INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
IFPRI

AGRIFOOD SYSTEM DIAGNOSTIC

Philippines

Situating the agrifood system and its evolving impacts

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Three Parts to the Agrifood System (AFS) Diagnostic

1. **Structure and Dynamics: The agrifood system in the broad economy**
   - What does the Philippines' agrifood system (AFS) look like today?
   - How has the Philippines' AFS been transforming?

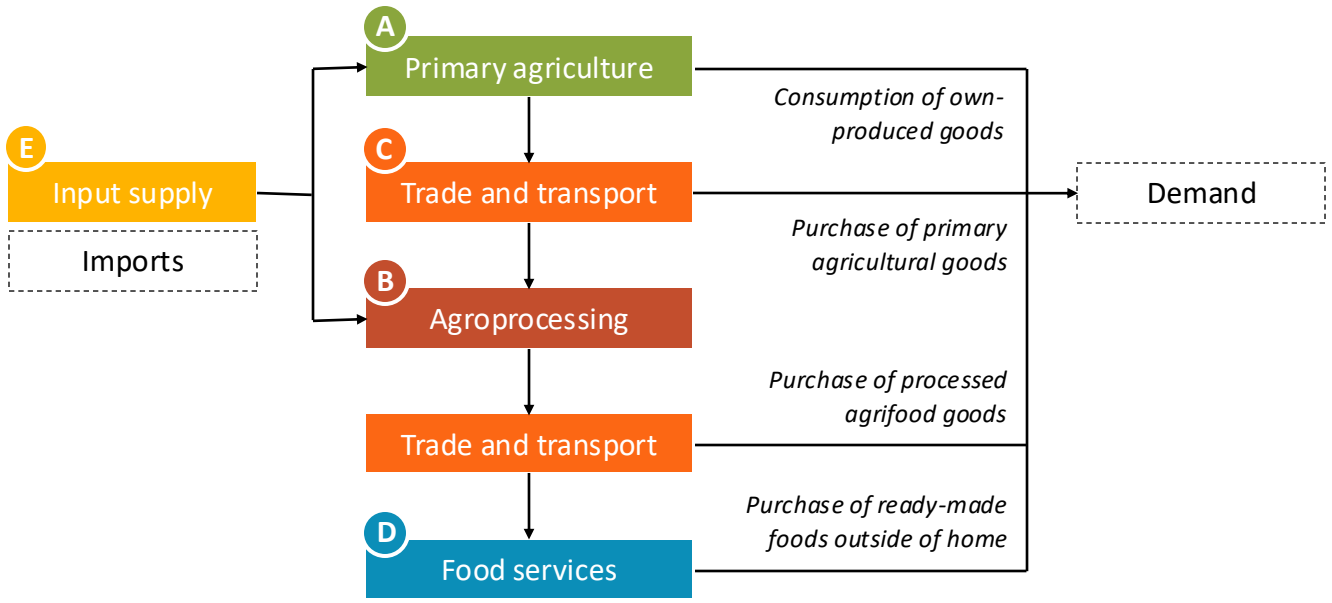
2. **Value Chains: Decomposing the agrifood system**
   - What are different roles of various agrifood value chains in the broader AFS?
   - Which value chains have contributed more to the AFS growth?

3. **Environment: Agricultural impacts**
   - How are different agricultural products contributing to the Philippines' water footprints?
   - How are different agricultural products contributing to the Philippines' greenhouse gas emissions?
   - Have agriculture's environmental impacts increased over time?

Structure and Dynamics | Defining the Agrifood System

AFS includes agriculture and four broad off-farm

- The AFS is a complex network of actors, connected by their differing roles in supplying, consuming, and governing agrifood activities
- We measure the structure and size of the AFS from the supply-side using standard economywide datasets (i.e., national accounts and employment statistics)



Agrifood System GDP
Total value added generated by all agricultural value chains

Agrifood System Employment
Total number of workers who are primarily employed in upstream or downstream of an agricultural value chain

Structure and Dynamics | Philippines' Agrifood System Today

Current structure and size of national AFS

- Latest AFS GDP and employment estimates
- Decomposed into five AFS components
- Situates AFS within the broader economy

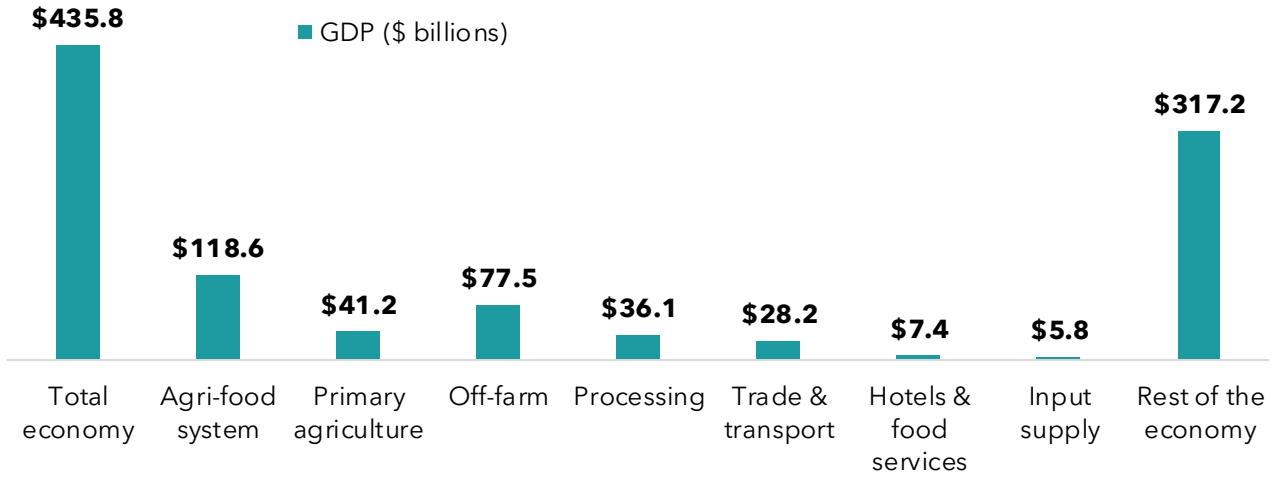
Uses official data sources

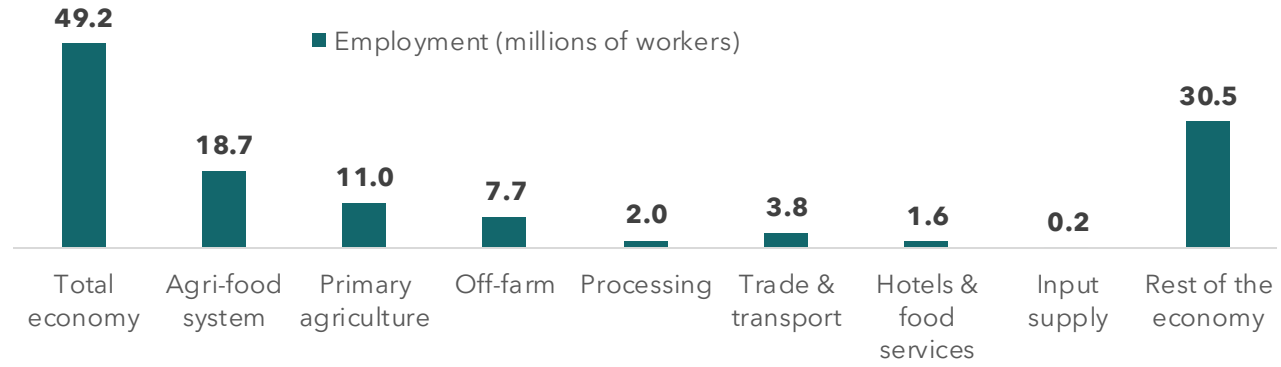
- GDP from national accounts
- Employment from various sources (population census, labor force surveys, ILO, etc.)

Philippines AFS estimates indicate

- AFS makes up less than 30% of GDP and less than 40% of total employment
- Primary agriculture (A) is still important, but off-farm components (B–E) far exceed agriculture in GDP

GDP and employment in Philippines' agrifood system
(2023)





Data source: GDP estimates from Philippines' national accounts data (Philippine Statistics Authority) and IFPRI's Philippines 2023 Social Accounting Matrix; employment estimates from ILO data.

