

SUDAN COUNTRY PROFILE

LAWS, POLICY, AND REGULATIONS AFFECTING
THE WATER-ENERGY-FOOD NEXUS



1 KEY FACTS & MACRO-ECONOMIC ENVIRONMENT

1.1 Gross Domestic Product

- In line with the start of crude oil production in the beginning of the century, Sudan's economy has witnessed significant growth. GDP rose from USD 10 billion in 2000 to USD 70 billion in 2010. However, following the secession of South Sudan in July 2011, Sudan's economic development was overshadowed with a sharp decline in GDP due to the loss of most of the oil production fields, which became part of the new country. The economy continued to shrink, finally reaching a GDP of USD 26 billion with an annual growth rate of -2.5% as of 2020.^{[1] [2]}
- The pandemic has worsened the economic outlook, increasing the inflation from 84% in 2019 to 124% in 2020 and lowering public revenues by 35%. The fiscal deficit clocked at 12.4% in 2020 compared to 11.3% in 2019.^[3]
- Following the change in political leadership and the formation of a transitional government in 2019, and in efforts to reintegrate into the international community, the country has started implementing numerous macroeconomic, microeconomic, and institutional policy reforms, e.g., cutting fuel subsidies, removal of several customs relief measures, and exemptions. With its \$50 billion external debt, the mentioned reforms have made the country eligible for debt relief as per the Highly Indebted Poor Countries initiative under the IMF.^{[4] [5]}
- Despite the shrinking GDP, positive indicators are being projected, e.g., poverty reduction by 0.5% and GDP growing at a rate of 1.4% in 2022. The recent military coup has led to the suspension of important foreign aid and reform projects e.g., IDA funded infrastructure projects, USAID's USD 700 million fund for democratic transition. This could negatively affect the economic outlook unless political corrective measures take place.^[3]

1.2 Labor Force/Unemployment

- Unemployment rate in Sudan shows a decreasing trend between 2013 and 2019. This is justified by the shift in the economy's dependence on crude oil production, a capital-intensive industry, from 2000 to 2011 to other labor-intensive sectors like agriculture and services from 2013 to 2019. However, 2020 experienced the highest unemployment rate during the last decade, 17.7%, because of the Covid-19 pandemic's impact. Agriculture contributed to 39.7 % of the labor force in 2020, while employment in Services and Industry was reported at 44.42% and 15.86%

respectively of total employment. The majority of working females are employed in the agriculture sector, representing 54.4% of total female employment. ^{[6] [19]}

- Women have contributed to 33% of the labor force in 2014, while youth represented 40% of the unemployed in urban centers. This is attributed to political, cultural, religious, and legal constraints. Since 2019, the government has modified laws that used to restrict women's participation in the labor market, thus enabling a positive environment e.g., amendment of public order laws. However, women still make up only 3% of the top management of Sudanese firms.

1.3 Doing Business in Sudan

- In 2020, Sudan ranked 171 out of 190 economies assessed in an Ease of Doing Business report by the World Bank ^[7]. This paints a clear picture of the difficulties that SMEs and the entrepreneurship ecosystem are facing when conducting business. Aggregating factors are as follows: Sudan's lowest scores were 15/100 and 19/100 for receiving credits and trading across borders, respectively. This is well-justified given the three decades of economic embargos and sanctions that limited the country's ability for effective financial transactions with financial institutions abroad. Up to 2020, Sudan was subsidizing fuel, wheat, and many food items heavily in comparison to neighboring countries. This has incentivized cross-border smuggling of subsidized commodities, negatively impacting trade through official cross-border trading routes.
- Overall, Sudan scores lower in topics related to business operation in comparison to business establishment (permits, registrations, etc.). Electricity is subsidized with tariff rates far below cost-recovery models. This, in combination with severe inflation and reduction in public expenditure over the past 4 years, have put pressure on the costly operation and maintenance of power plants. Consequently, the country has experienced serious power outages with the industrial sector being the most impacted and agriculture being the lowest. Power outages take place at least 5 times per week and can last up to 12 hours. Despite being the least affected sector, the agriculture sector still suffers from weak accessibility to power since several agriculture schemes are tied to the national grid.

