
Codex Planetarius

Pilot Study: Sugarcane Production in Malawi

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About *Codex Planetarius*

Codex Planetarius is a proposed system of minimum environmental performance standards for producing globally traded food. It is modeled on the *Codex Alimentarius*, a set of minimum mandatory health and safety standards for globally traded food. The goal of *Codex Planetarius* is to measure and manage the key environmental impacts of food production, acknowledging that while some resources may be renewable, they may be consumed at a faster rate than the planet can renew them.

The global production of food has had the largest impact of any human activity on the planet. Continuing increases in population and per capita income, accompanied by dietary shifts, are putting even more pressure on the planet and its ability to regenerate renewable resources. We need to reduce food production's key impacts.

The impacts of food production are not spread evenly among producers. Data across commodities suggest that the bottom 10-20% of producers account for 60-80% of the impacts associated globally with producing any commodity, even though they produce only 5-10% of the product. We need to focus on the bottom.

Once approved, *Codex Planetarius* will provide governments and trade authorities with a baseline for environmental performance in the global trade of food and soft commodities. It won't replace what governments already do. Rather, it will help build consensus about key impacts, how to measure them, and what minimum acceptable performance should be for global trade. We need a common escalator of continuous improvement.

These papers are part of a multiyear proof of concept to answer questions and explore issues, launch an informed discussion, and help create a pathway to assess the overall viability of *Codex Planetarius*. We believe *Codex Planetarius* would improve food production and reduce its environmental impact on the planet.

This proof-of-concept research and analysis is funded by the Gordon and Betty Moore Foundation and led by World Wildlife Fund in collaboration with a number of global organizations and experts.

For more information, visit www.codexplanetarius.org

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Acronyms

ABF	Associated British Foods	ITC	International Trade Centre
AfCFTA	African Continental Free Trade Area	IUCN	International Union for Conservation of Nature
AfDB	African Development Bank	LTM	Long Term Mean
AWS	Alliance for Water Stewardship	MBS	Malawi Bureau of Standards
BOD	Biochemical Oxygen Demand	MEPA	Malawi Environmental Protection Authority
BMPs	Better Management Practices	MFN	Most Favored Nation
CAC	<i>Codex Alimentarius</i> Commission	MW	Megawatt
CCA	Community Conservation Area	NAP	National Adaptation Strategy (Malawi)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	Nbs	Nature based Solutions
CMS	Condensed Molasses Solids	NDCs	Nationally Determined Contributions
COMESA	Common Market for Eastern and Southern Africa	NSEOR	National State of Environment and Outlook Report (Malawi)
DCF	Deforestation- and Conversion-Free	NSFS	New Synergistic Farming System
DCTS	Developing Countries Trading Scheme (UK)	NWRA	National Water Resource Authority (Malawi)
EAD	Environmental Affairs Department (Malawi)	SADC	Southern African Development Community
EBA	Everything But Arms (EU trading scheme)	SAI	Platform Sustainable Agriculture Initiative Platform
E&I	Energy & Industry	SASRI	South African Sugarcane Research Institute
EIA	Environmental Impact Assessment	SBTi	Science Based Targets initiative
ESIA	Environmental and Social Impact Assessment	SDG	Sustainable Development Goal
ESMP	Environmental and Social Management Plan	SIS	Soil Information System
ESCOM	Electricity Supply Corporation of Malawi	SOM	Soil Organic Matter
EU	European Union	SOTER	SOil and TERrain Database
FAO	Food and Agriculture Organization of the United Nations	SUGAM	Sugarcane Growers Association of Malawi
FLAG	Forest, Land, and Agriculture	SUSFARMS	Sustainable Sugarcane Farm Management System
FMG	Farm Management Group	SVTP	Shire Valley Transformation Programme
FOLUR	Food Systems, Land Use, and Restoration Impact Program	TCH	Tonnes of Cane per Hectare
FPIC	Free, Prior, and Informed Consent	TCO_{2e}	Tonnes of Carbon Dioxide Equivalent
FSA	Farm Sustainability Assessment	TRQ	Tariff Rate Quota
FSC	Forest Stewardship Council	UK	United Kingdom
GBA	Greenbelt Authority (Malawi)	UN	United Nations
GEF	Global Environment Facility	UNEP	United Nations Environment Programme
GHG	Greenhouse Gas	USAID	United States Agency for International Development
GSP	Generalized Scheme of Preferences	US	United States
HSE	Health, Safety, and Environment	WoSIS	World Soil Information Service
IFC	International Finance Corporation	WTO	World Trade Organization
IPM	Integrated Pest Management	WUE	Water Use Efficiency
ISRIC	International Soil Reference and Information Centre		

1 Introduction

The WWF Markets Institute, in partnership with the Global Environment Facility (GEF) and the Food Systems, Land Use and Restoration Impact Program (FOLUR), is developing *Codex Planetarius* – a set of mandatory baseline standards for the environmental performance of globally traded food commodities. Targeting six critical impact areas – soil health, water use, water effluent, biodiversity, emissions, and land-use change – this initiative aims to transform agricultural trade by making sustainability a non-negotiable requirement.

This report examines the potential application of *Codex Planetarius* to Malawi's sugar sector. It assesses the country's relative position within sugarcane production and trade, as well as existing regulatory frameworks and environmental reporting practices to evaluate the feasibility and implications of implementing these new global standards.

Sugarcane is the world's largest crop by volume¹, yet its production and trade are characterized by large inequalities. The top 10 producing nations, all middle-income countries, account for 85% of global output, while low-income countries such as Malawi contribute just 1%. Furthermore, only around 35% of sugar enters international trade, with the balance consumed domestically.² Sustainability efforts within the sector currently rely largely on voluntary standards and certifications. While trusted by major buyers, these mechanisms lack the regulatory authority to enforce system-wide compliance. Global trade associations have significant leverage to mandate higher environmental standards, but unlocking this potential requires building trust, securing financing, and investing in capacity building – especially in producer nations such as Malawi.

As a landlocked low-income country, Malawi faces acute challenges. Its population of 21.1 million is characterized by a very high youth demographic, with half of all citizens under 18.³ Its economy is highly vulnerable to inflation, climatic shocks, and infrastructural deficits. Within this fragile context, the sugar sector is a cornerstone: a major employer and a critical source of foreign exchange. This dual role makes it both economically vital and politically sensitive. It is against this complex landscape that this *Codex Planetarius* pilot seeks to align environmental and sustainability standards with pathways to improved equitable development, ensuring that any new standards benefit producers and ecosystems alike.

2 Malawi's Sugar Sector

Production and Trade

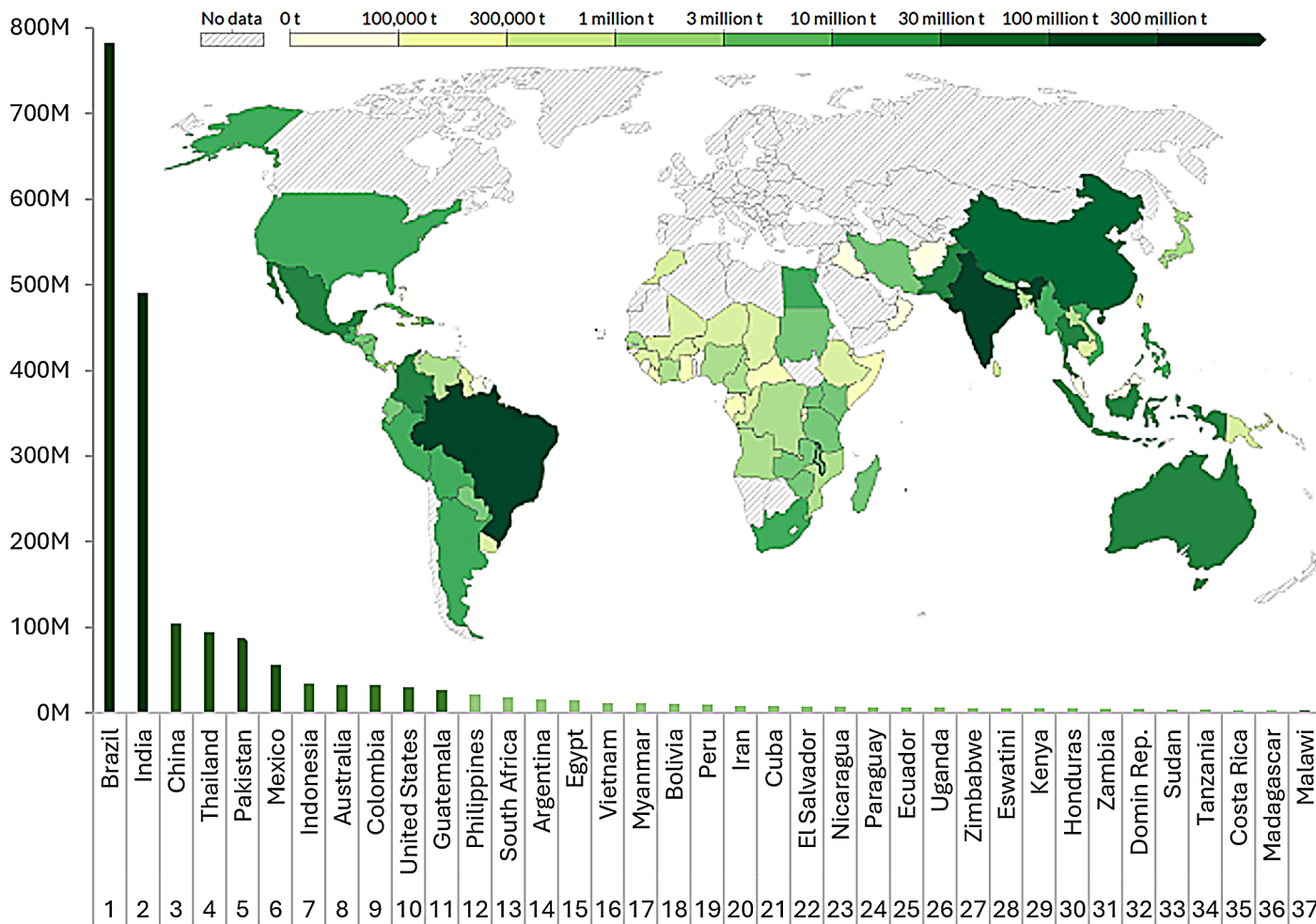
In 2023, Malawi's sugarcane output reached just over 3 million metric tonnes, making it the 37th largest producer globally (out of 95), representing less than 0.5% of global production (see Figure 1, page 4). Across Africa, 38 countries produce sugarcane, collectively making up 5% of total global production. The continent's leading producers are South Africa (18m tonnes), Egypt (15m) and Uganda (6m) – [Annex: African Sugarcane Production](#).

The sugar sector plays a vital role in Malawi's economy, generating between 5% and 10% of the country's foreign exchange earnings.⁴ Employment generation from the sector is significant; direct employment exceeds 30,000 workers (including seasonal staff) and across the wider supply chain indirect employment is estimated over 5,000. (When accounting for dependents the sector sustains livelihoods for 150,000+ people.⁵)

Malawi's sugar industry manufactures a variety of downstream products, including raw, brown, refined, and specialty sugar, serving both local and international markets. With an annual sugar output of 300,000 tonnes, 60-80% is sold domestically, whilst the balance is exported to regional markets as well as to buyers in the UK, EU, and US.⁶

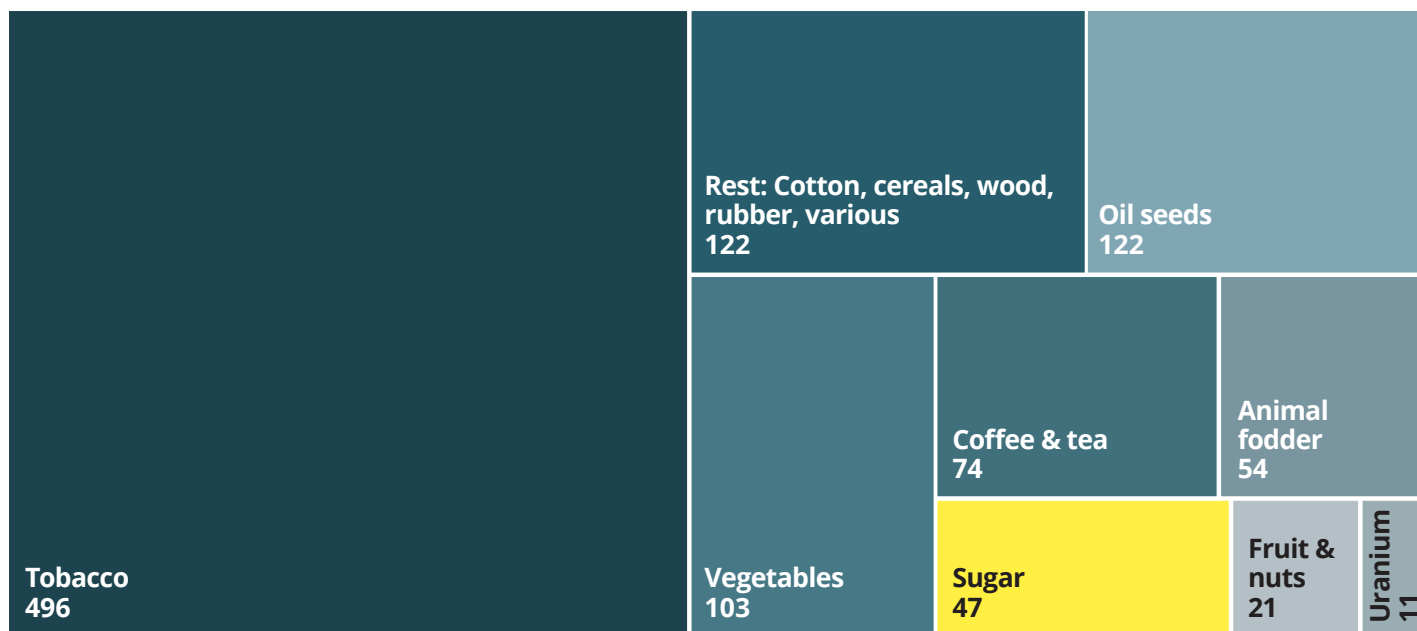
The phasing out of EU sugar quotas in 2017 severely impacted Malawi's sugar industry, causing a price drop (circa 38%, from €501 to €312 per tonne) and reduced import demand as EU beet production increased. This had an impact on Malawi's sugar export revenues; in response, Malawi's National Adaptation Strategy (NAP) was established to seek new export opportunities through regional African markets, such as Common Market for Eastern and Southern Africa (COMESA) and Southern African Development Community (SADC).

Figure 1: Global Sugarcane Production (2023): 2 billion tonnes



Source: Food and Agriculture Organization (2025)

Figure 2: Malawi Total Exports (2023): US\$1,032M



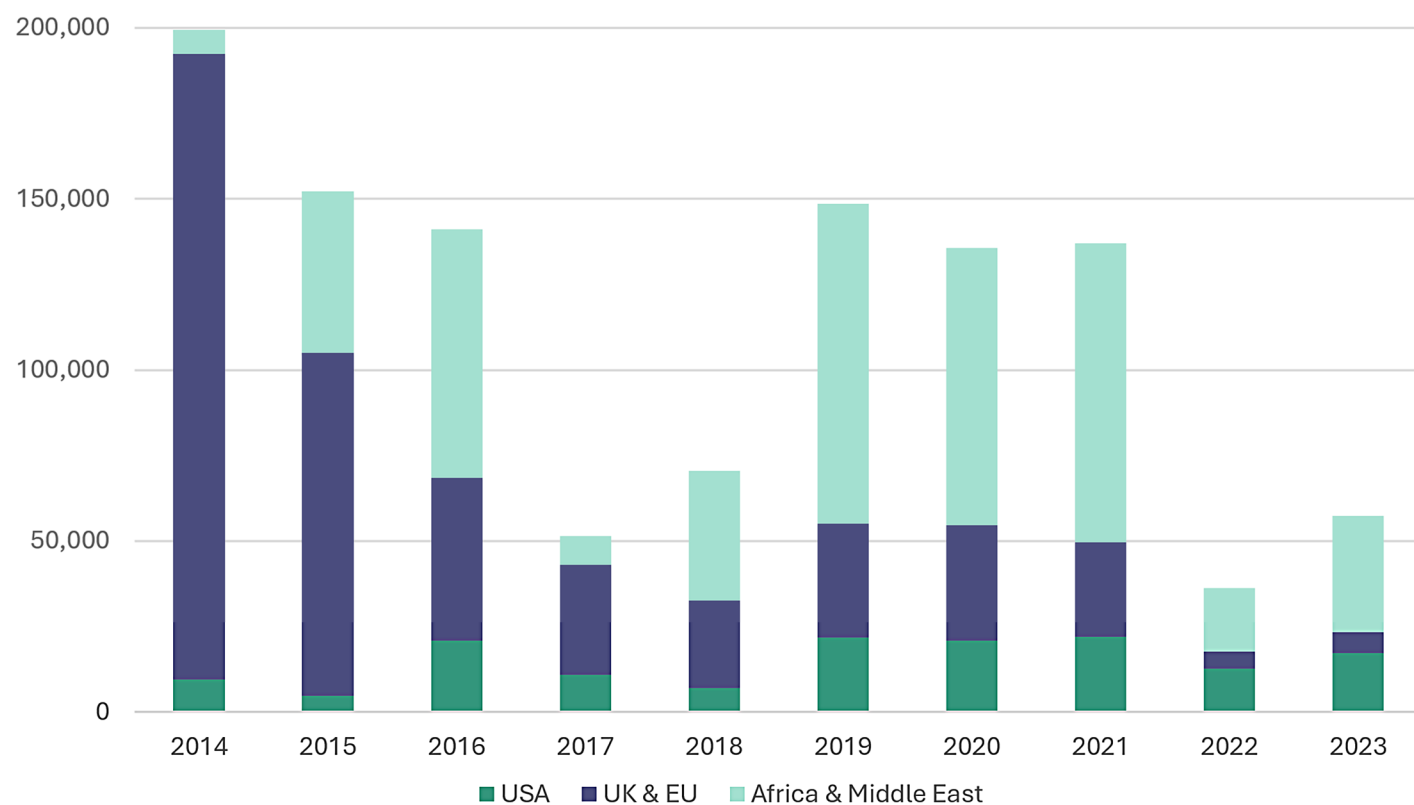
Source: ITC & Malawi National Statistical Office

Figure 3: Malawi’s Top Ranking Exports

Year/ Rank	2015	2016	2017	2018	2019	2020	2021	2022	2023
1	Tobacco	Tobacco	Tobacco	Tobacco	Tobacco	Tobacco	Tobacco	Tobacco	Tobacco
2	Sugar	Sugar	Coffee & tea	Coffee & tea	Sugar	Coffee & tea	Oil seeds	Oil seeds	Oil seeds
3	Coffee & tea	Coffee & tea	Animal fodder	Oil seeds	Coffee & tea	Sugar	Coffee & tea	Coffee & tea	Vegetables
4	Vegetables	Beverages	Oil seeds	Vegetables	Oil seeds	Oil seeds	Sugar	Vegetables	Coffee & tea
5	Animal fodder	Uranium	Sugar	Sugar	Vegetables	Vegetables	Vegetables	Animal fodder	Animal fodder
6	Uranium	Vegetables	Vegetables	Animal fodder	Fruit & nuts	Animal fodder	Fruit & nuts	Fruit & nuts	Sugar
7	Dairy produce	Oil seeds	Uranium	Fruit & nuts	Animal fodder	Fruit & nuts	Animal fodder	Uranium	Fruit & nuts
8	Plastics	Glass	Fruit & nuts	Mis. edible goods	Uranium	Wood & charcoal	Uranium	Sugar	Rare earth metals

Source: ITC & Malawi National Statistical Office

Figure 4: Malawi Sugar-Product Exports by Destination (tonnes)



Source: TradeMap, International Trade Centre (2025)

Malawi's sugar exports retain duty-free, quota-free access to the European Union under the Everything But Arms (EBA) scheme, owing to Malawi's status as a Least Developed Country. This arrangement provides an exemption from tariffs and quantitative restrictions. Similarly, the UK provides duty- and quota-free access for Malawian sugar under its Developing Countries Trading Scheme (DCTS), which replaced the Generalized Scheme of Preferences (GSP) in 2023.

Within regional African markets, Malawi receives duty-free access for sugar exports to COMESA member states that meet rules of origin requirements regarding local value addition. Under SADC provisions, sugar exports to South Africa face an average tariff of 0.6%, while other SADC members apply zero tariffs on sugar, maintaining duties only on non-agricultural goods. The African Continental Free Trade Area (AfCFTA) applied a 13.8% tariff on sugar during its implementation period from 2023 to 2034, which remains below Malawi's WTO Most Favored Nation (MFN) rate of 17.7% for agricultural products. See [Annex: Malawi's Regional Trade Agreements](#).

