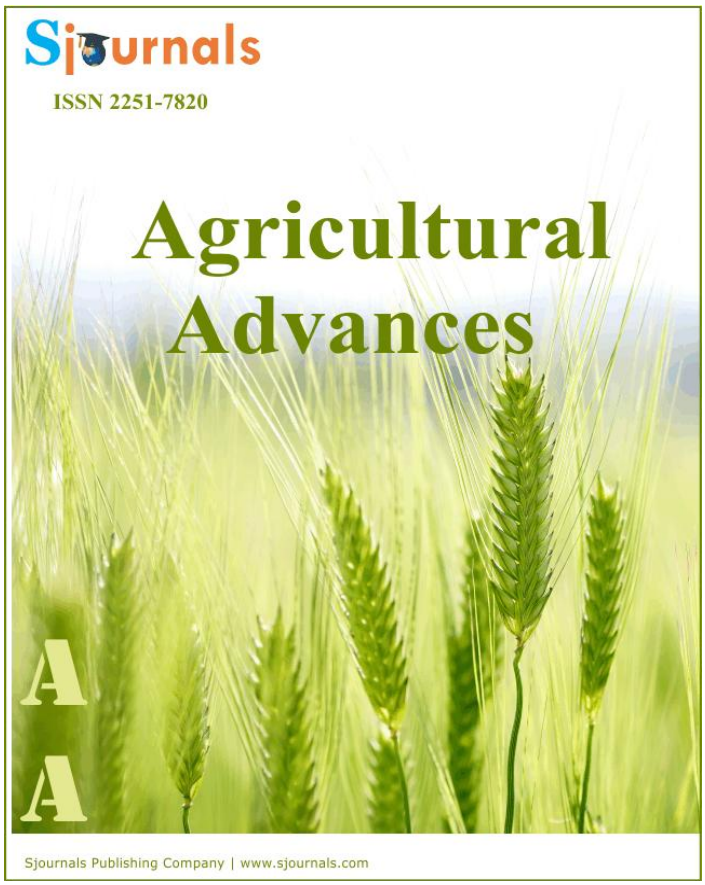

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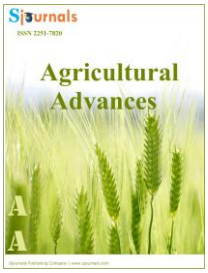

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Review article

Agricultural residues, sustainable development and environment

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ABSTRACT

Sudan's climatic conditions (mainly the rainy seasons) enable double annual harvests (in July and November) in the southern parts of the country. Most of the agricultural activities are concentrated near the Nile River. The El Gezira irrigation system that is located between the White and the Blue Nile Rivers (both rivers merge to form the Nile River) is the most important agriculture project and, according to some statistics, is also the largest artificially irrigated region in the world. As the irrigation system has been put in place, sorghum, wheat, and groundnuts have been planted instead of cotton in an effort to make Sudan self-sufficient in foodstuffs. The agricultural sector is the most important economic sector in Sudan. It created 39 percent of the gross domestic production (GDP), employed about 80 percent of population, and contributed 80 percent of the country's exports in the late 1990s. Cotton is the main agriculture export item, although its export volumes have been decreasing recently. The lack of any marketing or developed market policy is evident. The government has suggested the end of export taxes in order to promote more agriculture products in the future. Other agricultural products include sesame seeds, sorghum, and gum Arabic. Animal husbandry represents a very important part of the national economy, as well. Its production increased during recent years as a result of better veterinary treatment, better credit policy, and higher prices in the market. Fishing is another important sector of the national economy. The average yearly production averages around 33,000 tons, from which sea fish

represent about 1,500 tons. Perch is the most important fresh-water fish, which is caught mostly in the Nile River. About one-third of the total area of Africa's largest country is suitable for agricultural development. Abundant rainfall in the south permits both agriculture and grazing grounds for the large herds owned by nomadic tribes. In the north, along the banks of the Nile and other rivers, irrigation farming prevails. Of an estimated 16.9 million hectares (41.8 million acres) of arable landing 1998, about 1.9 million hectares (4.7 million acres) were irrigated. Principal cash crops are cotton, sesame, peanuts, sugarcane, dates, citrus fruits, mangoes, coffee, and tobacco; the principal subsistence crops are sorghum, millet, wheat, beans, cowpeas, pulses, corn, and barley. Cotton is the principal export crop and an integral part of the country's economy. In 2001, agricultural products accounted for 21.9% of imports and 19.2% of exports; there was an agricultural trade deficit of $24.5 million. Government regional development schemes have played a decisive part in the economy since the 1920s. The Gezira Scheme, located between the Blue and White Niles near their confluence at Khartoum, is the world's largest under a single management and provides a substantial portion of foreign exchange and government revenue. This storage irrigation project, which covers 840,000 hectares (more than two million acres) but has an additional potential of two million hectares (5 million acres), dates back to 1911 and was put into operation by a British firm. After the expiration of the firm's contract with the Sudanese government in 1950, the land was leased to tenant farmers, who numbered over 100,000 in 1987. They manage the scheme jointly with the government through the Gezira Board. In July 1980, construction began on the 354-km (220-mile) Jonglei Canal, intended to drain the Sudd swamp and channel water from the White Nile to the arid northern Sudan and to Egypt. Built by a French consortium at a projected cost of $260 million and scheduled for completion in 1985, the canal could irrigate up to 243,000 ha (600,000 acres) of Sudanese land. By 1984, however, the project had been halted by the Sudanese People’s Liberation Army (SPLA) opposition, with less than 100 km (62 mi) to be excavated. In 1992, the public and private agricultural sectors invested heavily in land preparations, pesticides, and related inputs. Agricultural funding for such projects comes from the World Bank, the African Development Bank, and the International Fund for Agricultural Development. However, completion of these projects has been complicated by debt-repayment problems. In spite of efforts to improve Sudan's agricultural resources, famine conditions have existed in southern Sudan since 1986. Inadequate rains, a poor distribution infrastructure, and civil war have hampered relief efforts. Among agricultural products in 1999 were sorghum, 3,045,000 tons; peanuts, 980,000 tons; sesame, 220,000 tons, (the third highest in the world after India and China); and wheat, 168,000 tons. Cotton fibre production in 1999 was 172,000 tons. Production in 1999 also included sugarcane, 5,950,000 tons; millet, 1,499,000 tons; cottonseed, 131,000 tons; tomatoes, 240,000 tons; dates, 176,000 tons; yams, 136,000 tons; and corn, 65,000 tons.

1. Introduction

Sudan, like many African countries, consists of numerous ethnic groups. Unlike most states, however, Sudan has two distinct divisions: the north, which is largely Arab and Muslim, and the south, which consists predominantly of black Nilotic peoples, some of whom are members of indigenous faiths and others who are Christians. British policy during the Anglo-Egyptian condominium (1899-1955) intensified the rift because Britain established separate administrations for the two areas and forbade northerners to enter the south. In the 1990s, many southerners continued to fear being ruled by northerners, who lacked familiarity with their beliefs and ethnic traditions and sought to impose northern institutions on them (Bret, 1989).

Given its proximity to Egypt and the centrality of the Nile River that both countries share, it is not surprising that historically Egypt has influenced Sudan significantly especially the northern part of the country. Ancient Kush, located in present-day northern Sudan, was strongly influenced by Egypt for about 1,000 years beginning ca. 2700 B.C. Although the Hyksos kings of Egypt temporarily broke off contact, Kush subsequently was incorporated into Egypt's New Kingdom as a province about 1570 B.C. and remained under Egyptian control until about 1100 B.C. In a move that reversed the pattern of Egyptian dominance, a Cushite king conquered Upper Egypt in 730 B.C.; in 590 B.C., however, the Cushite capital was sacked by the Egyptians and the court moved farther south along the Nile to Merowe. By the sixth century A.D., Merowe had broken up into three kingdoms collectively referred to as Nubia. The people of Nubia adopted Christianity and were ministered to largely by Egyptian clergy. The kingdoms reached their peak in the ninth and tenth centuries. Prior to the coming of Islam, the people had contact with the Arabs primarily in the form of trade. Sudan became known as a source of ivory, gold, gems, aromatic gum, and cattle, all products that were transported to markets in Egypt and Arabia. Following the Muslim conquest of the area, in 1276 the Mamluk rulers of Egypt gave Nubia to a Muslim overlord. The Nubians themselves converted to Islam only gradually; a majority of them remained Christian until the fifteenth or sixteenth century. During the sixteenth century, the Muslim religious brotherhoods spread through northern Nubia, and the Ottoman Empire exerted its jurisdiction through military leaders whose rule endured for three centuries.

In 1820 Muhammad Ali, who ruled Egypt on behalf of the Ottomans, sent 4,000 troops to Sudan to clear the area of Mamluks. The invasion resulted in Ottoman-Egyptian rule of Sudan from 1821 to 1885; the rule was accompanied by the introduction of secular courts and a large bureaucracy. The 1880s saw the rise of the Mahdist movement, consisting of disciples of Muhammad Ahmad Ibn as Sayyed Abd Allah, a Sudanese who proclaimed himself the Mahdi or "guided one," and launched a jihad against the Ottoman rulers. Britain perceived the Mahdists as a threat to stability in the region and sent first Charles George Gordon and then Herbert Kitchener to Sudan to assert British control. The British conquest led to the establishment of the Anglo-Egyptian condominium and, initially, to military rule of Sudan, followed by civilian administration. Britain largely ignored southern Sudan until after World War I, leaving Western missionary societies to establish schools and medical facilities in the area (Omer, 2003).

After World War I, Sudanese nationalism, which favoured either independence or union with Egypt, gathered popular support. Recognizing the inevitable, Britain signed a self-determination agreement with Sudan in 1952, followed by the Anglo-Egyptian accord in 1953 that set up a three-year transition period to self-government. Sudan proclaimed its independence January 1, 1956. The country had two short-lived civilian coalition governments before a coup in November 1958 brought in a military regime under Ibrahim Abbud and a collective body known as the Supreme Council of the Armed Forces. Abboud’s government sought to arabise the south and in 1964 expelled all western missionaries. Northern repression of the south led to open civil war in the mid-1960s and the rise of various southern resistance groups, the most powerful of which was the Anya Nya guerrillas, who sought autonomy. Civilian rule returned to Sudan between 1964 and 1969, and political parties reappeared. In the 1965 elections, Muhammad Ahmad Mahjub became prime minister, succeeded in June 1966 by Sadiq al Mahdi, a descendant of the Mahdi. In the 1968 elections, no party had a clear majority, and a coalition government took office under Mahjub as prime minister.

In May 1969, the Free Officers' Movement led by Jaafar El Nimeiri staged a coup and established the Revolutionary Command Council (RCC). In July 1971, a short-lived procommunist military coup occurred, but Nimeiri quickly regained control, was elected to a six-year term as president, and abolished the RCC. Meanwhile in the south, Joseph Lagu, a Christian, had united several opposition elements under the Southern Sudan Liberation Movement. In March 1972, the southern resistance movement concluded an agreement with the Nimeiri regime at Addis Ababa, and a cease- fire followed. A Constituent Assembly was created in August 1972 to draft a constitution at a time when the growing opposition to military rule was reflected in strikes and student unrest. Despite this dissent, Nimeiri was re-elected for another six-year term in 1977. During the early stages of his new term, Nimeiri worked toward reconciliation with the south. As the south became stronger, however, he considered it a threat to his regime; and in June 1983, after abolishing the Southern Regional Assembly; he re-divided the southern region into its three historic provinces. The Sudanese People's Liberation Movement (SPLM) and the Sudanese People's Liberation Army (SPLA), founded in 1983, opposed this division. They intensified their opposition following the imposition of Muslim Sharia law throughout the country. In early 1985, while Nimeiri was returning from a visit to the United States, a general strike occurred that the government could not quell, followed by a successful military coup led by Lieutenant General Abd El Rahman Siwar El Dhahab. A Transitional Military Council was created, but the government proved incapable of establishing a national political consensus or of dealing with the deteriorating economic situation and the famine threatening southern and western Sudan. In March 1986, in the Koka Dam Declaration, the government and the SPLM called for a Sudan free from "discrimination and disparity" and the repeal of the Sharia.

