



Food and Agriculture
Organization of the
United Nations



The Sudan

2020 Flood impact rapid assessment

September 2020

A joint assessment with the Government of the Sudan

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Assessment highlights

- Torrential rains and floods combined with the historical overflow of the River Nile and its tributaries caused devastating damages to agriculture and livestock across the Sudan. In the rainfed agriculture sector, around 2 216 322 ha of the planted area was flooded, representing 26.8 percent of cultivated areas in the 15 assessed states.
- The production loss due to the crop damage by floods is estimated at 1 044 942 tonnes in the rainfed areas. Sorghum – which is the main staple food in the country – constitutes about 50 percent of the damaged crops, followed by sesame at about 25 percent, then groundnut, millet and vegetables.
- The extent of the damage to planted areas in the irrigated sector is estimated at 103 320 ha, which constitutes about 19.4 percent of the total cultivated area. The production loss is under estimation.
- Gedarif is the most affected state in terms of damage to planted area with more than 1 067 721 ha of cultivated land washed away due to floods and a total loss of crops. Blue Nile is the second most affected state with 617 419 ha damaged, followed by Sennar and Kassala states with 112 579 ha and 109 048 ha respectively.
- A total of 597 689 farming and pastoral households have been affected by the floods and heavy rains. This number includes 527 968 farming households in the rainfed areas; 49 200 farming households in the irrigated sector; and 20 521 pastoral households.
- The livestock sector was also severely impacted with the loss of more than 108 000 heads of livestock, particularly sheep, goats, poultry and cattle, belonging to about 20 521 households. North Darfur, Blue Nile and Sennar states registered the highest number of losses.
- Damage to the forestry and fishery subsectors was also reported, particularly in Blue Nile, Sennar, Gezira and Gedarif states.
- Horticulture, seeds, tools, equipment, machinery and agriculture and irrigation-related infrastructure were also either lost or damaged in the disaster. With additional damage to irrigation systems, many farmers risk missing the start of the upcoming 2020 winter and 2021 summer agriculture seasons, starting in October and March, respectively.
- The replacement of agricultural inputs and tools, rehabilitation of irrigation schemes, as well as provision of support to livestock, fishery and forestry subsectors is crucial to ensure that affected populations can continue with their agricultural activities in the upcoming seasons. Cash-for-work programmes are considered critical to rehabilitate affected areas and allow for income-generation (e.g. restoring irrigation systems, repairing roads, rehabilitating small *hafirs* and shallow wells, removing debris from agricultural land, etc.).

Executive summary

The economic crisis, compounded by a set of complex and intersecting factors including the COVID-19 pandemic, climate-induced natural hazards, conflicts, and rapid and unpredictable soaring food prices have led to a deterioration of the food security and nutrition situation in the Sudan. The latest Integrated Food Security Phase Classification (IPC) for June–September 2020 estimates that 9.6 million people in the Sudan are in Crisis or worse levels of acute food insecurity (IPC Phase 3 or above), including 2.2 million people in Emergency (IPC Phase 4). This is the highest figure ever recorded in the history of the IPC in the country. Additionally, nearly 15.9 million people are estimated to be in Stress (IPC Phase 2). These numbers indicate that most people have been shifting to worse phases of food insecurity. The recent floods have exacerbated and intensified the food insecurity, malnutrition and livelihoods impoverishment of already vulnerable populations and further put them at risk of falling into more severe phases of food insecurity – such as IPC Phase 4 (Emergency) and Phase 5 (Famine) – if no robust external support from resource partners is provided.

Since July 2020, through mid-September, continued torrential rains and flooding combined with the historical overflow of the River Nile and its tributaries have affected all the states in the Sudan with the exception of South Darfur, causing devastating damage alongside riverbanks in the northern, central and eastern regions of the country. This has caused widespread damage in a range of sectors, including and most significantly, the agriculture sector.

FAO in the Sudan, jointly with the Ministry of Agriculture and Natural Resources, and Ministries of Production and Economic Resources, conducted a rapid impact assessment in mid-September covering 80 localities seriously affected by flooding in 15 affected states (Table 1). The main objective of the rapid assessment was to evaluate the impact of flooding on the agriculture sector and farming and pastoral communities in these areas in order to develop a response plan that cuts across immediate and medium-term interventions to mitigate the negative impact on the most vulnerable households.

Floods and waterlogging due to intense rainfall heavily damaged crop and pasture lands in the Sudan. Flash floods also caused major losses of agricultural inputs, tools and pumps, as well as the destruction of agriculture and livestock service facilities. Limited movement and access to farms and inputs was also recorded, affecting the livelihoods and food security of thousands of already vulnerable communities across the country. Moreover, the wet environment constitutes favourable conditions for the spreading of weeds, plant pests and livestock diseases, posing additional risks to the agriculture and livestock sectors.

The key findings of the assessment, which relied on primary data collection, focus group discussions, semi-structured interviews with key informants and secondary sources of information, revealed that 597 689 farming and pastoral households in the 80 assessed localities have been affected by the floods and heavy rains. This number includes 527 968 farming households in rainfed areas (Table 3); 49 200 farming households in the irrigated sector (Table 4); and 20 521 pastoral households (Table 5). About 42 percent of the total affected households are female-headed (Table 2). Approximately 2 216 362 ha of cropland is reported to have been damaged in the 15 assessed states, particularly in Gedarif, Blue Nile,

Sennar and Kassala, which reported that large parts of their agricultural land were affected by the floods and where almost 1 906 767 ha of the planted area was submerged (Table 3). This resulted in severe damage to cultivated crops, particularly sorghum – the staple food crop in the Sudan – and sesame. The production loss is estimated at 1 044 942 tonnes in the rainfed sector. The analysis of the production losses refers only to groundnut, millet, sesame and sorghum. The overall production loss does not include losses to vegetables and pulses due to the lack of disaggregated information (i.e. varieties of crops affected). The overall proportion of crops damaged by the floods consists of 50 percent sorghum and 25 percent sesame. The remaining 25 percent includes millet, groundnut, vegetables, and legumes. Conversely, the extent of the damage to the planted areas in the irrigated sector is estimated at 103 320 ha (Table 4). Seeds, tools, equipment, machinery and agriculture-related infrastructure was also lost. With additional damage to irrigation systems, many farmers risk missing the start of the upcoming 2020 winter and 2021 summer agricultural seasons, starting in October and March, respectively.