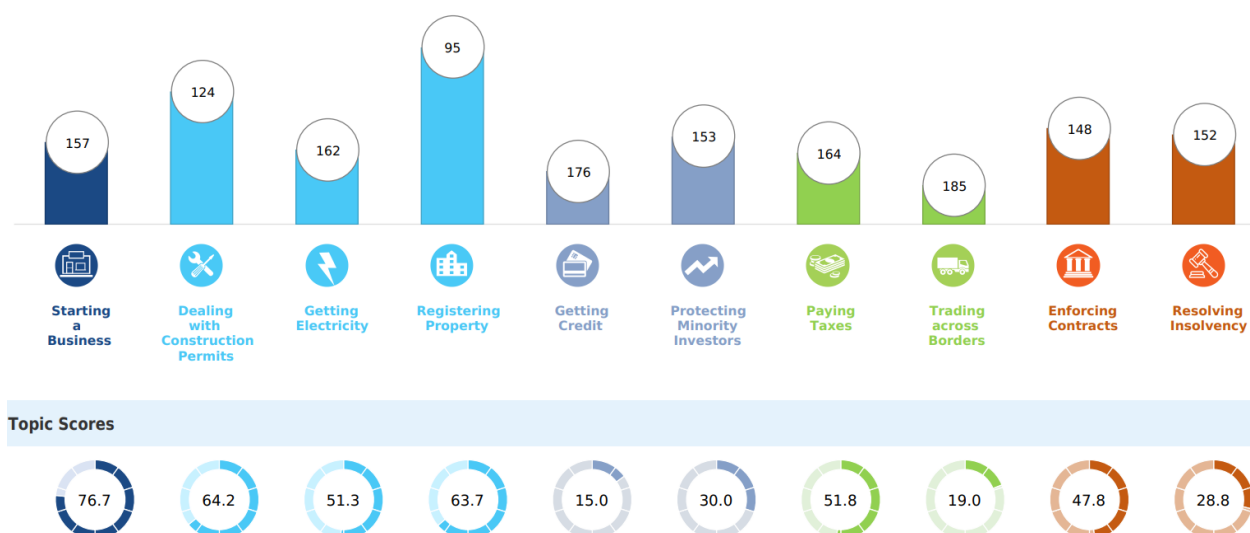


Figure 1 SEQ Figure * ARABIC 1: Ease of doing business scores out of 100 points and in compare to 199 economies. World Bank 2020

1.4 COVID-19 Mitigation Measures & Responses

- Sudan, like the rest of the world, attempted to enforce some mitigation measures against the spread of the COVID-19 pandemic. In March 2020, the Sudanese government established a committee to introduce policies and mitigation measures to tackle the pandemic in Sudan. The government imposed the closure of schools, airports, ports, and land crossings; banned travel between states; and prohibited mass gatherings.
- A partial lockdown was imposed in Khartoum State in mid-March 2020. The imposed COVID-19 measures have led to severe economic consequences in the country. The rapid spread of COVID-19 in Sudan and the government's containment measures could negatively affect household welfare, including loss of employment and income, decreased access to basic commodities and services, and food security. For example, restrictions on movement worsened the economic situation, with commodity prices rising across the country. Most households, particularly the poorer ones, felt the price increases. Other services like travel and trade were affected as well.