Sadiq al Mahdi formed what proved to be a weak coalition government following the April 1986 elections. An agreement with the SPLM was signed by Sadiq al Mahdi's coalition partners at Addis Ababa in November 1988; the agreement called for a cease- fire and freezing the application of the Sharia. Sadiq al Mahdi's failure to end the civil war in the south or improve the economic and famine situations led to the overthrow of the government at the end of June 1989 by the Colonel Omar Hassan Ahmad al Basher.

Sudan's economic straits reflected its position as Africa's largest nation geographically, but one possessed of large areas of desert and semi-desert east and west of the Nile and in the south the world's largest swamp, As Sudd, which led to tropical rain forests in the southernmost area. As a result, although the Nile itself with its tributaries -the Blue Nile and the White Nile, which joined at Khartoum- constituted a vital communications link for the country and a source of water for agriculture, and the cultivable area of Sudan was somewhat limited. Moreover, in years of drought the agriculturally productive sector declines appreciably, causing the likelihood of severe famine (Omer, 2007).

In accordance with the focal role played by the Nile, about one-third of Sudan's 1990 estimated population of 25 million lived around Khartoum and in Al Awsat State. The latter included the rich agricultural region of Al Jazirah, south of Khartoum between the Blue Nile and the White Nile. Although only one-fifth of the population lived in urban areas, two-thirds of the total population resided within 300 kilometres of Khartoum. About 600 ethnic groups speaking around 400 languages were represented. Arabic was the official language of the country, with English spoken widely in the south. Ethnic statistics for the 1990s were lacking, but in 1983 Arabs constituted about two-fifths of the total population, representing the majority in the north where the next largest group was the Nile Nubians. Much of the remainder of Sudan's population consisted of non-Muslim Nilotic peoples living in southern Sudan or in the hilly areas west of the Blue Nile or near the Ethiopian border. Among the largest of these ethnic groups were the Dinka and the Nuer, followed by the Shilluk. Many of these groups migrated with their herds, seeking areas of rainfall, and therefore it was difficult to establish their numbers accurately.

In the early 1990s, agriculture and livestock raising provided the major sources of livelihood for about four-fifths of the population. Wherever possible, Nile waters were used for irrigation, and the government has sponsored a number of irrigation projects. Commercial crops such as cotton, peanuts, sugarcane, sorghum, and sesame were grown, and gum Arabic was obtained from trees. Most of these products along with livestock destined primarily for Saudi Arabia also represented Sudan's major exports.

Manufacturing concentrated on food-processing enterprises and textiles, as well as some import substitution industries such as cement, chemicals, and fertilisers. Industry, however, contributed less than one-tenth to gross domestic product in the early 1990s, in comparison with agriculture's more than three-tenths contribution. Sudan was among the world's poorest countries according to the World Bank (WB), with an annual per capita income of US$310 in fiscal year (FY) 1991.

Several factors accounted for the relative economic insignificance of the industrial sector. Historically, during the colonial period, Britain had discouraged industrialization, preferring to keep Sudan as a source of raw materials and a market for British manufactured goods. Following independence, a paucity of development programmes as well as better employment opportunities in the Persian Gulf states have contributed to a shortage of skilled workers. In the early 1990s, Sudan also had limited energy sources only small amounts of petroleum in the south between Kurdufan State and Bahr al Ghazal State and a few dams producing hydroelectric power. In addition, transportation facilities; were limited; there existed only a sketchy network of railroads and roads, many of the latter being impassable in the rainy season. Inland waterways could also be difficult to use because of low water, cataracts, or swamps. The lack of a good transportation network hindered not only the marketing of produce and consumer goods but also the processing of such minerals as gold, chrome, asbestos, gypsum, mica, and uranium. The lack of capital accumulation also limited financial resources and necessitated funding by the government, which itself had inadequate revenues. Some northern Sudanese hoped that the rise of Islamic banks might result in more capital being invested in private industrial development, especially after the World Bank refused to extend further loans to the country.

Sudan's problems with the World Bank occurred initially in 1984. The World Bank cited Sudan's large external debt in June 1992 the debt was about US$15.3 billion, of which approximately two-thirds represented payment arrears and its failure to take steps to restructure its economy as reasons for denying credit. The large debt resulted primarily from the nationalisation of major sectors of the economy in the 1970s and the use of funds borrowed from abroad to finance enterprises with low productivity. The government needed to use its revenues to meet the losses of these enterprises. In addition, the civil war, the prolonged drought, widespread malnutrition, famine, and the hundreds of thousands of refugees further sapped the economy. Not until June 1990 did the government act to reform the economy by instituting a three-year (FY 1991-93) National Economic Salvation Programme. The programme aimed to reduce the budget deficit, privatise nationalised enterprises, heighten the role of the private sector, and remove controls on prices, profits, and exports. In October 1991, other steps toward economic reform included devaluing the official exchange rate from LSD4.5 to LSD15 (for value of the Sudanese pound) to the United States dollar and reducing subsidies on sugar and petroleum products. In February 1992, in a further liberalisation of the economy, all price controls were removed and official exchange rates devalued to LSD90 to the United States dollar. Officials hoped that these measures would not cause the inflation rate, which was about 115 percent per year as of March 1992, to worsen. In a further move designed to curb inflation, Sudan instituted a new currency, the Dinar, worth ten Sudanese pounds, in May 1992.

Although the World Bank refused to authorise new loans for Sudan, in July 1991 the bank granted Sudan US$16 million for the Emergency Drought Recovery Project. In addition, in the spring of 1992 Sudan received an agricultural credit of US$42 million from the African Development Bank and some bilateral aid from Iran and Libya. Like the World Bank, the United States and the European Community had suspended loans to Sudan but had provided some humanitarian assistance; the value of United States humanitarian aid in 1991 was estimated to exceed US$150 million. Nevertheless, the drought, the famine, and the massive influx into the north of refugees from the south as a result of the civil war caused the country's already precarious economy to deteriorate further and complicated the government's ability to rule.

Since the military coup of June 30, 1989, the constitution had been suspended, political parties banned, and the legislative assembly dissolved. For practical purposes, in mid-1992 Basher made political decisions in his capacity as president or head of state, prime minister, commander in chief, and chairman of the legislative body created by the 1989 coup, the Revolutionary Command Council for National Salvation (RCC-NS). The RCC-NS consisted of fifteen members who had carried out the coup along with Basher. Several members had ties to the National Islamic Front (NIF), the political arm of the Muslim Brotherhood, an Islamist (sometimes seen as fundamentalist) activist group.

Although political parties were illegal under the Basher government, the NIF represented the equivalent of a party. The nature of the relationship between Basher and the NIF was not clear. Some well informed Western observers considered Basher to be a tool of the NIF in spreading its Islamist programmes and its strong advocacy of the imposition of the Sharia. Other observers believed that Basher was using the NIF for his own purposes. The leading figure in the NIF was Hassan Abd Allah at Turabi, an Oxford-educated Muslim religious scholar and lawyer, who strongly advocated the spread of Islamism in the Muslim world. As Turabi was ending his tour of the United States and Ottawa in late May in the spring of 1992, he was attacked in Canada by a Sudanese opponent of the NIF and was seriously injured. Whereas by late July Turabi had resumed meetings with government and Islamic

officials and speeches to Muslim groups in Khartoum and in London, the effects of his impaired health on the NIF, the RCC- NS, and the political scene were uncertain in mid-August.

In addition to their legislative functions, members of the RCC-NS shared with Basher and members of the Council of Ministers functions traditionally associated with the executive branch, such as heading government ministries. The Council of Ministers included civilians as well as military officers and in practice was subordinate to the RCC-NS. In April 1991, probably in response to growing criticism of its authoritarian rule, the RCC- NS convened a constitutional conference. However, major opposition groups boycotted the conference. As on previous occasions, the principal intractable problem proved to be the inability of Muslims and non-Muslims to agree on the role of Islamic law as the basis of the legal system at both the national and local levels.

Another vexing problem historically was the relationship of regional and local governmental bodies to the national government. The Nimeiri regime had created a pyramidal structure with councils at various levels. The councils were theoretically elective, but in practice the only legal party at the time, the Sudan Socialist Union, dominated them. In February 1991, the RCC- NS introduced a federal structure, creating nine states that resembled the nine provinces of Sudan's colonial and early independence years. The states were subdivided into provinces and local government areas, with officials at all levels appointed by the RCC-NS. Although the governors of the three southern states were southerners, power laid in the hands of the deputy governors who were Muslim members of the NIF and who controlled finance, trade, and cooperatives. Below them the most important ministerial posts in the southern states also were held by Muslims, including the post of minister of education, culture, youth, guidance, and information.

In a further step, in mid-February 1992, Basher announced the formation of an appointed 300-member Transitional National Assembly to include all RCC-NS members, federal cabinet ministers, and state governors. Basher also indicated in March that beginning in May popular conferences based on religious values would be held in the north and in "secure areas" of the south to elect chairmen and members of such conferences. The election process would create a "general mobilisation of all political institutions." Although the agendas for conferences over the succeeding ten-year period would be based on national issues set by the head of state and local issues raised by the governors, the government touted the process as one that would "fulfill the revolution's promise to hand over full power to the people." The proposed conference committees were somewhat reminiscent of the popular committees established by the Popular Defence Act of October 1989. Initially, these popular committees had the function of overseeing rationing, but their mandated was broadened to include powers such as arresting enemies of the state.

The control exerted by the RCC-NS over various parts of the country varied. For example, western Sudan, especially Darfur, enjoyed considerable autonomy, which at times approached anarchy, as a result of the various armed ethnic groups and the refugee population that existed within it. The situation was even more confused in the south, where until 1991 the government had controlled the major centres and the SPLM occupied the smaller towns and rural areas. The government launched a military campaign in 1991-92 that succeeded in recapturing many military posts that had served as SPLM and SPLA strongholds. The government's success resulted in part from the acquisition of substantial military equipment financed by Iran, including weapons and aircraft bought from China. Another reason for the successes of the government forces was the split that occurred in August 1991 within the SPLA between Garang's Torit faction (mainly Dinka from southern Al Istiwai) and the Nasir group (mainly Nuer and other non-Dinka from northern Al Istiwai). The two groups launched military attacks against each other, thereby not only destroying their common front against the government but also killing numerous civilians. The Nasir group had defected from the main SPLA body and tried unsuccessfully to overthrow John Garang over human rights violations, Garang's authoritarian leadership style, and his favouritism toward his ethnic group, the Dinka. Abortive peace talks with representatives of both groups as well as the government were held in Abuja, Nigeria, in May and early June 1992. In December 1989 former United States president Jimmy Carter had attempted without success to mediate peace talks between the government and the SPLA. The Torit faction sought a secular state and an end to the Sharia; the Nasir group wanted self-determination or independence for southern Sudan. During the talks, both groups agreed to push for self-determination, but when the government rejected this proposal, they decided instead to discuss Nigeria's power-sharing plan.

A major basis of southern dissidence was strong opposition to the imposition of the Sharia--the SPLA had vowed not to lay down its arms until the Sharia was abrogated. The other source of concern was the fear of northern pressures to arabise the education system (the Basher regime had declared Arabic the language of

instruction in the south in early 1992), government offices, and society in general. These fears had led to the civil war, which, with a respite between 1972 and 1983, had been ongoing since 1955.

The Basher government's need for assistance in pursuing the war in the south determined to a large degree Sudan's foreign policy in the 1990s. Basher recognised that the measures taken in the south, which outside observers termed human rights abuses, had alienated the West. Historically, the West had been the source of major financial support for Sudan. Furthermore, Sudan's siding with Iraq in the 1991 Persian Gulf War had antagonised Saudi Arabia and Kuwait, principal donors for Sudan's military and economic needs in the preceding several decades.