In addition to the damages to crops, the livestock sector was also severely impacted with the loss of more than 108 000 heads of livestock particularly sheep, goats, poultry, and cattle, belonging to about 20 521 households (Table 5). North Darfur, Blue Nile and Sennar states registered the highest number of losses with a combined total of 75 597.

The assessment findings show that job opportunities such as casual agricultural labour – considered one of the most important income-generating activities for the rural population – have already diminished and will probably decrease even further during the upcoming harvest season. Consequently, a lack of job opportunities in areas such as farm labour and agrifood processing and marketing will have a significant impact on the livelihoods of many vulnerable women.

Additional findings of the assessment show that affected populations have begun to engage in distress coping mechanisms such as borrowing money and selling productive assets to access food. Levels of debt are escalating and affected populations will need to access cash as soon as possible to repay their debts.

The replacement of agricultural inputs and tools, as well as the rehabilitation of irrigation schemes is crucial to ensure that affected populations can continue agricultural activities in the coming seasons.

Restocking of sheep, goats and chickens should take place as soon as possible to avoid a sharp decrease in family income and animal protein intake.

Cash-for-work programmes are critical to rehabilitate affected areas and allow for income generation (e.g. restoring irrigation systems, repairing roads, rehabilitating small *hafirs* and shallow wells, removing debris from agricultural land, etc.).

Currently, the distribution of food and non-food items is ongoing by the World Food Programme (WFP), non-governmental organizations (NGOs), Zakat Chamber and national voluntary and charity organizations covering some of the affected states. Additional funds are required to continue this support as well as to provide the required agricultural livelihood emergency and recovery support for the upcoming winter and 2021 summer agricultural seasons.

FAO's assessment findings reinforce the need for external robust support from resource partners to respond to the needs of affected communities by providing immediate emergency livelihood support and medium-term interventions to strengthen the resilience of the most vulnerable households and devise preparedness and preventive measures for flood management.

The high impact of natural hazards and disasters on agriculture calls for enhanced mainstreaming of disaster risk reduction and resilience building within the agriculture sector to strengthen the livelihoods and food security and nutrition of the Sudanese people.

Introduction / rationale of the study

Since July 2020, heavy rains and flooding combined with the historical overflow of the River Nile and its tributaries have affected most of the states in the Sudan, causing devastating damage alongside riverbanks in the northern, central and eastern regions of the country. More than 100 people have lost their lives due to the floods, and displacement and massive destruction of infrastructure has been reported. In view of this disaster, on 4 September 2020, the Transitional Government of the Sudan declared a three-month State of Emergency and formulated a supreme committee headed by the Ministry of Labor and Social Development to respond to the disaster and its impacts. Several countries and humanitarian actors are currently supporting the country to mitigate the impact of the floods on affected people through the provision of urgent supplies, in particular food, shelter and medicine aid packages.

As a result, FAO in the Sudan jointly with the Ministry of Agriculture and Natural Resources, and Ministries of Production and Economic Resources at state level, conducted a rapid impact assessment in mid-September. The assessment covers 15 states and 80 localities affected (Table 1) with the intention of estimating the degree of damage to the agriculture sector and formulate emergency response interventions to support the population in need. In addition, the Ministry of Irrigation established a technical taskforce to document the damage caused by the floods to the irrigation sector. Moreover, the damage that occurred to the planted areas in the irrigated schemes was assessed by the Ministry of Agriculture and Natural Resources and its result was captured by FAO in Table 4 of the report.

The rapid assessment used a combination of semi-structured and key informant interviews, as well as focus group discussions with the affected farming and pastoral communities. Secondary data were also utilized and complemented by satellite images that were used to assess the damage across all 17 affected states in the Sudan.

With the exception of South Darfur State, all of the remaining 17 states were affected by the floods to varying degrees. The key findings of the assessment reveal that a total of 597 689 farming and pastoral households, engaged in traditional rainfed agriculture and irrigation and pastoral systems, have been impacted by the floods and heavy rains. This number includes 527 968 farming households in the rainfed areas; 49 200 farming households in the irrigated sector; and 20 521 pastoral households. In addition to the damages to crops resulting in the loss of an estimated 1 044 942 tonnes of sorghum, sesame, millet and

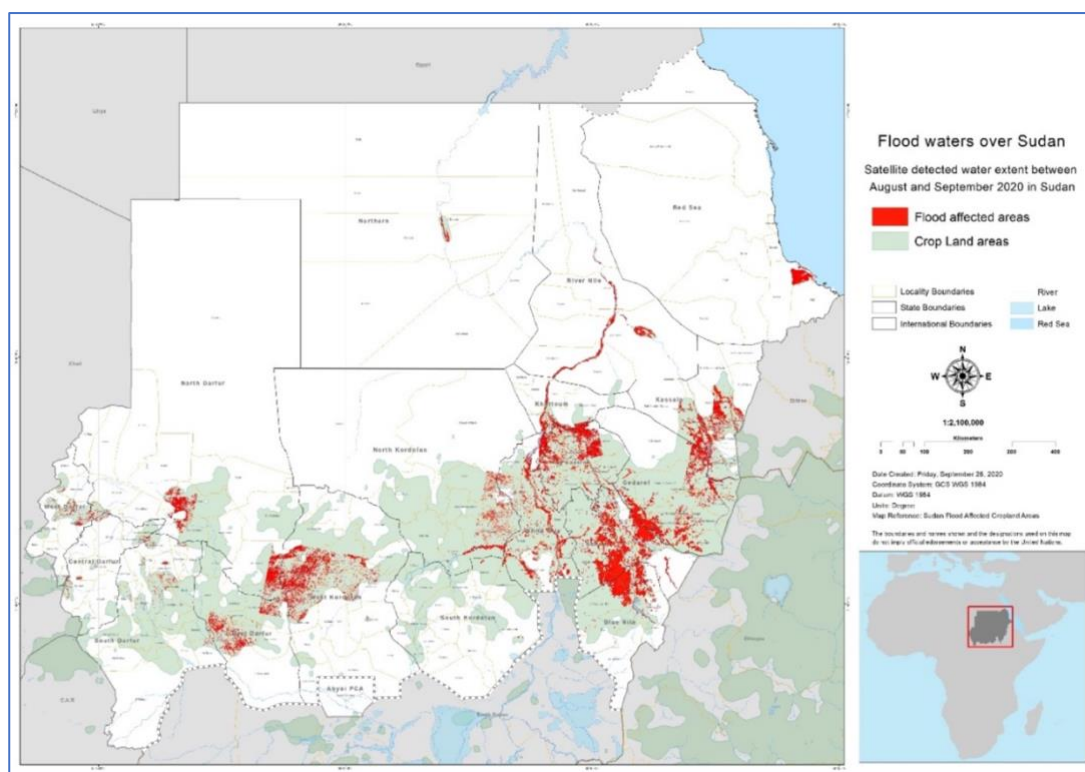
groundnuts, the entire livestock sector was also severely affected with the loss of more than 108 000 heads of livestock. Sheep, goats, poultry, and cattle, belonging to about 20 521 households were reported lost. North Darfur, Blue Nile and Sennar states registered the highest number of animal losses.