Malawi benefits from a duty-free quota (10,758 tonnes) for raw cane sugar exports to the U.S. under the Tariff-Rate Quota (TRQ) system for FY 2025, and a 15% reciprocal tariff applies to any volumes above this. For markets beyond the EU, UK and Africa, Malawi's sugar exports face standard WTO MFN tariffs, averaging approximately 20% for raw sugar.⁷

Ethanol and Electricity

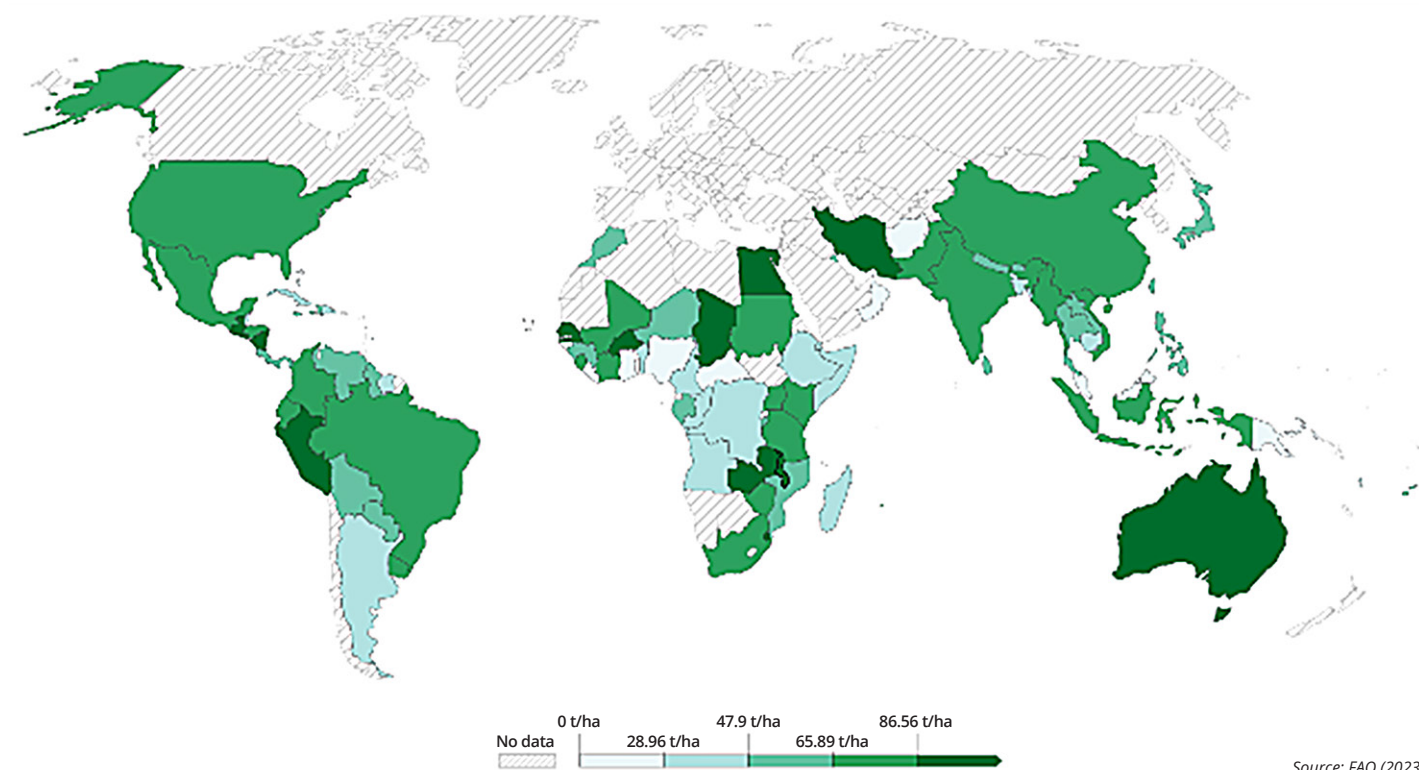
Malawi mandates a nationwide 20% ethanol blend with petrol (E20), which reduces the country's fuel imports and conserves foreign exchange. The country's ethanol is derived from sugarcane molasses sourced from its major sugar mills.

Malawi's two main sugar mills generate around 8 megawatts (MW) of renewable electricity through bagasse cogeneration, meeting 90% of their energy needs for milling, refining, and irrigation. Plans to increase capacity by 43 MW and sell excess power to the national grid (ESCOM) have been delayed by recent foreign exchange shortages.

Sugarcane Farming and Yields

Sugarcane is a perennial crop cultivated in tropical and subtropical regions. Malawi possesses ideal agro-climatic conditions for its cultivation, with approximately 26,000 hectares under commercial production, dominated by a few large estates and an outgrower sector. Commercial production widely utilizes N-Series varieties (e.g. N25, N32) developed by the South African Sugarcane Research Institute (SASRI) and are well suited to Malawi's harvest cycles and growing conditions.

Figure 5: Map of Global Sugarcane Yields, 2023 - (tonnes per hectare)



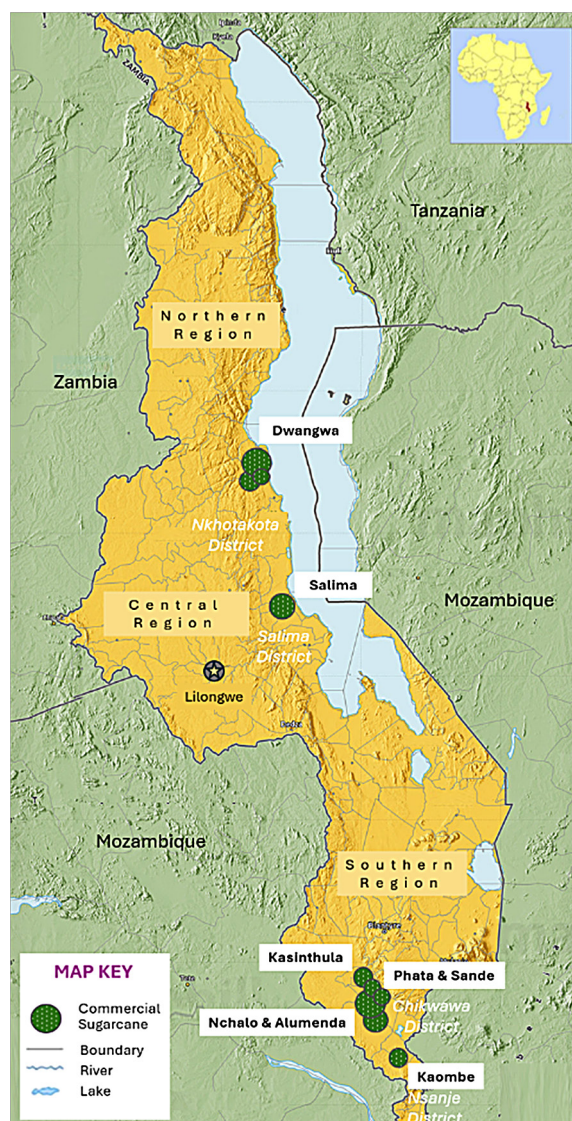
Land preparation involves manual or mechanized methods, followed by planting cane setts (45cm pieces) alongside fertilizer application, irrigation, weeding, and harvesting. Pre-harvest burning is common. Harvesting is predominantly manual, though some large estates have begun adopting mechanical harvesters. Cut cane is then stacked at field edges for transport to mills by contracted haulage companies (e.g., Unitrans).

Sugarcane yields depend on growing conditions, agronomic practices, harvest timing, and cane variety. Globally, yields typically range between 50 and 150 tonnes per hectare (t/ha).⁹ Malawi historically ranks among the world's more productive sugarcane producers, with an average potential yield of 107 t/ha.⁹

Commercial sugarcane cultivation in Malawi is concentrated in four districts – Nkhotakota, Chikwawa, Nsanje, and Salima – all characterized by low altitude (<500m) and tropical savanna climate (Köppen Aw classification). These regions experience a pronounced seven-to-eight month dry season (April–November), mean monthly temperatures consistently above 18°C, and average annual rainfall of 600-1,000 mm. High evapotranspiration rates (1,700–2,000 mm annually) and rainfall variability during the wet season create significant water deficits, making reliable irrigation infrastructure the primary constraint on productivity.

In Chikwawa and Nsanje (<150 m elevation), extreme aridity and high evapotranspiration demand intensive irrigation, with water sourced from the Shire River; in addition, low-lying topography makes these areas vulnerable to seasonal flooding. Nkhotakota relies on the Dwangwa River and Lake Malawi for irrigation and has a shorter dry season and lower water deficit compared to southern districts. Salima benefits from lake-moderated temperatures, sourcing water from Lake Malawi.

Figure 6: Map of Malawi – Areas of Commercial Sugarcane Production



Producers

Illovo Sugar Malawi

Illovo is Malawi’s largest sugar producer and only registered exporter. Part of Associated British Foods (ABF), headquartered in the UK, ABF’s sugar division operates across eight countries, producing 4.5 million tonnes of sugar annually. In Africa, they operate in Eswatini, Malawi, South Africa, Tanzania, and Zambia, with 60% of cane sourced from 24,000+ growers.¹⁰

In Malawi, majority ownership sits with Illovo Group/ABF, with a minority stake listed on the Malawi Stock Exchange. Illovo is one of Malawi’s largest single private-sector employers, providing permanent, seasonal and casual employment for over 10,000 people. For the Government of Malawi, Illovo is a major tax contributor and generator of foreign exchange.

Annually, Illovo cultivates 1.8 million tonnes of cane, sourcing an additional 470,000 tonnes from independent growers – see [Annex: Illovo Operational Statistics \(Five-Year Review\)](#).

Illovo produces over 80% of Malawi’s sugar (approximately 250,000 tonnes annually) from its two mills in Nchalo and Dwangwa, producing white refined, brown, raw, and specialty sugars (e.g. dark demerara). The company prioritizes domestic sales, exporting only surplus sugar (historically 20-40% of sales).

Figure 7: Illovo Sugar Malawi Corporate Structure

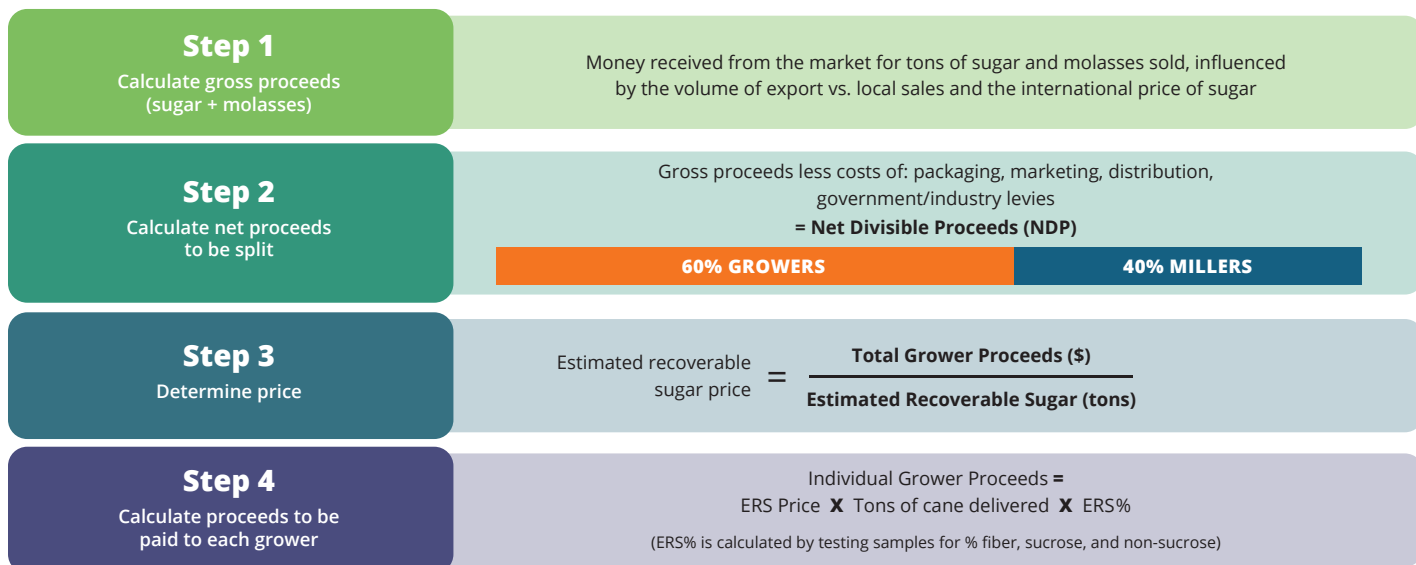


Small Scale Growers & Smallholder Cooperatives

Illovo sources around 20% of its cane from growers, mostly smallholder cooperatives with collective land holdings of 100–3,000 hectares, some of which employ agricultural management teams to oversee operations. Malawi stands out within the Illovo Group for its reliance on smallholder cooperatives rather than large commercial outgrowers. In Malawi approximately 8,000 smallholder farmers are part of this supply chain, selling cane to Illovo through a structured payment system.

Illovo’s sugarcane payment system is designed so that growers sell the sugar and not the sugarcane. Growers can therefore increase revenues by improving sugarcane quality; better quality sugarcane has a higher percentage of sucrose, resulting in more sugar produced per tonne of cane. Sucrose accumulation increases as the crop approaches maturity; at optimal harvest, commercial crops typically achieve 10–12% sucrose content by fresh weight. This incentivizes growers to achieve the correct harvest timing and minimize delays in getting sugarcane to the mill, as delays also directly impact sucrose levels.

Figure 8: Illovo’s Grower Sugarcane Payment System



Agricane

Agricane is a key player in commercial sugarcane production in Malawi, operating as a producer, farm management company, and provider of agricultural technical services (e.g., irrigation/bulk water design, feasibility studies, and crop R&D). The company has a significant presence in Southern Malawi, where it supplies the Illovo Nchalo mill. In this key sugarcane-producing region, Agricane operates its own commercial estates while also managing production on behalf of smallholder cooperatives. In total, the company is responsible for over 3,000 hectares of sugarcane in Malawi. Agricane has also been a key proponent of sustainability within the sector; further details on these initiatives are outlined below.

Phata Sugarcane Outgrowers Cooperative

Managed by Agricane and established in 2011, Phata is a cooperative of 1,130 members. Previously Phata's farmers relied on rainfed agriculture with low yields and challenging routes to market. With support from Agricane, Phata secured \$7 million in funding to develop 600 hectares of irrigated sugarcane production to supply Illovo's Nchalo mill under a long-term supply agreement. Phata is Fairtrade certified, and as a cooperative has used the premiums it receives to diversify into aquaculture, maize farming, solar power, and sustainable charcoal.

Kaombe Estate

Managed by Agricane since 2008, Kaombe Estate comprises 800 hectares of irrigated sugarcane supplying Illovo's Nchalo mill. It is situated at the edge of Elephant Marsh (a RAMSAR recognised site of international importance). Kaombe has been proactive in managing environmental risks in relation to this ecological site, in 2017 implementing the Alliance for Water Stewardship (AWS) Standard with Water Witness International. The estate has a 750 hectare nature reserve (Thangadzi River Conservancy) and supports eco-tourism, having recently constructed a solar-powered lodge that hosts game tours and boat-guided birdwatching.

Kasinthula Cane Growers Association

Managed by Agricane, Kasinthula is a 1,300 ha irrigated scheme supplying Illovo's Nchalo mill. It supports 300 farmers and employs 800 seasonal workers. Kasinthula is Fairtrade certified and uses premiums to fund community projects. In 2022, USAID funded the expansion of its irrigation for food and cash crops between the sugarcane fields, utilizing water from Kasinthula's existing bulk water system.

Dwangwa Growers

Approximately 1,000 small-scale sugarcane farmers in the Dwangwa region supply cane to Illovo's mill but operate within a complex landscape marked by historical land disputes, environmental concerns, and economic pressures. Historically, most small-scale growers were managed by Dwangwa Cane Growers Limited (DCGL) and represented by the Dwangwa Smallholder Cane Growers Association and the Dwangwa Cane Growers Trust (DCGT). These entities provided growers with agricultural management services – including technical support, input access, and loan brokerage – in exchange for a 20% management fee plus additional deductions for loan repayments, irrigation, replanting etc. Many of the original schemes were developed by the Malawi government with financial support from African Development Bank (AfDB). However, the management system faced criticism over lack of transparency and exploitative practices, prompting many growers to break away and form independent management companies such as Tipate Cane Growers Limited and Umodzi Cane Growers Association. As a result of this fragmentation, much of Dwangwa's grower base has struggled to maintain irrigation infrastructure or finance replanting – issues that have resulted in reduced yields. In total, Dwangwa growers represent less than 10% of Illovo's supply chain by volume.

Salima Sugar Company

This publicly owned enterprise in central Malawi operates a sugar mill with a capacity of 1,250 tonnes of cane per day, producing 22,000 tonnes annually. The mill is supported by a 1,000-hectare sugarcane estate and a network of small-scale growers. Operations are currently overshadowed by corruption allegations, legal battles, and public distrust. Following the termination of a private partner's stake in 2023, the government took full control through the Greenbelt Authority (GBA), which is itself involved in lawsuits.

Figure 9: Farm-level Sugarcane Production in Malawi

Mill and Region	Producer	Hectares Cultivated
Illovo Nchalo Mill Southern Region	Nchalo Estate (<i>Illovo</i>)	8,700
	Alumenda Estate (<i>Illovo</i>)	2,500
	Kasinthula Cane Growers Association (<i>Agricane</i>)	1,300
	Phata Sugarcane Outgrowers Cooperative (<i>Agricane</i>)	600
	Sande Estate (<i>Agricane</i>)	400
	Kaombe Estate (<i>Agricane</i>)	800
	Chisanja (<i>PressCane</i>)	100
Illovo Dwangwa Mill Central Region	Dwangwa Estate (<i>Illovo</i>)	6,300
	Dwangwa Growers (<i>Various independent small-scale grower groups</i>)	4,200
	Limphasa Sugar Corporation Limited (<i>Independent</i>)	500
Salima Sugar Mill Central Region	Salima Sugar Company (<i>Malawi Government</i>)	1,000
Total		26,400

Source: CanePro; Illovo Sugar Malawi Annual Reports (5 year averages used where available)

Other Actors

EthCo and **PressCane** operate as independent distilleries sourcing sugarcane molasses from Illovo's mills. In addition to fuel grade ethanol, both companies also produce alcohol products for beverages, pharmaceuticals, and industrial applications, carbon dioxide for Malawi's bottling industry, and vinasse processed into organic fertilizer. They generate 4.1 MW of electricity from biogas, selling excess power to the grid.

Sugarcane Growers Association of Malawi (SUGAM) advocates for smallholder farmers, facilitating access to inputs, technical support, and fair pricing. It also coordinates disaster response initiatives.

The **Shire Valley Transformation Programme (SVTP)** is one of Africa's largest irrigation projects, backed by over \$500 million from the World Bank, African Development Bank and Global Environment Facility, will transform 44,000 hectares in Malawi's primary sugarcane growing region. It is expected to add ~2,000 hectares of irrigated sugarcane and will allow Illovo to shift to gravity-fed irrigation, reducing costs. See [Annex: Map of Shire Valley Transformation Project \(SVTP\)](#). The project includes strong environmental sustainability components – see [Annex: Environmental & Social Impact Assessment Summary: Shire Valley Transformation Project](#).



Figure 10: Main Canal – Shire Valley Transformation Project in Southern Malawi

Source: World Bank

Key Environmental Challenges

Farming Practices

Synthetic nitrogen fertilizers are extensively used in sugarcane farming to boost yields and meet the high nutrient demands of the crop. While effective in supporting rapid growth and high sucrose production, their overuse or improper application leads to significant environmental consequences, including nitrate leaching into groundwater, emissions of nitrous oxide (a potent greenhouse gas), and the contamination of soil and water systems. To mitigate these impacts, integrated nutrient management strategies – such as combining synthetic fertilizers with organic alternatives and adopting precision agriculture techniques – are increasingly promoted to enhance efficiency and sustainability.

Pesticide overuse is another critical issue, with the sugarcane industry accounting for 10–15% of Malawi’s pesticide imports; it is the third largest user of pesticides in Malawi. A 2018 study involving interviews with 55 sugarcane farmers documented widespread pesticide misuse in Malawi’s sugarcane sector, with 78% reporting health symptoms (e.g. headaches, skin rashes) from exposure. The study found that while measures to reduce pesticide exposure were in place on the large estates and farms, smallholders lacked protective equipment and training and were particularly at risk.

Cane burning has long been a widespread practice in sugarcane production, employed to facilitate harvesting by removing sharp leaves and pests, thereby making manual cutting easier and more economical. However, this method carries considerable environmental and health consequences, as it releases large quantities of particulate matter and greenhouse gases. Consequently, growing pressure is being placed on the industry to phase out burning in favor of more sustainable methods, such as mechanized 'green harvesting' (detailed further below).

Figure 11: Pre-Harvest Burning



Malawi’s sugarcane production faces significant soil degradation due to erosion from heavy rainfall and flooding, which strips away fertile topsoil. Monoculture sugarcane farming can further exacerbate nutrient depletion, reducing long-term agricultural productivity. Mitigation measures, such as planting buffer zones with bamboo and vetiver grass along drainage lines to stabilize soil and reduce runoff, are available. However, smallholder farmers often lack the resources to adopt such conservation measures, leaving their plots more vulnerable.