1.5 Taxation Structure

- Sudan's taxation system has three main categories: personal income tax, corporate tax and value added tax. The personal income tax is a fixed rate at 15%, just like the value added tax (VAT) at 17%. However, corporate tax varies depending on the nature of businesses. While cigarettes and tobacco companies get as low as a 2% tax rate and manufacturing and real estate gets 10%, the majority of corporates have an average tax rate of 15%. In the higher end, telecommunications companies pay a 30% tax rate and oil, and gas companies pay a 35% tax, which is also the highest tax slab.
- If sold in natural form, livestock, poultry, milk, and fish as well as all types of agriculture products receive a tax exemption. Financial, educational, medical and insurance services are also tax exempt. In Africa, Sudan is one of the lowest ranking countries in terms of tax revenue. Currently, the collected tax revenue represents 5.8% of the country's GDP. ^[20]

1.6 MSME's and Entrepreneurship

- There are limited resources and research-based knowledge available on the characteristics of the entrepreneurship landscape in Sudan. This hinders efforts to formulate a comprehensive understanding and, consequently, the development of effective policies and programs to enhance the entrepreneurship ecosystem in Sudan. Access to finance, policy reform and lack of supporting public and private institutes are among the top challenges entrepreneurs face.
- According to the Global Entrepreneurship Monitor's 2018 survey (GEM) about the national ecosystem of entrepreneurship, it was concluded that entrepreneurial activities tend to be necessity-driven rather than opportunity-driven.
- When looking for reasons for business discontinuation, 23.4% of businesses discontinued because of a lack of finance, 22.5% due to family and personal issues, and 19.8% due to poor profitability.
- Gender-wise, 68% of the surveyed entrepreneurs were male, although more women than men have found Sudan to be an easy country to start business. In general, women entrepreneurs face gender stereotypes and social challenges that necessitate the provision of women-centered policies and support structures to help them engage in entrepreneurial activities effectively.

- Under the national poverty reduction framework to support small enterprise development and entrepreneurship, the Central Bank of Sudan developed a microfinance project in 2007 which obliges all banks to reach a limit of 12% in loans to SMEs. Later, requirements were made easier for agricultural associations; however, the allocated loans continue to fall behind targets, mainly due to required guarantees, bureaucracy and corruption. ^[21]
- In a national expert survey, carried out by a consortium of Ahfad university for women, Impact hub Khartoum and Innovation and Entrepreneurship Community in Sudan carried out under GEM in 2018, Sudan ranked in the low segment (45 out of 54) in the quality of the National Entrepreneurship Framework, with lowest scores in elements like government assistance and policies, government entrepreneurial programs, and entrepreneurship education. Table 1 shows the declining rate of new business registration since 2011, which correlates with the annual GDP and country's economic situation overall.

Indicator	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Limited liability companies	494	761	960	962	1257	2400	1894	1761	2100	2527
Sole proprietorship	894	961	1160	1262	3936	4840	4867	5316	6375	4000
Total firms	1388	1722	2120	2224	5193	7240	6761	7077	8475	6527
% growth in new firm		24	23	5	133	39	-7	5	20	-23

Table 1: New businesses registered in Sudan (2005-2014)

2 POLICIES AND TRENDS IN THE WATER-ENERGY-FOOD NEXUS

2.1 Agricultural Context

- Sudan has huge agricultural potential, with 122 million hectares of agricultural land suitable for cultivation. Only 3.8 million hectares are being cultivated with irrigation systems, while 12.4 million hectares are rain-fed, with cereals being cultivated in 96% of total rain-fed area.

Livestock population in 2018



4.8
million camels



31.8
million goats



40.8
million sheep



31.2
million cattle

- Semi-mechanized agriculture accounts for 6.7 million hectares, with sorghum covering 80% of the cultivated land. Other important crops are millet, wheat, groundnuts, sugar cane and vegetables.
- Livestock population is estimated at 108.6 million heads. Currently, livestock contributes to 50% of agriculture's share in the GDP.
- 65 fish species, out of 450 bony fish species that were identified in Sudan, are found to be of economic importance. Current production size of aquaculture is 2000 tons

annually; however, fisheries' production potential is estimated at 34,000 tons annually, highlighting the untapped potential in this sub-sector.