Floods and waterlogging due to intense rainfall heavily damaged crop and pasture lands in the Sudan. Flash floods also caused the destruction of aquaculture farms and the loss of agricultural inputs, tools and water pumps, as well as the destruction of agriculture and livestock service facilities. Limited movement and access to farms and inputs was also recorded, affecting the livelihoods and food security of thousands of already vulnerable communities across the country. Moreover, the wet environment constitutes favourable conditions for the spreading of weeds, plant pests and livestock diseases, posing additional risks to the agriculture, livestock and forestry sectors.

Objectives of the assessment

To understand the impact of the floods and heavy rains on the agriculture sector, with close focus on the crop and livestock subsectors, the rapid assessment was conducted with the following objectives:

- To assess the impact on agriculture and livestock production, livelihoods and food security.
- To recommend short-, medium- and long-term interventions.



Map 1. Satellite-detected floods between August and September 2020 in the Sudan.
Source: FAO Sudan, September 2020.

Methodology

The purpose of the rapid assessment was to build up a credible and well-triangulated picture of the likely damage and loss to crops and livestock caused by the floods. To this end, the exercise consisted of a number of linked stages. Stage one involved a thorough desk review and consultation of secondary data to understand the pre-flood demographic, socio-economic, cropping and livestock situation. At the same time, assessment teams carried out consultations with local authorities at state level to identify the most affected localities using a purposive sampling technique.

The next stage was actual primary data collection. This was undertaken by rapid assessment teams, comprising FAO technical field officers and monitoring and evaluation field officers, as well as representatives from the Ministry of Production and Economic Resources at state level, the Food Security Technical Secretariat and the Humanitarian Aid Commission.

Primary data collection took place through semi-structured interviews with Key Informants and Focus Group Discussions (FGDs) at community level. In addition, satellite imagery was analysed to verify information given by the state authorities.

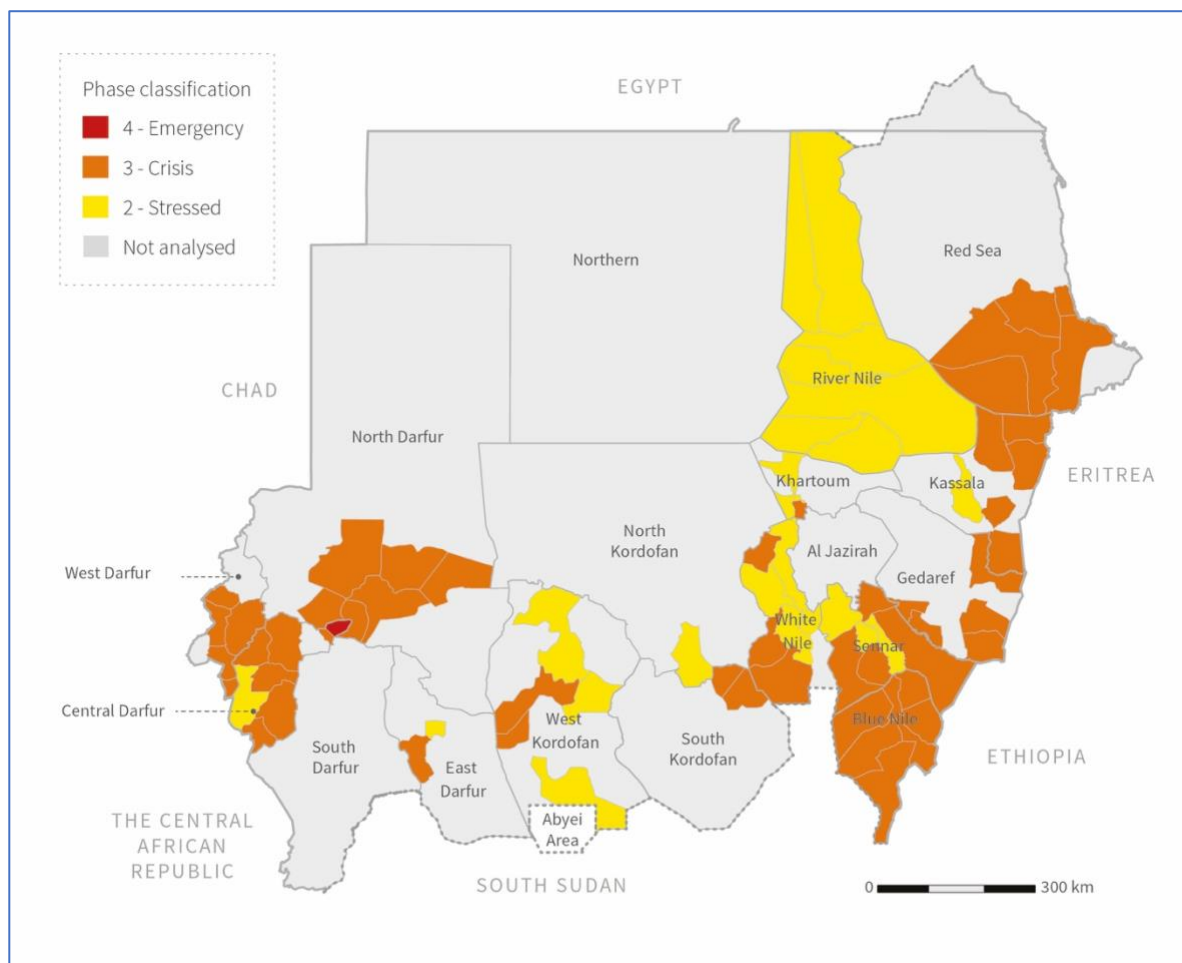
More than 170 FGDs were conducted across 15 states, with over 3 000 people taking part in 80 localities. The population interviewed consisted of livestock owners, farmers, community leaders and farmers' unions representatives. About 30 percent of the interviewed respondents who participated in the FGDs were women. Agricultural officers working in the Ministry of Agriculture at locality level were selected as the main key informants. In addition to the interviews, field visits to damaged farms were undertaken by the assessment teams together with local authorities, to better understand the degree of damage and the reliability of the information reported by the respondents.