Water Security

Water systems face increasing pressure from pollution and deforestation. Household reliance on charcoal and firewood for cooking and heating is a major driver of deforestation, which has led to intensified flooding, landslides, and siltation. This in turn lowers soil fertility and water retention capacity. The government has tried to tackle deforestation through amendments

to the Forestry Act, which require forest management plans and licenses for charcoal production, as well as the prosecution of illegal deforestation cases – though enforcement remains a constant challenge.

Malawi's two major sugar producing areas, the Lower Shire River Basin in southern Malawi and Dwangwa River in central region have been reported as significantly degraded. Deforestation and agricultural development have contributed to high levels of soil erosion and sedimentation, and there are reports the Shire and Dwangwa rivers that supply sugarcane with water for irrigation have become more eutrophic due to contaminants from sewage discharge and agricultural run-off.¹¹

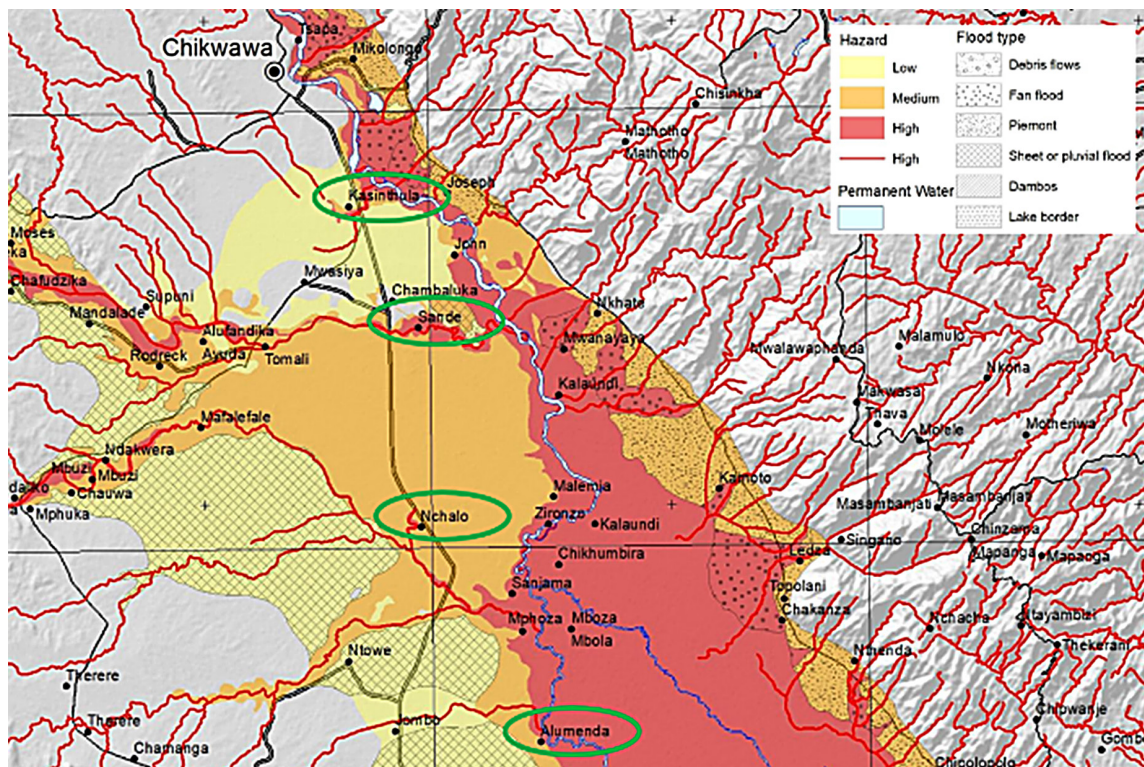
These issues particularly threaten the sustainability and ecological integrity of the Ramsar site, Elephant Marsh. This large wetland, formed by the Shire River, is located adjacent to the Kaombe sugar estate, which also relies on the river for water. The estate initially abstracted water directly from the marsh but, due to sedimentation and poor water quality, built a canal to abstract directly from the Shire River instead. As runoff from the Kaombe Estate is channelled back into Elephant Marsh, ensuring the quality of this effluent is a high priority. An assessment by Water Witness International identified the following priority water risks for the site: 1) degraded water quality from upstream uses and catchment degradation; 2) increased water shortages due to erratic and reduced rainfall; 3) potential damage to Kaombe Estate and surrounding communities during floods.

Climate Shocks

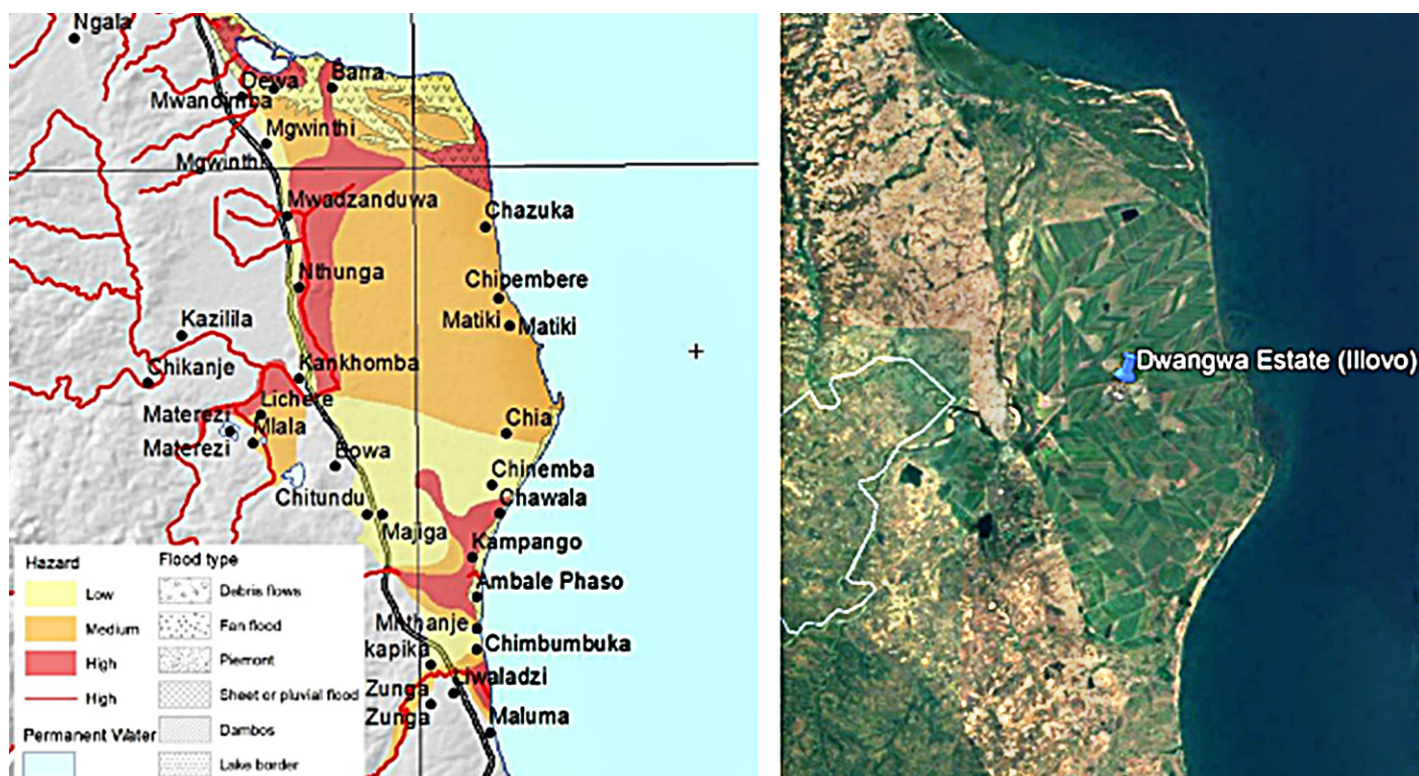
Malawi experiences a prolonged seven-month dry season, making rain-fed agriculture increasingly unreliable. The recent El Niño-induced drought (2023–2024) led to widespread crop failures, affecting 44% of maize fields and leaving 4.2 million people food insecure. Sugarcane's high water demand (1,500–2,500 mm/year) means irrigation is critical for efficient sugarcane cultivation. Malawi's sugarcane producers are therefore located close to perennial water sources, such as Malawi's major lakes and rivers. This proximity, combined with largely low-lying farmland, makes the sector highly vulnerable to climate shocks and associated flood risks (see flood hazard maps below).

Drought and flood events directly threaten Illovo's operations and have a history of large financial impacts to the company. In Malawi droughts and floods have reduced Illovo's sugarcane yields and quality. ABF projects yield declines of 10% across its global sugar operations by 2030 and up to 29% by 2050 under current climate models¹², posing long-term financial risks. Rising costs for emergency repairs, irrigation upgrades, and disaster relief in countries such as Malawi further impact the company's profitability. The following are recent examples of extreme weather events impacting Malawi's sugarcane sector.

Figure 12: Flood Hazard Map – Chikwawa, Southern Malawi



Source: World Bank

Figure 13: Flood Hazard Map – Dwangwa, Central Malawi

Source: M. Garcin, H. Mdala, Y. Kalebe, Flood hazard in Malawi

Tropical Storm Ana (January 2022)

This event caused significant flooding in southern Malawi, submerging sugarcane fields, damaging irrigation infrastructure, and disrupting operations at Illovo's Nchalo Estate. The floods also destroyed the Kapichira Hydroelectric Power Station, which supplies 30% of Malawi's electricity, leading to prolonged nation-wide power outages that further impacted sugar processing operations.

Illovo faces litigation from UK law firm Leigh Day, which alleges that the company's operations exacerbated flood damage during Tropical Storm Ana in Kanseche village. ABF strongly disputes these claims, arguing that the storm was an unpreventable natural disaster. The lawsuit highlights the reputational risks associated with operating as a large company in a country such as Malawi where the government lacks the resources to lead climate mitigation and adaptation efforts.

Cyclone Freddy (February–March 2023)

Cyclone Freddy, which persisted for 37 days making it one of the longest-lasting tropical cyclones on record in Malawi, delivered extreme precipitation to southern Malawi. The storm system produced 600-900mm of rainfall in Chikwawa and Nsanje districts, an important sugarcane region. This resulted in flooding across approximately 430 km² of agricultural land, with significant impacts to both communities and sugarcane operations.

In response Illovo provided emergency shelter for over 1,200 displaced individuals and distributed essential supplies, including maize flour, blankets, and fuel for rescue operations. The company also allocated funding for long-term reconstruction, including housing repairs and healthcare infrastructure. At Illovo's Dwangwa Estate situated along the Lifidzi River floodplain, water levels exceeded the riverbanks by 1.5 meters and fields remained submerged for 18-22 days. This led to oxygen deprivation in root zones and reduced sucrose accumulation, delayed harvest, and increased susceptibility to fungal infections in surviving cane. The waterlogging caused structural damage to the estate's irrigation infrastructure, including pump stations and distribution channels. Post-event analysis indicated yield losses of 30-35% for the affected growing season at Dwangwa.

These events underscore the sector's exposure to climate risks, with ABF warning that repeated flooding could render some estates economically unviable – a scenario already realized for Illovo's Maragra Estate in Mozambique where in 2023 flood-damage to over 5,000 hectares of sugarcane resulted in a £36 million impairment write-down¹³ and indefinite suspension of Illovo's operations in Mozambique.

Figure 14: Summary of Recent Climate Shocks

Event	Impact on Sugarcane	Broader Impact
Tropical Storm Ana (2022)	Flooded estates, displaced communities and workers, infrastructure damage to power, roads, bridges, and irrigation canals disrupting supply chains and milling operations	Damage to Kapichira Hydroelectric Power Station resulted in 30% national power loss and country-wide load shedding; 16 districts and 994,967 people impacted
Cyclone Freddy (2023)	Soil erosion and sedimentation from floodwaters degraded sugarcane land, requiring costly rehabilitation	1,216 deaths; \$507m damage; cholera outbreaks contaminated water supplies in flood-affected communities, including Illovo's workforce; damage to 430 km ² of crops; triggered landslides
El Niño Drought (2024)	Increase sugar cane theft reported	44% maize crop failure; 16% drop in agri-production, 4.2 million facing acute food insecurity; maize prices +160%

Source: ABF Sustainability Reports; Malawi Government Post-Disaster Assessments; Malawi Government – State of Malawi Climate Reports

Existing Environmental Regulation

Malawi has a comprehensive framework for environmental regulation, anchored by key legislation such as the Constitution of Malawi (1994), which enshrines the right to a clean environment, and the Environmental Management Act (1996, amended in 2017), establishing mechanisms for pollution control, environmental impact assessments, and institutional oversight by several key institutional bodies, each playing distinct roles in policy implementation, coordination, and enforcement.

The country has progressively aligned with international agreements, including the [Paris Agreement \(2015\)](#) and the [Kigali Amendment \(2016\)](#), while implementing national policies such as the [National Climate Change Management Policy \(2016\)](#).

The current government's vision, articulated in the [Malawi 2063](#) long-term development plan, emphasizes environmental sustainability as a cornerstone for economic transformation, targeting reduced carbon emissions, improved waste management, and climate resilience through initiatives such as the Nationally Determined Contributions (NDCs) and the forthcoming National State of Environment and Outlook Report (NSEOR) – see below.

The following are key legislation and enforcement bodies particularly relevant to sugarcane production – for a more detailed list see [Annex: Malawi's Environmental Institutions](#).

Environment Management Act (2017)

The Environment Management Act (EMA) of 2017 serves as Malawi's comprehensive legal framework for environmental protection and natural resource management. This legislation establishes standards for air, water, and soil quality that are particularly relevant for *Codex Planetarius* compliance in agricultural sectors.

A key component of the legislation is its waste management provisions, which systematically regulate the collection, storage, treatment, and disposal of waste to mitigate environmental degradation. Sugarcane mills must adhere to waste disposal guidelines to prevent contamination from byproducts, including molasses and vinasse. Burning of cane fields – a practice linked to air pollution – has not been explicitly regulated. The Act also prioritizes biodiversity conservation through specific protections for biological resources, genetic diversity, and designated protected areas.

The legislation establishes two critical institutions: the Malawi Environmental Protection Authority (MEPA) as the primary enforcement body responsible for implementing the Act's provisions and promoting sustainability, and an Environmental Tribunal dedicated to resolving environmental disputes. Enforcement mechanisms under the Act define specific environmental offenses and prescribe corresponding penalties, primarily relying on criminal sanctions to ensure

compliance. Challenges however persist in coordination as current oversight relies on fragmented efforts between MEPA, the Ministry of Agriculture, and local governments. The Act integrated social issues, including gender, health, and human rights, into environmental assessments, shifting from traditional Environmental Impact Assessment (EIA) to Environmental and Social Impact Assessment (ESIA) – see further below.



Malawi Environment Protection Authority (MEPA)

MEPA falls under the Ministry of Natural Resources and Climate Change and is the primary agency responsible for overseeing compliance and enforcement of environmental standards and legislation, such as those governing pesticide use, water management, and pollution control. Established with the mandate to preserve the country's natural resources and promote sustainable development, MEPA plays a crucial role in shaping and implementing environmental policies and regulations. It does so through environmental assessments, licensing, and auditing functions. The Environment Management Act (2017) empowers MEPA to carry out, with or without notice, periodic inspections to ensure compliance with environmental regulations and, if necessary, to order the closure of non-compliant entities.

MEPA succeeded the Environmental Affairs Department (EAD). Where the EAD was required to seek Ministerial approval before proceeding with enforcement, MEPA no longer requires this and as a result is in a better position to independently enforce standards. MEPA has a toll-free number for the public to provide anonymous information on any activities that are detrimental to the environment. Enforcement, however, in practice is a challenge. MEPA is relatively new, with on the ground administration only starting in early 2025. As with many other government agencies, MEPA is not well funded (e.g. it currently lacks funding for vehicles). Companies are required to submit annual reports on environmental performance. Based on discussions with a senior MEPA official, few companies submit these reports, and submissions are rarely followed up on.

Through the EMA (2017) MEPA has the authority to define Malawi's environmental standards; however, presently it is using those set previously by Malawi Bureau of Standards (MBS) – a list of relevant standards to this pilot can be found in [Annex: Malawi Bureau of Standards – Environmental Standards](#).



Malawi Bureau of Standards

The Malawi Bureau of Standards (MBS) is a statutory organization established in 1972 under the Laws of Malawi (amended in 2012) to promote standardization and quality assurance for commodities and manufacturing processes in the country. Operating under the Ministry of Industry and Trade, MBS develops and enforces national standards across key sectors such as agriculture, food safety, engineering, and chemicals to ensure product safety, consumer protection, and trade competitiveness. It provides testing, certification, and inspection services through its laboratories and collaborates with regional (e.g. SADC) and international bodies such as the *Codex Alimentarius* Commission (CAC), ISO and WTO to align Malawi's standards with

global practices. Until recently MBS was responsible for monitoring environmental standards, and whilst this is now officially the mandate of MEPA, there appears to be some overlap in this function between the two agencies.

Environmental and Social Impact Assessment (ESIA)

An ESIA is required for new projects and developments, including the establishment of all agricultural farms and enterprises. ESIA's follow a legal framework that presents the anticipated environmental and social impacts of development projects, as well as feasible alternatives and mitigation strategies. This aims to ensure that environmental and social concerns are integrated into project design, implementation and decision making – submission fees are dependent on the overall cost of the project. Each development must follow an Environmental and Social Management Plan (ESMP). MEPA monitors compliance through site inspections. [Annex: Malawi's Environmental and Social Impact Assessment Process](#) outlines in more detail the key stages of the ESIA process.

Pesticides Act (2000)

This Act regulates the import, export, manufacture, distribution, storage, disposal, and use of pesticides in Malawi, including those used in sugarcane farming (e.g., glyphosate, atrazine) and bans highly toxic pesticides such as dichlorvos. Despite this, enforcement gaps persist, particularly among smallholders who often lack training in safe application practices. MEPA's mandate is to monitor groundwater contamination risks from pesticides such as glyphosate, which is intensively used in sugarcane farming; however, in practice, MEPA lacks the resources for widespread monitoring.

Despite laws, smallholder farmers often lack training in safe pesticide use, leading to over-application and pollution. A 2018 study documented widespread pesticide misuse in Malawi's sugarcane sector, with 78% of farmers reporting health symptoms (e.g. headaches, skin rashes) from exposure.¹⁴ The report also cited MEPA's inability to enforce labelling in local languages or conduct routine inspections.

Integrated Pest Management (IPM) Plan (2013)

This plan promotes reduced pesticide use, aligning with the EU's Directive 2009/128/EC, and prioritizes pesticides with low environmental contamination potential. The major problem in implementing successful IPM programs in Malawi is a lack of, or insufficient, data on the environmental impacts of pesticides (load and toxicity).

National Water Resource Authority (NWRA)

The NWRA is the governing body for the country's water boards which monitors water rights and use and has the power to cancel licences for violations. Studies by Water Witness International and the Alliance for Water Stewardship (AWS) Africa show that the NWRA faces capacity and resource constraints.¹⁵

Sugarcane Industry Bill (2025)

The original draft created some uncertainty relating to land rights and leasehold requirements for sugar producers, as well as proposing a new mechanism for domestic sugar pricing. However, industry consultation has generally been well received, and subsequent drafts have addressed many of these issues. Positive outcomes as viewed by the industry relate to the establishment of a Malawi Sugarcane Industry Commission, which would promote greater two-way dialogue between government and the private sector as well as being a forum to oversee environmental compliance and dispute resolution.

Malawi National State of the Environment and Outlook Report (2025)

The 2025 Malawi National State of the Environment and Outlook Report (NSEOR) is a government-led assessment that will evaluate environmental trends, challenges, and policy responses in Malawi, projecting future scenarios to guide sustainable development. It is being produced by MEPA under the Ministry of Natural Resources and Climate Change. The final report has not yet been published, but preliminary drafts indicate that it will cover issues such as:

- Climate change impacts (e.g. droughts, floods) on agriculture, including sugarcane production
- Deforestation and land degradation, particularly in agro-industrial zones (e.g. Shire Valley)
- Water resource management, focusing on irrigation demands for crops including sugarcane
- Pollution from agricultural practices, such as sugarcane burning, and industrial emissions
- Policy gaps and recommendations, including alignment with the Malawi 2063 Vision and global commitments such as the Paris Agreement

Enforcement

In Malawi, private companies fund government audits through annual and application fees. Enforcement is often disproportionate; smaller businesses are rarely scrutinized due to the high cost of audits, while larger firms, especially multinationals, face intense scrutiny.