- Despite the significant development potential, the agriculture sector in Sudan does not meet aspirations due to multiple reasons: low productivity coupled with absence of serious competitiveness and low market prices, which leads to the fact that there aren't enough incentives for farm production. Inadequate strategic planning, training, land tenure systems, weak extension programs, low public expenditure (3%) as well as low banks investments (11% of bank credits) are among the top drivers of poor agriculture development.
- As of 2020, the agriculture sector represents 31% of the country's GDP and employs nearly 50% of its workforce. ^[22]

Women constitute 49% of farmers in the irrigated sector and 57% in the traditional rain-fed sector. Geographically, over 85 % of farmers in the western region (Kordofan and Darfur) are women, while this figure decreases significantly in eastern states. However, most of the communal land is owned by men, as women continue to face social and legal challenges in owning and managing agricultural land. ^[23]

2.2 Supply Chain

- In 2019, Sudan's agricultural exports amounted to 1.8 billion USD, representing 45% of the total exports with oil seeds and live animals representing 80% of agriculture exports. Sesame seeds, groundnuts, gum Arabic, sheep and cows are the most exported agricultural products. On the other hand, agriculture imports were 2.85 billion USD in the same year, representing 38% of total imports.
- Along the supply chain, veterinary control programs are weak and do not have the ability to contain outbreaks, and infrastructure is of limited capacity, e.g., certifying bodies, regulatory infrastructures. Additionally, storage facilities are limited and mostly owned by the state, resulting in increased post-harvest losses and middlemen market monopoly. Likewise, inland logistics are poor, especially roads, railways, and ports, limiting access to rural areas for international markets.

2.3 Water & Energy in Agriculture

- Major sources of water in Sudan are rainfall, the Nile River and its tributaries, seasonal rivers (Wadis), and groundwater.
- According to the MoWR (2021), there are 12 primary surface water catchments that collectively contribute 27.5 BCM/year to the surface water in Sudan. In addition,

Sudan's groundwater resources come from 8 groundwater basins with an annual discharge of 4 BCM.

- The Nile system is the major source of water for irrigation, hydropower generation and domestic and industrial uses in areas along the Nile, while areas away from the Nile depend on groundwater - mainly for municipal supply - and rainwater harvesting. The average yearly flow of the Nile measured at Aswan, near the Sudanese-Egyptian border, is 84 BCM, shared between Sudan (20.5 BCM) and Egypt (55.5 BCM) according to the 1959 Nile Water agreement between the two countries^[9]. Climate projections indicate that water flow in the Nile is expected to decrease by 20-30% over the next 40 years^[10].
- Agriculture is by far the main water consumer in the country, consuming annually around 26 BCM, while industrial and municipal water consumption is estimated to be around 0.075 and 0.95 BCM/year respectively^[12]. Figure 2 represents the percentage of water withdrawal by each sector.
- Water tariffs collected from irrigation, energy, and water supply services have been highly subsidized in Sudan.

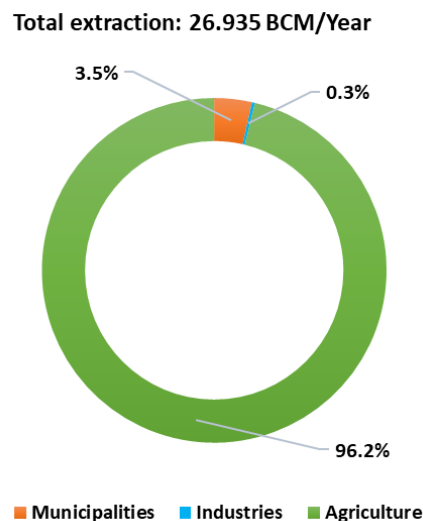


Figure 2. Water withdrawal by sector in Sudan. Based source (FAO, 2018)

- According to Babiker et al., (2019), there are several factors influencing the regular supplies of irrigation water from dams along the River Nile and its tributaries that create a critical water situation and jeopardize future irrigation plans and food production in Sudan, such as:
 - o the limitations on using the Nile water, which is governed by 1959 Nile Agreement between Sudan and Egypt,

- the tradeoff between opening dams for irrigation and closing dams for hydropower generation,
- the high cost of digging new canals and maintaining existing ones in the large, irrigated schemes,
- the heavy load on the national government budget.