In Central Darfur, Khartoum, North and South Kordofan and River Nile states it was not possible for the rapid assessment teams to conduct the interviews and carry out the FGDs. Instead, the data and information on the impact of the floods were collected and reported exclusively by the state agriculture department under the state ministries of Production and Economic Resources. To further verify on the validity of the information provided and to build a stronger evidence base on the overall damage to farms and pastureland, satellite images were used and analysed for these five states.

In the time available for the assessment, the use of random sampling techniques was not possible. Moreover, due to road blockages caused by the floods and heavy rainwater, not all affected areas could be reached/assessed. However, through careful triangulation of data from different sources it is believed that the information contained in the assessment is accurate enough to guide initial prioritization, financing and programming decisions. Further precision will follow through more in-depth assessments including an upcoming Post Disaster Needs Assessment (PDNA) process.

Table 1. Flood affected states and localities

State	Number of localities assessed	Names of localities assessed
East Darfur	2	El Ferdous, El Daein
Red Sea	5	Tokar, Sinkat, Sawakin, Dordeib, Haya
White Nile	9	Goli, Kost, El Getaina El Jabaleen, El Salam, Tandalti, Um Rimta, El Doem, Rabek
Kassala	7	North Delta, Telkok, Hameshkoreib, Wad El Hillaiw, River Atbara, New Halfa, El Girba
Gedarif	5	El Mafaza, El Galabat, Basunda, El Rahad, El Fashaga
West Darfur	5	El Genaina, Kerenik, Sirba, Habila, Forbranga
North Darfur	5	Kutum, Mellit, Tawila, Kebkabyia, Rural El Fasher
South Kordofan	2	Tadamon, El Abassia
Central Darfur	9	Azum, Zalinge, Mukjar, Um Dukhun, Golo, Nertiti, Rokoroo, Wadi Saleh, Bendesi
Blue Nile	6	El Damazine, El Rosieres, El Tadamon, Bau, Gissan, , Wad El Mahi
Sennar	7	Sennar, East Sennar, Dinder, Dali and Mazmoom, Suki, Abu Hogar, Sinja
West Kordofan	6	El Sonut, El Odaya, Babanosa, El Muglad, El Dibab, El Nuhood
North Kordofan	1	El Rahad (outside the irrigated area)
Khartoum	4	Khartoum, Kararri, Um Dorman, Jebel Aoliaa
River Nile	7	Atbara, El Damer, El Matamma, El Boheirra, Abu Hamad, Berber, Shendi
Total	80	



Map 2: Flood-assessed localities under IPC acute food insecurity situation for June–September 2020
Source: FAO Sudan, September 2020.

Background / existing economic, health and environmental challenges

The Sudan is a country in transition that is facing multiple crises, ranging across political, economic, health and environmental issues. The current situation is marked by crippling shortages of basic commodities, bread and fuel, extended power outages and soaring inflation.

The Transitional Government is facing challenges to stabilize the economy, including the depreciation of the Sudanese Pound (SDG) and the widening of fiscal and external imbalances. Although the official exchange rate was pegged at SDG 55 per USD since June 2020, USD 1 was traded for up to SDG 245 in the parallel market as of mid-September 2020. The weakening of the Sudanese Pound also exerted upward pressures on prices, especially those of imported goods, including fuel, wheat, and agricultural inputs. Sudanese farmers, particularly smallholder farmers and vulnerable households will most likely be unable to purchase food for their families, as well as agricultural inputs to resume their farming activities. According to the recent August 2020 WFP market prices survey, sorghum prices have increased in all states by 486 to 951 percent compared with the average price, in the same period, for the past five years. The FAO/WFP Crop and Food Security Mission (CFSAM) 2019/2020 report indicated that the application of most agricultural inputs (fuel, seeds, fertilizers, herbicides, labour and agricultural machinery) for crop production, was generally lower compared with the previous year in 2018 and this trend will be further exacerbated for the 2020/2021 agricultural season if no robust and timely external support is provided to farmers.

The ongoing imposed international sanctions on the Sudan is precluding the country from debt relief and blocks almost all sources of new borrowing from international financial institutions.

The downturn of the economy is the main factor for an increasingly destitute population as reflected in the number of people needing humanitarian assistance. This number has increased by 75 percent, from 5.2 million people in 2015 to 9.3 million in 2020. According to the most recent IPC for the Sudan (July 2020), about 2.2 million people are facing Emergency acute food insecurity (IPC Phase 4) and around 7.4 million people are facing Crisis acute food insecurity (IPC Phase 3), while 15.9 million people are estimated to be in Stress (IPC Phase 2).