For a company such as Illovo, which is linked to a UK-based multinational, the reputational and operational risks of non-compliance far outweigh the costs. To ensure full compliance with all local environmental regulations across its managed estates, Illovo's Health, Safety, and Environment (HSE) department utilizes third-party auditing services for independent verification.¹⁶

Figure 15: Malawi's Environmental Regulatory Framework

Codex Categories	Key Legislation		Relevance to Sugarcane	Compliance Requirements	Enforcement Body
Soil Health	<i>Environmental Management Act (2017)</i>	<i>Fertilizer Act (2022)</i>	Regulates soil degradation (e.g. salinization, erosion); mandates sustainable fertilizer use	Soil testing and conservation plans; limits on chemical inputs	Malawi Environmental Protection Authority (MEPA)
Water Use	<i>Water Resources Act (2013)</i>	<i>Malawi Bureau of Standards (MBS) Guidelines</i>	Ensures sustainable irrigation; protects aquatic ecosystems from over-extraction	Permits for water abstraction; riparian buffer zones	MEPA & Ministry of Water & Sanitation
Water Effluent	<i>Environmental Management Act (2017)</i>	<i>MBS Effluent Standards</i>	Sets limits on agrochemical/pollutant discharge from mills	Effluent treatment before discharge; regular monitoring	MEPA & MBS
GHG Emissions	<i>Environmental Management Act (2017)</i>	<i>National Climate Change Policy (2016)</i>	GHG monitoring, renewable energy (e.g. bagasse)	Voluntary reporting emissions	MEPA & Ministry of Forestry & Natural Resources
Biodiversity	<i>National Biodiversity Strategy & Action Plan (2015–2025)</i>	<i>Wildlife Act (2017)</i>	Protects habitats; mandates EIAs for expansion near sensitive ecosystems	EIAs and monitoring	MEPA & Department of National Parks & Wildlife
Land-Use	<i>Environmental Management Act (2017)</i>	<i>Land Act (2016)</i>	Controls deforestation/conversion of natural land for sugarcane	Land-use permits; compensation for displaced communities	Ministry of Lands

Sustainability Reporting in Malawi's Sugarcane Sector

Illovo Sugar & Associated British Foods

As the largest sugar producer in Malawi and sole buyer for many independent sugarcane growers, Illovo Sugar and its parent company, ABF, have a strong influence on the sector's adoption of sustainability practices.

At a Group level, ABF has committed to reducing Scope 1 and 2 emissions by 30% by 2030 (from a 2018 baseline), with this target validated by the Science Based Targets initiative (SBTi). The company has committed to avoiding carbon offsets and has allocated 6% of its capital expenditure to in-house climate and ESG-related initiatives, focusing on fuel substitution (e.g. biomass energy) and energy efficiency programmes (e.g. drip irrigation). ABF's sugar division, including Illovo Sugar Malawi, has access to centralized systems that provide up-to-date information to track targets and define savings.¹⁷

Illovo's Smart Water and Irrigation Management (SWIM) system uses water flow meters and remote sensing technology to detect leaks and optimize irrigation schedules in real-time. Piloted at Illovo's Nchalo Estate in 2020, the program demonstrated a potential yield increase of 3 tonnes per hectare without additional water use. The system was rolled out to all of Illovo's Malawi estates in 2023. Illovo Malawi has a target to reduce its water footprint by 30% by 2030 (from a 2018 base year).

Sustainable Agriculture Initiative (SAI) Platform

Illovo Sugar leads sustainability initiatives in the region through the implementation of SAI Platform's Farm Sustainability Assessment (FSA) across its estates and for independent growers. The FSA was chosen as ABF's principal framework for sustainability reporting across agricultural operations because it is widely benchmarked to existing standards and certifications – currently, 100+ sustainability schemes meet FSA equivalence, including GlobalG.A.P., Fairtrade, and Rainforest

Alliance.¹⁸ The FSA also was valued for its inclusion of regenerative agriculture and strong due diligence components. In 2022, Illovo verified all its agricultural estates in the region under FSA, advancing its stated commitment of promoting sustainable agriculture across its supply chain.¹⁹

It is incumbent on us to implement sustainable agricultural practices, protect biodiversity through managed wildlife areas and contribute to thriving rural communities through an inclusive supply chain, health and safety, employment and capability building. Taking our growers on the same journey, we want to champion agricultural sustainability equitably across our own and our growers' cane operations. From small-scale growers to big estates, we should all have the inclusive support we require to implement sustainable agricultural practices, and FSA is a tool helping us to do that.

– Andrew Cochrane, Group Head of Grower Agriculture

In Malawi, individual farms or farm collectives, known as farm management groups (FMGs), annually submit self-assessments consisting of a 109-question questionnaire across 11 economic, social, and environmental topics. For a detailed breakdown see [Annex: Farm Sustainability Assessment \(FSA\) – Metrics](#). Self-assessments are then audited every three years by a third-party, SAI-approved body, during which self-assessment answers are validated through field inspections. Farms or FMGs achieve one of three tiers (Gold, Silver, Bronze) based on their adherence to FSA's criteria – see [Annex: Farm Sustainability Assessment \(FSA\) – Performance Levels](#).

In Malawi, Illovo has integrated the FSA framework into its systems of internal controls and compliance. All of Illovo managed estates were awarded Silver status in 2022, representing 17,500 hectares. Wider adoption by other sugar producers in Malawi has been driven by Illovo's leadership and support in this area, with FSA-verified growers representing a further 2,700 hectares. In total, 81% of hectares cultivated, or 88% of sugarcane produced²⁰ within Illovo's supply chain, is already verified.

The table below summarizes which farms within Illovo's supply chain are verified and which are not. Sande and Chisanja farms are currently in the process of being verified, while verification for Dwangwa's small-scale growers is planned for 2028. Illovo has committed to supporting Dwangwa's growers by identifying missing documentation, addressing water inefficiencies, and introducing biodiversity safeguards before seeking formal verification.

Figure 16: Malawi's Environmental Regulatory Framework

Producer	Farm	Latest Award	Hectares	Percentage
FSA Verified				
Illovo Estate	Nchalo & Alumenda	Silver (2022)	11,200	45%
Illovo Estate	Dwangwa	Silver (2022)	6,300	25%
Sub-total			17,500	70%
Illovo Grower	Kasinthula	Silver (2022)	1,300	5%
Illovo Grower	Phata	Gold (2022)	600	2%
Illovo Grower	Kaombe	Silver (2022)	800	3%
Sub-total			2,700	11%
Total (FSA-Verified)			20,200	81%
Non-FSA				
Illovo Grower	Sande		400	2%
Illovo Grower	Chisanja		100	0%
Illovo Grower	Dwangwa Small-Scale Growers		4,200	17%
Total (non-FSA)			4,700	19%
TOTAL			24,900	100%

Corporate Citizenship

Corporate Citizenship (the independent environmental consultancy firm) was employed by Illovo to provide impact assessments across their Africa sugar operations (Zambia, South Africa, Mozambique, Malawi, Eswatini, and Tanzania). Assessments were carried out in 2017 and 2022 and involved analyzing the economic, social and environmental impacts created by the business. Findings from these reports are used in the analysis below.

Science Based Targets initiative (SBTi)

Co-founded by CDP, the UN Global Compact, World Resources Institute, and WWF – SBTi enables companies to align emissions reductions with the Paris Agreement. Its Forest, Land and Agriculture (FLAG) guidance targets a 35% reduction in land-sector emissions by 2030.

In 2024, ABF Sugar’s FLAG targets were validated by SBTi, including a 36.4% reduction in absolute FLAG emissions (Scope 1–3) by 2030 (2018 baseline) and net-zero goals (90% reduction for Scope 1–2, 72% for Scope 3 by 2050). Illovo Malawi contributes to these group targets, along with a no-deforestation commitment. Illovo currently monitors factory emissions using internal GHG reporting and on-farm emissions (e.g. soil N₂O from fertilizers, CO₂ from cane burning) using SAI Platform’s Farm Sustainability Assessment (FSA). In total, 94% of Illovo Malawi’s carbon footprint (factory and farm) originates from Scope 1 activities, of which 92% is from burning bagasse to generate energy for their operations.²¹ Growers make up around 20% of Illovo Malawi’s cane supply, and their associated emissions fall under FLAG reporting – though data collection challenges exist and not all outgrowers have been verified.



SUSFARMS

SUSFARMS (Sustainable Sugarcane Farm Management System) was developed in South Africa through collaboration between Noodsberg Cane Growers, WWF, and SASRI. It was developed as a tool to provide Better Management Practices (BMPs) for sustainable sugarcane farming, covering environmental, social, and economic pillars.

SUSFARMS includes a Progress Tracker tool for self-assessment and compliance monitoring, aligned with global standards such as SAI Platform’s FSA (achieving Gold-level equivalency in 2024). Illovo integrates SUSFARMS across its South African estates, reporting on sustainability practices such as minimum tillage, drip irrigation, and soil health monitoring. Illovo Malawi uses its own reporting systems, linked to FSA verification.

Fairtrade International

Fairtrade have been certifying sugarcane since the 1990s and emphasizes fair pricing, decent work, and child-labor prevention. Globally, it currently supports 77 sugarcane producers representing 36,700 sugarcane farmers in 18 countries. In Malawi, the Kasinthula Cane Growers Association (certified in 2002) and Phata (2015) Sugarcane Cooperative both hold Fairtrade certification, and benefit from Fairtrade’s minimum price guarantee and an additional \$60/tonne premium. Premium funds have been invested in improving productivity, healthcare, clean water, and education. For example at Kasinthula, cane fields have been replanted to improve yields and funding has been used, along with an EU grant, to expand production by 400 hectares.

Bonsucro

Bonsucro promotes responsible sugarcane production through its mill and farm certification system. It has over 330 members, including large buyers such as PepsiCo, Mars, Mondelez International, The Coca-Cola Company, General Mills, Unilever, Nestlé, and SAB Miller. For Illovo’s sugarcane operations it is only their South African farms that have Bonsucro certification.

Figure 17: Summary of Illovo's Sustainability Reporting within the *Codex Planetarius* Categories

Codex Category	Key Legislation	Relevance to Sugarcane
Soil Health	- Soil Organic Matter (SOM %) - Erosion control (%) - Fertilizer efficiency (NUE)	SAI FSA SAI FSA Nutrient management plans/soil lab tests
Water Use	- Blue water withdrawal (m ³ /tonne cane) - Green water/rainfall - Water Use Efficiency (WUE) - Local water stress index	Illovo SWIM system Weather station data CanePro: Irrigation water vols SWIM system
Water Effluent	- BOD/TSS levels (mg/L) - Nitrogen/Phosphorus runoff - Effluent treatment compliance	Factory wastewater logs SAI FSA SAI FSA
GHG Emissions	- Farm emissions (tCO ₂ e/tonne cane) - FLAG vs. E&I breakdown - Energy efficiency - Renewable energy share (%)	SBTi reporting SBTi reporting Illovo energy logs Illovo energy logs
Biodiversity	- Natural habitat (%) - Species count (birds/trees) - Restoration progress	Land use reports, EIA reports Wildlife surveys Satellite imagery
Land-Use	- Deforestation/conversion-free (DCF) status - Cane expansion vs. protected areas - Smallholder land use shifts	SAI FSA SAI FSA Outgrower programs

Sustainability Practices in Malawi's Sugarcane Sector

Water Management

Illovo Malawi aims to reduce its end-to-end water footprint by 30% by 2030 (from a 2018 baseline) by transitioning to more efficient irrigation systems. As part of this effort, the company plans to convert 4,700 hectares to drip irrigation by 2028, with 2,200 hectares already completed between 2017–2022. This shift is expected to deliver significant efficiencies, including:

- 40% reduction in energy use.
- 25% improvement in water application efficiency.
- 55% reduction in water required per tonne of sugarcane produced.

The Shire Valley Transformation Project, in which Illovo participates, is projected to achieve 17% water savings at its Nchalo estate through gravity-fed irrigation. This project also supplies clean water to nearby communities, enhancing local water security. The consultancy Agricane complements these efforts via precision irrigation designs (e.g. center pivots, drip networks) for the Phata Cooperative, minimizing depletion from the Shire River through topological surveys and environmental impact assessments. Effluent quality management and wastewater recycling at Illovo's factories further reduce freshwater extraction.

Water Effluent

Illovo implements pollution control measures in line with regulations, including water and air quality monitoring, wastewater screening, and reuse of treated factory effluent for irrigation. To further mitigate runoff risks, Illovo has trialled nature-based solutions such as riverbank bamboo planting for flood and erosion control.

Soil Health

Regenerative agriculture principles – minimal soil disturbance, residue retention, and crop diversification – are widely promoted by Illovo and Agricane in Malawi to boost soil fertility and carbon storage.

Both companies have recently transitioned their harvesting practices away from pre-harvest burning to green-cane harvesting. This method, also known as trash-blanketing, involves harvesting without burning, leaving a protective layer of crop residue (trash) on the soil surface. This mulch is highly beneficial for soil health as it:

- Conserves soil moisture and moderates soil temperature.
- Suppresses weed growth and reduces erosion.
- Enhances soil structure and increases water infiltration over time.
- Adds vital nutrients and organic carbon back into the soil, reducing reliance on synthetic fertilizers.

From an environmental perspective, the practice also eliminates the air pollution associated with burning, including particulate matter and greenhouse gas emissions. In 2024, over 70% of cane from Illovo estates and outgrowers in Malawi came from farms practicing this method, with plans to increase adoption annually. The company is focused on aligning with methodologies such as the Greenhouse Gas Protocol's land-sector guidance to accurately quantify the net environmental benefits.

The adoption of green-cane harvesting requires significant capital investment in machinery. A primary challenge has been managing the socio-economic impact, particularly the reduced demand for manual cutters. To mitigate this, Illovo has implemented upskilling programs for machinery operators and supported the creation of alternative employment opportunities.

During fallow periods, Illovo Malawi also supports soil health through the use of nitrogen-fixing cover crops (e.g. sun hemp and legumes) on 700+ hectares annually. These crops replenish soil nutrients and help combat pests (e.g., black sugarcane beetles) and diseases (e.g., smut). Additionally, Illovo repurposes sugar byproducts such as Condensed Molasses Solids (CMS), blending them with nitrogen fertilizer to optimize nutrient delivery while minimizing losses through volatilization or leaching.

Both Illovo and Agricane have begun trialling integrated pest management (IPM) to reduce reliance on chemicals and minimize ecological and human health risks.

Greenhouse Gas (GHG) Emissions Reduction

Illovo adheres to Science-Based Targets (SBTi), committing to a 36.4% reduction in Forestry, Land, and Agriculture (FLAG) emissions (Scope 1–3) by 2030 and a 52.1% cut in Energy & Industry (E&I) emissions (Scope 1–2) by 2030, and net-zero by 2050. Initiatives include transitioning to renewables, which supplied 91% of Illovo's energy (723,560 MWh) in 2020/21, largely via bagasse cogeneration. Over 30 carbon-saving projects – such as solar installations, fuel swaps, and irrigation conversions – were identified in 2024 to accelerate decarbonization. Agricane supports low-input farming, reducing synthetic fertilizers and promoting integrated pest management (IPM) at schemes such as Phata and Kaombe, which lowered GHG emissions per tonne of cane produced.

Land Use and Biodiversity Conservation

Illovo has promoted buffer zones in flood risk areas, using vetiver grass and bamboo to stabilize riverbanks. Its Thriving Community Foundation supports community projects such as fish farming to mitigate pressures on local ecosystems.

Within the fence of Agricane's Kaombe Estate there is a 750 hectare riparian forest wildlife reserve ([Thangadzi Conservancy](#)). Annual wildlife counts show it hosts 12 game species and 340 bird species. The estate also borders 3km of the Elephant Marsh, a 61,500 hectare wetland and internationally recognized UNESCO Ramsar Site. In commitment to conserving Elephant Marsh, Agricane helped create within the marsh a 3,000 hectare Community Conservation Area (CCA). Furthermore, the company has built a lodge at Kaombe Estate, bringing ecotourism and visitors to Elephant Marsh.

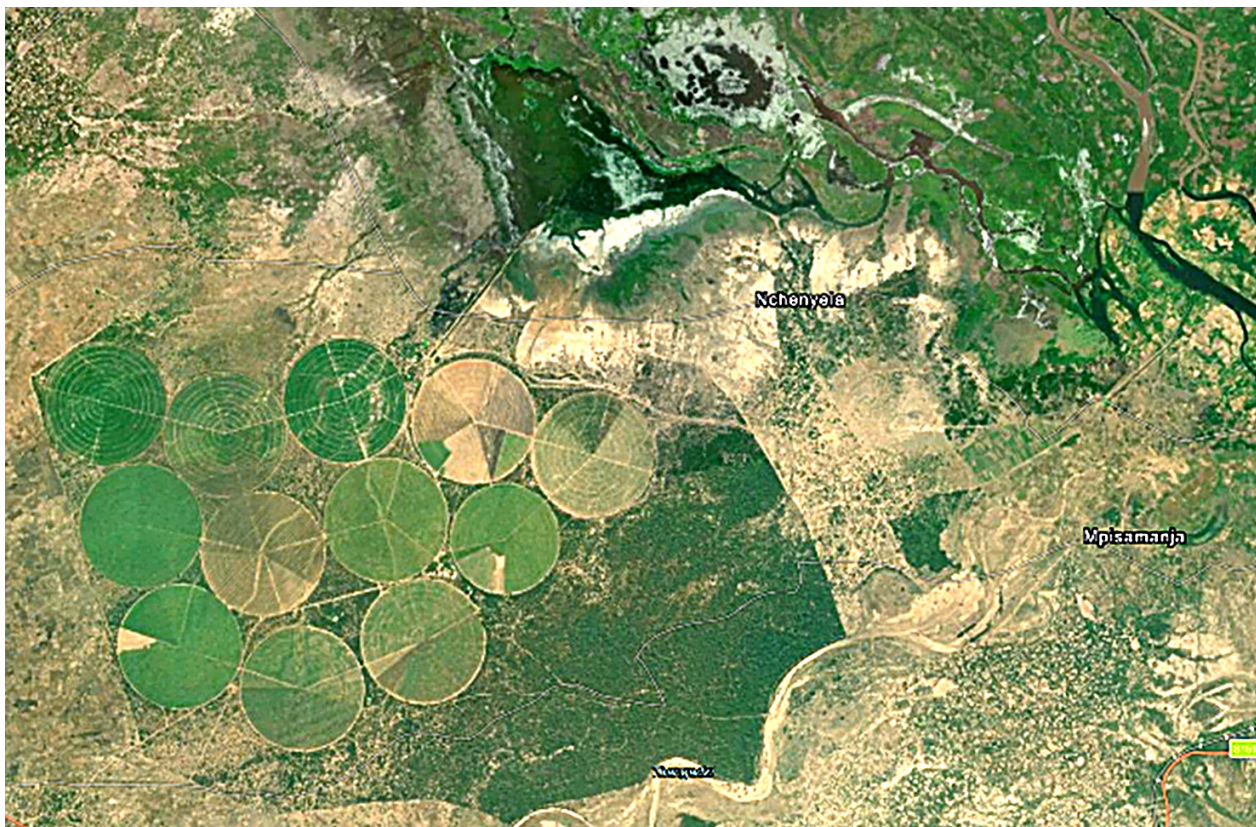
Agricane has developed wildlife corridors between sugarcane pivots at Phata, Sande, and Kaombe (see above), totalling over 200 hectares. As a result, these farms dedicate a lower proportion of productive land to sugarcane cultivation compared to Illovo's estates. It has been observed that this approach correlates with fewer pest incidents in comparison to nearby Illovo estates.

Agricane has begun adopting Integrated Pest Management (IPM) to reduce agrochemical reliance, testing methods such as introducing natural predator insects ("beneficials" or "biologicals") to target aphid outbreaks. To balance pest control amid worsening climate-related pest pressures, drone-based spot spraying of pesticides has also been trialled at Kaombe Estate.

Figure 18: Wildlife corridors in-between sugarcane (Phata Sugarcane Cooperative)



Figure 19: Wildlife conservancy and Elephant Marsh (Kaombe Estate)



3 Analysis

This analysis focuses on Illovo's production and supply chain due to its direct relevance to the *Codex Planetarius* pilot, which targets export-eligible supply chains. Since 2022, Illovo has used the Farm Sustainability Assessment (FSA) framework for comprehensive sustainability reporting. The company reports that 100% of its directly managed estates and a large majority of its growers are FSA-verified. The most recent verification cycle was completed in 2025, with formal plans to extend coverage to 100% of Illovo's growers by 2028.

Engagement with Associated British Foods (ABF) and Illovo confirmed that the FSA process collects farm-level data across all six *Codex* environmental categories. However, these data are not publicly available, and full access to the dataset remains restricted pending legal approval from ABF. Although obtaining complete data was beyond the scope of this study, several primary data points and validated proxies offer critical insight into the environmental performance and risks associated with sugarcane production in Malawi.