2.4 Energy Sector

- There are a variety of energy sources in Sudan, such as electricity, fossil, renewable and biomass. However, only a small share of the population (38.5%) has access to clean and modern energy and is connected to the national grid ^[11]. Out of this percentage, around 62% of the urban population have access to electricity, but the share remains extremely low in rural areas, at about 22% in 2016 ^[8].
- On the other hand, the current and future demand for electricity in Sudan shows a big gap between supply and demand as between 2013 and 2017, the demand in Sudan increased by 70 % at an average growth rate of 11.3 % each year ^[14]. Therefore, there has been an urgency to look for alternatives to cover part of this increasing demand by importing electricity from neighboring countries like Ethiopia and Egypt, with 440 GWH being imported from Ethiopia ^[11].
- The residential sector is the major consumer of electricity supplies in Sudan (57%), followed by industries (15%), while agriculture consumes only around 7% of electricity supplies according to the Ministry of Water Resources, Electricity, and Irrigation statistics in 2018 ^[8].
- In general, traditional biomass, mainly forest trees and agricultural residuals, provides for most of the energy needs of the local population, especially those who live in the countryside with no access to electricity. Biomass is followed by petroleum and hydropower generation^[8] as shown in Figure 5. Electricity generation in Sudan is mainly based on hydropower and thermal power generation (Figure 6).

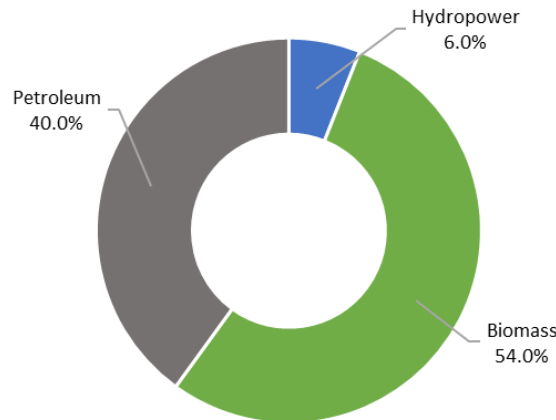


Figure 3. Source of energy supply in Sudan. Based on data from: [16]

- The hydropower generation in Sudan backdates to 1962 and the commissioning of the Sennar Dam Hydropower Plant (HPP). Currently, hydropower is generated from Roseires, Sennar, Jebel Aulia, Khashim El-Girba, Upper Atbara and Setit Dam Complex (UASDC), and Merowe dams, with a total design capacity of 1912 MW ^[15], covering more than 50% of the current peak demand (3020 MW).

2.5 Future Prospective - Renewable Energies

Solar energy:

- Introducing renewable energy sources, especially solar energy in Sudan, are promising given the number of bright sunny days throughout the year. Two solar energy units, each of 5 MW, are installed in Kordofan and Darfur States in Western Sudan [8].
- The energy policy of the State Ministry of Agriculture in the Northern State aims at converting agricultural diesel pumps into solar pumps.

Biofuels:

- Sudan is the third largest sugarcane producer in Africa, which could be used to produce biofuels (ethanol and biodiesel) as byproducts of sugar.
- Government of Sudan expressed their interest in encourages investment in solar energy specially BOT (Build-operate-transfer) system. So far, city wide solar power generation have only been implemented in two cities in Darfur with a capacity of 5 Megawatts.
- Development partners are much involved at community level. A UNDP led project in Northern state, diesel generators were replaced with solar power for irrigated agriculture. As a result, production have increased by 47% which encouraged other actors like Global Environmental Facility (GEF), the Korea International Cooperation Agency and the African Development Bank to replicate the trial in other states.