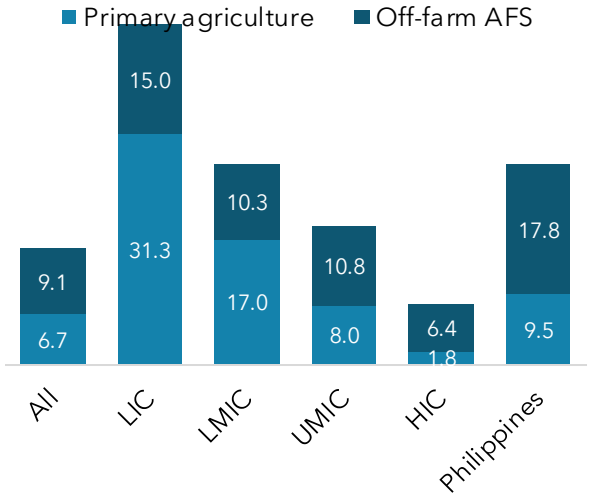
Structure and Dynamics | Comparison to Other Countries

The AFS varies at different stages of development

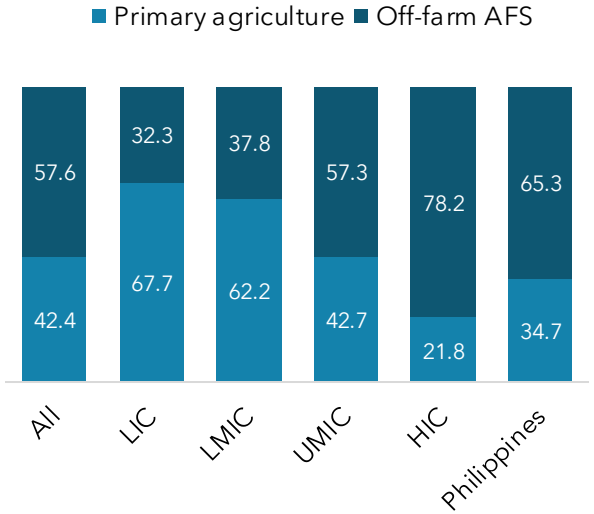
Philippines is a lower-middle-income country (LMIC)

- **A**: Philippines' agriculture GDP in total GDP is much smaller than LMIC average with off-farm components relatively larger
- **B**: Thus, Philippines' primary agriculture in AFS GDP is much smaller than LMIC average
- **C**: Share of agro-processing in the off-farm components of AFS GDP is larger than LMIC average with smaller food service and input supply components

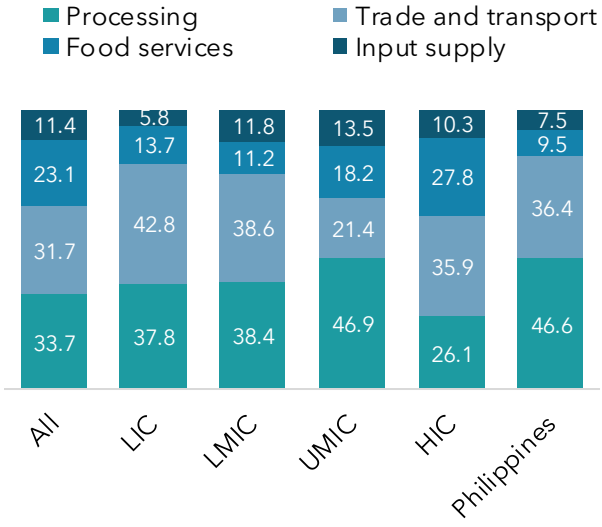
A Share of total GDP (%)



B Share of AFS GDP (%)



C Share of off-farm AFS GDP (%)



LIC = low-income countries | LMIC = lower-middle income | UMIC = upper-middle-income | HIC = high-income

Source: IFPRI Agri-Food System Database

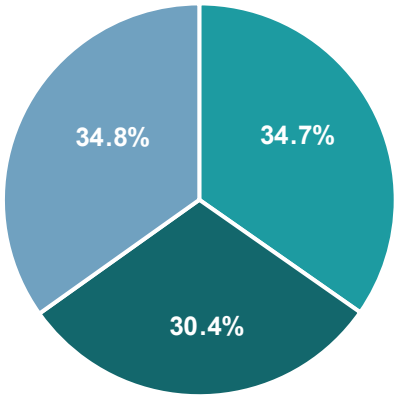
Structure and Dynamics | Supply and Demand Sides

- GDP contributions define the structure of AFS on the supply side
- Household demand captures AFS structure on the demand side
- Processing agriculture is more important on the demand side than on the supply side in the AFS
- Philippines consumes more agrifood products than it produces (import value is three times that of exports)

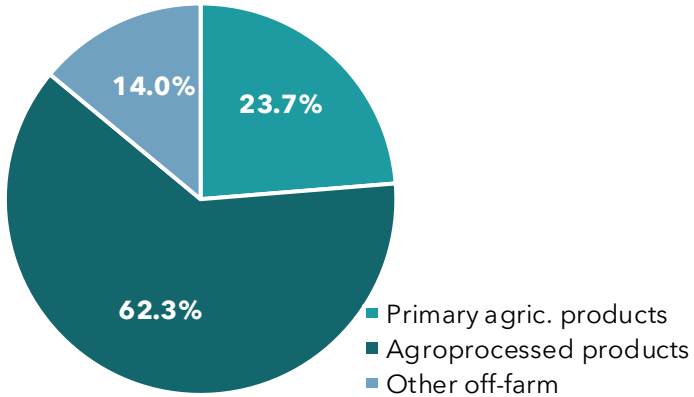
Agrifood GDP vs. consumption

Primary, processed, and other product shares (%)

AFS GDP



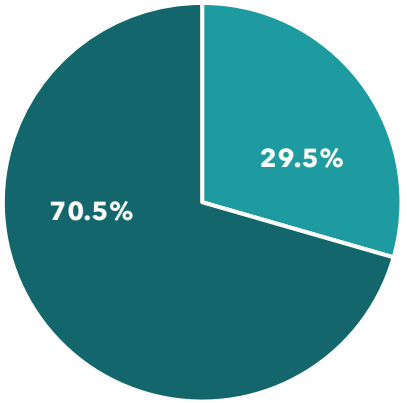
Household demand



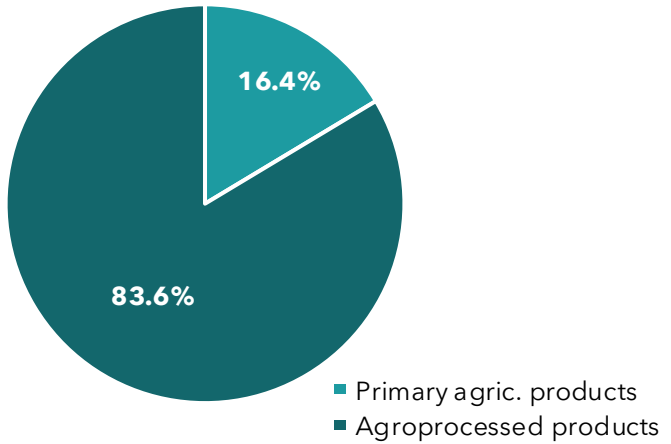
Agrifood exports vs. imports

Primary and processed product shares (%)

Exports ($5.56 bil.)



Imports ($17.42 bil.)