Basher therefore turned to Iran, especially for military aid, and, to a lesser extent, to Libya. Iranian president Ali Akbar Hashemi Rafsanjani visited Sudan in December 1991, accompanied by several cabinet ministers. The visit led to an Iranian promise of military and economic assistance. Details of the reported aid varied, but in July 1992, in addition to the provision of 1 million tons of oil annually for military and civil consumption, aid was thought to include the financing of Sudanese weapons and aircraft purchases from China in the amount of at least US$300 million. Some accounts alleged that 3,000 Iranian soldiers had also arrived in January 1992 to engage in the war in the south and that Iran had been granted use of Port Sudan facilities and permission to establish a communications monitoring station in the area; these reports were not verified as of mid-August 1992, however.

The only other country with which Sudan had close relations in the early 1990s was Libya. Following an economic agreement the two countries signed in July 1990, head of state Muammar El Qadhafi paid an official visit to Khartoum in October. Basher paid a return visit to Libya in November 1991. Libyan officials arrived in Khartoum for talks on unity, primarily economic unity, in January 1992. While the government was cultivating relations with Iran and Libya, the SPLM and SPLA were seeking other sources of aid in Africa. They had lost their major source of support when the government of Mengistu Hailey Miriam in Ethiopia was overthrown in May 1991. The SPLM and SPLA subsequently sought help from Kenya, Uganda, and several other African countries, thereby creating tensions between those nations and the Basher regime. Furthermore, Sudan's relations with Egypt had soured in 1991 as a result of the Basher government's failure to support Egypt's position in the Persian Gulf War. One manifestation of the deteriorating relations occurred in April 1992 when Sudan became involved in a border confrontation with Egypt. The disagreement resulted from an oil concession Sudan had granted to a subsidiary of Canada's International Petroleum Corporation for exploration of a 38,400-square-kilometer area onshore and offshore near Halaib on the Red Sea coast, an area also claimed by Egypt.

In the matter of determining Sudan's foreign policy as well as domestic policy, the military had played a major role since independence. Initially, the military was seen as being free from specific ethnic or religious identification and thus in a position to accomplish what civilians could not, namely to resolve economic problems and to bring peace to the south. Such hopes proved futile, however. The growing civil war in the south from 1955-72 and again from 1983 to the present, as well as the rising strength of the SPLA and the SPLM posed tremendous problems for the military and for the internal security forces. The civil war was extremely costly; according to one Sudanese government estimate, it cost approximately US$1 million per day. Furthermore, it disrupted the economy-Basher stated in February 1992 that the loss of oil revenues alone since 1986 amounted to more than US$6 billion. In addition, based on United States Department of State estimates in late 1991, war had displaced as many as 4.5 million Sudanese. To counter the SPLA, the government armed various non-Arab southern ethnic groups as militias as early as 1985. In addition, in October 1989 the Basher government created a new paramilitary body, the Popular Defence Forces (PDF) to promote the Islamist aims of the government and the NIF. Although the Basher regime prominently featured the PDF's participation in the 1991-92 campaign in the south, informed observers believed their role lacked military significance.

In view of the ongoing civil war, internal security was a major concern of the Bashir regime, which reportedly had been the object of coup attempts in 1990, 1991, and 1992. In this regard, the government faced problems on several fronts. There was the outright dissidence or rebellion of several southern ethnic groups. There was also the creation in January 1991 of an opposition abroad in the form of a government in exile. This body, called the National Democratic Alliance, was headed by Lieutenant General Fathi Ahmad Ali, formerly commander of the armed forces under Sadiq al Mahdi. There also was increasing opposition in the north on the part of those who favoured a secular state, including professional persons, trade union leaders, and other modernisers. Such persons opposed the application of Islamic *Hudud* punishments, the growing restrictions on the activities and dress of women, and the increasing authoritarianism of the government as reflected, for example, in the repression of criticism through censorship, imprisonment, and death sentences. On a wider scale, members of the public in the

north staged protests in February 1992 against the price increases on staples after price supports were removed (Omer, 2008).

As a result of the repressive measures taken by the government and the actions of armed government militias in the south as well as retaliatory measures of the SPLA forces, the human rights group Africa Watch estimated that at least 500,000 civilian deaths had occurred between 1986 and the end of 1989. The overall number of deaths between 1983 and mid-1992 was far greater, an outcome not only of the civil war, but also of the famine and drought in the late 1980s and early 1990s. In late 1989, the government, which has considered famine relief efforts a political football, ended its cooperation with relief efforts from abroad because it feared such measures were strengthening southern resistance. The pressure of world public opinion, however, obliged Sudan to allow relief efforts to resume in 1990.

The United Nations (UN) World Food Programme (WFP) had initiated Operation Lifeline Sudan (OLS) in March 1989, which had delivered more than 110,000 tons of food aid to southern Sudan before it was obliged by renewed hostilities to close down operations in October 1989. OLS II was launched in late March 1990, via the UN and the International Committee of the Red Cross, to bring in food flights via Kenya and Uganda. In the spring of 1990, WFP indicated it was helping 4.2 million people in Sudan: 1.8 million refugees in Khartoum; 1.4 million people in rural areas of the south; 600,000 who had sought refuge in southern towns; and 400,000 in the "transition zone" in Darfur and Kurdufan, between the north and the south.

In addition to these sources of suffering, the government, beginning in the 1980s, had undertaken campaigns to destroy the Dinka and the Fur and Zaghawa ethnic groups in Darfur. As of 1991 the Bashir regime was also using armed militias to undertake depopulation campaigns against the Nuba in southern Kurdufan. Moreover, the government had to deal with the return in 1991 of Sudanese citizens who had been working in Iraq and Kuwait; according to estimates of the International Labour Organisation, such persons numbered at least 150,000. Finally, during late November 1991 and early 1992, the government forcibly uprooted more than 400,000 non-Arab southern squatters, who had created shanty towns in the outskirts of Khartoum, and transported them to the desert about fifty kilometres away, creating an international outcry (Abdeen, 2007).

In summary, in August 1992 the Bashir government found itself in a very difficult position. Although the country's economic problems had begun to be addressed, the economic situation remained critical. At the peace negotiations in Abuja, slight progress had been made toward ending the civil war in the south, but the central concerns about imposition of the Sharia and arabisation had not been resolved. Moreover, the regime appeared to be facing growing dissension, not only in the south but from elements in the north as well. These considerations raised serious questions about the stability of the Basher government.

2. Agriculture

In the early 1990s, agriculture and livestock raising were the main sources of livelihood in Sudan for about 61 percent of the working population. Agricultural products regularly accounted for about 95 percent of the country's exports. Industry was mostly agriculturally-based, accounting for 15 percent of GDP in 1988. The average annual growth of agricultural production declined in the 1980s to 0.8 percent for the period 1980-87, as compared with 2.9 percent for the period 1965-80. Similarly, the sector's total contribution to GDP declined over the years, as the other sectors of the economy expanded. Total sectoral activities, which contributed an estimated 40 percent of GDP in the early 1970s, had fluctuated during the 1980s and represented about 36 percent in 1988. Crop cultivation was divided between a modern, market-oriented sector comprising mechanised, large-scale irrigated and rainfed farming (mainly in central Sudan) and small-scale farming following traditional practices that was carried on in the other parts of the country where rainfall or other water sources were sufficient for cultivation (Omer, 1995).

Large investments continued to be made in the 1980s in mechanised, irrigated, and rainfed cultivation, with their combined areas accounting for roughly two-thirds of Sudan's cultivated land in the late 1980s. The early emphasis on cotton growing on irrigated land had decreased. Although cotton remained the most important crop, peanuts, wheat, and sugarcane had become major crops, and considerable quantities of sesame also were grown. Rainfed mechanised farming continued to produce mostly sorghum, and short-fibre cotton was also grown. Production in both sub-sectors increased the domestic supplies and export potentials. The increase appeared, however, to have been achieved mainly by expanding the cultivated area rather than by increasing productivity. To stimulate productivity, in 1981 the government offered various incentives to cultivators of irrigated land who were

almost entirely government tenants. Subsistence cultivators produced sorghum as their staple crop, although in the northerly, rainfed, cultivated areas millet was the principal staple. Subsistence farmers also grew peanuts and sesame (Appendix 1).

Livestock raising, pursued throughout Sudan except in the extremely dry areas of the north and the tsetse-fly-infested area in the far south, was almost entirely in the traditional sector. Because livestock raising, provided employment for so many people. Modernisation proposals have been based on improving existing practices and marketing for export, rather than moving toward the modern ranching that requires few workers (Omer, 2008a). Fishing was largely carried out by the traditional sector for subsistence. An unknown number of small operators also used the country's major reservoirs in the more populated central region and the rivers to catch fish for sale locally and in nearby larger urban centres. The few modern fishing ventures, mainly on Lake Nubia and in the Red Sea, were small (Omer, 2008b).

The forestry sub-sector comprised both traditional gatherers of firewood and producers of charcoal--the main sources of fuel for homes and some industry in urban areas--and a modern timber and sawmilling industry, the latter government owned. Approximately 21 million cubic meters of wood, mainly for fuel, were cut in 1987. Gum Arabic production in FY 1986-87 was about 40,000 tons. In the late 1980s, it became in most years the second biggest export after cotton, amounting to about 11 percent of total exports.

2.1. Land use

By 1991 only partial surveys of Sudan's land resources had been made, and estimates of the areas included in different land-use categories varied considerably. Figures for potentially arable land ranged from an estimate of 35.9 million hectares made in the mid-1960s to a figure of 84 million hectares published by the Ministry of Agriculture and Natural Resources in 1974. Estimates of the amount actually under cultivation varied in the late 1980s, ranging from 7.5 million hectares, including roughly 10 or 11 percent in fallow, to 12.6 million hectares.

Substantial variations also existed in land classified as actually used or potentially usable for livestock grazing. The ministry and the United Nations Food and Agriculture Organisation (FAO) have classified about 24 million hectares as pastureland. The 1965 estimate of land use classified 101.4 million hectares as grazing land, and in 1975 an ILO-United Nations Development Programme (UNDP) interagency mission to Sudan estimated the total potential grazing land at between 120 million and 150 million hectares. Forestland estimates also differed greatly, from less than 60 million hectares by staff of the Forestry Administration to about 915 million hectares by the Ministry of Agriculture and Natural Resources and the FAO. Dense stands of trees only covered between 20 million and 24 million hectares of the total forestland. Differences in land classification may have been accounted for by use of some woodland areas for grazing and some traditional grazing lands for raising crops. Given the dearth of rainfall during the 1980s and early 1990s, the ecological damage from mechanised farming, and the steady march of desertification, discrepancies in these statistics had little meaning in 1991.

It was generally agreed, however, that in the late 1980s Sudan still had a substantial amount of land suitable for future cropping. The ILO-UNDP mission believed that two-thirds of the potential area for livestock grazing, however, was already in use. In addition to land suitable for cultivation and livestock grazing, Sudan also had about 76 million to 86 million hectares of desert. Additionally, an area of about 2.9 million hectares was covered by swamps and inland water, and about 280,000 hectares were occupied by urban settlements and other man-made features.

2.2. Land tenure

The right to own property, to bequeath it to heirs, and to inherit it was established by the Permanent Constitution of 1973; this right was suspended in 1985. Sudan had long had a system of land registration through which an individual, an enterprise, or the government could establish title to a piece of land. Such registration had been extensive in northern Sudan, especially in El Khartoum, Al Awsat, and Ash Shamali provinces. Before 1970 all other land (unregistered) belonged to the state, which held ownership in trust for the people, who had customary rights to it. In 1970 the Unregistered Land Act declared that all waste, forest, and unregistered lands were government land. Before the act's passage, the government had avoided interfering with individual customary rights to unregistered land, and in the late 1980s it again adhered to this policy.

