 1990–2016 ($GgCO_2eq$)



Source: Authors' calculations based on Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).

Note: $GgCO_2eq$ = gigagrams carbon dioxide equivalent.

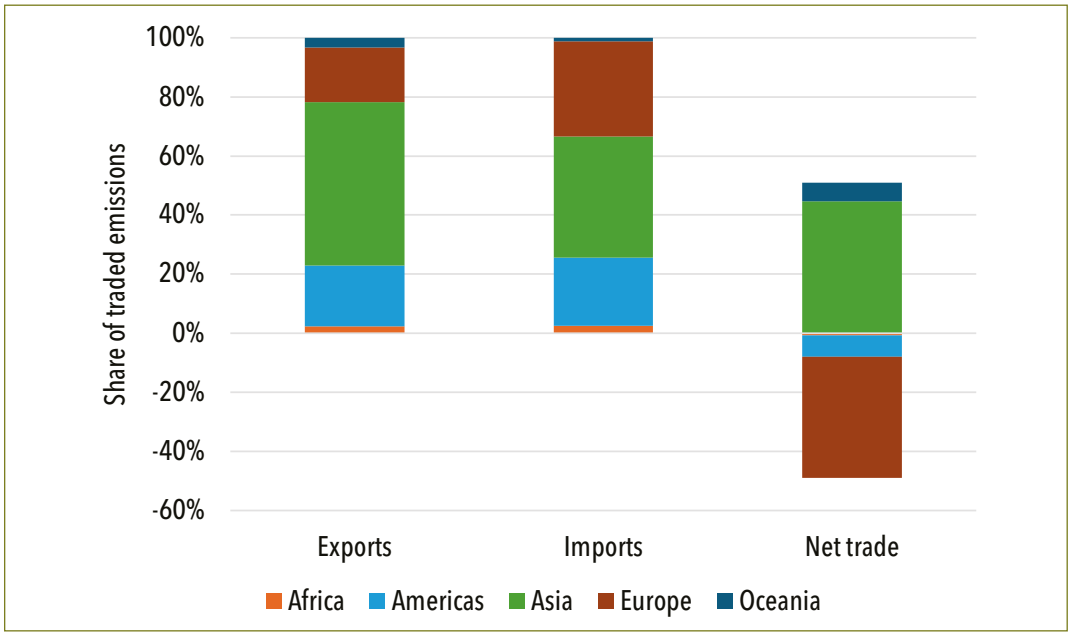
Table 2.12 Annual growth in GHG emissions embodied in African and world agricultural trade, 1992–2016

Period	African agricultural trade		Global agricultural trade (%)
	Exports (%)	Imports (%)	
1992–1996	5.1	4.0	5.2
2002–2006	3.6	9.3	6.3
2012–2016	−4.6	4.6	0.6

Source: Authors' calculations based on Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).

Figure 2.5 explores the relative importance of Africa's participation in global carbon emissions through agricultural trade. It shows that Africa is responsible for only a tiny share of global emissions embodied in agricultural trade: 2.3 percent and 2.5 percent in exports and imports, respectively. These contributions to GHG emissions are much lower than the continent's shares in global agricultural exports and imports in gross value terms, as observed in Table 2.2, which are 4.0 percent and 5.6 percent, respectively. Asia contributes the largest shares of carbon emissions incorporated in world agricultural exports (55 percent) and imports (41 percent). The Americas contribute more than Europe on the exports side, while the reverse holds on the imports side. Overall, while Asia and Oceania are net exporters of carbon emissions, Europe, the Americas, and Africa are net importers, although Africa's net import of carbon emissions is so small it is hardly visible in Figure 2.5.

Figure 2.5 Regional breakdown of GHG emissions embodied in global agricultural trade, 2012–2016



Source: Authors' calculations based on Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).