Structure and Dynamics | Performance

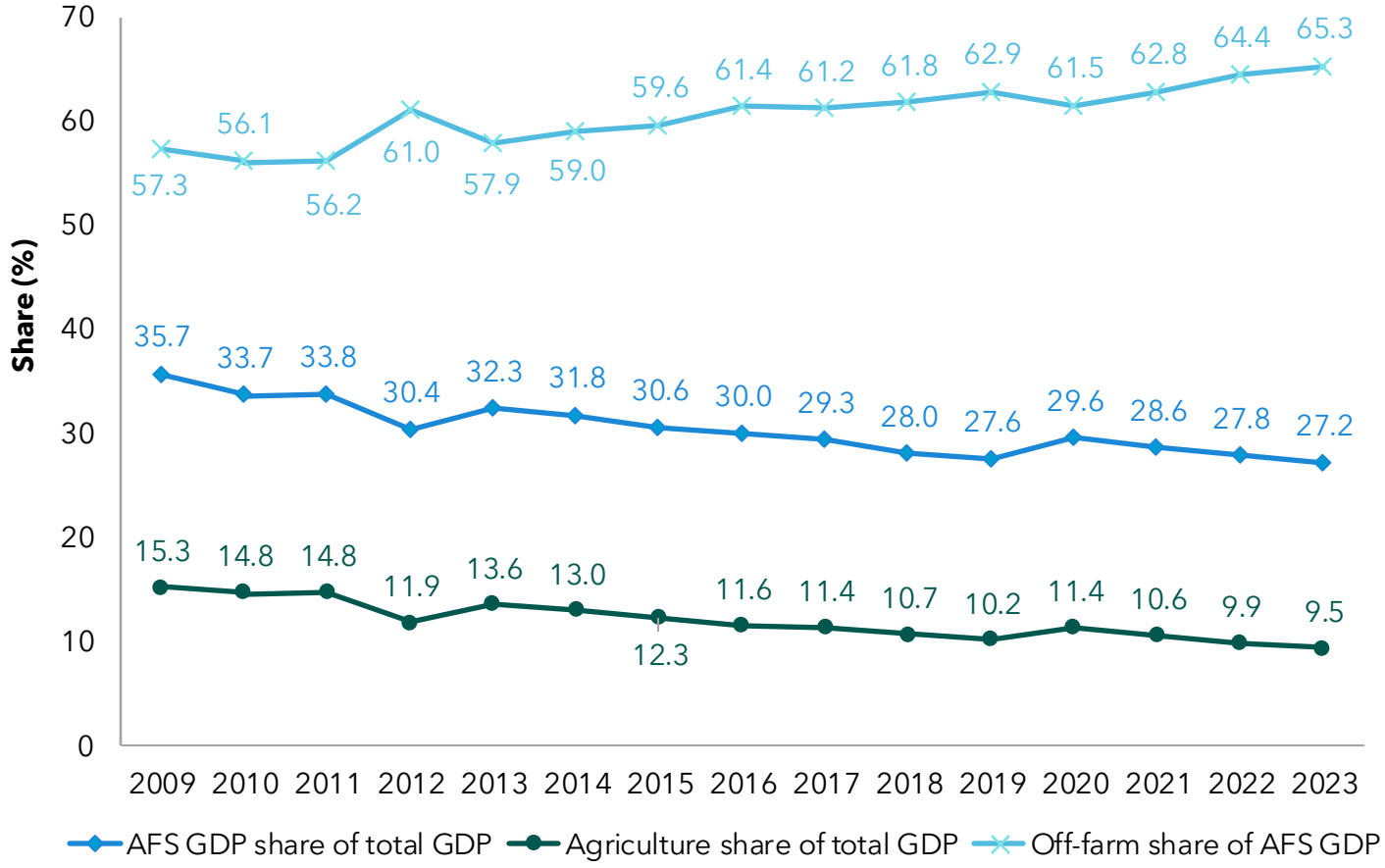
Philippines AFS has been transforming

- Agriculture's share of total GDP has steadily declined, dropping below 10% in recent years
- Off-farm AFS have gained increasing prominence
- The overall AFS contribution to the national economy gradually edged downward

The off-farm AFS GDP consistently exceeded that of primary agriculture throughout the period

- In recent years, off-farm components have accounted for nearly two-third of total AFS GDP

Shares of AFS and agriculture in total GDP and off-farm share of AFS GDP



Data source: IFPRI's Philippines 2009 – 2023 Social Accounting Matrixes.
Note: All GDP estimates are measured in constant 2023 prices.

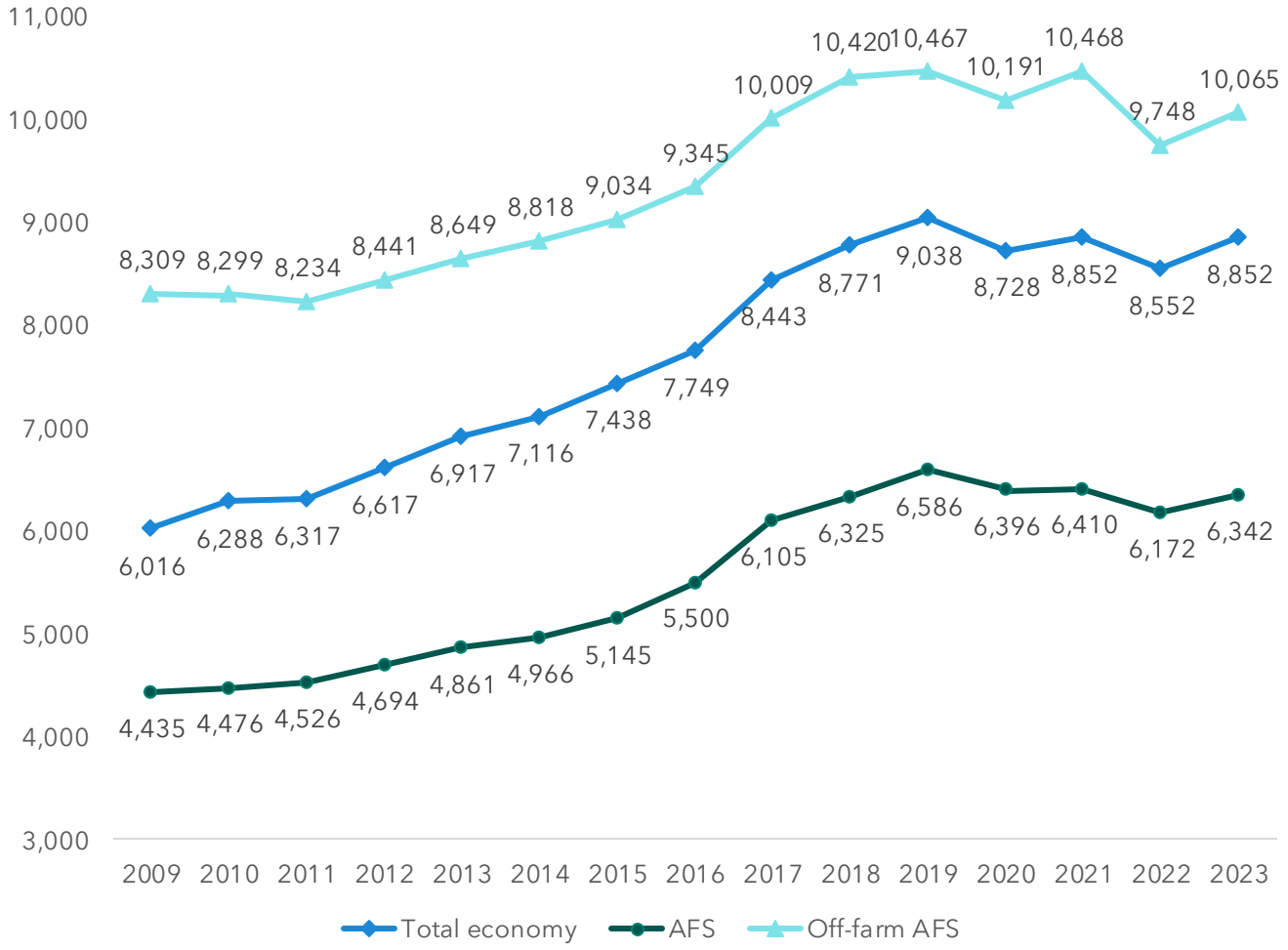
Structure and Dynamics | Growing AFS Productivity

Philippines' AFS labor productivity is relatively high and has continued to grow, with some recent stagnation

- AFS GDP per worker rose steadily between 2009 and 2019, but growth has since plateaued following the pandemic
- Off-farm AFS remained above that of both the total economy and primary agriculture throughout the period, despite a post-pandemic dip

GDP per worker in the AFS and total economy

(constant 2023 US$)