The government owned most of the land used by the modern agricultural sector and leased it to tenants (for example, the Gezira Scheme) or to private entrepreneurs, such as most operators of large-scale mechanised rainfed farming. In the late 1980s, however, the great area of land used for pasture and for subsistence cultivation

was communally owned under customary land laws that varied somewhat by location but followed a broadly similar pattern. In agricultural communities, the right to cultivate an area of unused land became vested in the individual who cleared it for use. The rights to such land could be passed on to heirs, but ordinarily the land could not be sold or otherwise disposed of. The right was also retained to land left in fallow, although in Bahr al Ghazal, Aali El Nil, and Al Istiwai there were communities where another individual could claim such land by clearing it.

Among the transhumant communities of the north, the rights to cultivated land were much the same, but the dominant position of livestock in community activities had introduced certain other communal rights that included common rights to grazing land, the right-of-way to water and grazing land, the right to grass on agricultural land unless the occupier cut and stacked it, and the right to crop residues unless similarly treated. In the western savannas, private ownership of stands of *Hashab* trees could be registered, an exception to the usual government ownership of the forests. But dead wood for domestic fuel and the underlying grass were common property. Water, a matter of greatest importance to stock raisers, was open to all if free standing, but wells that had been dug and the associated drinking troughs were private property and were retained by the digger season after season. In northern Sudan, especially in the western savannah where increasing population and animal numbers have placed pressure on the land, violations of customary laws and conflicts between ethnic groups over land rights have been growing. Resolution of these problems has been attempted by local government agencies but only on a case-by-case basis (Omer, 2000).

2.3. Irrigated agriculture

In 1991 Sudan had a large modern irrigated agriculture sector totalling more than 2 million hectares out of about 84 million hectares that are potentially arable. About 93 percent of the irrigated area was in government projects; the remaining 7 percent belonged to private operations. The Nile and its tributaries were the source of water for 93 percent of irrigated agriculture, and of this the Blue Nile accounted for about 67 percent. Gravity flow was the main form of irrigation, but about one-third of the irrigated area was served by pumps (Omer, 2001).

The waters of the Nile in Sudan have been used for centuries for traditional irrigation, taking advantage of the annual Nile flood. Some use of this method still continued in the early 1990s, and the traditional *Shaduf* (a device to raise water) and waterwheel were also used to lift water to fields in local irrigation projects but were rapidly being replaced by more efficient mechanised pump systems. Among the first efforts to employ irrigation for modern commercial cropping was the use of the floodwaters of the Qash River and the Baraka River (both of which originate in Ethiopia) in eastern Sudan to grow cotton on their deltas. This project was started in the late 1860s by the Egyptian governor and continued until interrupted by the turbulent period of the 1880s, leading to the re-conquest of the country by the British in 1899. Cultivation was resumed in 1896 in the Baraka Delta in the Taker area, but in the Qash Delta it only resumed after World War I. Between 1924 and 1926, canals were built in the latter delta to control the flood; sandstorms made canals unfeasible in the Baraka. Between the 1940s and the 1970s, various projects were developed to irrigate land. In 1982 both deltas yielded only one crop a year, watered by the flood. Adequate groundwater, however, offered the eventual possibility of using pump irrigation from local wells for additional cropping or for supplementing any flood shortages (Omer, 2004).

The drought that affected Sudan in the 1980s was a natural disaster that had a crushing effect on the country's irrigation systems. In 1990-91, for instance, water was so scarce in the Toker area that for the first time in 100 years the crops failed (Omer, 2008c).

As of 1990, the country's largest irrigation project had been developed on land between the Blue and White Nile rivers south of their confluence at Khartoum. This area is generally flat with a gentle slope to the north and west, permitting natural gravity irrigation, and its soils are fertile cracking clays well suited to irrigation. The project originated in 1911, when a private British enterprise, Sudan Plantations Syndicate, found cotton suited to the area and embarked on what in the 1920s became the Gezira Scheme, intended principally to furnish cotton to the British textile industry. Backed by a loan from the British government, the syndicate began a dam on the Blue Nile at Sennar in 1913. Work was interrupted by the World War I, and the dam was not completed until 1925. The project was limited by a 1929 agreement between Sudan and Egypt that restricted the amount of water Anglo-Egyptian Sudan could use during the dry season. By 1931 the project had expanded to 450,000 hectares, the maximum that then could be irrigated by the available water, although 10,000 more hectares were added in the 1950s. The project was nationalised in 1950, and was operated by the Sudan Gezira Board as a government enterprise. In 1959 a new agreement with Egypt greatly increased the allotment of water to Sudan, as did the completion in the early 1960s of the Managil Extension on the western side of the Gezira Scheme. By 1990 the

Managil Extension had an irrigated area of nearly 400,000 hectares, and with the 460,000 hectares eventually attained by the original Gezira Scheme, the combined projects accounted for half the country's total land under irrigation (Abdeen, 2004).

In the early 1960s, the government set up a programme to resettle Nubians displaced by Lake Nubia (called Lake Nasser in Egypt), which was formed by the construction of the Aswan High Dam in Egypt. To provide farmland for the Nubians, the government constructed the Khashm al Girba Dam on the Atbara River and established the Halfa El Gadid (New Halfa) irrigation project. Located west of Kassala, this project was originally designed to irrigate about 164,000 hectares. In 1982 it was the only large irrigation project in the country that did not use the waters of the Blue Nile or White Nile. The resettlement was effected mainly after completion of the Khashm al Girba Dam in 1964. Part of the irrigated area was also assigned to local inhabitants. The main commercial crops initially introduced included cotton, peanuts, and wheat. In 1965 sugarcane was added, and a sugar factory having a design capacity of 60,000 tons was built to process it. The project enabled 200,000 hectares of land to be irrigated for the first time. Heavy silting as well as serious problems of drainage and salinity occurred. As a result, by the late 1970s the reservoir had lost more than 40 percent of its original storage capacity and was unable to meet the project water requirements. These problems persisted in the early 1990s.

The multipurpose Roseires Dam was built in 1966 and power- generating facilities were installed in 1971. Both the water and the power were needed to implement the Rahad River irrigation project located east of the Rahad River, a tributary of the Blue Nile. The Rahad entered the Blue Nile downstream from the dam and during the dry season had an insufficient flow for irrigation purposes. Work on the initial 63,000 hectares of the project began in the early 1970s, the first irrigation water was received in 1977, and by 1981 about 80 percent of the prepared area was reported to be irrigated. In May 1988, the World Bank agreed to provide additional funding for this and other irrigation projects. Water for the project was pumped from the Blue Nile, using electric power from the Roseires plant, and was transported by an eighty-kilometre-long canal to the Rahad River (en route under-passing the Dinder River, another Blue Nile tributary). The canal then emptied into the Rahad above a new barrage that diverted the combined flow from the two sources into the project's main irrigation canal. Irrigation was by gravity flow, but instead of flat field flooding, furrow irrigation was used, because it permitted more effective use of machinery.

In the 1920s, private irrigation projects using diesel pumps also had begun to appear in El Khartoum Province, mainly along the White Nile, to provide vegetables, fruit, and other foods to the capital area. In 1937 a dam was built by the Anglo-Egyptian condominium upstream from Khartoum on the White Nile at Jebel al Aulia to regulate the supply of water to Egypt during the August to April period of declining flow. Grazing and cultivated land along the river was flooded for almost 300 kilometres. The government thereupon established seven pump irrigation projects, partially financed by Egypt, to provide the area's inhabitants with an alternative to transhumance (Abdeen, 2000).

This irrigation project eventually proved successful, making possible large surpluses of cotton and sorghum and encouraging private entrepreneurs to undertake new projects. High cotton profits during the Korean War (1950-53) increased private interest along the Blue Nile as well, and by 1958 almost half the country's irrigated cotton was grown under pump irrigation. During the 1960s, however, downward fluctuations in world cotton prices and disputes between entrepreneurs and tenants led to numerous failures of pump irrigation projects. In 1968 the government assumed ownership and operation of the projects. The government established the Agricultural Reform Corporation for this purpose, and the takeover began that year with the larger estates. Subsequently, as leases expired, the corporation acquired smaller projects, until May 1970 when all outstanding leases were revoked. A considerable number of small pump operations that developed on privately owned land, chiefly along the main Nile but also on the Blue Nile, continued to operate.

Since the 1950s, the government has constructed a number of large pump projects, mostly on the Blue Nile. These have included the Junayd project on the right bank of the Blue Nile east of the Gezira Scheme. This project, with an irrigated area of about 36,000 hectares, went into operation in 1955 to provide an alternative livelihood for nomadic pastoralists in the area. It produced cotton until 1960, when about 8,400 hectares were converted to sugarcane. A sugar factory built to process the crop (with a potential capacity of 60,000 tons of sugar a year) opened in 1962. In the early 1970s, the Japanese-assisted As Suki project, also of 36,000 hectares, was established upstream from Sennar to grow cotton, sorghum, and oilseeds. In the mid-1970s, the government constructed a second project near Sennar of about 20,000 hectares. In addition to cotton and other crops such as peanuts, about 8,400 hectares of the area were devoted to raising sugarcane. The cane-processing factory, with a design capacity

of 110,000 tons of sugar a year, opened in 1976. Several smaller Blue Nile projects added more than 80,000 additional hectares to Sudan's overall irrigated area during this time (Abdeen, 2005).

In the 1970s, when the consumption and import of sugar grew rapidly, domestic production became a priority, and two major pump-irrigated sugar plantations were established on the White Nile in the Kosti area. The Hagar Asalaia Sugar Project, begun in 1975, had an irrigated area of about 7,600 hectares. The sugar factory, completed in 1977, had a potential annual capacity of 110,000 tons. The Kenana Sugar Project, which had almost 16,200 hectares under irrigation in 1981 and had a future potential of over 33,000 hectares, was one of the world's largest sugar- milling and refining operations. In 1985-86 production reached more than 330,000 tons a year. This project, first proposed in 1971, was beset with funding problems and overruns that increased overall costs from the equivalent of US$113 million estimated in 1973 to more than US$750 million when the plant opened officially in early 1981.

The Kenana Sugar Project, unlike the country's four other government-owned sugar projects, was a joint venture--among the governments of Sudan, Kuwait, and Saudi Arabia, and the Arab Investment Company, the Sudan Development Corporation, Kenana Limited, and the AAAID, including local Sudanese banks. An initial trial run in the 1979-80 cane seasons produced 20,000 tons of sugar. Yield increased to an estimated 135,000 to 150,000 tons the following season. Production at the Hagar Asalaia factory did not get under way until the 1979-80 seasons because of cane and sugar-processing difficulties. Problems have also affected the other three state sugar factories, but as a result of proposed World Bank management, the output total of these four government operations for the 1984-85 seasons improved to nearly 200,000 tons. Output declined to 159,000 tons in 1985-86 because of the drought. In 1989 sugarcane production reached 400,000 tons (Abdeen, 2006).

2.4. Rainfed agriculture

Cultivation dependent on rainfall falls into two categories. Most Sudanese farmers always have relied on rainfed farming. In addition to these traditional farmers, a large modern mechanised rainfed agriculture sector has developed since 1944-45, when a government project to cultivate the cracking clays of central Sudan started in the Al Gedaref area of Ash Sharqi Province, largely to meet the food needs of army units stationed in the British colonies in eastern Africa (present-day Kenya, Tanzania, and Uganda). An average of about 6,000 hectares a year was cultivated between 1945 and 1953, producing chiefly sorghum, under a sharecropping arrangement between the government and farmers who had been allocated land in the project. These estates proved costly, however, and in 1954 the government began encouraging the private sector to take up mechanised farming in the area, a policy that continued after Sudan gained independence in 1956. Under the new approach, the government established several state farms to demonstrate production methods and to conduct research. Research activities have been very limited, however, because of staffing and funding problems, and the farms have been operated essentially as regular production units.