Sugarcane Yields

Yield data provides a critical benchmark for quantifying resource efficiency (e.g. water and fertilizer) and environmental impact, where higher yields with lower inputs indicate more sustainable production. By contrast, yield gaps can reveal where targeted improvements in water management and agronomic methods are most needed. Furthermore, yield data supports the calculation of key sustainability indicators such as emissions intensity and water use efficiency, enabling comparisons across production systems and regions – an essential capability for frameworks such as *Codex Planetarius*. As shown below, Malawi's Tonnes of Cane per Hectare (TCH) performance places it in the mid-range among Illovo's regional producers. Both Malawi's estates and growers have consistently performed above the lower 25% quartile (those highlighted in yellow with TCH below 45.5). It is important to note that agro-climatic differences significantly impact these results, and TCH values must be interpreted in context. This is evident when considering that all of Illovo's South African farms are dryland operations, while 64% of Tanzania's production is irrigated. In contrast, Eswatini, Malawi, Mozambique, and Zambia rely on 100% irrigation.

Figure 20: Illovo Regional Production - Yield Comparison (Tonnes of Cane per Hectare)

Country	Producer Type	5-Year Average	2020	2021	2022	2023	2024	Hectares
		tonnes/hectare						
Zambia	Growers	125	130	120	125	125	123	5%
Eswatini	Estates	109	108	115	104	109	109	4%
Zambia	Estates	109	110	106	110	109	108	6%
Malawi	Estates	96	91	97	98	94	100	8%
Eswatini	Growers	93	91	95	93	93	94	6%
Tanzania	Estates	67	76	62	66	68	65	4%
Malawi	Growers	65	59	75	61	67	64	3%
Mozambique	Estates	63	61	64	64	63	64	3%
Mozambique	Growers	62	59	61	67	62	63	2%
Tanzania	Growers	39	40	37	41	39	39	6%
South Africa	Growers	38	39	36	38	38	37	49%
South Africa	Estates	36	35	37	36	36	36	4%

Source: Corporate Citizenship - Illovo Independent Impact Reports (2023); CanePro (2020-2024) ; Total cultivated hectares (5-year average): 245,980

Figure 21: Regional Comparison of Blue Water vs Cane Yield across Illovo managed estates (2023)

Illovo Mill	Farm Type	Farm	5-Year Average	2020	2021	2022	2023	2024	Hectares
			tonnes/hectare						
Dwangwa	Estate	1	108	114	106	109	105	109	25%
Nchalo	Grower	2	103	110	106	108	87	102	3%
Nchalo	Grower	3	102	117	104	94	92	105	2%
Nchalo	Grower	4	89	103	90	92	67	95	2%
Nchalo	Estate	5	89	100	93	93	81	79	35%
Nchalo	Grower	6	89	110	100	90	93	51	0%
Nchalo	Estate	7	79	75	82	87	77	75	10%
Nchalo	Grower	8	70	64	83	76	66	63	5%
Dwangwa	Grower	9	49	35	61	39	59	50	17%

Source: Corporate Citizenship - Illovo Independent Impact Reports (2023); CanePro (2020-2024) ; Total cultivated hectares (5-year average): 245,980

A farm-level comparison within Malawi identifies the Dwangwa collective of small-scale growers as the lowest-performing producers, falling below the bottom yield quartile of 65 TCH. In total their farms represent 17% of sugarcane cultivation across Illovo’s Malawian producer base. Yield profiles are comparable to dryland cultivation in South Africa, indicating significant challenges with water access and management.

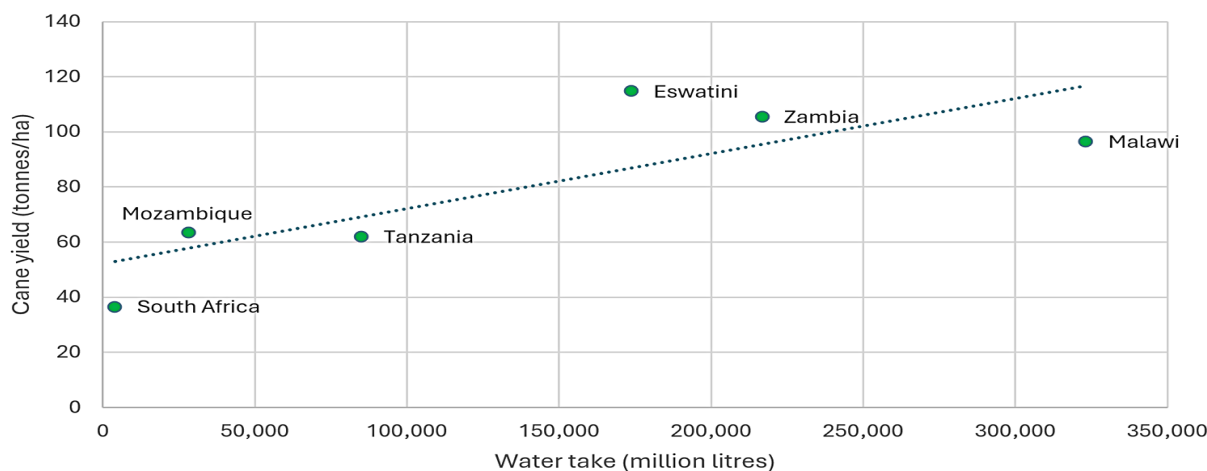
Water Use

The total water footprint for sugar production encompasses both agricultural (farm) and industrial (factory) consumption. This is primarily classified as blue water – freshwater withdrawn from surface and groundwater sources such as rivers, dams, and aquifers.

- At the **farm level**, blue water is used mainly for irrigation to support cane growth, especially in regions with seasonal rainfall or drought.
- At the **factory level**, water is withdrawn for processing operations, including cleaning, cooling, and extraction. While factories often recycle process water, a portion is consumed or discharged as effluent.

The following graph illustrates the strong correlation between blue water withdrawals (at farm and factory) and cane yields across Illovo’s regional managed estates.²²

Figure 22: Regional Comparison of Blue Water vs Cane Yield across Illovo managed estates (2023)



Source: Corporate Citizenship - Illovo Independent Impact Reports (2023)

Water use efficiency (WUE), measured in tonnes of sugarcane per 100 mm of water per hectare (TCH/100mm/ha), is a key performance metric that reflects the effectiveness of water utilization in the sugar industry. For sustainability reporting, it enables the sector to demonstrate responsible water stewardship, reduce waste, and align with global environmental standards. It is important to note that factors such as irrigation method (e.g., drip systems typically result in higher efficiency), climate, agronomic practices, and water availability all play significant roles in determining WUE.

Figure 23: Regional Comparison of Water Use Efficiency – Illovo Managed Estates (2023)

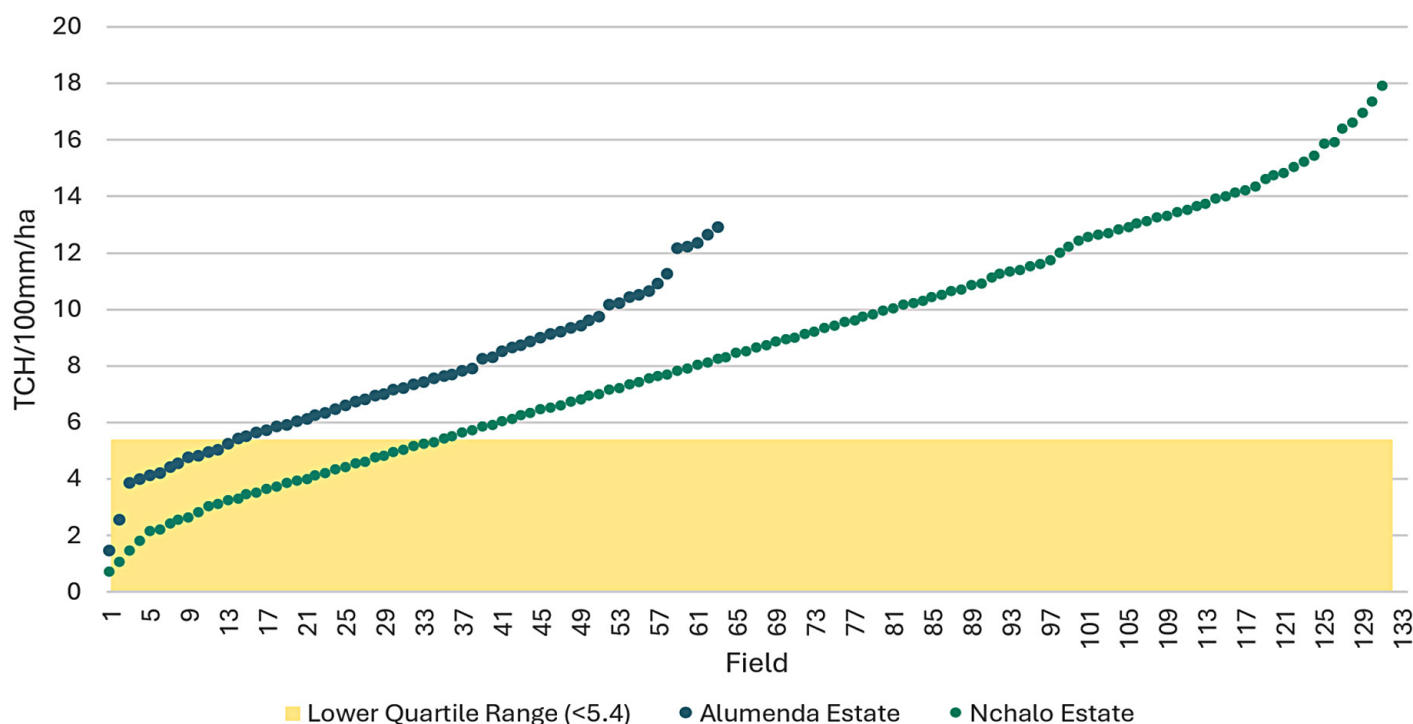
Illovo Estates	Water Take	Hectares	Sugarcane	Water Use Efficiency	Water Use
	(million litres)	(ha)	(tonnes)	(TCH/100mm/ha)	
Mozambique	28,060	6,290	399,752	14.25	100% irrigated
Zambia	216,718	15,952	1,683,344	7.77	100% irrigated
Tanzania	85,172	9,729	602,358	7.07	64% irrigated
Eswatini	173,770	9,222	1,057,939	6.09	100% irrigated
Malawi	323,247	19,326	1,866,627	5.78	100% irrigated

Source: Corporate Citizenship - Illovo Independent Impact Reports (2023)

Using net irrigation data instead of total water withdrawal is a better indicator of water use efficiency for irrigated sugarcane, as it isolates applied irrigation water from factory consumption. This metric serves as a key benchmark for comparing performance across irrigated estates. A higher value indicates superior agronomic practices, more precise irrigation scheduling, and a more efficient irrigation system, ultimately reflecting better productivity.

For farm-level comparison, net irrigation data is only available for Illovo’s Nchalo and Alumenda estates. In 2024, these two estates exhibited a range of <1 to 18 TCH/100mm/ha, with 5.4 TCH/100mm/ha representing the lower quartile across all fields. At the Alumenda estate, 14% of harvested hectares fell below this threshold, compared to 25% at Nchalo (see below).

Figure 24: Malawi Farm-Level Comparison of Water Use Efficiency – Illovo Managed Estates (2024)



Source: CanePro (2024)

The following analysis compares the agricultural water demand between two key sugarcane-growing regions in Malawi – Nkhotakota (Dwangwa) and Chikwawa – using established FAO methodologies. The calculation of irrigation needs is based on the relationship between atmospheric water demand, effective rainfall, and crop-specific requirements:

- **Long-Term Mean Reference Evapotranspiration (LTM ETo):** A climatic value representing the atmospheric demand for water, measured as the potential water loss from a standard grass surface over a long-term period. It is location-specific and driven by solar radiation, temperature, humidity, and wind speed.
- **Effective Rainfall:** The portion of total rainfall that is effectively stored in the root zone and used by the crop, as estimated by the FAO CROPWAT model. It accounts for losses from surface runoff, deep percolation, and canopy interception.
- **Crop Coefficient (Kc):** A crop-specific factor used to adjust the ETo value for a particular crop's water needs. For sugarcane, a perennial crop with a long growing season, a single average Kc value of 0.90 is often used for annual water planning, simplifying a more complex model that varies by growth stage (e.g. initial: ~0.4, mid-season: ~1.0–1.25, late season: ~0.75).

The comparison reveals a stark contrast in agricultural water demand between the two regions. Chikwawa requires 21,282 m³/ha of irrigation water annually – 85% more than the 11,448 m³/ha required in Nkhotakota.

This is primarily due to Chikwawa's higher atmospheric demand (ETo) and significantly lower effective rainfall, resulting in a year-round irrigation season. Nkhotakota, benefiting from higher rainfall concentrated in the summer months, has a shorter, less intense irrigation season. The data clearly shows that Nkhotakota is an inherently more water-secure and potentially more sustainable region for sugarcane production than Chikwawa due to its favorable climate. This is supported in yield figures above, where Illovo's Dwangwa estate at 108 tonnes per hectare is the highest observed. Notably lower yields from Dwangwa small-scale growers highlight inefficiencies in cultivation methods, particularly around water use.

Figure 25: Chikwawa Sugarcane Water Demand

Month	LTM Rainfall	LTM Effective Rainfall	Crop Water Use ETo * Kc	Deficit / Net Water Requirement	Irrigation Required
	mm	mm	mm	mm	m ³ /ha
Jan	159	79	161	82	1,161
Feb	139	69	138	69	978
Mar	97	49	150	101	1,424
Apr	35	18	131	114	1,598
May	14	0	114	114	1,611
Jun	15	0	95	95	1,335
Jul	15	8	106	99	1,385
Aug	5	0	140	140	1,970
Sep	4	0	179	179	2,519
Oct	16	8	223	215	3,030
Nov	54	27	218	192	2,696
Dec	138	69	181	112	1,574
Total	692	327	1,838	1,511	21,282

Crop coefficient (Kc) = 0.9; Irrigation efficiency = 71%

Source: FAO CROPWAT

Figure 26: Nkhotakota Sugarcane Water Demand

Month	LTM Rainfall	LTM Effective Rainfall	Crop Water Use ETo * Kc	Deficit / Net Water Requirement	Irrigation Required
	mm	mm	mm	mm	m ³ /ha
Jan	320	157	110	-47	0
Feb	266	152	103	-49	0
Mar	408	166	116	-50	0
Apr	228	145	113	-33	0
May	34	32	113	81	1,146
Jun	12	11	109	98	1,379
Jul	8	8	111	103	1,446
Aug	2	2	127	125	1,759
Sep	1	1	149	148	2,077
Oct	10	10	176	166	2,344
Nov	80	70	162	92	1,296
Dec	282	153	128	-25	0
Total	1,651	907	1,516	609	11,448

Crop coefficient (Kc) = 0.9; Irrigation efficiency = 71%

Source: FAO CROPWAT

Water stewardship is a core component of the SAI Platform's Farm Sustainability Assessment (FSA), reflecting its critical role in sustainable agriculture. Under FSA, water metrics are tracked annually at the farm level, with key data points including irrigation water sources, volumes used, and efficiency measures - verification occurs every three years.

Figure 27: SAI FSA Self-Assessment Water Use

Blue water	<ul style="list-style-type: none"> - Valid water extraction license - Water extraction volumes - Irrigation water quality compliance (e.g. salinity) - Irrigation records for 5+ years - Irrigation management plan - Prevent wastewater pollution (e.g. identify sources; use buffer strips) - Measures to optimize rainwater use (e.g. contouring, mulch, grass strips) - Harvesting surplus rainwater or groundwater recharge
Green water	<ul style="list-style-type: none"> - Measures to optimize rainwater use (e.g. contouring, mulch, grass strips) - Harvesting surplus rainwater or groundwater recharge

Source: FSA 3.0 Self-Assessment Questionnaire

Water Effluent

A significant challenge in water effluent management lies in the limited availability of public farm-level data for comprehensive analysis. The most effective solution involves accessing the Farm Sustainability Assessment (FSA) data from the Sustainable Agriculture Initiative, which systematically tracks environmental performance indicators. Within the FSA framework, water effluent management receives dedicated attention through annual monitoring of chemical runoff levels, pesticide residues, and compliance with wastewater treatment protocols.

Figure 28: SAI FSA Self-Assessment Water Effluent & Waste Categories

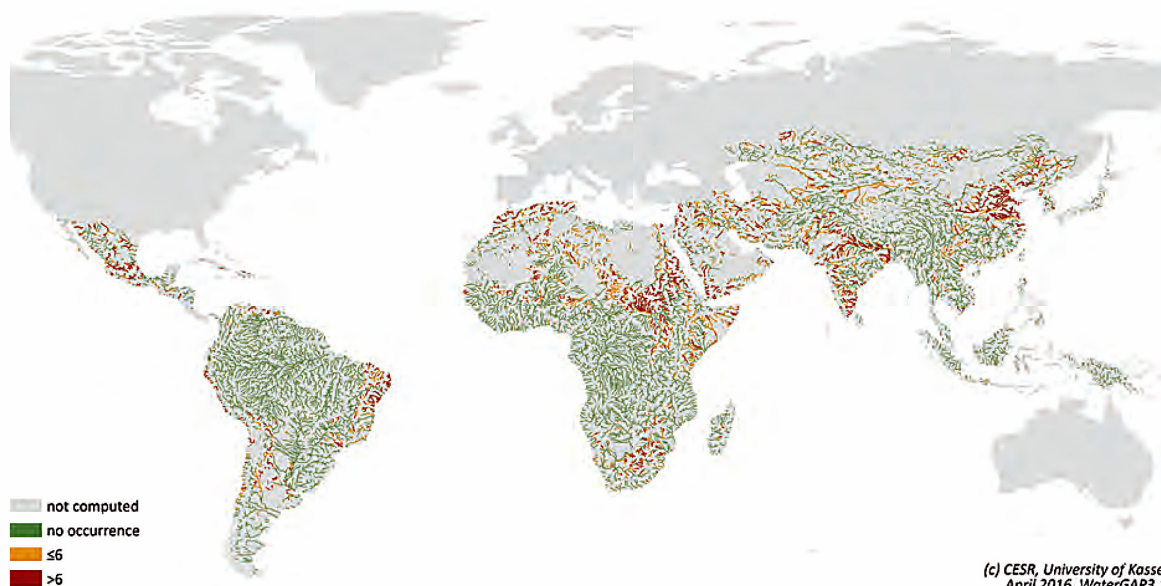
Grey water	Recycling of greywater sources
Black water	Prevent use of untreated sewage per local legislation; keep records
Waste	Compliance with waste & hazardous materials legislation (e.g. disposal paperwork; risk assessments; correct storage; no burning of pesticides)
Reduce, reuse, recycle	Waste management plan to reduce, reuse, and recycle non-crop waste
Organic waste	Management of crop residues (e.g. compost, feed, or energy)
Chemical runoff prevention	Buffer zones ($\geq 10\text{m}$); spray drift records

Source: FSA 3.0 Self-Assessment Questionnaire

To address spatial and temporal monitoring gaps, integrating third-party data sources and advanced technologies offers promising solutions. Global repositories such as AQUASTAT provide validated national-level data on wastewater production, treatment, and use, enabling regional contextualization of effluent volumes. Similarly, GEMStat, hosted by UNEP, offers scientifically robust water quality data that supports [SDG Indicator 6.3.2](#) monitoring and cross-regional comparison of effluent impacts.

Remote sensing technologies have emerged as particularly valuable tools, especially for monitoring in remote or resource-limited areas. Advanced satellite systems, notably Sentinel-2 with its 10-meter spatial resolution, enable detailed mapping of smallholder farms and effluent pathways. These systems can detect key parameters including chlorophyll-a concentrations (indicating algal blooms from nutrient runoff), turbidity and suspended solids (signalling sediment discharge), and thermal pollution (detecting temperature changes from industrial discharge).

Figure 29: Severe River Pollution: Biochemical Oxygen Demand (BOD) in Latin America, Africa, and Asia



Frequency (months/year) in which "severe pollution" levels of biochemical oxygen demand occur in different river stretches in Latin America, Africa and Asia in 2008-2010

Source: UNEP (2016) A Snapshot of the World's Water Quality: Towards a Global Assessment

At the field level, several proxy indicators can effectively supplement direct measurements. Tracking agrochemical application rates per hectare provides valuable insights into potential nutrient and contaminant leaching patterns. Additional indicators include soil health metrics, where higher soil organic matter levels correlate with reduced chemical runoff, and sustainable farming practices such as green cane harvesting and maintenance of riparian buffer zones. The presence of vegetative buffers, particularly vetiver grass, serves as an excellent proxy for reduced effluent transport into waterways.

Soil Health

Soil health represents a fundamental aspect of agricultural sustainability, though its comprehensive assessment involves complex, technical measurements. This section outlines both the primary farm-level data collected by Illovo in Malawi and the key proxy indicators that can provide valuable insights into soil conditions and management practices.

Soil properties are essential for multiple critical applications: they enable agro-ecological assessments by revealing soil constraints and agricultural potentials; support climate change studies through modelling carbon stocks and greenhouse gas fluxes; facilitate land degradation assessment by monitoring and modelling erosion and other degradation processes; and inform hydrological modelling by providing data on water retention and runoff characteristics.