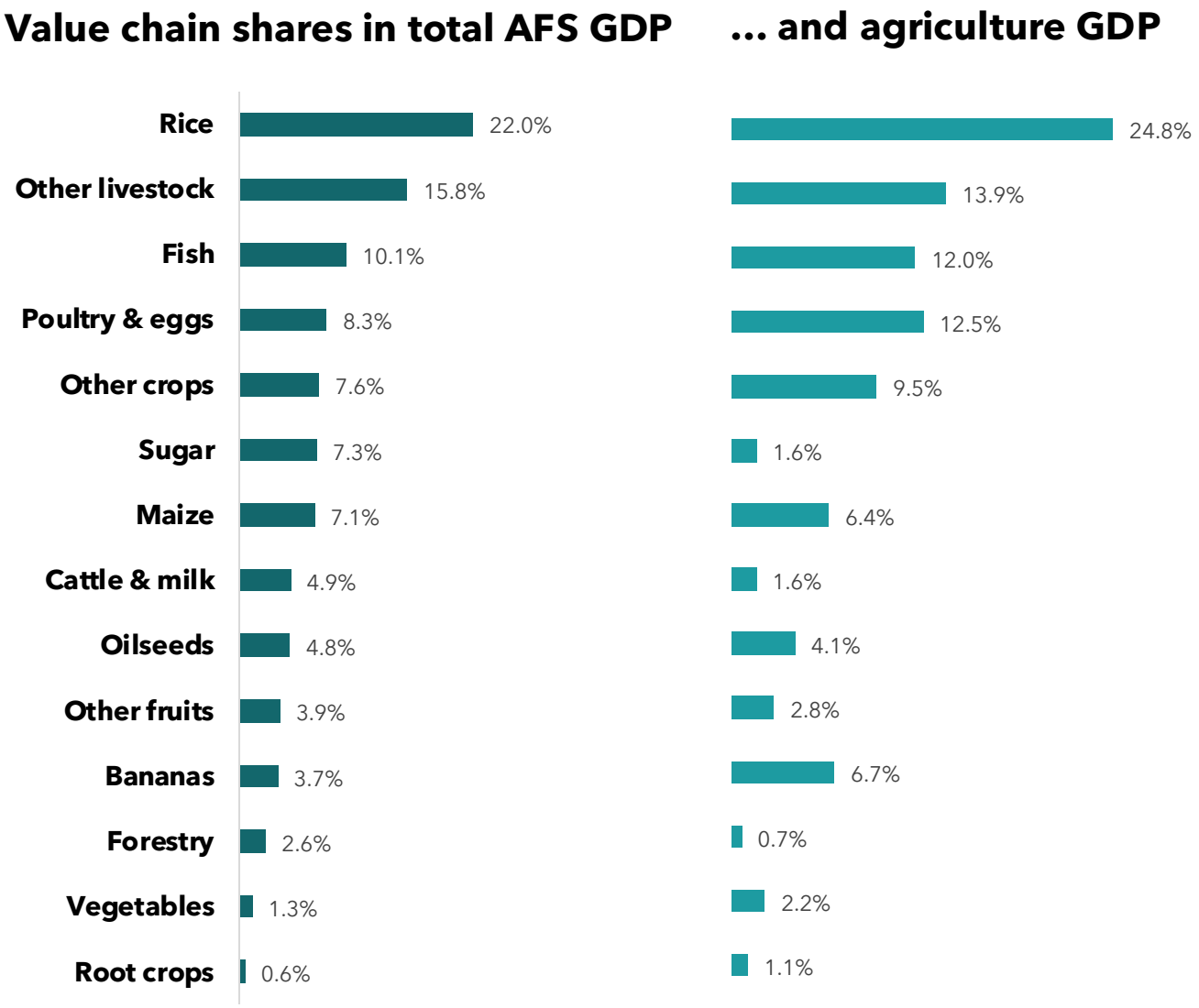


Data source: IFPRI's Philippines 2009 – 2023 Social Accounting Matrixes.
Note: GDP estimates are measured in constant 2023 prices.

Value Chains| Decomposing AFS

Philippines' AFS is decomposed into 14 broad value chain groupings

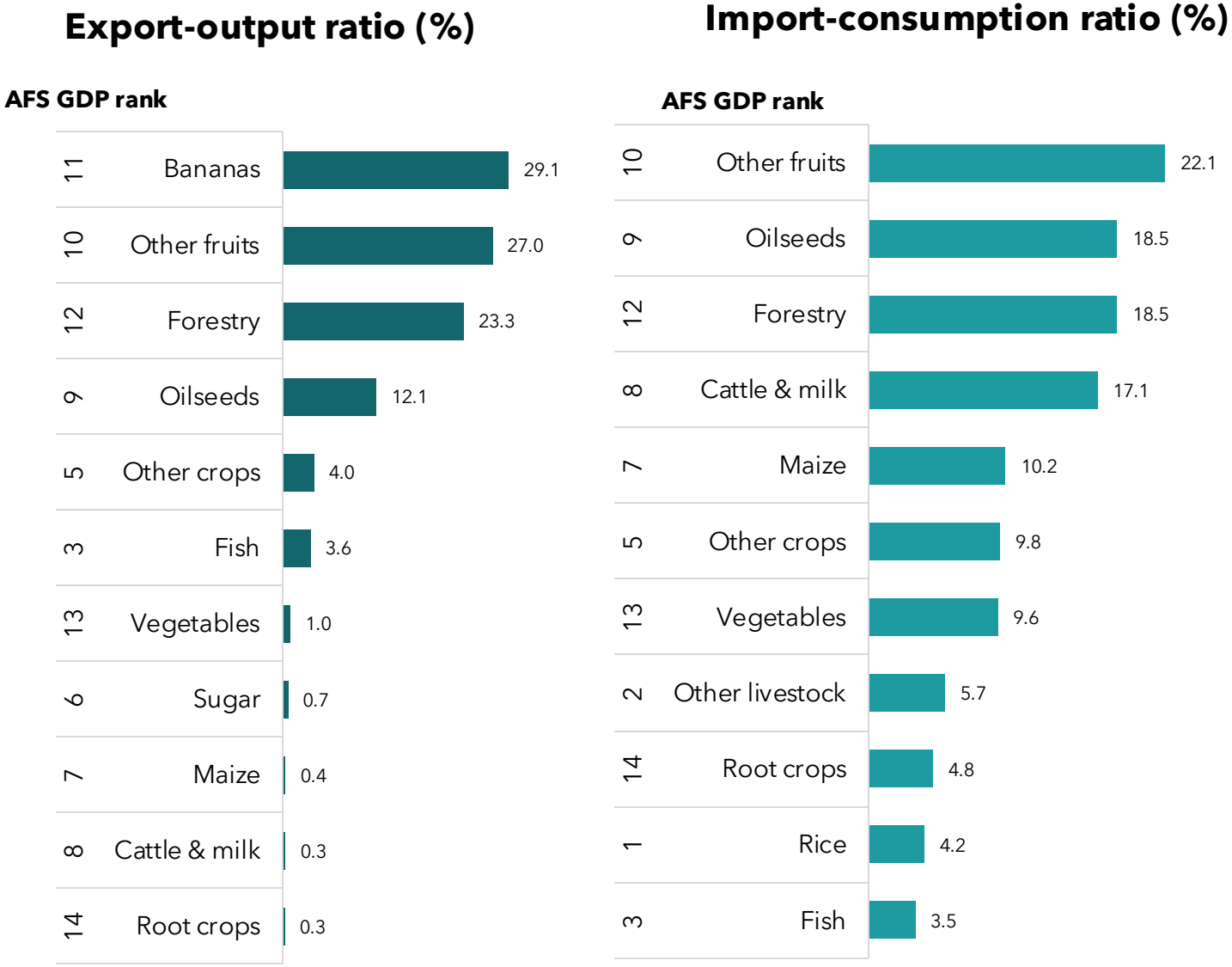
- Rice is the largest in both measures of GDP
  - It accounts for more than 20% of AFS GDP and one-quarter of agriculture GDP
- Philippines' agrifood system is diverse with sizable contributions from other livestock (dominated by pig), fish, and poultry & eggs value chains
- The root crop and vegetable value chains contribute smaller shares to both AFS and agriculture GDP



Data source: IFPRI's Philippines 2023 Social Accounting Matrix.
Note: The detailed grouping of individual products for the value chain groups are provided in the last slides.