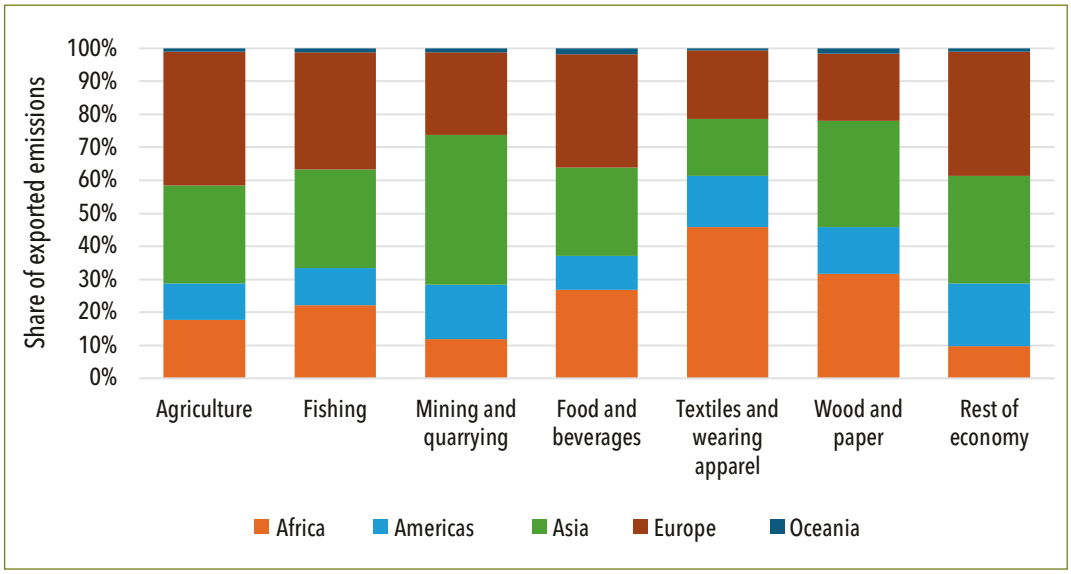
In sum, Africa's contribution to GHG emissions through trade in agricultural commodities is low, in line with its share in global agricultural trade in gross value terms. In an attempt to understand these trends, the next section explores the destination and source regions of GHG emissions embedded in Africa's trade, comparing emissions originating in agriculture and other sectors of the economy. As noted above, agriculture is an aggregate sector in the simplified version of the Eora dataset used for the analysis (Lenzen et al. 2012, 2013). Agriculture comprises crop production, livestock, forestry, and hunting. It is unfortunately not possible to decompose total GHG emissions associated with African agricultural trade into the respective contributions of specific agricultural activities or products. Similarly, it is not possible to break down GHG emissions embedded in trade into specific shares of emissions generated during the production and transportation of traded commodities. Moreover, the dataset is not appropriate for exploring a decomposition of total carbon emissions embodied in trade by type of input used and type of GHG emitted.[11]

Major destinations and sources of GHG emissions embodied in Africa's agricultural trade

Figure 2.6 summarizes the breakdown of GHG emissions embodied in Africa's sectoral exports into destination regions. Europe is the top destination for emissions originating in Africa's agriculture and fishing export sectors: it received 40 percent and 35 percent of Africa's GHG emissions exports from these sectors, respectively, in the 2012–2016 period. In contrast, most of the emissions embedded in exports from the mining and quarrying sector are destined to Asia. It is noteworthy that emissions associated with African exports from the textiles and wearing apparel sector are primarily retained within Africa. In general, the Americas are the fourth largest destination, after Asia, Europe, and Africa.

11 In-depth research to explore those breakdowns needs to be conducted using the full Eora database, which is accessible with a paid license.

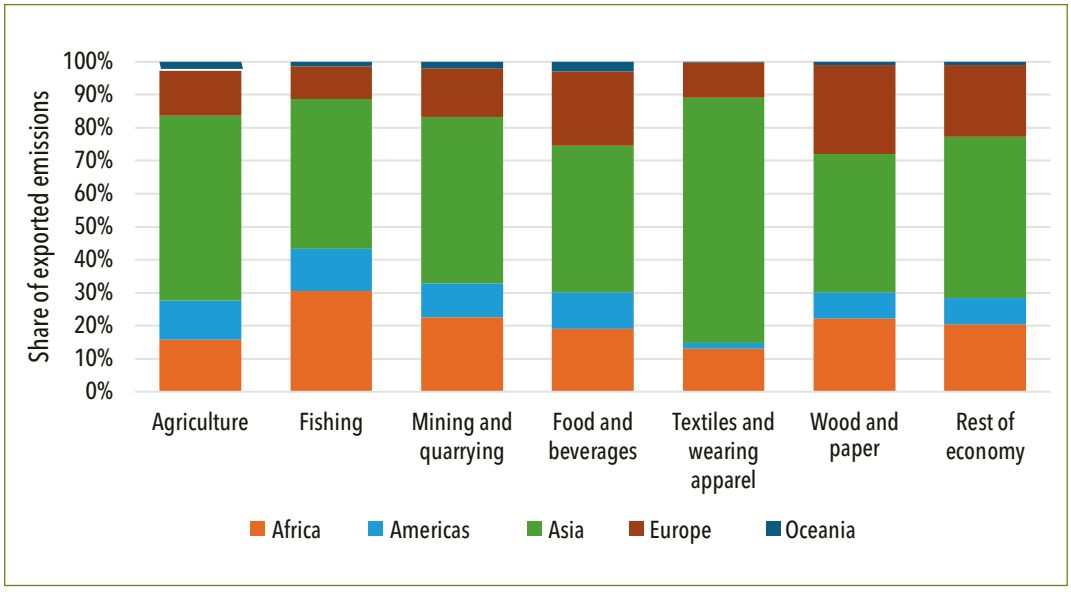
Figure 2.6 Destinations of GHG emissions embedded in Africa's exports, by source sector, 2012–2016



Source: Authors' calculations based on Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).