Illovo's monitoring systems in Malawi tracks several direct indicators of soil management:

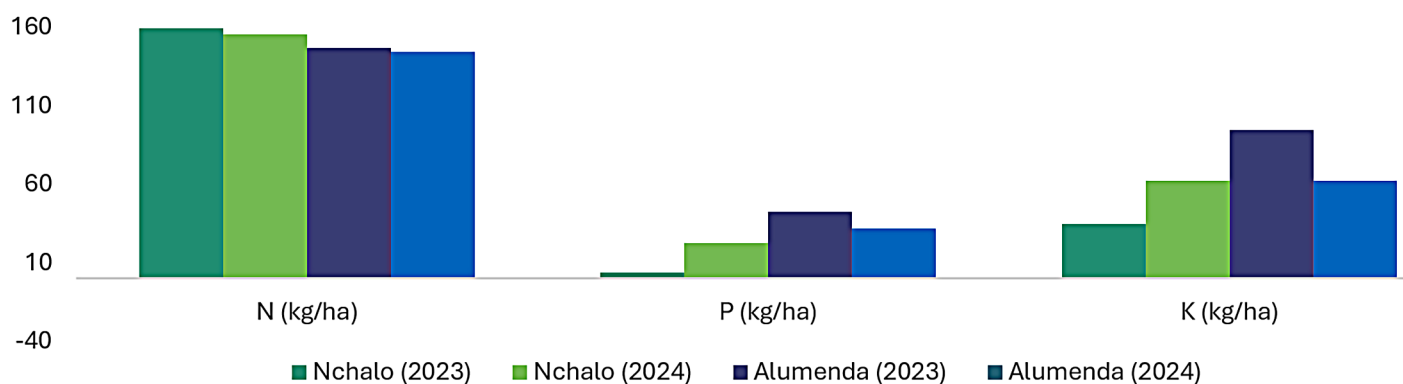
- Implementation of green cane harvesting (trash blanketing)
- Adoption of cover cropping systems
- Application rates of organic and synthetic fertilizers
- Soil organic matter measurements
- Erosion control practices including contour planting and buffer maintenance

Figure 30: Illovo Green-Cane Harvesting in Malawi

Farm	2020	2021	2022	2023	2024	Hectares
Chisanja	0%	0%	0%	0%	100%	67
Sande Estate	0%	0%	0%	0%	78%	354
Phata	0%	0%	0%	0%	78%	450
Alumenda Estate	0%	0%	0%	1%	77%	1,961
Kaombe Estate	0%	0%	0%	0%	74%	592
Nchalo Estate	0%	0%	0%	5%	73%	6,279
Kasinthula	0%	0%	0%	0%	72%	997
Total						10,701

Source: CanePro (2020-24)

Figure 31: Fertilizer Application at Illovo Malawi Southern Estates (kg/ha)



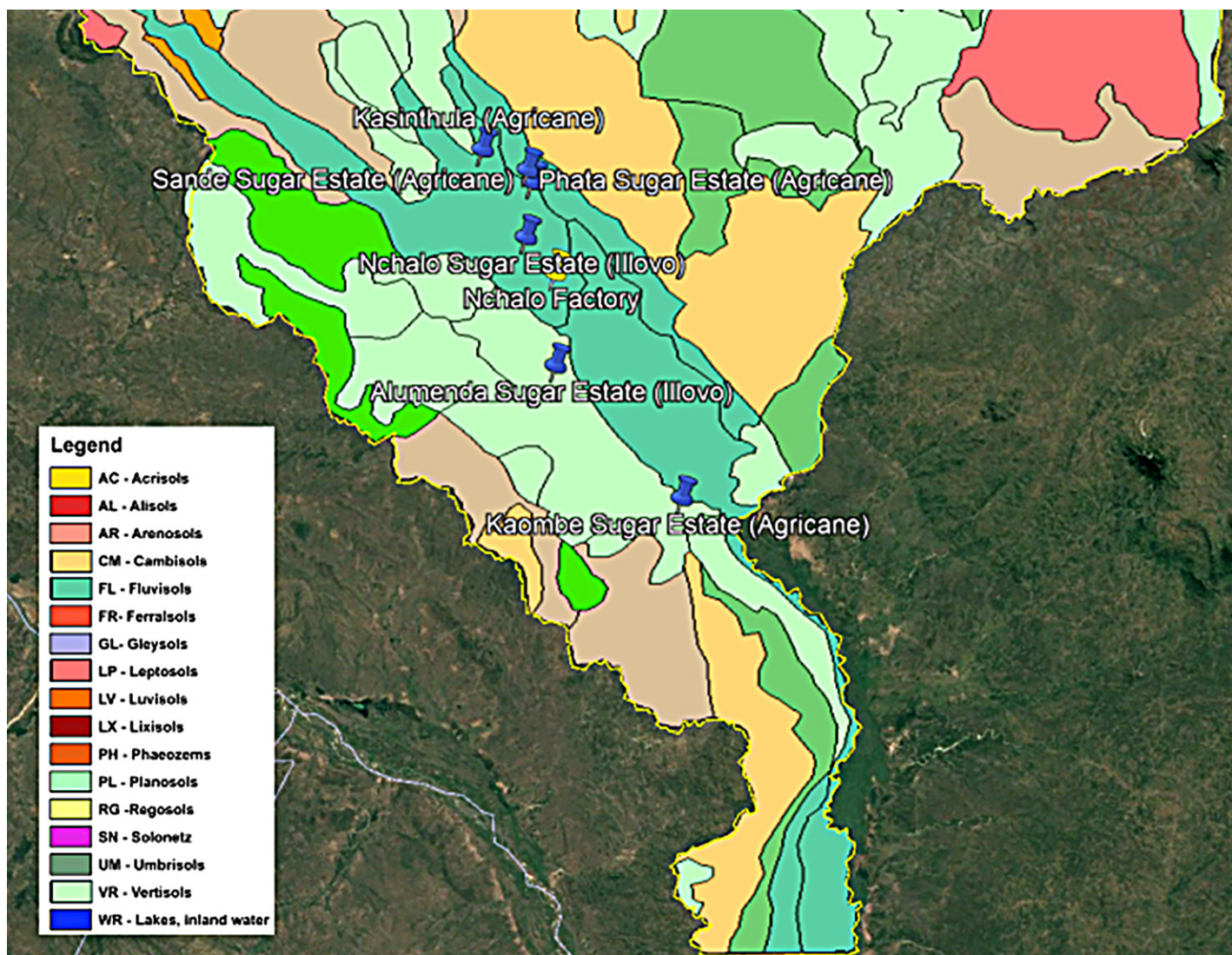
Source: CanePro (2023-24)

ISRIC is the world’s leading institution for the collection, standardization, and dissemination of global soil data - nearly all of ISRIC’s resources are freely and openly accessible. Key initiatives and databases developed by ISRIC include: **SoilGrids** is a globally recognized digital soil mapping system that uses machine learning models trained on over 230,000 soil profiles and environmental covariates – including climate, topography, and remote sensing data – to provide high-resolution (250m) predictions of key soil properties such as pH, organic carbon, sand, silt, clay content, cation exchange capacity, and nitrogen; **World Soil Information Service (WoSIS)** is a central global database of standardized and harmonized soil profile data worldwide.

Two regional projects relevant for Malawi soil profiling and useful reference proxies for *Codex’s* soil category include:

1. **Soils4Africa:** A continental-scale effort to build a Soil Information System (SIS) for Africa. Based on a detailed map of agricultural land, the project selected 20,000 sampling sites to produce baseline soil data aimed at guiding sustainable agricultural interventions. The first version of the SIS was launched in May 2025; full release is still pending.
2. **SOTER Database for Malawi:** A nationwide soil and terrain database at a scale of 1:1 million, designed to support broad-scale agricultural and environmental planning. It incorporates the World Reference Base (WRB) for soil classification and includes properties such as organic carbon, nitrogen, pH, erosion degree, rootable depth, and water holding capacity. See: [Annex: Map of SOTER Soil Sampling in Malawi](#).

Figure 32: Map of Southern Malawi Sugarcane Estates overlaid with Soil Classification



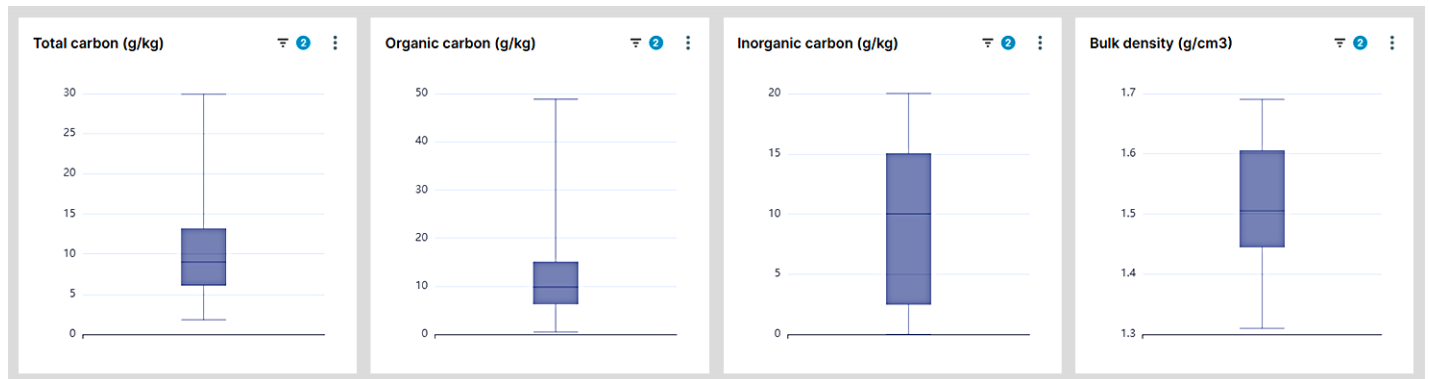
Source: Soil and Terrain Database (SOTER) for Malawi, ISRIC – World Soil Information (2016)

Collectively, these resources comprise an integrated suite of tools and databases designed to support evidence-based decision-making for the development of *Codex Planetarius*, particularly in the domains of sustainable land use and soil management across local, regional, and global scales. With over 20 distinct metrics employed in comprehensive soil analysis, this framework enables detailed assessment and monitoring of key soil health indicators.

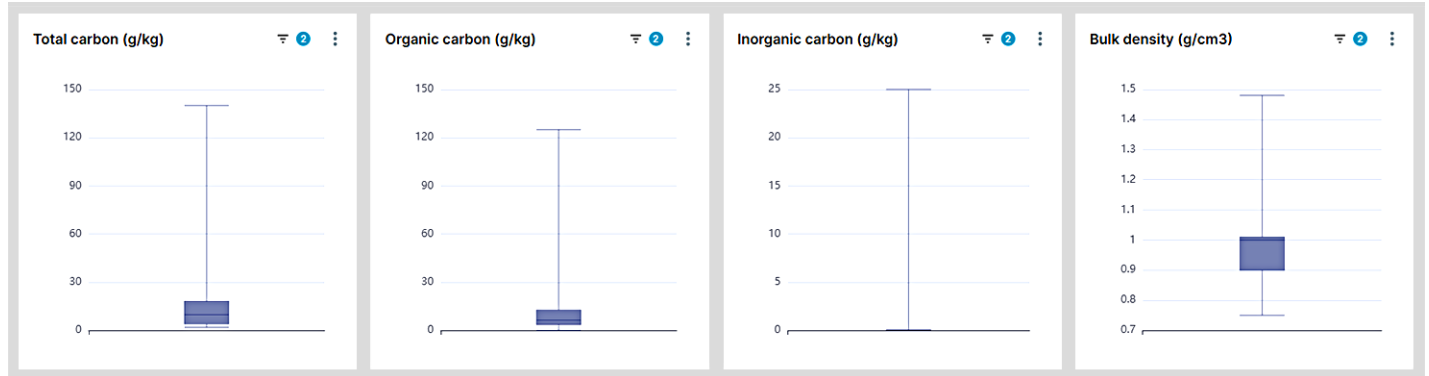
Preliminary high-level analysis at the national level reveals that Malawi demonstrates significantly lower levels of soil organic carbon compared to other major sugarcane-producing nations such as South Africa and Brazil. However, to obtain a more accurate understanding of relative soil health performance, further investigation is required at the sub-national level, specifically targeting sugarcane-growing regions where local soil management practices and environmental conditions may significantly influence organic carbon levels.

Figure 33: Topsoil Observations

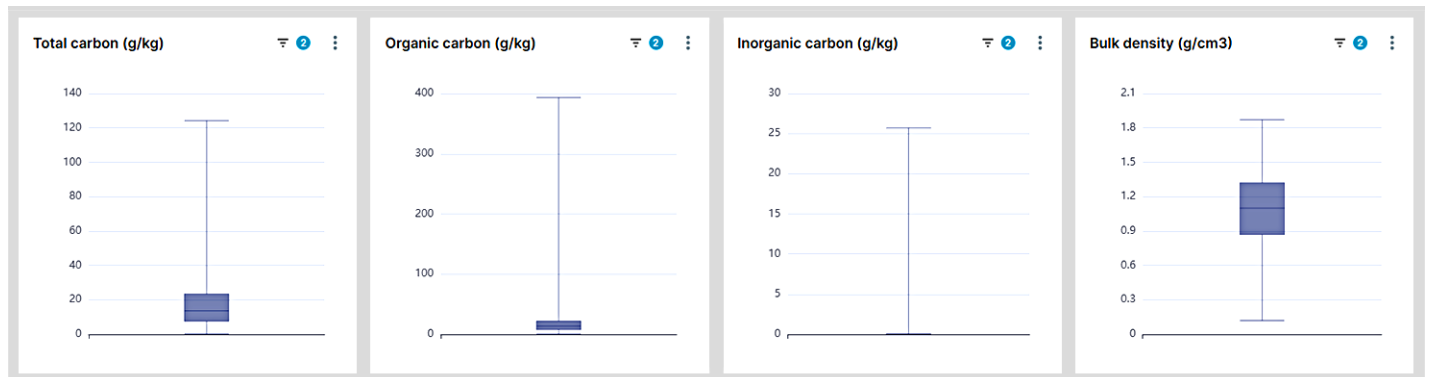
Malawi Topsoil Observations <30cm



South Africa Topsoil Observations <30cm



Brazil Topsoil Observations <30cm



Source: [WoSIS \(2025\)](#)

GHG Emissions

At a Group level, Illovo's parent company, ABF, has committed to Science Based Targets initiative (SBTi)-validated GHG reduction targets – including a 30% cut in Scope 1 and 2 emissions by 2030. Illovo supports these goals through integrated farm and factory monitoring, using internal GHG reporting for factories and the SAI Platform's Farm Sustainability Assessment for on-farm emissions, enabling alignment with ABF's group-wide FLAG targets such as a 36.4% reduction in absolute Scope 1–3 emissions by 2030.

The following table highlights Illovo's emissions performance across its African operations, measured in tonnes of CO₂ equivalent per tonne of cane harvested (TCO₂e/TCH). Malawi emerges as the standout performer, recording the lowest emissions intensity at just 0.39 TCO₂e/TCH. This result is largely attributable to Malawi's reliance on carbon-neutral bagasse for energy generation, efficient energy conversion at its mills, and high-yield irrigated agriculture. The data underscores how regional factors – including energy sources, agronomic practices, and processing technologies – directly influence carbon efficiency, offering a clear benchmark for sustainability improvements, applicable for the development of *Codex Planetarius*.

South Africa's Illovo operations exhibit a significantly higher emissions per tonne of sugarcane primarily due to its heavy reliance on coal and natural gas as energy sources, as opposed to bagasse which is a renewable source and used widely in other countries. This high emissions factor is compounded by extensive dryland (rain-fed) farming, which yields less cane per hectare, thereby concentrating emissions over a smaller production volume.

Figure 34: Illovo Regional GHG Emissions Comparison (2021)

Country	Total Scope 1-3 Emissions (TCO ₂ e)	TCO ₂ e/TCH
Malawi	734,163	0.39
Mozambique	173,144	0.43
Zambia	845,842	0.50
Tanzania	370,850	0.62
Eswatini	948,682	0.90
South Africa	1,573,564	3.92

Source: Corporate Citizenship - Illovo Independent Impact Reports (2023)

While Illovo tracks its own Scope 1 and 2 emissions and monitors direct farm-level emissions – such as nitrous oxide (N₂O) from fertilizer application and CO₂ from farm machinery fuel use, a significant gap remains in capturing supply chain emissions, particularly those from smallholder outgrowers. These growers often lack the technical and financial resources for granular emissions monitoring. To address this, Illovo plans to expand Farm Sustainability Assessment (FSA) audits and pilot digital monitoring tools, such as mobile applications, to improve data collection and emission visibility across its broader supply chain.

Biodiversity

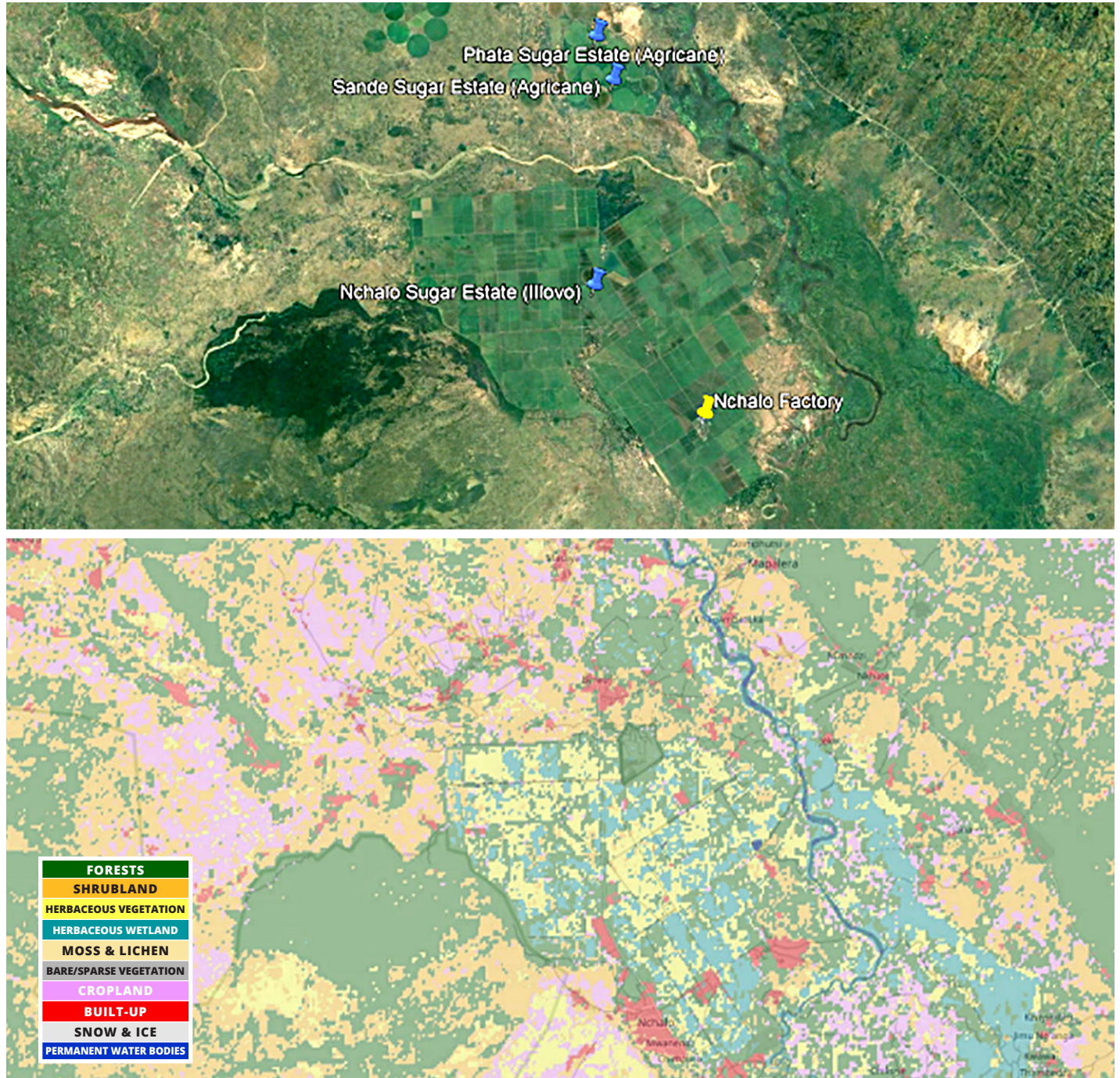
Illovo also monitors biodiversity performance using SAI's FSA, which incorporates specific indicators such as the proportion of farm area conserved as natural habitat, observations of pollinators and bird nests, and systematic management of invasive species. Monitoring involves annual surveys aligned with global standards including the IUCN Red List and Aichi Targets, complemented by biannual evaluations of invasive species control in accordance with national regulations. The company also records sightings of rare or endangered species in support of conservation initiatives consistent with international agreements such as [Convention on International Trade in Endangered Species of Wild Fauna and Flora \(CITES\)](#) and domestic wildlife laws. While this data is not available for inclusion in the present report, the structured approach reflects Illovo's commitment to biodiversity documentation.