In addition to this, COVID-19 has heaped further restrictions on the economy, reducing the Government's ability to mobilize taxes and maintain already meagre expenditures on basic services, including access to food, especially for the most vulnerable strata of the population (e.g. youth and women).

The Sudan is exposed to environmental challenges and the ongoing devastating flooding of the last 100 years has inflicted significant damage to many sectors of the economy, including agriculture, land, crops, livestock, and forestry and aquaculture production. This is likely to continue if no sustainable and preventive measures are implemented.

Investment in the agriculture sector is low, despite its key role in the country's economy, accounting for about 30 percent of its GDP and remaining as the primary source of livelihood for more than 70 percent of the Sudanese population. Because of its importance for food security, household welfare and export earnings, interest in the sector should increase, especially following the secession of South Sudan in 2011 and the loss of substantial oil revenues and current low market prices. In fact, according to the World Bank, the annual government expenditures on agriculture accounts for under 3 percent of total public expenditures.

Prior to the ongoing devastating floods, a desert locust invasion in the horn of Africa and surveillance efforts in the affected countries had already eroded the Government's capacity to react and led to the mobilization of external support. FAO was already supporting the Transitional Government of the Sudan's efforts to conduct desert locust control operations and must now also provide additional support to mitigate the impact of the flooding, which has severely damaged agricultural land, crops, livestock and the rainfed subsectors and will further complicate the desert locust control operations on the ground. The prevalence of crop pests and diseases, which had already risen during the previous and current planting season, is likely to further increase in addition to livestock transboundary diseases due to the ongoing flooding.

Owing to the above analyses, FAO believes that the combination of the impact of the economic downturn, high level of inflation, COVID-19 pandemic, desert locust invasion and now the ongoing flooding, will likely further weaken the agriculture sector – which is the primary source of livelihood for a large majority of the population, particularly the most vulnerable.

Importance of agricultural production in the affected areas

Crop production

The economy of the Sudan is highly dependent on agriculture, which occupies an estimated 43 percent of its labour force (ILO estimates of 2019) and accounts for about 30 percent of its GDP (World Bank). Crop production is quite diversified and includes cereals (sorghum, millet, wheat, rice and maize); oilseeds (sesame, groundnut and sunflowers); industrial crops (cotton and sugarcane); fodder crops (alfalfa, fodder sorghum and Rhodes grass); pulses (broad beans and pigeon peas); horticultural crops (okra, onions and tomatoes); and perennial/fruit trees (citrus, mango, etc.).

According to the 2019/2020 CFSAM report, the total production of sorghum and millet in 2019/20 is estimated at 5.1 million tonnes, 57 percent below that of the previous year and 18 percent less than the five-year average. Sorghum production is estimated at about 4 million tonnes, 26 percent lower than the level of the previous year and 19 percent less than the five-year average. National millet production is estimated at 1.1 million tonnes, 63 percent lower than the bumper production of 2018 and 16 percent less than the five-year average.

While there is considerable potential for agricultural crop production in the Sudan, the subsector has faced a number of challenges that have constrained and restricted opportunities for sustainable growth to support the economy and the people that depend on the sector for their livelihoods. Among the key constraints are limited resource allocations, capacity and infrastructure; limited enabling environment for business; and climate challenges, including agro-climatic conditions. Being mainly rainfed, agriculture in the Sudan is highly vulnerable to variations in rainfall amounts and timing.

Livestock production

The Sudan is one of the largest livestock producing countries in Africa and the Arab World, where the livestock sector contributes to the livelihoods of at least 26 million people. The sector also contributes significantly to the national economy as reflected in the Sudan's official statistics. It provides more than 60 percent of the estimated value added to the agriculture sector and is a substantially more important contributor to the GDP than crop farming, with an average of 20-22 percent in comparison with 11 percent for the crop sector.

The main livestock production systems include nomadic pastoralism and agropastoralism. Under nomadic pastoralism, livestock ownership per household is large and may vary from 100 to 1 000 heads of livestock, including cattle, camel, goats and sheep; whilst in agropastoral systems, crop production is small and mixed with livestock rearing with livestock ownership per household ranging from 7 to 15 small animals, mainly local chickens, goats and sheep. Under agropastoralism, goats and poultry are kept as a source of animal protein in the form of milk, eggs and poultry meat, in addition to their role as a source of income,

while sheep are kept mainly as a source of income. Livestock under nomadic pastoralism move over long distances stretching over more than 500 kilometres in search of feed and water, meanwhile for agropastoralists, livestock cover shorter distances depending on the rainfall situation.

Forest production

Forests in the Sudan contribute significantly to food security, economic growth and poverty reduction as they provide many food and non-wood forest products, animal fodder and energy to local communities, representing an important source of revenue both at the national and local levels. The assessment specifically evaluated riverine forests affected by the recent floods.

Sudanese riverine forest landscapes are located along the banks of the Blue Nile, its tributaries and also along the White Nile and other wetland bodies, which may have fed into the Nile tributaries. They are characterized by multiple coexisting land uses, including a unique forest ecosystem covering a vast area with vital environmental and economic importance. They protect the Nile system and its watershed and soil against wind and water erosion, reduce water pollution, and provide habitats for wild animal species, migratory birds and many aquatic organisms.

The riverine forests also hold significant biodiversity value as they harbour a wide range of fauna and animals, contributing to environmental conservation and livelihoods. The riverine forest sites shelter a wide diversity and density of invertebrates when compared to their adjacent forest ecosystems and comprise some of the world's most productive ecosystems. Riverine forests provide a variety of habitats to wildlife including hedgehogs, monkeys, rats and gazelles, as well as to birds and plants. The riverine forests are managed to conserve the Nile ecosystem and also play an important role in stabilizing the Nile riverbanks from erosion and degradation, as well as having profound effects on water quality and the hydrology of the river, which sustains agricultural activities for local communities.

Fish production

The River Nile and its tributaries provide immense aquatic resources but most importantly, fish. The inland fisheries sector in the Sudan represents an important source of livelihood and well-being for individuals and communities, as well as a potential means to enhance food security in the country. Despite this, the populations that depend on this sector presently suffer from poverty, lack of employment, food insecurity, illiteracy, health constraints, gender inequality and poor policy protection, resulting in undignified living conditions. Inland fishing communities are often located in isolated and marginalized locations. Consequently, their potential is hidden and often forgotten.