Value Chains | Trade Dependency

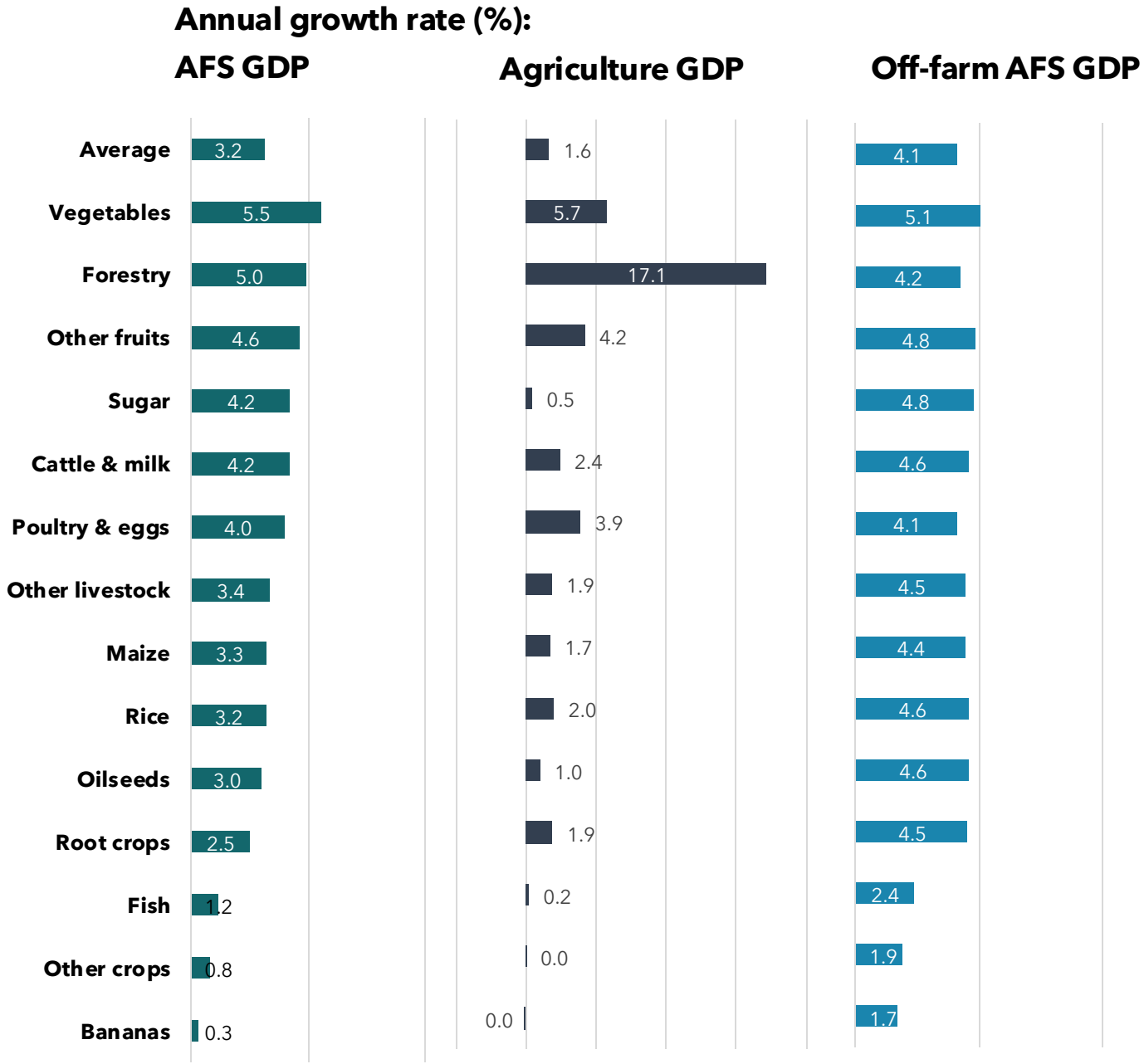
- Philippines imports twice more agrifood products than it exports ($17.42 vs. 5.56 billion in 2023).
  - Imports accounted for 7.2% of agrifood consumption, while exports contributed only to 3.2% of agrifood output.
- Rice is the largest value chain, but Philippines still needs to import 4% of rice for domestic consumption
- Fish, the 3rd largest value chain, is largely trade-independence
- Philippines exports more fruits especially bananas



Data source: IFPRI's Philippines 2023 Social Accounting Matrix.
Note: Exports and imports of a value chain are measured by the values of the traded agricultural and agro-processed products. The value chain output is the gross output generated by agriculture and agro-processing in that value chain.

Value Chains | Performance

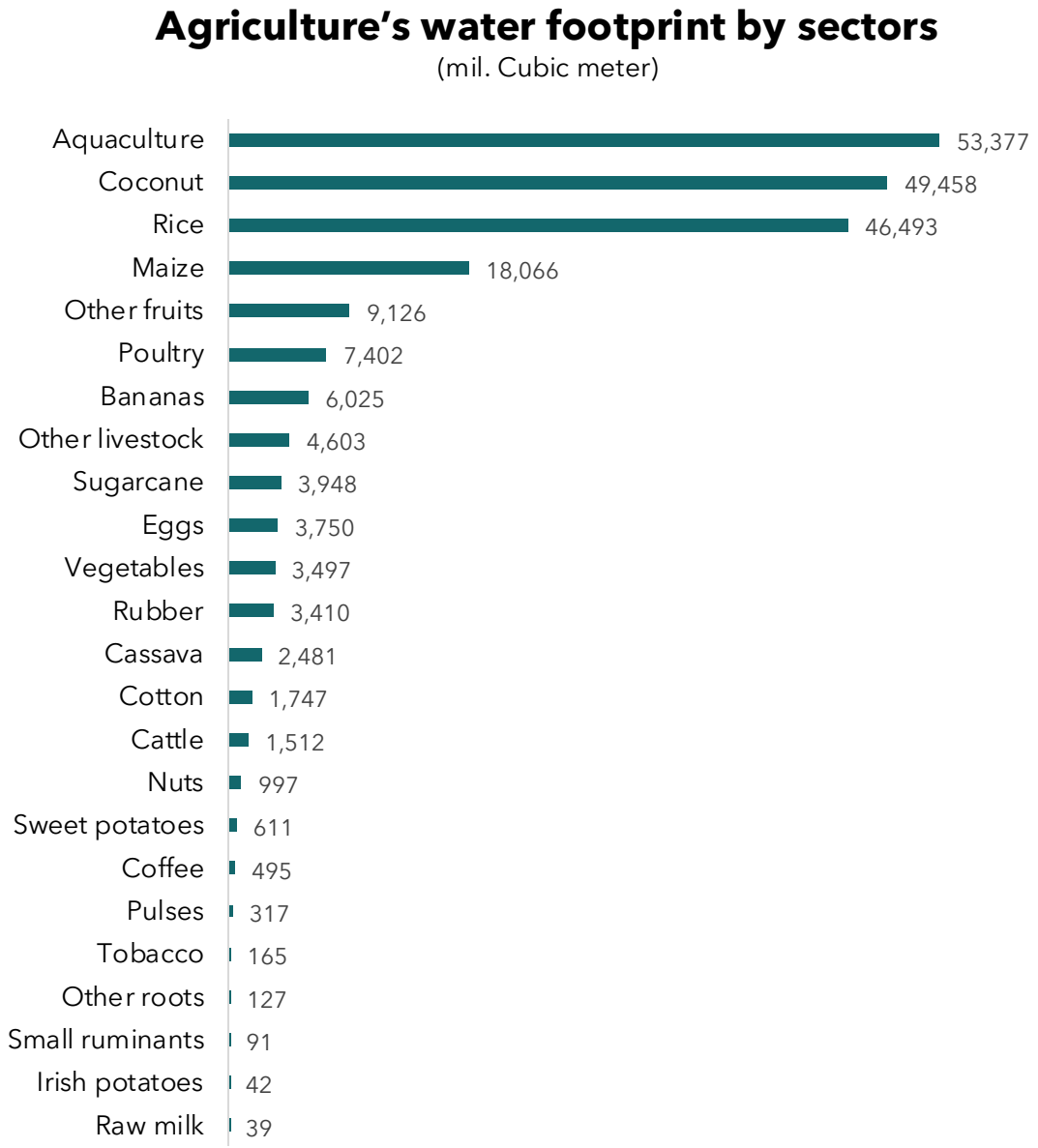
- AFS GDP grew at 3.1% annually between 2009 and 2023, while agriculture GDP rose at 1.6%, only slightly above the population growth rate
- Off-farm AFS grew faster at 4.2%, though it remained below the 6.1% annual growth of non-agriculture GDP
- Six value chains posted AFS GDP growth 4.0% or above. Among these, only vegetables, forestry, and other fruits achieved similar or higher growth on the agricultural side
- Agriculture GDP grew marginally across most value chains, where AFS growth was often driven by off-farm expansion, especially in trade, transport, logistics, and agro-processing, in response to rising market-linked demand



Data source: IFPRI's Philippines 2009 – 2023 Social Accounting Matrixes.