Land Use

Illovo's approach to land use in its sugarcane operations is rigorously monitored through the FSA framework, which commits to zero deforestation. Illovo's sugar estates were established long ago and therefore already meet the requirement of no primary forest loss since 2015 – a claim supported by satellite imagery and legal land titles. The company also upholds Free, Prior, and Informed Consent (FPIC) principles for the use of indigenous lands, aligning with international standards such as FSC and IFC

Performance Standards. To further enhance spatial accuracy and support analysis for the *Codex Planetarius* program, future assessments could incorporate proxy data derived from third-party sources such as Copernicus Global Land Cover datasets. These provide 100m resolution land cover information, which can be overlaid with high-resolution satellite imagery to verify land use patterns visually.

Figure 35: Map of Chikwawa Sugarcane Farms & Copernicus Land Cover Classification



Source: Copernicus Global Land Cover (2025)

4 Findings and Recommendations

Summary of Key Findings

Malawi's sugar sector is a key national industry but a minor global player, producing approximately 300,000 tonnes of sugar annually. Illovo Sugar, the sole registered exporter, dominates the market, which primarily serves domestic consumption; on average only about 100,000 tonnes are exported each year. Although current expansion is limited by milling capacity, projects at Illovo Nchalo and Salima Sugar could boost national output by approximately 17%.

Significant environmental and climate challenges threaten the sector's future, driven by water needs, soil degradation, and high vulnerability to climate shocks. Climate projections indicate yield declines of up to 29% by 2050 without adaptation, while agrochemical overuse, soil degradation from pre-harvest burning, erosion, and deforestation risk compound these issues.

Despite a comprehensive environmental regulatory framework, enforcement remains weak due to institutional fragmentation and resource constraints, creating the potential for uneven compliance across the sector. Regional benchmarking reveals that Malawi excels in emissions efficiency, performs well on yield, but ranks last for water-use efficiency – although a major water infrastructure project, soon to come online, has the potential to address this.

In this context, Illovo's sustainability leadership is critical. The company has set ambitious targets and verified 90% of its supply chain against international standards (the Farm Sustainability Assessment - FSA), demonstrating comprehensive monitoring across all *Codex Planetarius* categories. Illovo's verified production of 1.89 million tonnes of sugarcane is 2.27 times the country's average annual sugar exports.

Potential Trade, Pricing, and Economic Implications

The integration of *Codex Planetarius* into global trade frameworks would have significant implications for producer countries. New standards would effectively function as a de facto tax on the least environmentally efficient producers, potentially taking the worst performing farms out of production. While furthering sustainability objectives in a narrow sense, it could also disrupt export economies and face implementation resistance as a result.

For Malawi, where sugar exports provide crucial foreign exchange, any additional compliance costs require careful evaluation. Fortunately, Malawi's current exposure is limited; through Illovo the country already produces a volume of internationally verified sustainable sugar that is more than double Malawi's average annual export volume.

For vertically integrated operators, such as Illovo, mandatory standards would incentivize them to rationalize their supply chains. Looking at Illovo's current implementation of Farm Sustainability Assessment (FSA), compliance is more feasible on estates than across smallholder networks. The introduction of *Codex Planetarius* could therefore lead to a two-tier system in Malawi:

- Export Tier consisting of Illovo's estates and high-performing growers meeting *Codex Planetarius* standards.
- Domestic Tier involving small-scale growers transitioning out of export supply chains, potentially operating under less stringent requirements.

This structure would reinforce Illovo's competitive advantage while creating significant barriers for any future exporter. For instance, Salima Sugar, which owns a mill but publishes no sustainability data, would likely be classified among *Codex's* worst performers, limiting its export potential. This would thereby exacerbate structural divisions and potentially limit growth ambitions for the sector.

Climate change acts as a critical risk multiplier in this context. Rising temperatures, worsening droughts, and unpredictable rainfall already threaten yields and increase production costs. As a water-intensive crop, Malawi's sugarcane sector is particularly vulnerable due to high evapotranspiration rates. While new standards could incentivize more efficient water use, they also risk compounding Malawi's existing climatic challenges – despite the country's minimal contribution to global emissions. This creates an inequitable situation where Malawi's export growth could be constrained by climate challenges it did not create, while simultaneously bearing compliance costs.

Impact Assessment & Mitigation Measures

The primary impact of *Codex Planetarius* would likely concentrate among small-scale growers in Dwangwa due to their challenges with water management and low yields. These growers represent less than 10% of Illovo's sugarcane supply, which translates to just 2-4% of the country's total sugar export volumes (based on export rates of 20-40%). The following table outlines practical mitigation measures designed to improve environmental performance across their 4,200 hectares, supporting Illovo's goal of achieving 100% sustainability verification across its supply chain by 2028.

Impact Goal	Mitigation Measure	Key Action & Tools
Improve Yields & Soil Health	<i>Implement Illovo's New Synergistic Farming System (NSFS)</i>	Leverage Illovo's expertise from Nakambala Estate in Zambia: optimized planting windows after green manure, GPS-guided land-forming, controlled-traffic to minimize compaction, aging cane beyond 12 months, and rotating with cover crops (e.g. sunn hemp). This system has demonstrated yield increases of over 50% (e.g. 205 t/ha vs. 130 t/ha) while enhancing soil organic matter and water use efficiency. ²³
Reduce Water Effluent	<i>Appropriate fertilizer & pesticide application</i>	Promote Integrated Pest Management (IPM) and precision nutrient management. Implement Nature-based Solutions (NbS) like vegetated filter strips and constructed wetlands to intercept runoff.
Reduce Blue Water Use	<i>(1) Rainwater Harvesting</i>	Construct micro-catchments around irrigation interventions at an estimated cost of ~US\$200/ha to capture and utilize rainwater, reducing dependence on abstracted blue water.
	<i>(2) Install Drip Irrigation</i>	Convert Illovo estates and grower irrigation from overhead or furrow to drip. Cost range: USD \$10,000-15,000/ha in Malawi. Growers to partner with Illovo/Agricane for long-term technical extension services, maintenance support, and supplier linkages to ensure system longevity and efficiency.
Increase Biodiversity	<i>Support food security crops & strategic land use</i>	Increase productivity on prime land (e.g. extend irrigation systems between sugarcane fields) to allow less productive areas to be used for woodlots and/or reforestation. Illovo, through their Thriving Communities Trust, to partner with farmers to provide market access, seeds, and agronomic support for sustainable food crop rotations, improving both food security and biodiversity.
Reduce GHG Emissions	<i>Map & reduce farm emissions</i>	Partner with growers to track practices through Illovo's own systems or via third-party systems e.g. FarmTrace mobile app. Use FAO's Ex-Act Carbon Tool for aligned SBTi FLAG reporting. The Cool Farm Tool offers free initial assessments and is currently used in Malawi.

Recommendations

1. Leverage existing sustainability frameworks and partnerships

Over 40 voluntary sustainability standards already engage the sugar industry globally, demonstrating strong market-driven commitment to sustainability. While there is a place for *Codex Planetarius* to target producers who do not follow these standards, it should integrate – not duplicate – these efforts, focusing on leveraging existing standards and supporting compliance for high-risk producers.

Recommended Actions:

- **Collaborate with established standards:** Partner with globally recognized platforms such as SAI Platform’s FSA to adopt their minimum red/amber list criteria for pesticides and water management.
- **Support smallholder grower through corporate partnerships:** Scale Illovo’s “Thriving Community” model (e.g. technical/financial support to outgrowers) to bridge compliance gaps. Illovo’s drip irrigation and SWIM systems have already reduced water use by 30% in Malawi, offering a replicable template.
- **Form multi-stakeholder platforms:** Establish a national sustainability taskforce with Illovo and government agencies (e.g. MEPA) to co-develop *Codex* implementation guidelines.

2. Strengthen local institutions and promote data transparency

Malawi’s new environmental agency (MEPA) lacks funding and capacity. *Codex* must prioritize institutional strengthening and open data sharing to identify and support the worst-performing farms.

Recommended Actions:

- **Build institutional capacity:** Provide technical assistance to help MEPA align national regulations with international sustainability standards like FSA and SBTi FLAG.
- **Support data-driven targeting:** Create a national sugarcane sustainability dashboard, aggregating data from auditors, mills, and smallholders to identify priority farms.

3. Adopt a landscape approach for climate resilience and biodiversity

Sugarcane farming risks exacerbating environmental degradation. Ecosystem-based adaptation should be prioritized to meet *Codex Planetarius* standards in challenging categories like land-use and biodiversity.

Recommended Actions:

- **Designate priority landscapes:** Establish the Shire River Basin as a *Codex* Pilot Zone, directing adaptation finance (e.g. [GEF LDCF grants](#)) for wetland restoration (e.g. Elephant Marsh), wildlife corridors, riparian buffers, and soil rehabilitation to reduce flood risks. This multi-stakeholder approach mirrors the Kafue Flats Joint Action Group in Zambia, where Zambia Sugar collaborates with WWF, government agencies, and local communities to advance sustainable water management and ecosystem preservation.
- **Scale Nature-based Solutions (Nbs):** Promote vetiver grass belts, green-cane harvesting, cover cropping, reduced tillage, and constructed wetlands – practices already trialled successfully by Illovo in Malawi and Zambia.

4. De-risk sustainability improvements and economic development

High upfront costs for environmental efficient technologies (e.g. drip irrigation, mechanized harvesters, solar pumps) remain prohibitive for smallholder growers. Blended finance can bridge this gap and unlock private capital.

Recommended Actions:

- **Origination Facility Model:** Partner with strategic finance partners such as WWF’s [Dutch Fund for Climate and Development \(DFCD\)](#) to provide early-stage grant funding for feasibility studies – following the success of KASCOL’s project in Zambia that achieved 70% water savings.
- **Expand cooperative management models:** Replicate Agricane’s approach with Dwangwa growers to enable collective certification and financing.

5. Align policy and trade measures to balance sustainability and equity

Sugar plays a strategically vital role in Malawi's economy, contributing to employment, public revenue, foreign exchange, and rural livelihoods. *Codex* implementation must be coupled with policies that support – not exclude – emerging producers and exporters, advancing sustainability without compromising economic stability.

Recommended Actions:

- ***Introduce phased compliance:*** Implement tiered transition timelines and requirements based on operational scale, allowing larger estates to lead while providing smaller growers tailored support to meet standards incrementally.
 - ***Align with regional trade frameworks:*** Harmonize *Codex* criteria with COMESA's trade protocols to safeguard Malawi's duty-free market access and export competitiveness.
 - ***Support emerging exporters:*** Develop practical programs offering technical guidance, pre-certification grants, risk-sharing mechanisms, and training partnerships to help smaller farmers/millers meet sustainability requirements and access international markets.
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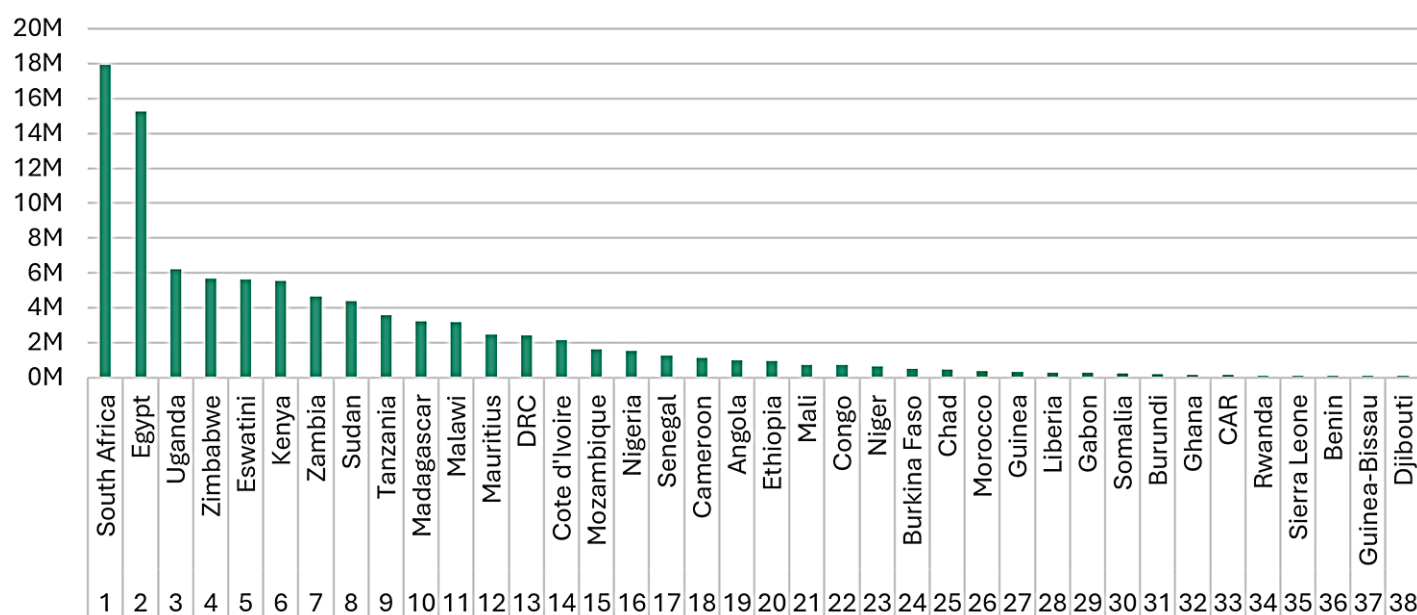
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Annexes

Annex: Interviews Conducted (June – August 2025)

Name	Role	Organization
Alan Cochrane	Agriculture Executive	Illovo Sugar Group
Maureen Kachingwe	Legal Counsel	Illovo Sugar Malawi
Jackie Strong	Nchalo Chapter Manager	Illovo Sugar Malawi
Jason Geddes	Head of Health, Safety, and Environment	Illovo Sugar Malawi
Katharine Teague	Group ESG Director	Associated British Foods
Bouke Biji	Director	Agricane
Bruce Carruthers	Director	Agricane
Callum Saunders	Project Coordinator	Agricane
Chris Matthews	Managing Director	Agricane
Rob Hartley-Louis	Senior Environmental Manager	C12 Consultants
Akeel Hajat	Director	C12 Consultants
Dr Juwo Sibale	Director of Environmental Assessments and Inspections	Malawi Environmental Protection Authority
Tsork Kumcheza	Environmental Officer	Malawi Environmental Protection Authority
Aaron Mponda	Standards Officer	Malawi Bureau of Standards

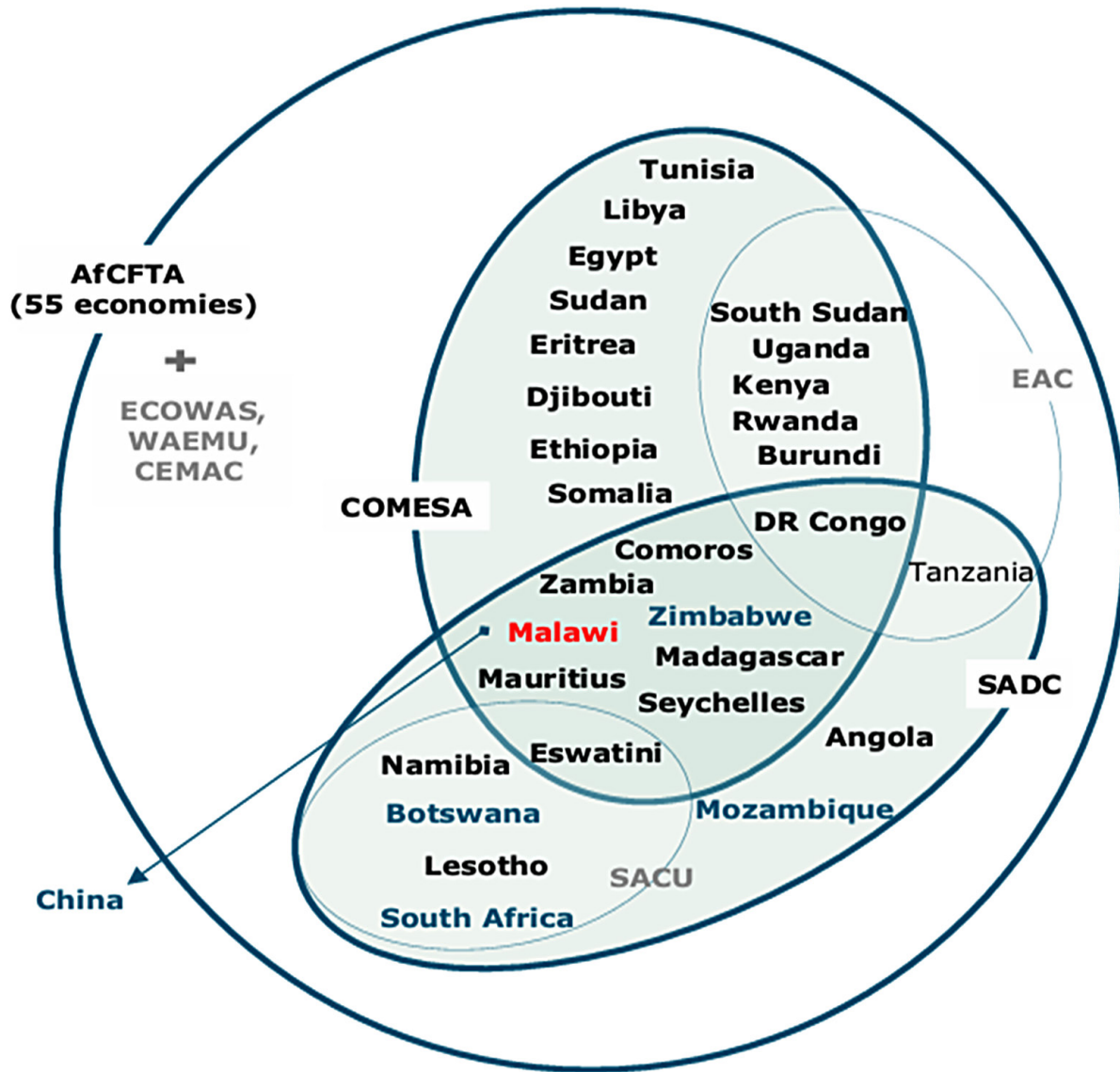
Annex: African Sugarcane Production



Year: 2023; Unit: tonnes

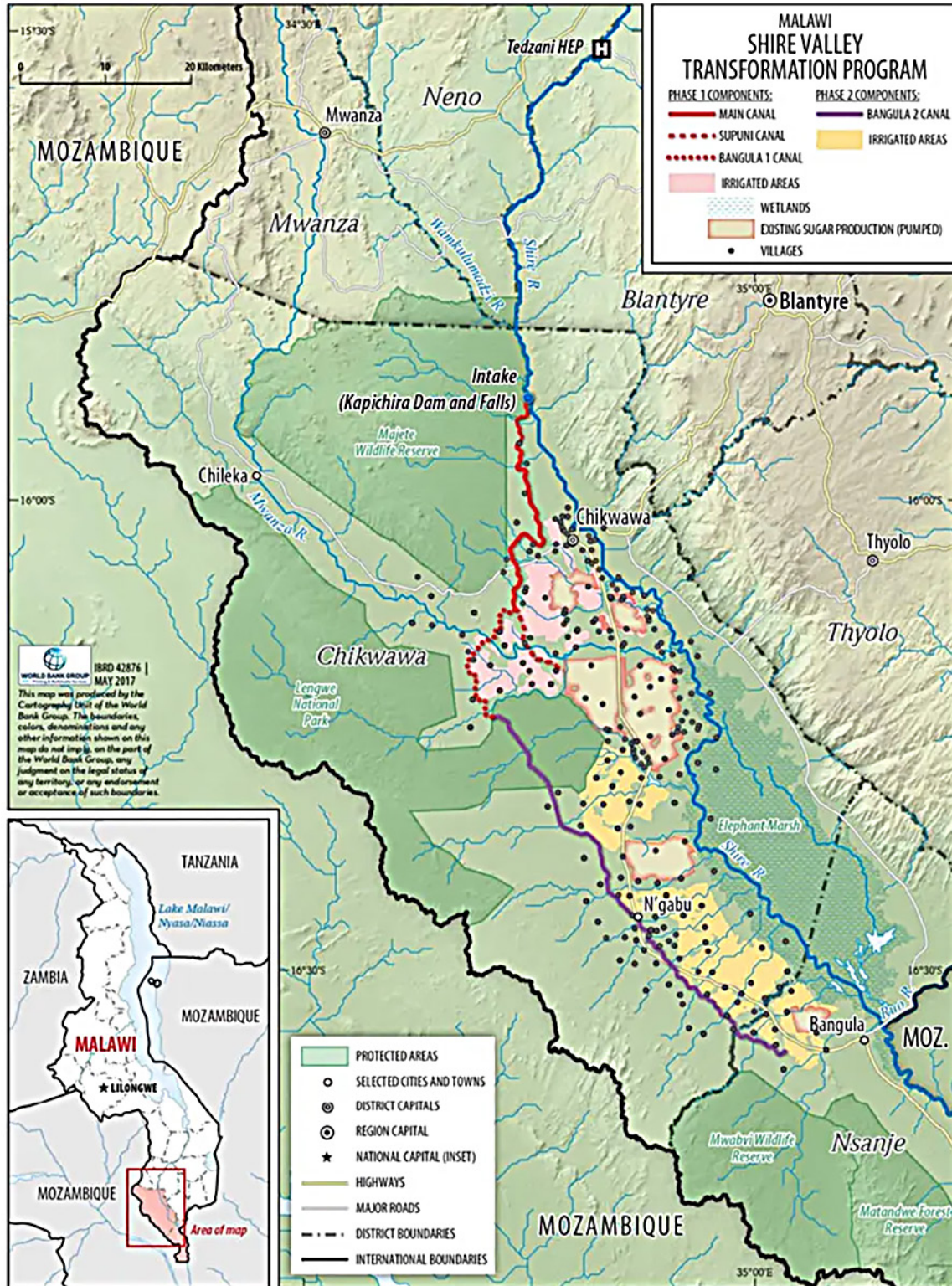
Source: FAO (2023)

Annex: Malawi's Regional Trade Agreements



Source: WTO Secretariat – Trade Policy Review: Malawi (2024)
 Note: Countries/territories with which Malawi has bilateral RTAs are shown in blue.