2.6. The Water-Energy-Food Nexus Evaluation for Sudan

- To gain insight into the overall WEF Nexus situation in Sudan and the assessment of each Nexus element, the WEF Nexus Index ^[17] is presented in figure 5 in the Annex. This index is a composite indicator that aggregates 21 globally available indicators. This indicator placed Sudan in the 143rd position out of all the countries assessed with a WEF Nexus Index value of 39.2. Based on this indicator, Sudan has a value of 25.3 for water (access and availability), 52.4 for the energy pillar and 39.9 for the food pillar.

3 CHALLENGES AND OPPORTUNITIES IN THE WATER-ENERGY-FOOD NEXUS

Challenges	Opportunities
Policy and regulation - Inadequate institutional setup and governance. For example, the institutions concerned with water harvesting programs, especially for small producers in agriculture, are fragmented with poor coordination, which results in ineffective policy implementation and dependency on international organizations and NGOs [8]. - Weak policies and poor coordination among key institutions and governmental agencies working on the water, energy, and food sectors. - Inefficient use of available water and limited energy resources result in low agricultural productivity. - Challenges in providing adequate energy sources. Inadequate supplies of fuel and renewable energy, while also relying on the heavy consumption of biomass energy.	Policy and regulation - Sudan has been blessed with substantial amounts of water and natural resources, as well as ample productive agricultural lands. Around 63% of its land is classified as agriculture land, which is not yet fully explored and used for production. Thus, there is a potential for more expansion in agricultural land to be irrigated from either the Nile River, including tributaries of the Blue Nile and the White Nile or from its groundwater reserve in nonirrigated areas. This could play a vital role in elevating the country's economy and improving the livelihood and employment of millions of Sudanese.
Climate, environment, and demography - Climate change coupled with population growth creates increasing demand for food and puts more pressure on Sudan's water, land, energy resources. - Vulnerability to climate change and climate variability such as recurrent droughts, floods, and shifts in rainfall patterns inevitably affect food, water, and energy production and consumption.	Climate, environment, and demography - Minimizing losses in the infrastructures and systems that are used in the production, supply, and utilization of water, energy and food in Sudan can contribute significantly to save substantial amounts of resources used in their production and reduce environmental degradation linked to their use. - Sudan has a great potential for renewable energies (i.e., solar and wind). Thus, renewable energy systems in rural areas can become a viable energy supply option as a supplementary source to the national grid. - Replacing high-cost diesel pumps with low-cost solar- and wind-driven pumps will increase

	water-use efficiency to irrigate more land for food production and reduce the overall water and energy demand and costs, especially in remote areas away from the national grid.
Investment and Finance - Lack of sufficient financial resources for small- and medium-scale WEF Nexus-related projects. The current economic crisis in Sudan reduces the ability of the Sudanese Government to finance such projects. - Lack of investment into the infrastructure improvement and domestic supply chains in agriculture and agribusiness working on postharvest processes lead to a considerable loss of agriculture output and thus to economic loss, as well as increased reliance on food imports.	Investment and Finance - Introduction of appropriate technologies including renewable energy, zero tillage and conservative agriculture, as well as modern irrigation tools (i.e., Center Pivot, drip, and sprinkler irrigation) are driving forces that integrate optimum management of the Nexus' three components with proper technologies. - Under the current constraining conditions in Sudan, such technological and innovative solutions may prove critical to the adoption of the WEF Nexus approach by various stakeholders.
Geopolitics - Prolonged civil conflicts, poverty and associated rural-urban migration have created new economic challenges while exacerbating existing ones, due to the abandonment of production areas in rural areas (i.e., agriculture) and seeking jobs in big cities. - Conflicts over natural resources (Water and land) between farmers and pastoralism in some areas of the country. - Serious concerns for the future of water security in Sudan are raised considering the changing water use of the upstream countries, because of their infrastructure development.	Geopolitics - Resolving the lack of coordination and consultation among federal, states and community partners, especially women, is critical to formulating and implementing viable WEF Nexus policies, strategies, and plans. - Decision-makers should understand that the economic valuation of the contribution of each of the three sectors must be weighed within the WEF Nexus framework. Also, synergies and a trade-off evaluation between WEF sectors should not only concern monetary values involved in the nexus but also non-monetary values which are often difficult to measure in market values, such as water, environment, and pollution.