The private-sector response was positive, and by 1960 mechanised farming had spread into other areas of the cracking clay zone in Ash Sharqi and Al Awsat provinces. The government set aside rectangular areas that were divided into plots of 420 hectares (later raised in places to 630 hectares) each. Half of these plots were leased to private farmers, the other half left in fallow. After four years, the originally leased land was to be returned to fallow and the farmer was to receive a new lease to an adjacent fallow area. When the demand for land grew faster than it could be demarcated, areas outside the designated project limits were taken over by private individuals. The four-year lease proved unpopular because it meant new investment in clearing land every four years, and apparently much of the worked land continued to be cultivated while fallow land was also placed under cultivation. By 1968 more than 750,000 hectares were being cultivated, of which it was estimated that more than 200,000 hectares constituted unauthorised holdings. The average agricultural production growth rate declined, however, from 2.9 percent in the period between 1965 and 1980, to 0.8 percent in the period between 1980 and 1987, the latest available figures. Reportedly, for the 1991-92 seasons, the Ministry of Agriculture and Natural Resources planned for about 7.3 million hectares of food crops to be planted, with about 1.6 million hectares planted in the irrigated sector and about 5.7 million hectares in the rain-fed areas (Abdeen Mustafa, 2007).

The investment requirements for mechanised farming favoured prosperous cultivators, and eventually most farms came to be operated by entrepreneurs who raised capital through mortgageable property or other assets in the urban centres. Through arrangements with other individuals, these entrepreneurs frequently managed to control additional plots beyond the legal limit of two. Their ability to obtain capital also permitted them to abandon depleted land and to move into newly demarcated uncleared areas, a practice that had a deleterious

impact upon the environment, deprived the indigenous inhabitants of work opportunities, and increased desertification. In 1968, to expand the operator base and to introduce more control over land allocation, crops, and farming methods, the government established the Mechanised Farming Corporation (MFC), an autonomous agency under the Ministry of Agriculture and Natural Resources. From 1968 through 1978, the IDA made three loans to the government to enable the MFC to provide technical assistance, credit for land-clearing and machinery, and marketing aid to individual farmers and cooperative groups. The MFC also became the operator of state farms.

In the late 1970s, about 2.2 million hectares had been allocated for mechanised farming, and about 420,000 hectares more had been occupied without official demarcation. About 1.9 million hectares in all were believed to be under cultivation in any one season. Of the officially allocated land, more than 70 percent was held by private individuals. Private companies had also begun entering the field, and some allocations had been made to them. State farms accounted for another 7.5 percent. About 15 percent of the total allocated land was in MFC-IDA projects. The largest proportion of mechanised farming was in Ash Sharqi Province, 43 percent; the next largest in Al Awsat Province, 32 percent; and about 20 percent was in Aali El Nil Province. Mechanised farming had also been initiated in southern Kurdufan Province through a project covering small-scale farmers in the area of the Nuba Mountains, but under a different government programme. Proposals also have been made for MFC projects using mechanised equipment in other areas of southern Kurdufan (some have already been tried) and southern Darfur provinces. There were serious feasibility problems in view of competition for land and conflicts with traditional farming practices, difficult soil conditions, and the probable negative effect on the large numbers of livestock of nomads.

Only a few crops had been found suitable for cultivation in the cracking clay area. Sorghum had been the principal one, and during the early 1980s it was planted on an average of about 80 percent of the sown area. Sesame and short-fibre cotton were also grown successfully but in relatively smaller quantities, sesame on about 15 percent of the land and cotton on about 5 percent. Soil fertility has reportedly been declining because of the continued planting of sorghum and the lack of crop rotation. Yields have apparently decreased, but in view of the area's greatly varying climatic conditions and the uncertain production data, definitive conclusions on trends appeared premature (Abdeen M. Omer, 2007).

2.5. Economy

The economy of Sudan continued to be in disarray in mid-1991. The principal causes of the disorder have been the violent, costly civil war, an inept government, an influx of refugees from neighbouring countries, as well as internal migration, and a decade of below normal annual rainfall with the concomitant failure of staple food and cash crops. The economic and political upheavals that characterised Sudan in the 1980s have made statistical material either difficult to obtain or unreliable. Prices and wages in the marketplace fluctuated constantly, as did the government's revenue. Consequently, information concerning Sudan's economy tends to be more historical than current (Abdeen Omer, 2007).

In the 1970s, economic growth had been stimulated by a large influx of capital from Saudi Arabia and Kuwait, invested with the expectation that Sudan would become "the breadbasket" of the Arab world, and by large increments of foreign aid from the United States and the European Community (EC). Predictions of continuing economic growth were sustained by loans from the World Bank and generous contributions from such disparate countries as Norway, Yugoslavia, and China. Sudan's greatest economic resource was its agriculture, to be developed in the vast arable land that either received sufficient rainfall or could be irrigated from the Nile. By 1991 Sudan had not yet claimed its full water share (18.5 billion cubic meters) under the 1959 Nile Waters Agreement between Egypt and Sudan.

Sudan's economic future in the 1970s was also energised by the Chevron Overseas Petroleum Corporation's discovery of oil on the borderlands between the provinces of Kurdufan and Bahr al Ghazal. Concurrently, the most thoroughly researched hydrological project in the Third World, the Jonglei Canal (also seen as Junqali Canal), was proceeding ahead of schedule, planned not only to provide water for northern Sudan and Egypt, but also to improve the life of the Nilotic people of the Canal Zone. New, large agricultural projects had been undertaken in sugar at Kenana and cotton at Rahad. Particularly in southern Sudan, where the Addis Ababa accords of March 27, 1972, had seemingly ended the insurgency, a sense of optimism and prosperity prevailed, dashed, however, when the civil war resumed in 1983. The Khartoum government controlled these development projects, but entrepreneurs could make fortunes through the intricate network of kinship and political relations that has traditionally driven Sudan's social and economic machinery.

In the early 1970s, public enterprises dominated the modern sector, including much of agriculture and most of large-scale industry, transport, electric power, banking, and insurance. This situation resulted from the private sector's inability to finance major development and from an initial government policy after the 1969 military coup to nationalise the financial sector and part of existing industry. Private economic activities were relegated to modern small- and medium-scale industry. The private sector dominated road transport and domestic commerce and virtually controlled traditional agriculture and handicrafts (Abdeen, 2008).

In the 1980s, however, Sudan underwent severe political and economic upheavals that have shaken its traditional institutions and its economy. The civil war in the south resumed in 1983, at a cost of more than £Sd11 million per day. The main participant in the war against government was the Sudanese People's Liberation Army (SPLA, the armed wing of the Sudanese People's Liberation Movement (SPLM)), under John Garang's leadership. The SPLA made steady gains against the Sudanese army until by 1991 it controlled nearly one-third of the country.

The dearth of rainfall in the usually productive regions of Sahel and southern Sudan added to the country's economic problems. Refugees, both Sudanese and foreigners from Eritrea, Ethiopia, Uganda, and Chad, further strained the Sudanese budget. International humanitarian agencies have rallied to Sudan's aid, but the government rejected their help. When Jaafar El Nimeiri was overthrown in April 1985, his political party disappeared, as did his elaborate security apparatus. The military transitional government and the democratically elected coalition government of Sadiq al Mahdi that succeeded the exiled Nimeiri failed to address the country's economic problems. Production continued to decline as a result of mismanagement and natural disasters. The national debt grew at an alarming rate because Sudan's resources were insufficient to service it. Not only did the SPLA shut down Chevron's prospecting and oil production, but it also stopped work on the Jonglei Canal.

On June 30, 1989, a military coup d'état led by Colonel (later Lieutenant General) Omar al Basher overthrew the government of Sadiq al Mahdi. Ideologically tied to the Muslim Brotherhood and dependent for political support on the Brotherhood's party, the National Islamic Front, the Bashir regime has methodically purged those agencies that dealt primarily with the economy--the civil service, the trade unions, the boards of publicly owned enterprises, the Ministry of Finance and Economic Planning, and the central bank. Under Basher's government, Sudan's economy has been further strained by the most severe famine of this century, the continuation of the war in the south, and a foreign policy that has left Sudan economically, if not politically, isolated from the world community (Abdeen Mustafa, 2008).

2.6. Livestock

In the early 1990s, drought caused a dramatic decline in livestock raising in Sudan, following a period in the early 1980s when livestock provided all or a large part of the livelihood of more than 40 percent of the country's population. Livestock raising was overwhelmingly in the traditional sector, and, although initial steps had been taken to improve productivity and develop market orientation, for the modern monetised economy the sector represented largely a potential asset. In 1983 Sudan's more than 50 million animals comprised the second largest national herd in Africa, next in size to that of Ethiopia. An FAO estimate in 1987 indicated that there were about 20.5 million cattle, 19 million sheep, 14 million goats, and 3 million camels. Other animals included 660,000 donkeys, 21,000 horses, a small number of pigs (kept by such non-Muslim peoples as the Nuba) and 32,000 chickens. By 1991 these numbers had been reduced by perhaps one-third by the drought of 1990-91; the August 1988 floods in the south, described as the worst in Sudan's history; and the ravages of civil war in the south. Poultry was raised mainly by farm families and villagers. A small modern sector consisted of limited government commercial operations and a few semi-commercial private ventures (Appendix 2).

Sudanese cattle are of two principal varieties: Baqqara and Nilotic. The Baqqara and two sub-varieties constituted about 80 percent of the country's total number of cattle. This breed was found chiefly in the western savannah regions and in fewer, although significant, numbers farther to the east from Aali El Nil to Kassala in Ash Sharqi. The Nilotic, constituting approximately 20 percent of all cattle, were common in the eastern hill and plains areas of south-eastern Al Istiwai, which were free of the tsetse fly, and in those parts of the Bahr al Ghazal and Aali El Nil lying outside the tsetse-fly zone. Because of periodic rinder-pest epidemics, the total number of cattle was relatively small until about 1930, when it stood at an estimated 2 million. A vaccination programme begun about that time and mass inoculations during the succeeding decades resulted in a great increase in numbers, which by 1970 had reached about 12 million. In the vast areas used by pastoral herders (estimated to be 80 million to 100 million hectares), cattle husbandry was conducted in an economic, cultural, and social context that had evolved over generations. This included an emphasis on increasing herd size as an investment for future family security.

Small surpluses (usually bulls) were available for subsistence use, exchange, or sale for local consumption or export. Cattle were also used for marriage payments and among the Nilotes for rituals. Numbers of cattle also helped to establish or increase status and power in a social system in which cattle were the measure of wealth (Abdeen M. Omer, 2008).

Most Nilotic cattle were kept by transhumant groups. Migrations, related to the wet and dry seasons, usually did not exceed 150 to 160 kilometres. The majority of the Baqqara strain of cattle belonged to the Baqqara Arabs. The latter were largely nomadic, but since at least the early 1900s had a settled base on which crop cultivation was practiced. The farmers, their relatives, or their agents moved the cattle over traditional migratory routes northward during the rainy season and southward to the area of the Bahr al Arab as the dry season progressed. Migrations in either direction might amount to 400 kilometres. The expansion of mechanised rainfed agriculture in the region used by the Baqqara, continued government efforts to enlarge the cultivated area, and pressures on the land from the growing population have gradually reduced grazing areas. At the same time, traditional cultural forces have brought about a steady increase in cattle numbers. The result has been increasing overstocking and pasture depletion until the outbreak of civil war in 1983 and the devastating droughts of the 1980s and early 1990s decimated not only the Nilotic herds but livestock throughout Sudan. Many families and indeed whole ethnic groups, who have traditionally survived on their cattle, sheep, goats, or camels, lost all of their herds and were forced to migrate to the Three Towns (Omdurman, Khartoum, and Khartoum North) in search of sustenance.

Sheep were herded chiefly by transhumants in Darfur and Kurdufan. Large numbers were found in the drier areas at greater elevations than the usual cattle zone. Several breeds were raised, but the predominant and preferred one was the so-called desert sheep, which had both good weight and good milk yield. Villagers in Al Awsat also raised large numbers of sheep, mostly on a non-migratory basis. Fodder was obtained from crop residues on irrigated and rainfed farms and from vegetation along the rivers and canals. Goats, of which there were three principal breeds (desert, Nubian, and Nilotic), were found throughout the country south of the northern desert areas. They were raised mainly by sedentary families for milk and meat. Goat meat, although less popular than mutton, formed part of the diet of most families, particularly those having low incomes. Goat milk was an important source of protein, and many families in urban areas kept a few goats for their milk.