Figure 2.7 presents the origins of GHG emissions embedded in Africa's sectoral imports, with Asia appearing as the primary origin irrespective of the emitting sector. Up to 56 percent of the GHG emissions content of African agricultural imports originated in Asia in 2012–2016, on average. However, Asia's contribution to GHG emissions in African imports of textile and wearing apparel was much larger, reaching 74 percent.

Figure 2.7 Origins of GHG emissions embedded in Africa's imports, by source sector, 2012–2016



Source: Authors' calculations based on Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).

Table 2.13 identifies the country destinations of emissions embedded in Africa's agricultural exports. The top 20 countries are destinations of 70 percent of GHG emissions exported from Africa's agriculture sector. Germany, the United Kingdom, and the United States together received nearly one-quarter of those emissions. Four African countries are among the top 20 destinations: Botswana, Namibia, Angola, and Zambia combined received 8 percent of those emissions.

Table 2.13 Top destinations of GHG emissions embodied in Africa's agricultural exports, 2012–2016

Destination	Share (%)	Destination	Share (%)
Germany	8.57	Spain	2.48
United Kingdom	8.04	India	2.31
United States	7.83	Namibia	1.91
Japan	4.7	Angola	1.81
France	4.52	Switzerland	1.75
Kazakhstan	4.38	United Arab Emirates	1.61
China	3.93	Zambia	1.59
China, Hong Kong	3.24	Saudi Arabia	1.38
Netherlands	3.03	Belgium	1.29
Botswana	2.66	**Top 20 total**	**69.6**
Italy	2.59		

Source: Authors' calculations based on Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).

The top 20 countries listed in Table 2.14 are the origin of nearly 90 percent of GHG emissions embodied in Africa's agricultural imports. The top three—India, China, and South Africa—are the source of up to 55 percent of GHG emissions imported to Africa with agricultural products. South Africa and Kenya are the only two African countries in this top 20.

Table 2.14 Major origins of GHG emissions embodied in Africa's agricultural imports, 2012–2016

Origin	Share (%)	Origin	Share (%)
India	23.92	Turkey	1.98
China	17.85	Kenya	1.85
South Africa	13.95	Thailand	1.37
United States	4.31	Spain	1.29
Iran	3.40	Italy	1.19
Argentina	2.81	Germany	1.18
France	2.61	Netherlands	1.15
Indonesia	2.28	Canada	0.86
Brazil	2.15	Malaysia	0.85
Viet Nam	2.12	**Top 20 total**	**89.20**
Australia	2.07		

Source: Authors' calculations based on Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).

In short, the preceding sections explored trends and patterns in Africa's agricultural trade in terms of both gross value and GHG emissions. From being a net exporter of agricultural GHG emissions, the continent became a net importer in the 2012–2016 period, partly due to a slowdown of its agricultural exports in gross value terms. In-depth research is needed to investigate the extent to which this trend reversal is associated with changes in the composition of the continent's agricultural exports. Europe is the top destination for GHG emissions from Africa's agricultural and fishing exports, and Asia receives most of the emissions exported from the continent's mining and quarrying sector, while the continent retains most of the emissions embedded in its exports of textiles and apparel products. On the import side, Asia is the primary source of emissions embodied in African agricultural imports, and more significantly in the continent's textiles and apparel imports.

Conclusions

Africa's participation in global agricultural trade in recent years is the focus of this chapter. The continent's agricultural trade is analyzed in terms of both value and GHG emissions. As a result of a consistent upward growth trend, Africa has the third fastest growth in agricultural exports after the Americas and Asia and the second fastest growth in imports after Asia. However, its share of global agricultural trade remains low, as does its contribution to GHG emissions through agricultural trade. The North and Southern Africa subregions drive the continent's export growth, while import growth is led by the East and North Africa subregions. Growth in the continent's agricultural trade deficit decelerated over the recent decade, as in other world regions.