Annex: Map of Shire Valley Transformation Project (SVTP)



Source: World Bank

Annex: Environmental & Social Impact Assessment Summary: Shire Valley Transformation Project

Category	Key Issues	Mitigation Measures
Water Use	- Abstraction of 20–50 m ³ /s from Shire River for irrigation	- Operational rules to ensure minimum environmental flows for Elephant Marsh and Kapichira Falls - Managed under Shire River Basin Management Program
Sugarcane Production	- Transition from pump-fed to gravity-fed irrigation for sugarcane estates (e.g. Illovo) - Risk of water overuse	- Promotion of water-efficient furrow irrigation - Integration into broader water allocation plans
Biodiversity & Wildlife	- Canal construction through Majete Wildlife Reserve (MWR) and Lengwe National Park (LNP) - Habitat fragmentation and drowning risks for wildlife	- Buried canal sections in Majete Wildlife Reserve - Wildlife-friendly crossings (underpasses, drinking spots) - Fish barrier (3.5m drop) to prevent invasive species (e.g. Tiger Fish) from entering Lake Malawi
Elephant Marsh Wetland	- Reduced dry-season flows may degrade wetland habitat	- Designation as a Ramsar Wetland - Community-led conservation initiatives
Pesticide & Soil Health	- Increased pesticide use in sugarcane farming risks water pollution - Soil salinization/waterlogging in vertisol soils	- Integrated Pest Management (IPM) to reduce chemical use - Training on safe pesticide disposal - Crop diversification (e.g. rice in waterlogged areas)
Health & Safety	- Canals may increase schistosomiasis (bilharzia) transmission - Drowning risks (especially children)	- Safety ladders every 500m - Public health campaigns and preventative treatment
Livestock Conflicts	- Canals disrupt cattle grazing routes	- Installation of cattle bridges and drinking troughs - Conflict resolution frameworks
Alternatives Considered	- Pump-based irrigation rejected due to high energy costs - Canal rerouting to avoid MWR deemed too expensive	- Optimized canal design to minimize ecological disruption

Source: [Government of Malawi \(2017\)](#)

Annex: Malawi's Environmental Institutions

Layer	Institution	Key Responsibilities
National Policy & Oversight	Ministry of Natural Resources and Climate Change	Leads climate policy, oversees international agreements (UNFCCC, Kigali Amendment), coordinates environmental strategies
	Cabinet Committee on Health and Environment	Provides high-level policy direction on environmental and climate issues
Regulatory & Enforcement	Malawi Environmental Protection Authority (MEPA)	Primary regulatory body established under the Environmental Management Act (2017), with enforcement powers over pollution, waste, and natural resource use. Currently using environmental standards set by MBS but has the remit to set new standards.
	National Water Resources Authority (NWRA)	Regulates water resources under the Water Resources Act (2013), ensuring sustainable use and pollution control
	Malawi Bureau of Standards (MBS)	Sets and enforces environmental quality standards for emissions and waste disposal
	Malawi Energy Regulatory Authority (MERA)	Regulates energy sector emissions and renewable energy compliance
Policy Coordination & Advisory	Environmental Affairs Department (EAD)	Primary government agency for environmental policy, compliance monitoring, and sustainability integration under the Environmental Management Act (1996, amended 2017)
	National Council for the Environment (NCE)	High-level advisory body reviewing projects for environmental compliance and advising the Cabinet, supported by the Technical Committee on the Environment (TCE)
Sector-Specific	Department of Forestry	Manages forest conservation and enforces regulations under the Forestry Act (1997)
	Department of Fisheries	Regulates aquatic ecosystems under Fisheries Act
	Department of National Parks and Wildlife	Oversees wildlife conservation and protected areas under the National Parks and Wildlife Act (2017)
	Ministry of Agriculture	Ensures sustainable agricultural practices to reduce environmental degradation (e.g. soil erosion, pesticide use)
	Ministry of Trade and Industry	Regulates trade-related environmental impacts, including industrial emissions and sustainable production
Local Implementation	District Environmental Officers (DEOs)	Implement local environmental plans and enforce regulations at district level
	Local Government Authorities (City/District Councils)	Implement waste management, land-use planning and local environmental bylaws
Research & Support	Universities & Research Institutions (LUANAR, MUBAS)	Provide scientific research and policy input on environmental management

Annex: Malawi's Environmental and Social Impact Assessment Process

Key Stage	Description
1. Screening	Determines if a development proposal requires an assessment (ESIA, Environmental Audit, or ESMP)
2. Scoping	Identifies key environmental and social issues, establishes the focus of the ESIA study, and develops Terms of Reference (TORs)
3. Project Brief	A short report submitted to MEPA to determine the required level of environmental assessment (SEA, ESIA, Audit, or ESMP)
4. Stakeholder Consultation	Engages affected and interested parties to gather input and address concerns. Mandatory for Environmental Assessments
5. Assessment	Developer hires ESIA consultants to conduct studies, collect baseline data, analyze impacts, propose mitigation measures, and prepare an ESIA report
6. Review of ESIA Report	Independent experts (Advisory Committee) review the ESIA report for adequacy. Gaps are addressed before recommendation for approval
7. Approval of ESIA Report	MEPA Board considers the recommended ESIA report for approval. An approval letter and ESIA Certificate (with conditions) are issued
Completion for stages 1-7 range from 6 months to 2+ years, depending on project scale and regulatory requirements	
8. Implementation of Mitigation Measures	Developer implements the ESMP and approval conditions. Non-compliance may result in penalties
9. Monitoring of ESMP Implementation	MEPA and regulatory agencies conduct site visits to ensure compliance with mitigation measures and approval conditions

Annex: Farm Sustainability Assessment (FSA) - Performance Levels

Level	Compliance Requirements	Examples of Criteria	Additional Details
Bronze	100% Essential + 75% Basic	Basic record-keeping	Represents a foundational level of sustainable practices, ensuring adherence to critical regulations and baseline sustainability measures
Silver	100% Essential + 80% Basic + 50% Advanced	Legal compliance (labor, environmental laws)	Demonstrates intermediate sustainability efforts, with proactive measures beyond legal requirements
Gold	100% Essential + 100% Basic + 75% Advanced	Minimal chemical use standards	Reflects exceptional practices aligned with global best practices

Annex: Farm Sustainability Assessment (FSA) - Metrics

Category	Metric	Examples of Accepted Metrics	Frequency & Legislation/Guidelines
Soil Health	Soil organic matter content	Organic matter %; compost/cover crop usage	Every 3 years. Reference: FAO soil health guidelines, national soil conservation laws.
	Soil erosion prevention	Erosion rates (tons/ha/year); presence of grass strips/contour farming	Annual monitoring. Reference: IFC PS1, local erosion control laws.
	Soil compaction mitigation	Bulk density tests; reduced tillage/controlled traffic farming	Post-harvest or after heavy machinery use. Reference: Industry best practices.
	Approved fertilizer use	List of registered fertilizers; NPK application rates per crop	Per growing season. Reference: National fertilizer laws, 4R Nutrient Stewardship (right source/rate/time/place).
	Soil nutrient testing	N/P/K levels (ppm); micronutrient analysis	Every 3 years. Reference: ISO 17025-accredited labs.
	Manure/compost application	Quantity (tons/ha); timing; method	Annual monitoring
Water Use	Irrigation efficiency	Water use per yield (m ³ /ton); drip irrigation adoption rate	Annual monitoring. Reference: FAO Aquastat, local water permits (FSA55).
	Rainwater harvesting	Storage capacity (m ³); % of irrigation demand met	Annual monitoring. Reference: WHO water quality standards (if used for crops).
	Groundwater recharge	Recharge volume (m ³); infiltration basin design	Annual monitoring. Reference: IWRM (Integrated Water Resource Management) plans.
Water Effluent	Greywater treatment	Effluent BOD (<150 mg/L), pH (6.5–9.0), E. coli (ND)	Quarterly testing. Reference: WHO wastewater standards, local discharge laws.
	Pesticide runoff prevention	Buffer zones (≥10m); spray drift records	Annual. Reference: SAI Platform Amber/Red List (FSA39), EPA Clean Water Act.
GHG Emissions	Carbon footprint	CO ₂ e per ton (Cool Farm Tool); diesel/electricity use (kWh/ha)	Annual monitoring. Reference: IPCC, ISO 14064.
	Methane/N ₂ O reduction	Reduced synthetic N use	Annual monitoring. Reference: UNFCCC reporting guidelines.
Biodiversity	Habitat protection	% of farm as natural habitat; presence of pollinators/bird nests	Annual surveys. Reference: IUCN Red List, CBD Aichi Targets.
	Invasive species control	Inventory of invasives; eradication plans (mechanical/chemical)	Biannual. Reference: National invasive species laws (e.g. USDA NISA).
	Rare species conservation	Documentation of endangered flora/fauna sightings	Annual monitoring. Reference: CITES, local wildlife protection acts.
Land Use Change	Zero deforestation	Satellite imagery (no primary forest loss since 2015)	One-time baseline + annual audits. Reference: FSC, RSPO, EUDR.
	Legal land titles	Land deeds; FPIC (Free, Prior, Informed Consent) records for indigenous lands	One-time verification. Reference: IFC PS7, UN Declaration on Indigenous Rights.

Source: SAI FSA 3.0 Self-Assessment Questionnaire

Annex: Malawi Bureau of Standards – Environmental Standards

Malawi Bureau of Standards		
Specification (Malawi Standard #)	Environmental Standards	Applicable Codex Category
<i>Water quality – Sampling Part 4 (MS 682-4)</i>	Guidance on sampling from lakes, natural and man made	Water effluent
<i>Water quality – Sampling Part 6 (MS 682-6)</i>	Guidance on sampling of rivers and streams	Water effluent
<i>Water quality – Sampling Part 11 (MS 682-11)</i>	Guidance on sampling of groundwaters	Water effluent
<i>Water quality – Sampling Part 12 (MS 682-12)</i>	Guidance on sampling of sediments	Water effluent
<i>Water quality – Sampling Part 17 (MS 682-17)</i>	Guidance on sampling suspended sediments	Water effluent
<i>Water quality – Sampling Part 19 (MS 682-19)</i>	Guidance on sampling of marine sediments	Water effluent
<i>Industrial Emissions (MS 737)</i>	Guidance on emissions limits from mobile and stationary sources	GHG emissions
Raw Sugar (MS 209)	Section 8.2: Pesticide residues <i>“White sugar shall comply with maximum residue limits established by the Codex Alimentarius Commission for raw cane sugar.”</i>	Not directly applicable for Codex Planetarius
White Sugar (MS 202)	Section 8.2: Pesticide residues <i>“White sugar shall comply with maximum residue limits established by the Codex Alimentarius Commission for white sugar.”</i>	Not directly applicable for Codex Planetarius

Annex: Illovo Operational Statistics (Five-Year Review)

	5-Year Average	2023	2022	2021	2020	2019
Cane Harvested (hectares)	18,008	19,359	15,358	19,089	17,579	18,656
- Nchalo	11,686	12,475	9,289	13,178	11,087	12,399
- Dwangwa	6,323	6,884	6,069	5,911	6,492	6,257
Yield (tonnes/hectare) (weighted avg)	97	94	98	98	100	94
- Nchalo	90	88	92	94	93	85
- Dwangwa	110	106	110	107	115	114
Cane Crushed (tonnes)	2,213,647	2,316,783	1,970,279	2,410,529	2,205,560	2,165,085
- Nchalo	1,053,365	1,095,650	850,273	1,242,324	1,027,073	1,051,506
- Dwangwa	690,365	723,319	659,619	624,303	737,370	707,213
- Growers	469,917	497,814	460,387	543,902	441,117	406,366
Sucrose (%) (weighted avg)	14.2	14.1	14.3	14.1	14.3	14.1
- Nchalo	13.8	13.5	13.7	13.8	14.0	13.9
- Dwangwa	14.8	15.0	14.9	14.7	14.7	14.5
- Growers	14.2	14.1	14.2	14.2	14.3	14.3
Sugar Produced (tonnes)	257,813	264,119	229,658	279,278	263,634	252,375
- Nchalo	140,560	143,868	115,354	167,713	139,914	135,950
- Dwangwa	117,253	120,251	114,304	111,565	123,720	116,425
Sugar Sales (tonnes)	263,820	254,881	279,282	297,010	272,788	215,141
- Domestic Market	179,304	225,432	213,550	172,578	147,242	137,716
- Export Market	84,517	29,449	65,732	124,432	125,546	77,425

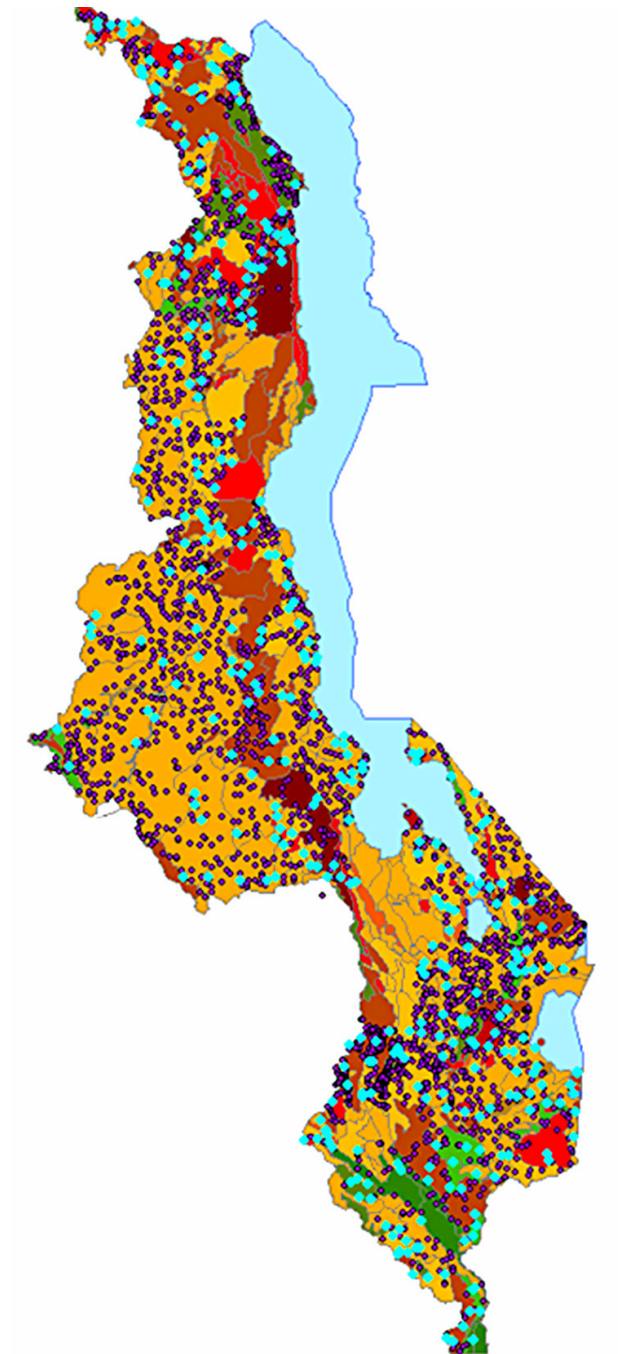
Source: Illovo Sugar Malawi Annual Report 2023

Annex: FAO Water and Land Databases & Software

Tool	Description
AQUASTAT	FAO's global water resources and agricultural water management database
AquaCrop	Crop-water productivity model simulating yield response to water for various crops
AQUAMAPS	Spatial database mapping water resources and agricultural systems globally
AQUALEX	Information system on aquatic species, fisheries, and aquaculture
Crop Information	Database or tool providing detailed agronomic data on crop varieties and practices
CropWat	Software for calculating crop water requirements and irrigation scheduling
CLIMWAT	Climate database used with CropWat for irrigation planning
Diagnostic Tools for Investment	Tools assessing agricultural investment needs and impacts (e.g. water/land use)
ETo Calculator	Software computing reference evapotranspiration (ETo) for irrigation planning
GAEZ (Global Agro-Ecological Zones)	Database evaluating agricultural potential based on climate, soil, and terrain
GeoNetwork	Open-source platform for managing geospatial data (e.g. maps, satellite imagery)
GLADIS	Global Land Degradation Information System - soil/land monitoring
HWSD (Harmonized World Soil Database)	Global soil database with 15,000+ soil mapping units
PRISM	Climate and environmental modelling tool
Rapid Appraisal Procedure (RAP)	Field assessment tool for quick evaluation of agricultural or water systems
Soil.EX	Soil data explorer or analysis tool (specifics undefined)
SoilSTAT	System for monitoring and reporting global soil conditions (possibly linked to FAO)
WaPOR	FAO's portal monitoring water productivity in agriculture using remote sensing
WaterLex	Legal database or tool for water governance and policy

Source: <https://www.fao.org/land-water/databases-and-software/en/>

Annex: Map of SOTER Soil Sampling in Malawi



Note: blue dots = soil sample location

Source: Soil and Terrain Database (SOTER) for Malawi, ISRIC – World Soil Information (2016)

Footnotes

- ¹ FAO (2025) - 2023 Global Production (billion tonnes): Sugarcane (2.0), Maize (1.2), Rice (0.8) and Wheat (0.8)
- ² FAO (2025) - 2022 Raw Sugar Production (tonnes); ITC (2025) 2022 Cane Sugar (Raw & Refined) Exports (tonnes)
- ³ [World Bank \(2023\)](#)
- ⁴ Malawi's National Statistical Office (NSO)
- ⁵ Illovo-Independent Impact Report - Group (2023); Average household size of 4.3 (Malawi Demographic and Health Survey DHS 2022)
- ⁶ Malawi Investment and Trade Centre (MITC)
- ⁷ Sources: EU EBA Regulation (No 978/2012); UK Developing Countries Trading Scheme (2023); COMESA Treaty (Article 47); SADC Trade Protocol; AfCFTA Tariff Schedules (2023); WTO Tariff Database; WTO Secretariat – Trade Policy Review: Malawi (2024); Chatham House, Tackling Trade Related Water Risks – Case Study: Malawi (2024)
- ⁸ <https://www.fao.org/land-water/databases-and-software/crop-information/sugarcane/en/#c236386>
- ⁹ Food and Agriculture Organization (2023)
- ¹⁰ [ABF Annual Report \(2024\)](#)
- ¹¹ Water Witness International: Implementing the Alliance for Water Stewardship Standard at Kaombe Estate
- ¹² USDA - Environmental Policy Integrated Climate (EPIC) Crop Growth Model
- ¹³ ABF Annual Report (2024)
- ¹⁴ Environmental load of pesticides used in conventional sugarcane production in Malawi, Donga and Eklo (2018)
- ¹⁵ Water Witness International (undated), Water Stewardship Malawi: Implementing the Alliance for Water Stewardship Standard at Kaombe Estate
- ¹⁶ Illovo uses ERM (Environmental Resources Management), an international consultancy firm specializing in sustainability and environmental services.
- ¹⁷ SpheraCloud is the program used for green-house-gas emission reporting, whilst CanePro is used for farm-level metrics such as yield data, green-cane %, soil analysis, pesticide and fertilizer-use.
- ¹⁸ FSA can also be benchmarked against national legislation and in countries defined as low or very low risk there is not the need for farm-level assessment/verification – Malawi currently is not included.
- ¹⁹ <https://www.illovosugarafrica.com/news/agricultural-sustainability-takes-a-front-seat-at-illovo>
- ²⁰ FSA verified sugarcane (Illovo estates + growers) = 1,890,000 tonnes
- ²¹ Corporate Citizen – Illovo Malawi Report (2023)
- ²² It is important to note that Illovo's South African estates relied solely on rain-fed (dryland) cultivation during the reporting period, however this data point has still been included for reference.
- ²³ <https://www.illovosugarafrica.com/news/contributing-to-sustainable-resource-stewardship-and-improved-cane-yields-at-illovo>