Camels were largely concentrated in the desert and sub-desert regions of northern Darfur, northern Kurdufan, and southern Ash Sharqi. They were kept almost entirely by nomadic and semi-nomadic peoples, for whom the animal represented the preferred mode of transport. Camels were also important for milk and for meat. Camel ownership and numbers were sources of prestige in nomadic societies.

2.7. Fisheries

Sudan's total production of fish, shellfish, and other fishing products reached an estimated 24,000 tons per year in 1988, the latest available yearly figures. This compared with estimates of a potential yearly catch exceeding 100,000 tons. The principal source of fish was the Nile River system. In central and northern Sudan, several lakes and reservoirs have been formed by the damming of the river and its branches: the 180-kilometer section of Lake Nubia on the main Nile in Sudan and the reservoirs behind the Roseires and Sennar dams on the Blue Nile, the Jebel al Aulia Dam on the White Nile, and the Khashm al Girba Dam on the Atbara tributary of the main Nile. These bodies of water accounted for about 11,000 tons of fish against a calculated potential of about 29,000 tons.

Production from Lake Nubia through 1979, the latest figures available in 1991, was only 500 tons a year, or about one-tenth of the estimated potential. Inhabitants around the lake, which had formed gradually in the 1960s, had no previous experience in fishing, and the first significant commercial exploitation of the lake's resources had been undertaken by the government's Fisheries Administration. In 1973 a private company also started operations. In the mid- and late 1970s, an ice plant and a cold storage facility were built at Wadi Halfa with assistance from China. China also furnished thirty-five two-ton fishing vessels, a number of transport launches, and other fishing equipment. Cooling plants were constructed at Khartoum and Atbara to hold fish that were brought from Wadi Halfa by railroad. Although ice was used in the shipments, substantial loss occurred, especially during the hotter months. To what extent fish productions from the lake and availability to consumers were increased by these new facilities was not known in 1991.

The largest potential source of freshwater fish was southern Sudan whose extensive river network and flooded areas in As Sudd were believed able to provide 100,000 to 300,000 tons annually on a sustained basis. Statistics on actual production were unavailable in 1991; much was consumed locally, although limited quantities of dried and salted fish were exported to Zaire where it was in great demand.

The country's second source of fish, the Red Sea coastal area, was relatively unexploited until the late 1970s. Annual production toward the end of the decade amounted to about 500 tons of fish, shellfish (including pearl oysters), and other marine life. In 1978 the British Ministry of Overseas Development began a joint project with the government Fisheries Administration to raise output by making boats, motors, and equipment available to fishermen. Included was an ice plant built at Suwakin to furnish local fishermen with ice for their catch. By 1982 the project was well advanced, and about 2,000 tons of fish were taken annually. A sustained catch of 5,000 tons might eventually be possible.

2.8. Forestry

Since the early 1900s, extensive areas of woodland and forest have been converted to agricultural use. Large amounts of land classifiable as woodland have been cleared in the development of large-scale mechanised rainfed farming in Ash Sharqi and Al Awsat states, and smaller amounts in Aali an Nil and southern Kurdufan states. Although Sudan had a large quantity of natural forest, by 1991 much of it remained almost totally unexploited. In the late 1970s, FAO estimated that the country's forests and woodlands totalled about 915,000 square kilometres, or 38.5 percent of the land area. This figure was based on the broad definition of forest and woodland as any area of vegetation dominated by trees of any size. It also included an unknown amount of cleared land that was expected to have forest cover again "in the foreseeable future". An estimate in the mid-1970s by the Forestry Administration, however, established the total forest cover at about 584,360 square kilometres, or 24.6 percent of the country's land area. More than 129,000 square kilometres (about one-quarter) of this amount were located in the dry and semiarid regions of northern Sudan. These forests were considered valuable chiefly as protection for the land against desertification, but they also served as a source of fuel for pastoral peoples in those regions. The continued population pressure on the land has resulted in an accelerated destruction of forestland, particularly in the Sahel, because charcoal remained the predominant fuel. The loss of forestland in the marginal areas of the north, accelerated by mechanised farming and by drought, resulted in a steady encroachment of the Sahara southward at about ten kilometres a year in the 1980s (Abdeen Omer, 2008).

The productive forest extended below the zone of desert encroachment to the southern border. It included the savannah woodlands of the central and western parts of the country, which were dominated by various species of acacia, among them *Acacia Senegal*, the principal source of gum Arabic. Gum Arabic was Sudan's second largest export product, accounting for 80 percent of the world's supply. It is non-toxic, non-calorific, and non-polluting, having no odour or taste. It is used widely in industry for products ranging from mucilage (for postage stamps) to foam stabilisers to recipient in medicines and dietetic foods. In 1986-87 Sudan produced more than 40,000 tons marketed through the Gum Arabic Company. In the late 1980s the drought severely curtailed production. The principal area of productive forest and woodland, however, was in the more moist southern part of the country. Covering an area of more than 200,000 square kilometres and consisting mainly of broadleaf deciduous hardwoods, it remained largely undeveloped in 1990. Timber processed by government mills in the area included mahogany for furniture and other hardwoods for railroad ties, furniture, and construction. Domestic production of timber fell far short of local needs in the 1970s, and as much as 80 percent of the domestic requirement was met by imports.

Plantations established by the government Forestry Administration in the mid-1970s totalled about 16,000 hectares of hardwoods and 500 to 600 hectares of softwoods, most were in the south. They included stands of teak and in the higher elevations of the Imatong Mountains, exotic pines. Eucalyptus stands had also been established in the irrigated agricultural areas to serve as windbreaks and to supply firewood. A gradually increasing forest reserve has been developed, and by the mid1970s it covered more than 13,000 square kilometres. Additional protection of forest and woodland areas was provided by several national parks and game reserves that encompassed 54,000 square kilometres in the mid-1970s.

Since 1983 the civil war virtually halted forestry production in southern Sudan, from which came the overwhelming amount of forestry products. According to FAO estimates, however, in 1987 Sudan produced 41,000 cubic meters of sawn timber, 1,906,000 cubic meters of other industrial round-wood, and more than 18 million cubic meters of firewood. Each of these categories showed a substantial increase from production levels in the 1970s. The insatiable demand was for charcoal, the principal cooking fuel, and the one major forest product not dependent upon the south. Because wood of any kind could be turned to charcoal, the acacia groves of the Sahel have been used extensively for this purpose, with a resulting rapid advance of deforestation. To improve government forestry conservation and management policy, as well as the issue of land use, in 1990-91 plans were

underway to establish a forestry resource conservation project, funded and co-financed by several international development agencies and donors.

Sudan vast country, which is characterised by the broad diversity in the soil and multiple in climates from the desert in the north to the tropical climate in the south and refracted number of rivers and included in the rain and a large of groundwater, which led to the diversity and ecological-environmental consequence, in many of the uses and production methods and type crop (Mustafa Omer, 2008). The management of each of these resources and its development needs to cover local, regional and international key objective seek by farmers and the state and local and global investors. With regard to organic agriculture, Sudan long history and its many generations pass compatible and integrated with the systems of organic agriculture, managed farms over the decade to reach normal rotations for the production of natural without chemicals in all areas of traditional agriculture - cycle crops with the so-called (Gum cultivating cycle) all these experiences have been benefiting from the Sudan in the draft proposal. Figure 1 and Table 1 show the agricultural production and yields.

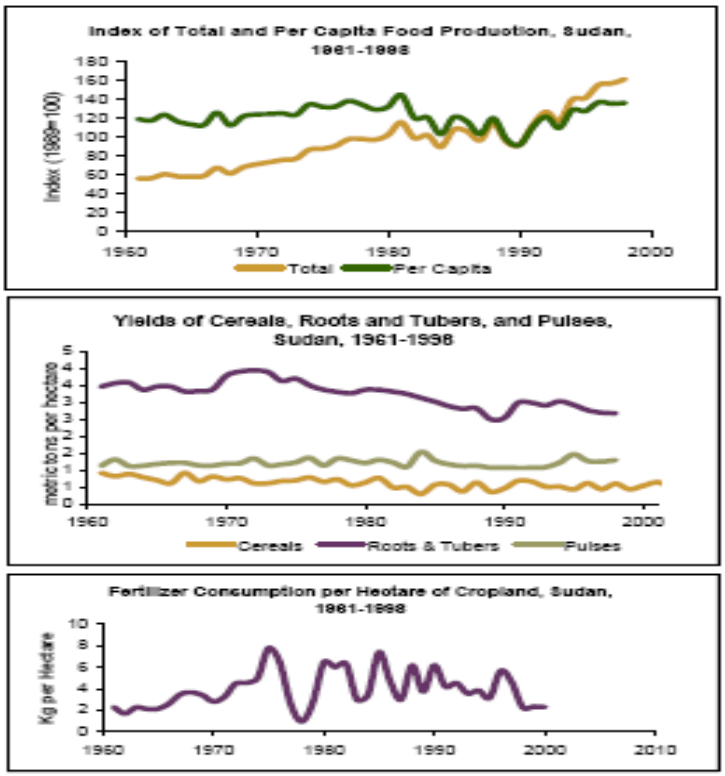

Fig. 1. Agriculture and Food in Sudan.

The idea of the project proposal by European companies in both England and the Netherlands for the production of specific crops (Sesame, and sun flower) of the European common market project has been expanded to cover various Sudanese crop to become a model of organic farming in the Sudan and a basis for a major through covering all crops in all areas and achieve optimum use of resources to provide Sudan the needs of the common European market and the Middle East region. Figure 2 and Table 2 show total and net cereal imports and consumptions.

2.8.1. Organic agriculture programme

This programme began in 2001 by ARAB Authority for Agriculture investment and development and aims to produce food commodities free of agricultural pollutants (fertilisers and pesticides), through the use of organic fertilisers and bio-resistance factors in pest control and, therefore, it contributes to environmental sanitation, agricultural (Omer, 2009).

Table 1
Agricultural production and yields.

Agricultural Production and Yields	Sudan	Sub-Saharan Africa	World
Cereals, 1999-2001			
Average production (000 metric tons)	3,268	87,715	2,075,387
Percent change since 1979-81	12%	54%	32%
Per capita production (tons per person)	105	135	343
Percent change since 1979-81	-31%	-11%	-4%
Average crop yield (kg per ha)	484	1,221	3,096
Percent change since 1979-81	-25%	9%	41%
Roots and tubers 1996-1998			
Average production (000 metric tons)	166	132,744	638,438
Average crop yield (kg per ha)	2,707	7,694	12,958
Pulses, 1996-1998			
Average production (000 metric tons)	169	6,499	55,469
Average crop yield (kg per ha)	1,266	481	808
Meat, 1999-2001			
Average production (000 metric tons)	681	8,124	233,218
Percent change since 1979-81	53%	49%	71%
Agricultural Land			
Total cropland (000 ha), 1999	16,900	173,572	1,501,452
Hectares of cropland per 1,000 population, 1999	555	274	251
Arable & permanent cropland as a percent of total land area, 1998	6.7%	7.1%	11.3%
Percent of cropland that is irrigated, 1999	11.5%	3.8%	18.3%
Agricultural Inputs			
Average annual fertilizer use, 1999			
Total (thousand metric tons)	92	2,124	141,360
Intensity (kg per hectare cropland)	5	12	94
Pesticide use, 1994-1996 (kg/ha cropland) [c]	106	X	X
Number of tractors, 1997	10,500	261,984	26,334,690
Agricultural workers as a percentage of the total labor force, 1990	69.5%	X	X
Percent of GDP generated from agricultural activities, 2000	37.2%	16.7%	5.0%

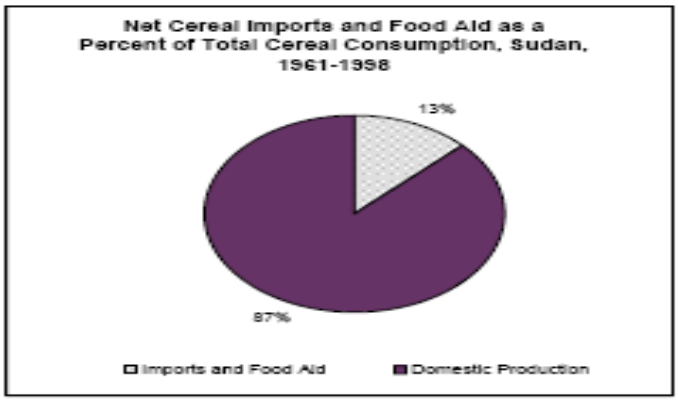

Fig. 2. Total and net cereal imports and consumptions.