While Africa accounts for a small share of global agricultural trade as a whole, it is a big player in the world markets of some of its most traded product categories, such as cotton, cocoa, coffee and tea, and tobacco on the exports side and cereals, sugars and sugar confectionery, and fats and oils on the imports side. The analysis of major trading subregions and countries reveal differences in comparative advantages, patterns of export specialization and import dependency, and vulnerability to world market disruptions, such as those resulting from the COVID-19 pandemic and the Russia–Ukraine war. However, the analysis also reveals a relatively higher diversification of the continent's export destinations compared with import sources in the world markets of its most traded commodity groups.

Africa generally sustains a significant growth rate in its most exported product categories, except for cocoa and cocoa preparations in recent years. However, it faces strong competition, whereby the world's leading exporters generally reap a larger share of the global export market compared to Africa. This explains why growth performance in its most exported products does not translate into a significant increase in world market share.

The trends in GHG emissions embodied in Africa's agricultural trade reflect the sustained growth performance of exports and imports in gross value terms, turning the continent into a net importer of agricultural GHG emissions a decade ago. While Africa's contribution to global GHG emissions via agricultural trade appears small compared with that of other world regions, it faces the common challenge of transitioning to sustainable technologies and practices.

Europe receives the largest portion of GHG emissions exported from Africa's agriculture and fishing sectors, while Asia is the primary destination of emissions embodied in the continent's exports from the mining and quarrying sector. Emissions embodied in exports from the textile and wearing apparel sector, where Africa has one of its largest manufacturing capacities, are largely retained within the continent. Emissions embedded in Africa's agricultural imports

mostly originate in Asia across all emitting sectors, but more notably in textiles and wearing apparel.

Overall, the findings from this chapter raise the importance of developing a strategy for import product and partner diversification to reduce the scale of carbon emissions imported with agricultural products. The strategy should also seek to diversify intracontinental import sources. Currently, intra-African imports mostly originate in only a few countries, with South Africa contributing significant shares of the continental supply of many product categories. Among the factors that limit imports from other intracontinental sources are poor trade infrastructure; trade-restricting, behind-the-border policies; and high external customs duties imposed on trade between regional economic communities.

A critical issue that warrants further exploration is the impact of nontariff measures (NTMs) on intra-African agricultural trade. NTMs are numerous and varied across the continent, playing a crucial role in shaping trade dynamics and market access. The prevalence of NTMs may reflect higher demand for safe food in a context of rising income and changing diets. NTMs intended to protect human health (sanitary and phytosanitary measures) account for 52 percent of all NTMs (UNCTAD 2012). Most NTMs are adopted with the objective of correcting market inefficiencies. Thus, NTMs can be trade catalysts or trade barriers. Santeramo and Lamonaca (2019) reviewed an extensive literature on the trade effects of NTMs and found that both the trade-barrier and trade-catalyst natures of NTMs have been empirically identified, but their trade-barrier nature prevails. Recent studies highlight that reductions in NTMs can significantly enhance intra-African trade under initiatives such as the African Continental Free Trade Area (AfCFTA) (Beckman, Johnson, and Ivanic 2024; Bouët, Laborde, and Traoré 2022). Since NTMs are expected to play a corrective role in the marketplace, raising the financial and technical capacities of African exporters to comply with NTMs might be more appropriate than reducing or dismantling them. By leveraging initiatives like AfCFTA and focusing on sustainable practices, Africa can enhance its economic resilience and contribute positively to global climate efforts.

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Appendix 2.1

Table A2.1 List of countries by African subregion

East Africa	Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, South Sudan, Tanzania, Uganda, Zambia, Zimbabwe
Central Africa	Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome and Principe
Southern Africa	Botswana, Eswatini, Lesotho, Namibia, South Africa
West Africa	Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo
North Africa	Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara

Source: United Nations country classification, https://unstats.un.org/unsd/methodology/m49/

Table A2.2 Eora 26-sector structure

#	Description	#	Description
1	Agriculture	14	Construction
2	Fishing	15	Maintenance and repair
3	Mining and quarrying	16	Wholesale trade
4	Food and beverages	17	Retail trade
5	Textiles and wearing apparel	18	Hotels and restaurants
6	Wood and paper	19	Transport
7	Petroleum, chemical, and non-metallic mineral products	20	Post and telecommunication
8	Metal products	21	Financial intermediation and business activities
9	Electrical and machinery	22	Public administration
10	Transport equipment	23	Education, health, and other services
11	Other manufacturing	24	Private households
12	Recycling	25	Others
13	Electricity, gas, and water	26	Re-export and re-import

Source: Eora Global Supply Chain Database (Lenzen et al. 2012, 2013).