Environment | Current Water Footprint

- Water footprint is a measure of water consumption and pollution in production, indicating pressure on freshwater resources
  - *Total water* includes *Green* (rainwater), *Blue* (surface and groundwater use, e.g., irrigation), and *Grey* (water needed to dilute pollutants from fertilizers and other chemicals)
- Aquaculture, coconut, and rice dominate Philippines' agriculture water footprint, accounting for more than two-thirds in 2023
- Blue water makes up more than 10% of total, used predominantly by aquaculture and rice

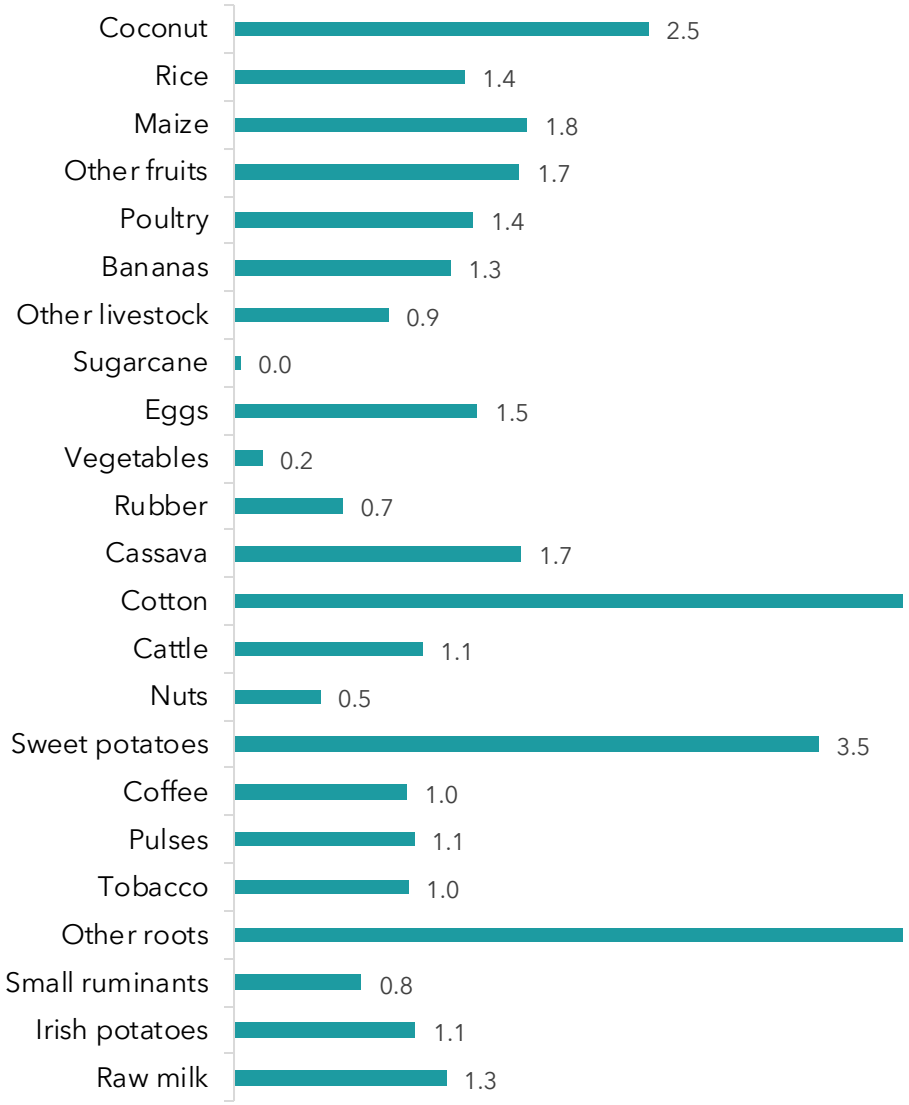


Data sources: Water footprint data per unit of agricultural output is from Mekonnen and Hoekstra (2010) and agricultural production data is for 2023 and from FAO.

Environment | World Average Comparison

- Many large contributors of total water footprint exceed the world average per unit of product
  - Rice and maize –the top two cereal contributors to total water use– produce 40% and 80% more than the world average per unit of product respectively

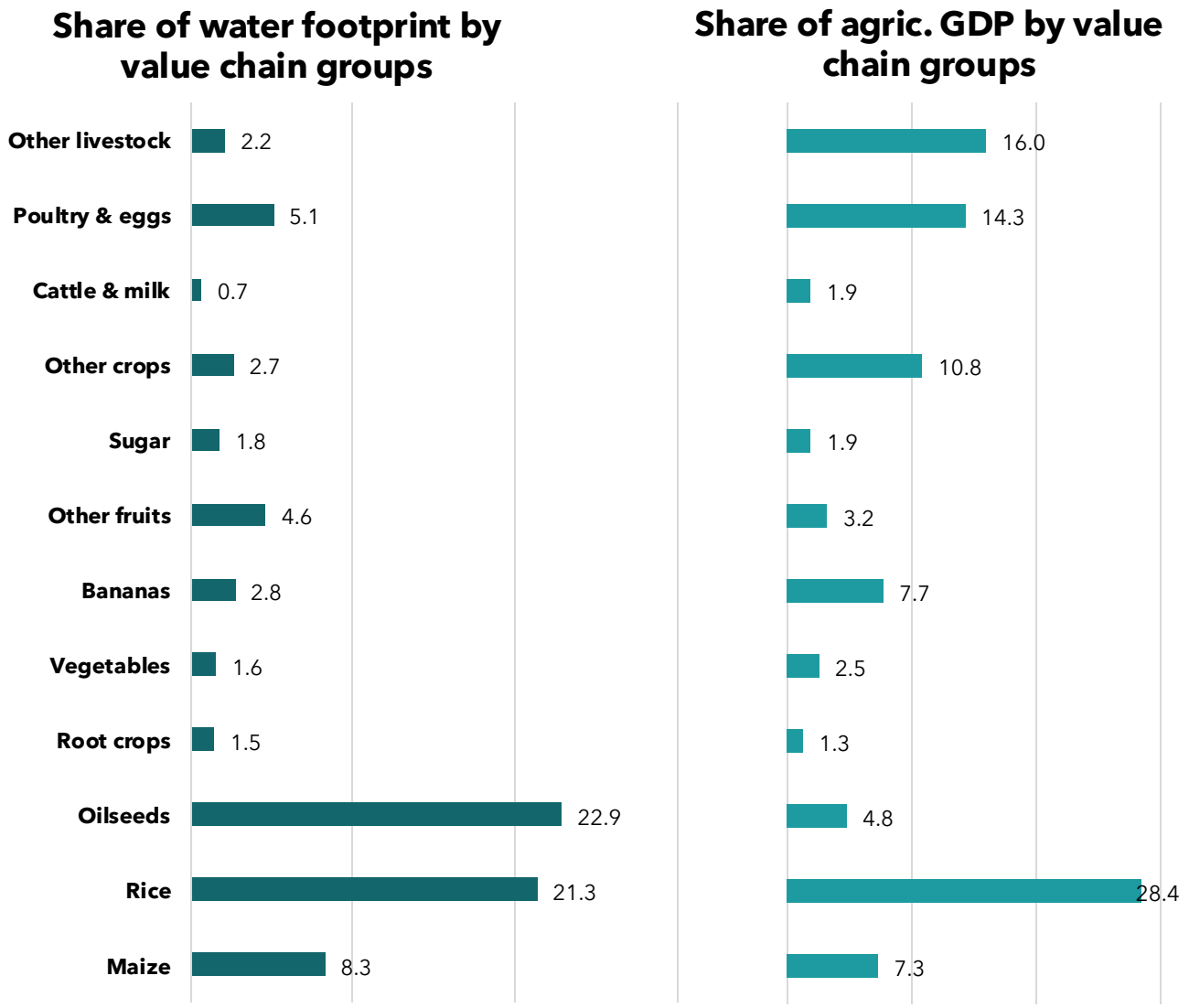
Ratio to the world average
(the world average per unit of same product = 1.0)



Data sources: Water footprint data per unit of agricultural output is from Mekonnen and Hoekstra (2010) and agricultural production data is for 2023 and from FAO.
Note: For each agricultural sector, the global average total water considers only the crop / livestock products that are also produced in Phillipines for reasons of comparison.

Environment | Comparison of Water Footprint and Agric.