Table 2
Food security.

Food Security	Sudan	Sub-Saharan Africa	World
Variation in domestic cereal production, 1992-2001 (average percent variation from mean)	22.7%	6.5%	3.5%
Net cereal imports and food aid as a percent of total consumption [b], 1998-2000	12.8%	13.5%	X
Food aid as a percent of total imports, 1998-2000	36.6%	19.9%	X
Average daily per capita calorie supply, 1999 (kilocalories)	2,360	2,238	2,808
Average daily per capita calories from animal products, 1999 (kilocalories)	462	152	460
Percent of children that are underweight, 1995-2000 [c]	17.0%	30.0%	27.0%

Three areas were selected to cover different types of agriculture in Sudan:

1. traditional farming areas in the rain - sandy land in the middle, East and western Sudan to produce Red sesame -Beans - Corn-Hibiscus - lsenmke - Watermelon seeds, Gum Arabic was chosen the eastern region of the state of North Kordofan and East State in Delta El Gash and Toker to produce Sunflower – Watermelon .
2. fed agriculture machinery in the plains natural for the production of white sesame - Sorghum - Sunflower -Cotton- Gum Arabic - medicinal and aromatic plants - timber forest products and has been chosen Sennar state, The Ministry of Agriculture and Irrigation implementation of the plan began in the area estimated «75» feddans different sources of irrigation and irrigated raincoat, and stated that the area will include vegetables and fruits especially fruit «banana», that pest control in this crops will be organic. Pointing out that the seed of Neem trees (Azadirachta indica) contributed to prove its effectiveness in this area. The National Committee began to address global companies working on certification of organic products to increase the cultivated area bringing blue to know the potential for producing organic mandate. I expected that the project achieved the desired success in the coming period.
3. irrigated agriculture - on rivers and valleys for the production of vegetable crops and fruit- Sesame - Sorghum - Sunflower -Cotton - Gum - wheat and sugarcane were selected mandate of the River Nile; The Ministry of Agriculture River Nile is ambitious plans to develop organic farming provide funding (scientific research). Transfer of technology and quality KEY FEATURES plan prepared by the Ministry of Agriculture, Livestock and Irrigation after mandate officials pledged to lift the ceiling interest in agriculture and the allocation (50%) of the area of organic agriculture. Plan also included the gradual shift to a system of organic agriculture mixed crop and animal production, food production and natural products free of chemical contaminants for humans and animals, in addition to benefit from the competitive advantages and preferential treatment for organic products in the global market, Arab and maximising the income of producers and enhance their productivity and protect the environment from degradation and pollution and maintaining the sustainability natural resources. Mentors plan focused on a spate irrigation system, lasting and select specific sites in each system are piled cultivation period and provide broad success factors and mixed organic agriculture and surveys to map each region and for the renewal of the characteristics of the site and the quality of crops and the work of initial or renewed tests of the soil to determine the level of organic matter (fertility). The features of the need to surveys and draw maps of the areas spate irrigation to determine the characteristics of different locations on the level of silting and flooding regularity every year and promote scientific research in the areas of organic agricultural production and provide the necessary funding to encourage companies and agricultural sectors and producers of the founding organic of farms recorded internationally, in addition to the introduction of crop cultivation and promising mandate for such a plant Alhohopa - white sesame – medicinal and aromatic plants -horticultural crops and fodder to the establishment of a central market for crops and vegetables standard specifications and the establishment of villages by the modern complexes of trustees and by the Ministry of Agriculture to follow product quality control and develop and disseminate a culture of total quality and build organic production technologies.

The Plan emphasised the important role of agricultural research mandate and urged agricultural research stations on the implementation of research programmes to provide financial and technical support for the draft organic farmers River Nile , providing information on soil management techniques and the destruction of organic materials within the plant and animal field and fermentation of organic materials and uses, in addition to information relevant agricultural-related courses fertilises the soil and control weeds and reduce transmission between crop and pests, well as providing technologies for operations aimed at raising agricultural productivity and the means biological control of pests and weeds.

Specific areas were selected for the introduction of the experiment, study and develop plans for the production of these crops under the umbrella of natural organic production as law and conditions of the common European market 91 / 209 Lgistyon EU project objectives. The project aims to produce a natural organic products as foundations and approved by the common European market and be products clean and green and 100% natural and free of chemicals, and does not have genetic modifications on the basis of sustainable development to meet the needs of the present generation and future generations.

There are also the foundations and standards adhered to by the project aims to achieve:

1. Biodiversity
2. Naturally, without the use of any chemicals.
3. Symbiosis resources-plant and animal
4. Maintaining soil fertility and renewal of natural.
5. Continuity and sustainability.
6. Complementary roles-public sector and private farmers' participatory approach.
7. The achievement of exports to the common European market and the region.

In all three areas chosen, the fertility of land through traditional means without the use of chemicals, agricultural practice cycle in the rain traditional (Gum cultivating agricultural cycle) is universally known and certified FAO selected region of the eastern state of North Kordofan region of the reconstruction belt Gum Arabic on the same grounds traditional ancestral funding from the Dutch government has been cooperative association of farmers region for the development of the production process and marketing. With funding from the FAO and the Ministry of Agriculture and Forests to introduce organic farming in Sudan tripartite partnership of the Ministry of Agriculture and Forests the private sector (foreign companies) farmers and organisations in the three regions selected. Been selected working group composed of four national experts and team leader for a foreign-study and a plan of action which includes projects in each area:

1. Production organic ended manner recognised.
2. Extension services and training, water supply and relocation services and storage.
3. Services for agricultural finance farmers.
4. Foundations and inspection standards and quality control and follow INTERNATIONAL CONTROL SYSTEM.
5. Marketing and promotion.

It was also the composition of the national executive and management includes all competent authorities under the umbrella of the Ministry of Agriculture and Forestry to develop laws and principles and criteria required for expression of supervision and development of organic farming and encourage the private sector and investors providing funding and training for farmers and workers in this area and to develop productive sector research and marketing.

GREEN NILE PROJECT headed by the Ministry of Agriculture and Forests study identified the following objectives:

1. Provide the necessary funding to the Ministry of Agriculture, Forests plans, programmes and bases for the development of organic farming and sustainability.
2. The establishment of effective administration of development and promotion.
3. Develop plans, programmes, officers as foundations, international standards recognised for development, development and marketing.
4. Develop research, training of modern technology verification needs global markets and sustainability.
5. Develop partnerships between various sectors and participate third and strengthening linkages between exporters, investors and fund.
6. Develop bank information, field studies, technical and various economic and increase income to various sectors and the development markets.
7. An action plan has been integrated, multi-stage, and a proposal for the regional administrations in three states.

FAO has been providing the project in July 2002 and was passed in August 2002 by the Ministry of Agriculture and Forest Trade in Organic Products Trade in organic products is a new area whereby Sudan can realise additional export earnings and enhance farm incomes, food security and rural development. Estimated at 10-12 billion US$ annually, trade in organic products is increasing rapidly. It is estimated to reach 80 billion US$ by 2008. Most of Sudanese commodities are free from chemical contamination and could be sold as organic products provided the necessary infrastructure and procedures are put in place. At present, production and trade on organic products is handicapped by many constraints, including:

1. Absence of a national organising body to oversee the whole range of issues of the supply chain.

2. Lack of awareness of farmers of the opportunities in international markets.
3. Low productivity and high costs of production due to lack of improved technology, weak extension services, and lack of finance.
4. Poor infrastructure and inadequate marketing system.

Sudan must build its organic food industry on sound bases to avoid setbacks. If Sudanese commodities exported as organic are found to be not complying with the strict standards and specifications, it would cost a lot of time and resources before the Sudan can re-enter the international market on organic products. Cultivation dependent on rainfall falls into two categories. Most Sudanese farmers always have relied on rainfed farming. In addition to these traditional farmers, a large modern mechanised rainfed agriculture sector has developed since 1944-45, when a government project to cultivate the cracking clays of central Sudan started in the Al Gedaref area of Ash Sharqi Province, largely to meet the food needs of army units stationed in the British colonies in eastern Africa (Kenya, Tanzania, and Uganda). An average of about 6,000 hectares a year was cultivated between 1945 and 1953, producing chiefly sorghum, under a sharecropping arrangement between the government and farmers who had been allocated land in the project. These estates proved costly, however, and in 1954 the government began encouraging the private sector to take up mechanised farming in the area, a policy that continued after Sudan gained independence in 1956. Under the new approach, the government established several state farms to demonstrate production methods and to conduct research. Research activities have been very limited, however, because of staffing and funding problems, and the farms have been operated essentially as regular production units (Table 3).

The private-sector response was positive, and by 1960 mechanised farming had spread into other areas of the cracking clay zone in Ash Sharqi and Al Awsat provinces. The government set aside rectangular areas that were divided into plots of 420 hectares (later raised in places to 630 hectares) each. Half of these plots were leased to private farmers, the other half left in fallow. After four years, the originally leased land was to be returned to fallow and the farmer was to receive a new lease to an adjacent fallow area. When the demand for land grew faster than it could be demarcated, areas outside the designated project limits were taken over by private individuals. The four-year lease proved unpopular because it meant new investment in clearing land every four years, and apparently much of the worked land continued to be cultivated while fallow land was also placed under cultivation. By 1968 more than 750,000 hectares were being cultivated, of which it was estimated that more than 200,000 hectares constituted unauthorised holdings. The average agricultural production growth rate declined, however, from 2.9 percent in the period between 1965 and 1980, to 0.8 percent in the period between 1980 and 1987, the latest available figures. Reportedly, for the 1991-92 seasons, the Ministry of Agriculture and Natural Resources planned for about 7.3 million hectares of food crops to be planted, with about 1.6 million hectares planted in the irrigated sector and about 5.7 million hectares in the rain-fed areas (Abdeen, 2009).

The investment requirements for mechanised farming favoured prosperous cultivators, and eventually most farms came to be operated by entrepreneurs who raised capital through mortgageable property or other assets in the urban centres. Through arrangements with other individuals, these entrepreneurs frequently managed to control additional plots beyond the legal limit of two. Their ability to obtain capital also permitted them to abandon depleted land and to move into newly demarcated uncleared areas, a practice that had a deleterious impact upon the environment, deprived the indigenous inhabitants of work opportunities, and increased desertification. In 1968, to expand the operator base and to introduce more control over land allocation, crops, and farming methods, the government established the Mechanised Farming Corporation (MFC), an autonomous agency under the Ministry of Agriculture and Natural Resources. From 1968 through 1978, the IDA made three loans to the government to enable the MFC to provide technical assistance, credit for land-clearing and machinery, and marketing aid to individual farmers and cooperative groups. The MFC also became the operator of state farms.