4 AGRICULTURE INVESTMENT POTENTIAL

4.1 Agricultural Investment Potential

- In 2015, the National Agriculture Investment Plan targeted a 6% annual growth in agriculture output. The planned budget was 5.1 billion USD, to be funded by public (65%) and private investment (22%) while development partners would cover the remaining 13%. Five years later, this target was not achieved. Agriculture shares in public expenditure did not exceed the 5% limit and access to credit bank finance by small holders, who represent most of the farming sector, was poor.
- In 2019, agriculture product export has reached 1.8 billion USD. Oil seeds and live animals represented 80% of total agriculture exports. Both depend majorly on rainfed systems, with limited foreign investment (less than 5%). Most of the cultivation is

carried t by smallholder farmers yet processing and exports (value adding) are majorly controlled by a handful of conglomerates who benefit from exclusive and flexible bank financing and political affiliation, as well as tailored deals to gain better access to international markets.

- Bank financing remain the lead source of investment in the agricultural arena, yet it often comes with demanding measures that reduces its accessibility for the bottom of the pyramid. Recently, some companies started to offer flexible finance models that ease the burden and risks associated with bank finance while leverage access to larger blocked areas under smallholder associations
- To enable an attractive environment for agriculture, the Sudanese government should address gaps in agricultural research to build knowledge, strengthen regulatory bodies, enhance agriculture the input monitoring system, support stallholder producers' associations, and create smart public-private partnerships. It would be beneficial to impose a series of reforms on the existing land-use planning and land tenure system.

Product (export)	USD	% of total GDP
Oil seeds and oleaginous fruits	933,972,228	23%
Live animals	504,028,826	13%
Lac; gums, resins and other vegetable saps and extracts	107,329,035	3%
Other	229,387,330	6%

Table 2 Agricultural products export in Sudan 2019. Source (<https://oec.world/en/profile/country/sdn>)

4.2 Agri-Businesses and Agro-Processing

- A variety of opportunities are available for agribusiness sector investments, including technological investments such as developing mobile app tools to address the knowledge gap on market information, smart and efficient agricultural machinery, and mobile phone lending. Additionally, agribusiness around cold chains, storage facilities and post-harvest processing technologies is of high demand and potential.

4.3 Agriculture Support Services

- Research: A limited scale of applied research in agricultural sectors is being carried out. Public spending in research did not exceed 5% of what was initially budgeted. This is attributed to weak institutional capacity and a failure to integrate research outcomes meaningfully in decision-making processes. Publicly funded research tends to focus on irrigated agriculture and neglects rain-fed agriculture, livestock, and other sectors ^[24].

- Extension: Sudan has limited capacity in providing extension service for all agricultural sub-sectors. Private sector engagement in extension services is limited, while public expenditure remains low. Even with current funds, the extension services provided fail to improve productivity significantly. A lack of veterinary control contributes to increased outbreaks of major infectious diseases.
- Credit and finance: Although being one of the leading countries in Sub-Saharan Africa in terms of banks' lending to agriculture, microfinance for early-stage entrepreneurs has not exceeded 5% of total loans, while household finance represents 2%. Most financing goes to large-sized corporates. Foreign finance remains significantly difficult due to the long history of economic sanctions and absence of long-term banking networks. The Sudanese Central Bank has been trying to channel credit to small scale agricultural schemes, yet the share of SMEs remains minimal ^[25].
- Markets: Agricultural markets are negatively affected by complex and ineffective supply chains that largely rely on the informal sector. Weak infrastructure, inadequate monitoring from regulatory authorities and unreliable information, in addition to a lack of transparency on data sharing, are all reducing smallholder ability to access markets ^[26].