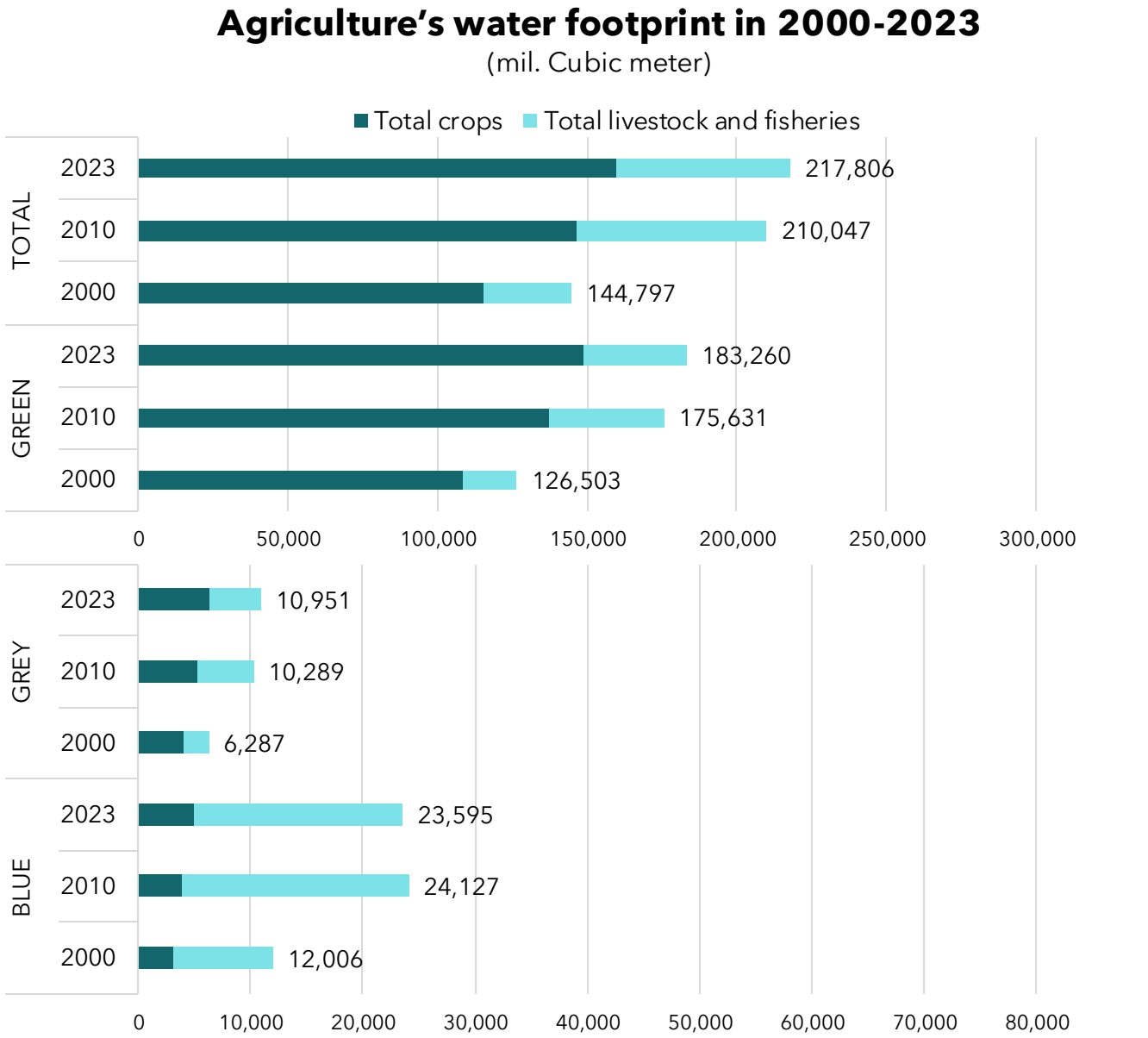
- Rice, the Philippines' largest agricultural value chain, is relatively balanced in terms of water footprint and GDP contribution
  - Its share in agriculture's water footprint is lower than its share in agricultural GDP
- Oilseeds (coconut) is the least water-efficient
  - It accounts for a disproportionately high share of agricultural water footprint relative to its GDP contribution



Data source: Water footprint data per unit of agricultural output is from Mekonnen and Hoekstra (2010) and agricultural production data is for 2023 and from FAO. IFPRI's Phillipines 2022 Social Accounting Matrix.

Environment | Increased Water Footprint of Agriculture

- The Philippines' agricultural water footprint grew from 130 to 220 billion m³ (2000–2023), driven by both crop (60%) and livestock & fishery production.
- Blue water footprint also grew rapidly, reaching 24 billion m³ in 2023.
  - Rice and aquaculture dominate total blue water and its growth

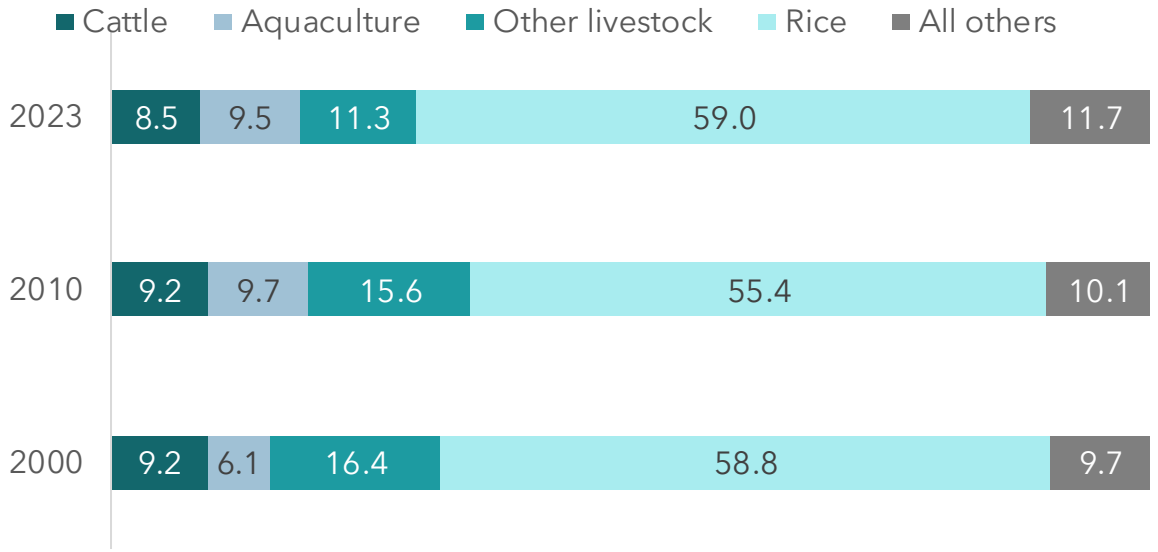


Data sources: Water footprint data per unit of agricultural output is from Mekonnen and Hoekstra (2010) and agricultural production data is for 2000, 2010 and 2023 from FAO.

Environment | Current Greenhouse Gas (GHG) Emissions

- The Philippines' agricultural GHG emissions –including emissions from land-use change (LULUCF)– reached 75 million tons CO_2e , accounting for nearly 30% of the nation's total emissions
- Rice is the largest contributor, responsible for about 60% of agricultural emissions

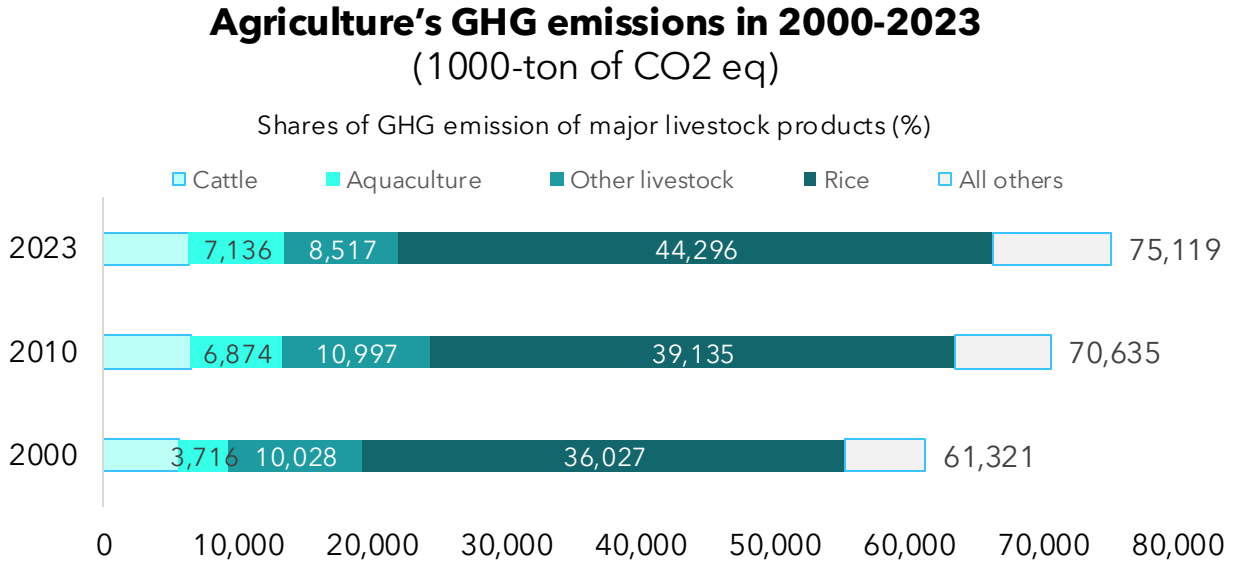
Shares of total agriculture's GHG emissions (%)