An important number of small-scale fisheries populations along the Nile in the Sudan continue to experience food and livelihood insecurity. This is due to a combination of factors including many years of conflict resulting in the prolonged isolation of communities, poor resource management, inefficient value chains (in terms of handling and hygiene, processing and marketing, disrupted trade and

supply channels, etc.), poor infrastructure and institutions, lack of investment and financing, insufficient capacity and training, and a lack of adequate income sources and employment opportunities. Recent increased competition for resources between resident communities and migrant fishers (who come from outside the area) will likely lead to social crises (FAO in the Sudan Fishery Sector Review 2019, draft). Estimates indicate that the sector provides direct employment for about 18 000 people (12 000 inland and 6 000 marine), and indirectly for about 50 000 people (40 000 inland and 10 000 marine).

Main livelihood sources and food security situation in the affected areas

Food insecurity and malnutrition remain alarmingly high in the Sudan due to a number of factors. Firstly, the protracted conflict and displacement that are still lingering since 2003. This situation was further impacted by the current economic downturn and higher inflation rates, in addition to food price hikes exacerbated by the impact of the COVID-19 pandemic. The lockdown measures to prevent the spread of COVID-19 have significantly decreased commodity movements, market functions and cross-border trade. This significantly compromises livelihoods by distorting the supply and demand of crops and value chains, restricts daily labour opportunities and reduces household purchasing power, which ultimately limits food access to vulnerable populations.

Due to the above-mentioned factors, the humanitarian situation in the Sudan has deteriorated rapidly in the first six months of 2020. Rising hunger across the country has become a remarkable problem over the last two years. About 9.6 million people, almost a quarter of the entire population of the Sudan, are facing acute food insecurity (IPC Phases 3 and 4) in the lean season (June–September 2020). This is the highest number ever recorded in the history of the IPC analysis in the country, representing an increase of 65 percent compared with the same period the previous year.

The most affected groups include internally displaced persons (IDPs), returnees, vulnerable residents who are engaged in farming and pastoral livelihood activities, and refugees from South Sudan and other neighbouring countries. Women and girls are more likely to experience worsening inequalities and disproportionate secondary impacts of restrictions compared to men and boys. This is even worse for other marginalized groups such as persons with disabilities and those in extreme poverty.

The states with the highest levels of acute food insecurity are South Kordofan, Blue Nile, North Darfur, Central Darfur, West Darfur, Red Sea, Kassala, South Darfur, North Kordofan and East Darfur. Additionally, the most affected localities are Al Buram, North Jebel Marra and Halaib in South Kordofan, Central Darfur and Red Sea states, respectively. These localities are currently classified in Emergency (IPC Phase 4).

Agriculture sector activities are the primary livelihood for more than 70 percent of the Sudanese population and support a large proportion of people in rural areas. As well as being the main source of income in these rural areas (Table 2), they are an important contributor to urban area economies through activities like storage, processing and trade.

At least 55 percent of the total population in the flood-affected states pursue agricultural and livestock activities as their main sources of income. Women farmers constitute about 42 percent of the total farmers engaging in agriculture and livestock rearing. If not directly engaged in agricultural production activities, the majority of rural populations undertake activities and services closely related and supportive to the sector, such as procuring inputs, processing, transport and trading among others.

Table 2. Proportion of total number of people engaging in agriculture across the 15 states assessed

State	Total number of people in the flood-affected localities	Total number of people engaged in agriculture	% of women engaged in agriculture
East Darfur	242 632	169 842	40%
Red Sea	842 655	505 593	25%
White Nile	179 881	116 923	30%
Kassala	309 230	207 184	15%
Gedarif	159 435	95 661	40%
West Darfur	1 271 645	890 152	50%
North Darfur	183 903	126 893	55%
South Kordofan	209 905	146 934	55%
Central Darfur	381 672	267 170	60%
Blue Nile	1 140 370	798 260	40%
Sennar	1 996 813	1 397 769	60%
West Kordofan	796 104	557 273	60%
River Nile	1 556 859	934 111	65%
Khartoum	4 499 423	1 348 527	25%
North Kordofan	162 928	114 350	50%
Grand total	13 933 455	7 676 642	42%

Conclusion: impact of flooding on key agricultural subsectors

Impact on crops and land

The 15 flood assessed states fall under different agro-ecological zones where diverse climatic conditions, soil composition, geographical settings, water availability and other factors influence crop production.

The rapid assessment revealed that vast farmlands in the assessed localities have been affected. Most of the affected population are small-scale vulnerable farming households who cultivate less than five feddans. The total number of farming households that have been negatively affected by the floods was estimated at 527 968 in the rainfed sector and 49 200 in the irrigated sector. In total, about 42 percent of the total affected households are female-headed.

The total area planted that was damaged by flooding is estimated at 2 216 362 ha, which constitutes about 26.8 percent of the total cultivated area under the traditional system. In the irrigated system, the damage to the planted areas amounts to 103 320 ha, which constitutes about 19.4 percent of the total cultivated area. Gedarif is the state that has been most affected, with more than 1 067 721 ha of cultivated land washed away due to floods. Blue Nile is the second most affected state with 617 419 ha destroyed, followed by Sennar and Kassala with 112 579 ha and 109 048 ha respectively.

The production loss due to the total crop damage by floods is estimated at 1 044 942 tonnes in the rainfed areas and 557 928 tonnes in the irrigated areas. Sorghum, millet, groundnut, and sesame are the main crops included in the calculation of the estimated production losses. The five-year average yield (2015/16–2019/20) of these crops, was used to calculate the losses. About 50 percent of the damage to crops in the traditional sector is related to sorghum (the main staple food in the country) followed by sesame at about 25 percent, then groundnut, millet and vegetables. Most of the key respondents across the 15 states confirmed the expected decrease in their crop production due to the impact of the floods. The production decrease will have a longer-term impact on household income and food consumption, which may lead to increased economic vulnerability and food insecurity.