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ANNEX I: WATER-ENERGY-FOOD NEXUS RELEVANT STAKEHOLDERS AND ENTITIES

Type	Name	Support
Research institute	Agriculture research corporation, Water Research Center	- Help connect with research driven innovation and applications in the market. - Identify innovative solutions developed in research institutes and labs. Connecting with this stakeholder would allow a shortcut to scientifically robust market businesses
Development Agencies	UNESCO, UNEP, UNDP, FAO, WFP, CRS, ZOA	- Help identify and connect with civil society groups, community farmer groups, do exiting public private partnership of relevance to WE4F goals
Donors and embassies	USAID, SIDA, FCDO	- Main source of funds for activities related to WE4F's program goals over the last 20 years. They can help advocating and promoting the WE4F approach and act as potential investors.
Agriculture	Federal Ministry of Agriculture, Federal Ministry of Water resources and Irrigation	- Can help connect with state-owned or -managed agriculture schemes.
Agriculture	MBG Group, African Agri. Dal group, CTC	- Potential investors - Potential partner providing agriculture services from innovators
Finance	Central Bank of Sudan	- Manage nationwide finance initiatives, e.g., microfinance projects
Incubation hubs and busniess developoement experts	249 Startups, Savanah innovation labs, Yalla busniess	- Provide technical assistance to SMES in addition to incubation and ecosystem development programs

ANNEX II: INCUBATORS AND ACCELERATORS FOR GROWTH RELATED TO WE4F

Type	Name	Support
Incubation/ Acceleration	249Startups	Secto-agnostic incubation program which depends mainly on foreign aid funding. Has presence in 3 states.
Incubation/ Acceleration	Impact Hub	Incubation and business support. Branch of a global ecosystem hub.
Incubation/ Acceleration	Savannah innovation Lab	Dedicated business development support services provider for different sectors. Collaborates with many actors in the MENA region to enable better markets for local innovators.

ANNEX III: EXISTING AND PROPOSED FUTURE IRRIGATED SCHEMES IN SUDAN

Scheme Name	Cultivable Area (ha)	Status
Gezira and Managel extension	882,000	Existing
Suki	36,500	
North-West Sennar	21,000	
Rahad 1	122,000	
New Halfa	185,000	
Blue Nile System	246,969.75	Proposed
Rahad Phase 1	125,047.97	
Rahad Phase 2	844,07.38	
Rahad Phase 3	375,14.39	
White Nile System	101,080.45	
White Nile Sugar	416,8.27	
Government Pumps	781,54.98	
Private Pumps	187,57.2	
Atbara System	312,619.93	
Setit	625,239.87	
Main Nile System	312,619.93	
Al Hawad	312,619.93	

Sources: based on information from [18] and [8]

ANNEX IV: SUMMARY OF HYDROPOWER PROJECTS IN SUDAN

Dam	Construction Year	Max Capacity (MW)	HPP Commissioning Year
Jebel Aulia	1937	30.4	2003
Sennar	1925	15	1962
Khashim El-Girba	1964	16	1964
Roseires	1966	280	1971
Merowe	2009	1250	2009
Upper Atbara and Setit Dam Complex	2017	320	2017
Total		1911.4	

Sources: based on information from [14]

Annex V: Population information

2020 Sudan Country Database

Total population

43.85 million

Population Growth

2.4% annual

Population density

23.7 people per sq.km of land

Fertility rate, Total

4.3 birth per women

School Enrollment,
Primary

76.8% gross

Data source [1]