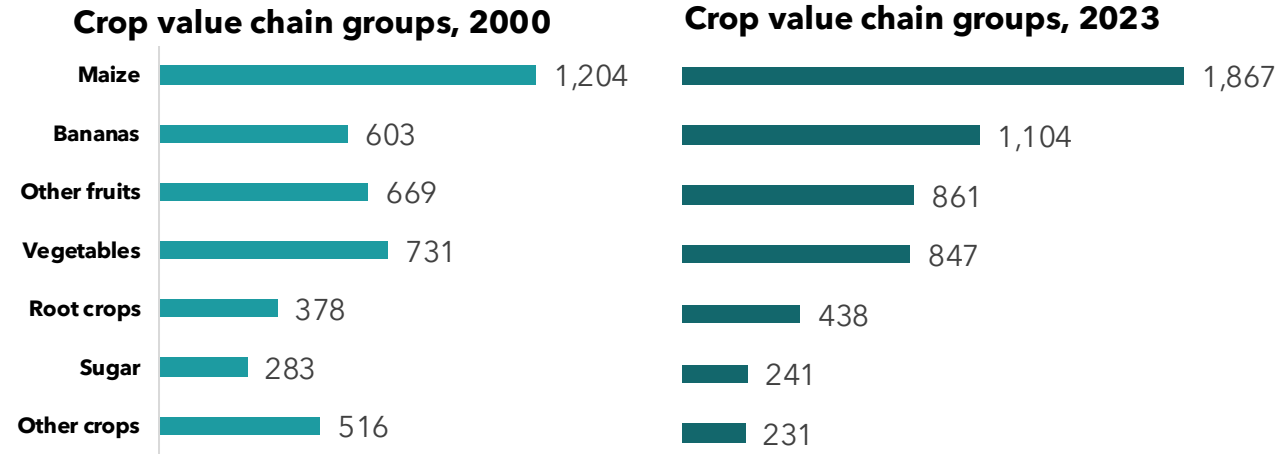


Data sources: National total GHG emission in 2023 is from EDGAR (Emissions Database for Global Atmospheric Research) Community GHG database. Agriculture total GHG emission in 2023 is from FAO. GHG emissions per kilogram is based on two sources: FAO emission intensities data for the livestock sectors, total cereals excluding rice, and rice, and Poore & Nemecek (2018) for other crops; agricultural production data is for 2023 and from FAO.

Environment | Increased Agricultural GHG Emissions

- The Philippines' agricultural GHG emissions rose more rapidly between 2000 and 2010 – from 61mil. tons CO_2e to 70mil. –then increased more gradually by an addition 5mil. tons by 2023
- The additional 5M tons GHG emissions from 2010 to 2023 were mainly from rice
- Emission from aquaculture declined modestly between 2010 and 2023
- Emissions from other crops remained modest but gradually increased across value chains





Data sources: Agriculture total GHG emission is from FAO. GHG emissions per kilogram is based on two sources: FAO emission intensities data for the livestock sectors, cereals excluding rice, and rice, and Poore & Nemecek (2018) for other crops. Agricultural production data is for 2000, 2010 and 2023 from FAO.

Conclusions | Highlights of the Philippines' AFS Diagnostic

The Philippines' AFS continued its transformation during 2009-2023

- Philippines' share of off-farm AFS exceeded that of primary agriculture throughout the period
- The contribution of primary agriculture to GDP continued to decline, dropping below 10% in recent years, while off-farm AFS expanded further
- The off-farm AFS labor productivity is relatively high and remained above the national, but growth has plateaued following the pandemic

The AFS growth was driven by off-farm sectors

- Philippines imports much more agrifood products than it exports
- Agriculture GDP grew marginally across most value chains
- AFS growth was often driven by off-farm expansion, especially in trade, transport, logistics, and agro-processing, in response to rising market-linked demand

Conclusions | Environmental Impacts

The environmental pressures are concentrated in a few sectors

- Aquaculture, coconut, and rice dominate agriculture's total water footprint.
- Blue water is used predominantly by aquaculture and rice
- Many large contributors of total water footprint exceed the world average per unit of product
  - Rice and maize, e.g., produce 40% and 80% more than the world average per unit respectively
- GHG emissions are also concentrated, and rice is the largest contributor of agricultural emissions

Agriculture's environmental impacts have intensified since 2000

- Total water footprints more than doubled from 2000 to 2023
  - Blue water footprint also grew rapidly led by aquaculture and rice expansion
- GHG emissions rose more rapidly between 2000 and 2010, then increased more gradually by 2023
  - The additional emissions from 2010 to 2023 were mainly from rice, while emission from aquaculture declined modestly
  - Emissions from other crops remained modest but gradually increased across value chains

Conclusions | Overall

- The AFS will continue to play key roles in growth, poverty reduction, food security, and nutrition improvement, while its role in environmental sustainability is becoming increasingly important

- Since impacts are concentrated in a few agricultural sectors, policies that promote sustainable practices in these value chains are essential

- The rice, coconut, and aquaculture value chains will likely remain central to the design of policies aimed at jointly achieving food security and environmental sustainability

Appendix I: Value Chain Groups and Agricultural Sectors in Individual VC Groups

Value chain group and their share of AFS GDP	Individual products and their share of group's agriculture GDP
Rice (22.0%)	Rice 100%
Maize (7.1%)	Maize 100%
Oilseeds (4.8%)	Coconut 97.8% | Groundnuts 0.7% | Pulses 1.6%
Root crops (0.6%)	Cassava 52.7% | Irish potatoes 5.0% | Sweet potatoes 33.2% | Other roots 9.0%
Vegetables (1.3%)	Vegetables 100%
Bananas (3.7%)	Bananas 100%
Other fruits (3.9%)	Other fruits 98.8% | Nuts 1.8%
Sugar (7.3%)	Sugar 100%
Other crops (7.6%)	Tobacco 1.1% | Cotton 0.7% | Coffee 3.5% | Cocoa 0.9% | Rubber 2.8 | Other crops 91.0%
Cattle & dairy (4.3%)	Cattle meat 92.8% | Raw milk7.2%
Poultry & eggs (8.3%)	Poultry meat 85.5% | Eggs 14.5%
Other livestock (15.8%)	Small ruminants 6.0% | Other livestock 94.0%%
Fish (10.1%)	Aquaculture 78.8% | Captured fish 21.2%
Forestry (2.6%)	Forestry 100%

Appendix II: Water Footprint Data Sources and Methodology

The national-level water footprint per metric ton of crop and livestock products (1995–2005 average) comes from:

- Mekonnen, M.M. and Hoekstra, A.Y. (2010):
  - The green, blue and grey water footprint of crops and derived crop products, *Value of Water Research Report Series* No. 47, UNESCO-IHE, Delft, the Netherlands
  - The green, blue and grey water footprint of farm animals and animal products, *Value of Water Research Report Series* No. 48, UNESCO-IHE, Delft, the Netherlands

http://www.waterfootprint.org/Reports/Report47-WaterFootprintCrops-Vol1.pdf

The original water footprint data for detailed agricultural crop and livestock products (per metric ton) is combined with FAO's annual agricultural production data (https://www.fao.org/faostat/en/#home) to calculate the total water footprints for each of the 38 agricultural sectors in 2000, 2010, and 2023.

Appendix III: GHG Emission Data Sources and Methodology

The GHG emission data is sourced from FAO, providing analytical data on greenhouse gas (GHG) emissions national and agricultural (farmgate) totals and per kilogram of agricultural products. The databases cover:

- 1961–2022 for agricultural total and 9 livestock products, cereals (excluding rice), and rice
  - FAO Methodological Notes
    https://files-faostat.fao.org/production/EI/EI_e.pdf
    https://files-faostat.fao.org/production/GT/GT_en.pdf
  - FAO GHG Emission Databases
    GHG Emission Intensity https://www.fao.org/faostat/en/#data/EI
    GHG Emission Total https://www.fao.org/faostat/en/#data/GT

For non-cereal crops, GHG emissions per kilogram are taken from:

- Poore, J. & Nemecek, T. (2018):
  Reducing food's environmental impacts through producers and consumers, *Science* 360(6392): 987–992
  - Data Source: https://ourworldindata.org/environmental-impacts-of-food
  - The Poore & Nemecek dataset provides global average CO_2-equivalent emissions per unit of product for 38 food commodities in 2010.

Since FAO already provides country-specific agricultural total CO_2-equivalent emissions and CO_2-equivalent per unit for cereals, rice, and 9 livestock products, we only use Poore & Nemecek's data for non-cereal crops. To estimate country-level emissions for non-cereal crops:

- Applying the ratio of FAO's country-specific cereal GHG emissions (2010) to Poore & Nemecek's global cereal GHG average (2010).This ratio is used to scale down global non-cereal crop emission values to country-specific levels.
- FAO's country-specific agricultural total CO_2-equivalent emissions trends between 2000 and 2022 are also incorporated for CO_2-equivalent emissions in 2000, 2010, and 2023