Horticulture, seeds, tools, equipment, machinery and agriculture and irrigation-related infrastructure were also either lost or damaged in the disaster. With additional damage to irrigation systems, many farmers risk missing the start of the upcoming 2020 winter and 2021 summer agriculture seasons, starting in October and March, respectively.

Table 3. Total number of farming households affected, ha of crops damaged and estimated production losses

State	Number of localities assessed	Total area cultivated (ha)	Total planted area damaged (ha)	% of the damage on planted area	Estimated production losses (tonnes)*	Total number of farming households affected
East Darfur	2	478 829	87 150	18	29 718	17 340
Red Sea	5	48 145	12 131	25	3 712	3 448
White Nile	9	446 463	44 326	10	10 372	12 598
Kassala	7	359 310	109 048	30	58 003	21 000
Gedarif	5	2 436 000	1 067 721	44	450 173	213 500
West Darfur	5	136 107	8 120	6	8 312	2 308
North Darfur	5	237 804	27 180	11	18 863	7 725
South Kordofan	2	650 000	26 842	4	10 307	7 629
Central Darfur	9	400 925	17 500	4	23 730	4 974
Blue Nile	6	1 820 529	617 419	34	341 001	175 477
Sennar	7	688 261	112 579	16	52 061	31 996
West Kordofan	6	315 000	31 573	10	13 476	8 973
River Nile	1	160 000	39 956	25	20 857	10 000
Khartoum	4	30 110	8 517	28	2 351	8 000
North Kordofan	7	63 000	6 300	10	2 007	3 000
Total	80	8 270 483	2 216 362		1 044 942	527 968

* The analysis of the production losses only refers to sorghum, millet, sesame and groundnut in the rainfed sector. The production losses do not include vegetables and pulses.

Table 4. Extent of the damage to the planted areas in the irrigated sector

Irrigated areas assessed	Total planted areas (ha)	Total planted areas damaged (ha)	% of the damage on planted areas	Total number of affected households
Khartoum, Blue Nile, Sennar, Kassala, White Nile, North Kordofan, River Nile, and Northern state	532 140	103 320	19.4%	49 200

Source: Ministry of Agriculture and Natural Resources, September, 2020

Impact on livestock

In the 15 states assessed, the current floods affected both nomadic pastoral and agropastoral groups, the latter of whom have faced the greatest damage, with more than 95 percent impacted.

Livestock losses (deaths) attributed to the floods were registered in all the assessed states with the exception of South Kordofan and Central Darfur states where there were no recorded losses. The livestock loss occurred in 52 localities out of 80. The total number of lost animals amounts to 108 044. There were great variations in the numbers and species of animals lost; about 61.5 percent sheep, 20.4 percent goats, 11.2 percent chickens and 4.5 percent cattle. With the exception of cattle, these small animals are the main contributors to the food security and nutrition of small-scale agropastoralists, vulnerable IDPs and returnees.

North Darfur, Blue Nile and Sennar states recorded the most animal losses with a combined total of 75 597. This constitutes more than 75 percent of the total livestock losses across all other states assessed. The states most affected by goat losses are Gedarif, North Darfur, West Darfur and Blue Nile; states most affected by sheep losses include Sennar, Blue Nile and North Darfur; states most affected by cattle losses include Blue Nile, West Darfur and Gedarif; while the states most affected by poultry losses include West Darfur and Kassala. Women in flood-affected areas reported losses of feedstock for small livestock and their holding pens, which had been destroyed or washed away.

Table 5. Total number of pastoral households affected and livestock losses (death) in the assessed states

State	Sheep	Goats	Cattle	Poultry	Horse	Donkey	Total Livestock losses	Total number of pastoral households affected
East Darfur	0	750	0	0	0	0	750	210
Red Sea	411	1 220	7	0	1 800	0	3 566	1 053
White Nile	2 406	657	569	0	0	0	3 639	1 326
Kassala	3 500	1 500	490	90	0	0	5 580	2 301
Gedarif	1 923	7 029	649	0	0	0	9 601	304
West Darfur	3 247	2 823	990	200	296	175	8 236	1 860
North Darfur	12 000	4 700	100	0	10 000	1 478	28 278	3 660
South Kordofan	0	0	0	0	0	0	0	0
Central Darfur	0	0	0	0	0	0	0	0
Blue Nile	21 021	2 373	1 767	0	0	0	25 161	4 328
Sennar	21 102	800	256	0	0	0	22 158	5 417
West Kordofan	852	218	0	0	0	0	1 075	62
Total	66 462	22 070	4 828	290	12 096	1 653	108 044	20 521

Impact on riverine forests

Although *Acacia Nilotica* is the only tree that is well-adapted to the prolonged flood period along these ecosystems (normal flood period between 3-4 months/year), the rainfall rates this year exceeded normal records, which negatively affected the ecosystem. The impact can be summarized as follows:

- The high rates of flooding affected the natural range within the riverine forest, which represents the main source of fodder during the dry season.
- High siltation rates, which affect the natural water catchments in these riverine forests (locally called Mayas), will result in changes to the ecological futures of this ecosystem.
- The long flood period will lead to deviations in the forest working plans that will affect the sustainable use of the ecosystem resources.

Impact on fisheries

Damage to fishing gear was reported by fishing communities along the Nile, especially in Blue Nile and Sennar states, as well as on the Upper Atbara lake on the border between Gedarif and Kassala states. Additionally, it was reported that due to the floods, alligators managed to attack aquaculture farms in Gedarif state, resulting in a loss of approximately 1 100 fish.

Impact on agricultural seeds, tools, equipment, machinery and infrastructure

About 111 tonnes of different seed varieties were reported to be washed away. However, this loss in seeds is under-reported and might be higher than stated. In response to the current situation, affected farmers may start employing negative coping mechanisms such as informal borrowing to ensure that they have seeds for the upcoming winter season and 2021 summer season. This will likely lead to an increase in household debt and other vulnerabilities.

Additional agricultural assets such as 256 tractors, 200 disc ploughs, 150 sprayers, 310 hand tools and 1 000 donkey ploughs were reported lost but may also be under-reported.

In the rainfed areas of the flood-affected states, other agriculture-related assets like water harvesting structures were damaged by the floods, including shallow wells, irrigation pumps, power generators, dams, *hafirs*, irrigation systems, slaughter slabs, village markets, and horticulture.

Impact of flooding on livelihood and food security

The findings of the assessment show that job opportunities such as casual agricultural labour – considered to be one of the most important income-generating activities for the rural population – have already diminished and will probably decrease even further during the upcoming harvest season. Vulnerable women are expected to be more severely affected. Furthermore, additional findings of the assessment show that affected populations have begun to engage

in negative coping mechanisms such as borrowing money and selling productive assets to access food. Levels of debt are escalating and affected populations will need to access cash as soon as possible to repay their debts.

Recommended immediate emergency and medium-term response interventions

The assessment shows that across the states assessed, less than eight localities received assistance soon after the floods. The main forms of assistance as reported by 32 localities came through personal initiative and networking among community members. Eighteen localities reported that households received assistance from the Government, as well as humanitarian actors and NGOs responding to the floods. Localities also reported assistance in the form of support from relatives, as well as from neighbouring villages and women's, youth and religious groups.

Most of the states assessed identified food distributions and provision of mosquito nets as the main forms of assistance received. In addition, Kassala State reported receiving sorghum seeds from the Italian NGO COOPI, as well as from additional international NGOs. As described above, the assistance received so far was mainly relief assistance; however, the disaster had a severe impact on the livelihoods of affected populations, which will require more specific short-and medium-term support as discussed in the following section.

Although men and women identify debt relief as their most critical need, seeds and agricultural inputs and veterinary and livestock support are also priority needs to mitigate the damage and start the recovery process for the upcoming winter and summer cropping seasons.

A total of 32 localities identified animal feed as the most important need due to the impact of the disaster on pasture and a lack of income to purchase replacement animal feed. The second most important need was restocking, reported by 25 percent of assessed localities. In terms of restocking, the results of the survey show differences between socio-economic groups. The priority for poorer households is to replace lost chickens while others prefer to replace draught goats and donkeys. This should be supported by the provision of animal feed and vaccines to prevent the spread of animal diseases and to ensure animals remain in good health. Small animals would help these households to rebuild their capacity to sell livestock products (e.g. eggs, milk and meat), increasing their income base and enhancing their overall nutritional intake. About 50 percent of localities identified water and tick-borne diseases, as well as internal and external parasites as a serious threat to their animals during this disaster. To avoid the spread of disease and further animal losses, the respondents of the assessment indicated a high need for additional services (veterinary vaccination and treatment services, together with mineral supplements).

Another immediate need is the rehabilitation of damaged agricultural land and irrigation schemes, as well as *hafirs* and shallow wells, to continue food production and income-generating activities. In most affected areas, families keep food stocks for a month or two. Considering part of the population will not be able to harvest crops until December, food support must be guaranteed for at least the next three months until the new crops are ready. This would also avoid the further selling of important household assets.

A combination of response interventions should be employed to meet the short- and medium-term needs of affected populations, including in-kind support, cash transfers and cash/food for work. Cash-in-hand will facilitate direct access to markets, reducing the need to borrow money or sell assets. Furthermore, in order to rapidly respond to the short-term needs identified by the affected populations, it is essential to prioritize the response interventions as indicated below.

Immediate needs (next 3-6 months)

Proposed interventions	Intervention mechanisms
Provision of agricultural seeds, tools and equipment for the upcoming winter season, particularly for the poorest and female-headed households	In-kind / cash transfers / vouchers / input trade fairs
Distribution of bags for grain storage to limit post-harvest losses	In-kind
Rehabilitation of water harvesting structures, particularly for the poorest households and female-headed households	Cash for work
Restocking of goats and poultry, particularly for the poorest households and female-headed households	In-kind / cash transfers / vouchers / input trade fairs
Provision of animal feed, mineral licks, veterinary vaccines and drugs	In-kind
Provision of fishing gear (boats, nets, ice boxes)	In-kind
Provision of cash transfers to address immediate food and basic needs	Cash transfers

Medium-term needs (next 6-12 months)

The needs identified by affected populations are very similar to those for short-term interventions, with support to pay off debts being recognized as most important. At the same time, agricultural inputs and seed supplies are still critical to continue agricultural activities, particularly for the next summer season starting in July 2021. FAO will use a holistic approach to continue building the resilience, food security and nutrition of affected farming and pastoralist households, focusing on the below key interventions.

Proposed interventions	Intervention mechanisms
Facilitating access to seeds, tools, and equipment for the 2021 summer season	In-kind and cash transfer
Technical support for improved cropping practices (e.g. integrated pest management, climate change adaptation, flood resilience, etc.)	Capacity building / training
Establishment of seed banks at village level	In-kind / capacity building
Income generating activities	Capacity building / training and financial support

Provision of veterinary services	In-kind / capacity building
Continued support for feed production through the development of cropping and agroforestry systems (in synergy with land stabilization)	Capacity building / training
Provision of technical support for improved breeding practices	Capacity building / training
Rehabilitation of the drainage systems (in-let and out-let) in affected riverine forests	Capacity building / training / cash for work
Restoration of the areas affected by floods within the riverine forests' ecosystem	In-kind / capacity building / training / cash for work
Strengthening of institutional capacity for early warning and early action	Capacity building
Enhancing of animal health services; establishment of processing facilities for agriculture, livestock and fisheries; and improvement of value chain, marketing and added value of agricultural produce	In-kind / capacity building / training
Supporting access to markets and affordable rural financial services	Cash transfers / capacity building / training

Long-term needs beyond next 12 months

FAO is working with Government counterparts and other stakeholders to conduct a comprehensive assessment to address long-term issues, including sustainable natural disaster risk management, early warning and early action and building resilient agricultural livelihoods through strengthening the institutional capacities of various actors to prepare for, prevent and manage the impact of climate hazards on the agriculture sector and food systems.

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Saving livelihoods saves lives

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