In the late 1970s, about 2.2 million hectares had been allocated for mechanised farming, and about 420,000 hectares more had been occupied without official demarcation. About 1.9 million hectares in all were believed to be under cultivation in any one season. Of the officially allocated land, more than 70 percent was held by private individuals. Private companies had also begun entering the field, and some allocations had been made to them. State farms accounted for another 7.5 percent. About 15 percent of the total allocated land was in MFC-IDA projects. The largest proportion of mechanised farming was in Ash Sharqi Province, 43 percent; the next largest in Al Awsat Province, 32 percent; and about 20 percent was in Aali El Nil Province. Mechanised farming had also been initiated in southern Kurdufan Province through a project covering small-scale farmers in the area of the Nuba

Mountains, but under a different government programme. Proposals also have been made for MFC projects using mechanised equipment in other areas of southern Kurdufan (some have already been tried) and southern Darfur provinces. There were serious feasibility problems in view of competition for land and conflicts with traditional farming practices, difficult soil conditions, and the probable negative effect on the large numbers of livestock of nomads.

Only a few crops had been found suitable for cultivation in the cracking clay area. Sorghum had been the principal one, and during the early 1980s it was planted on an average of about 80 percent of the sown area. Sesame and short-fibre cotton were also grown successfully but in relatively smaller quantities, sesame on about 15 percent of the land and cotton on about 5 percent. Soil fertility has reportedly been declining because of the continued planting of sorghum and the lack of crop rotation. Yields have apparently decreased, but in view of the area's greatly varying climatic conditions and the uncertain production data, definitive conclusions on trends appeared premature (Abdeen Mustafa, 2009).

Table 3
Sudanese agriculture statistics.

Agricultural growth (%)	156	[7th of 149]
Agricultural land (% of land area)	56.65 % of land area	[51st of 198]
Agricultural land (sq. km)	1,346,000 sq. km	[8th of 198]
Agricultural machinery (tractors)	11,856	[81st of 190]
Arable and permanent cropland	16,433 thousand hectares	[20th of 148]
Arable land (% of land area)	7.15 % of land area	[124th of 199]
Arable land (hectares)	17,000,000 hectares	[17th of 199]
Cereal production	156 thousand metric tons	[7th of 149]
Cereal yield (kg per hectare)	398.2 kg/ha	[168th of 171]
Cotton exports	450 thousand bales	[11th of 109]
Cotton production	500	[17th of 109]
Fertiliser use	2.3 kg	[125th of 138]
Food production index	107.8 %	[77th of 182]
Labour share	60.2%	[37th of 149]
Meat production	588 thousand metric tons	[47th of 149]
Pesticide use	0 kg	[46th of 45]
Tractor concentration	0.7	[122nd of 147]
Tractors	11,050	[77th of 147]
Value added annual growth (%)	7.52 %	[22nd of 164]

Grasslands, including acacia-scrub semi-desert and low-woodland savannah, cover two-thirds of Sudan, or approximately 600,000 square miles. This domain stretches from the Sahara on the north to the high-woodland savannas and Nilotic flood region on the south, from Chad on the west to Ethiopia and the Red Sea on the east. During the more than 50 years of their rule in Sudan, the British were content to maintain civil order in this region. They did not attempt any basic change in the economies of the nomadic and settled tribes who lived far from Khartoum.

When Sudan became independent in the mid-1950s, however, the leaders of the new government saw a poor country whose grasslands had immense potential for development. Eager to spur economic growth, the Sudanese minister of agriculture in the 1954 transitional government asked the United Nations to provide experts from the Food and Agriculture Organisation (FAO). Their arrival set in motion a chain of events for agricultural development in the grasslands that daily grows more complex. The work of those early experts and all but the most recent of their successors have been nearly forgotten, even to development practitioners in Sudan. Few things, it seems, fade from memory faster than a development project whose funding has ceased. Yet new projects begin every year. Designed almost without regard to what has gone before, they often repeat the errors of the

past. A critical history of almost a half-century of efforts to improve Sudanese grassland agriculture may therefore be useful both to current workers in Sudan and to anyone broadly interested in the perils of planning (Abdeen Omer, 2009).

2.9. Origins of grassland development

The primary task assigned to the FAO experts in 1954 was to develop policies to check overgrazing, a problem recognised by the British. In 1944 they had established a Soil Conservation Committee that recommended forest plantings on the outskirts of settlements, along with the hillside terracing and stabilisation of active dunes. The chief accomplishment of the committee, however, was the establishment of a Soil Conservation Service dedicated not to constructing terraces or plantings but to excavating hundreds of ponds in the clay plains that cover much of central Sudan. The development of water resources, it was thought, would spread the burden of livestock over a wider area and in this way reduce overgrazing. This approach could work only if livestock populations were stabilised. The government planned to do that by providing no more water than the ranges could support, but the soil-conservation advisor admitted in 1954 that he lacked the staff to do the careful planning this required. Uncontrolled by the government, the livestock population began to rise steeply. In the 25 years after 1917, the numbers of cattle, goats, sheep, and camels in Sudan increased from 3.5 million to about 13 million; in the last decade of British rule, the expansion rate more than doubled to a total of approximately 21 million. Part of that explosive growth may be explained by the decision of the British in 1947 to begin a huge campaign vaccinating cattle against rinder-pest, the most serious of the cattle diseases in Sudan. By 1953 a million inoculations were being given annually.

Sales of livestock might have increased to match these numbers, but markets were slow to develop, especially since European quarantine regulations made it impossible for Sudan to export meat directly from livestock-producing areas. The inevitable result was overgrazing, not only in the traditional grazing grounds but also in the new areas opened by the Soil Conservation Service. An official reconnaissance of grazing resources was conducted in 1955, and it recorded the absence of the choicest forage on the Butana, the plain between the Blue Nile and the Atbara River. M.N. Harrison, the author of that reconnaissance, in striking contrast with much later writing on Sudanese nomadism, did not advocate nomad settlement as a means of checking overgrazing. On the contrary, Harrison admired so-called seasonal migration and considered it the only way, for the time being, that large areas of Sudan could be grazed, because some were too dry in winter and others were too muddy and plagued by biting flies in summer. He noted that the annual movement of nomadic livestock had an elegant symmetry, with one set of elongated north-south ovals traced by migrating cattle and another followed by sheep, goats, and camels. Each year, flies and mud in the Bahr el Arab forced cattle northward to pastures vacated by camels, sheep, and goats that had moved into far northern ranges. A few months later, the cattle shifted south and once again yielded their summer grounds to returning herds of camels, sheep, and goats (Muftafa Omer, 2009).

In recent years, drought and overgrazing, expansion of cultivated areas, and civil unrest have disrupted much of this interlocking movement. Yet the main point of the 1955 report—that only nomads can use much of the area is still true, and Harrison's recommendations for improving nomadism remain valid. The government probably could not reduce the existing livestock population; nor could it combat flies or make the ranges of the Bahr el Arab usable throughout the year. Harrison instead recommended the development of a dense pattern of shallow wells that would be cheap, would open unused areas, and would yield small enough quantities of water that large herds would not be drawn to them. In theory the Soil Conservation Service followed the same line of reasoning, but Harrison took the argument several steps further. First, because most of the Sudan's annual grass was lost each year in dry-season fires, Harrison called for the development of firelines, mechanically or chemically blazed. Second, he stressed the importance of dividing the land around wells into pastures that would be rested and subjected to control grazing in alternate years. Fences were uneconomic, and rotational grazing would have to be managed by careful herders. For this to work, the range had to be allocated and registered to tribal owners. This final recommendation was crucial, because until individuals or groups knew that the benefits of new or improved ranges would be theirs, all efforts to develop rotational grazing would fail. Although Harrison proposed these recommendations in the mid-1950s, Sudan has yet to find anything better.

3. Land-use planning

The FAO experts who arrived in the newly independent Sudan no doubt read the 1955 report and appreciated the risks of unplanned water development. Perhaps that is why they soon recommended that the Soil Conservation Service be renamed the Department of Land Use and Rural Water Development. The change augured well, but by 1959 it was clear that the department was not fulfilling its mission. One FAO expert wrote bluntly that "there is no point" in providing water for uncontrolled pastures and expressed deep concern about "the final consequences" if planning did not precede water development. That warning, and others, went unheeded.

By 1960 there were 470 ponds on the clay plains. In sandy areas too pervious to hold water, diesel-driven pumps lifted water from drilled bore-holes; 700 “wateryards” were built between 1953 and 1960, each with storage tanks, watering troughs, and taps for domestic use. Drawing on funds donated by Sweden, Great Britain, Egypt, Yugoslavia, Czechoslovakia, and Italy, the Sudanese government launched three annual "anti-thirst campaigns" between 1966 and 1968. Between them, these campaigns produced more than 1,000 shallow wells, equipped almost 500 new wateryards, and excavated another 100 ponds. The Department of Land Use and Rural Water Development, in a significant reorganisation, was split in 1965 into a Rural Water Development Corporation, which is still an important agency, and a Department of Soil Conservation and Land Use, which after a steep decline is currently inactive.

3.1. The land-use battle was lost

Until 1974, FAO remained the one strong voice speaking in Sudan against unplanned water development. The agency undertook a series of projects to demonstrate the value of land-use planning. In 1958, for example, it supported a programme of grassland improvement and pasture development that included fencing 250,000 acres at Ghazala Gawazat, east of Nyala. That project, the first one for range improvement in Sudan, unfortunately assumed that fencing was sufficient to exclude livestock. Without community support, of course, the fences were soon and permanently breached. Five years later, another FAO expert proposed ten nomad-settlement ranches, and in 1968 a reduced programme of five such ranches was actually begun. Four were near a grossly underused dried-milk plant built by the Soviet Union at Babanusa, near El Muglad; one was farther north. None were successful. In the case of the northern ranch, the families to whom grazing rights had been assigned overstocked the paddocks tenfold, and the livestock of envious neighbouring tribes also finally had to be admitted.

In 1962, a much bigger project was started by the FAO Special Fund, the unit of FAO that became the United Nations Development Programme (UNDP) in 1966. The Special Fund project had two objectives: first, to bring water to sandy places where boreholes failed and, second, to introduce improved crop, range, and fallows management as part of a comprehensive land-use plan. This project focused on the neighbourhood of El Obeid in Kordofan. Nomads were already settling spontaneously there, in part because water development made it possible. Many areas remained unsettled, however, either because water could not be found or because non-cracking clay soils were too hard for traditional cultivation. The Special Fund conducted an immense, four-year study whose results were intended to be applicable not only to Kordofan but also westward across Africa to the coast of Senegal.

The final report was extraordinarily weak on issues of economics, equitable access to resources, and land tenure. On the question of water supply, for example, cost was almost entirely ignored in the proposed construction of more than 1,000 underground tanks. The non-cracking clays were meanwhile judged as unsuited to smallholder settlement, because the project staff believed that their cultivation required "rehabilitation" with tractor-drawn chisel plows. The report therefore proposed mechanised farms of 1,000 acres; the government was to plow the fields and sow pasture grass for a number of years before leasing the farms for cultivation. The study also recommended the creation of three pilot ranches, each a square six kilometres on a side. The ranches would be cut into fenced quarters, which would be grazed rotationally after the land had been cleared, deep-plowed, and sown to improved grasses (Omer Mustafa, 2008).

A barrier fence 300 kilometres long would stand at the southern rim of the study area, with gates to control migrating stock. If the pilot ranches were successful, the fence itself could serve as one edge of a set of additional ranches. None of these recommendations were implemented. Neither the tanks nor the mechanised farms could ever be economically justified, and there was no reason to believe that the ranches would be more successful than previous FAO attempts to fence Sudan’s ranges. The Special Fund report made a fourth recommendation, however, and under other sponsorship this one was put into practice. The recommendation was that nine model

villages should be established on uninhabited sands. The villages would have been modelled on the traditional Sudanese bush fallow on sandy soils. In this system, millet and peanuts are grown for about four years on a plot that is then retired for 15 years to a crop of acacias tapped by farmers for gum Arabic, historically the principal export of western Sudan. Each model village was to be assigned a block of land six kilometres square, much like the proposed ranches. In this case, however, 90 families, each holding approximately 60 acres, would grow fifteen acres of millet, sesame, and peanuts on a field cultivated for four years. The field would then be retired to acacia for 16 years. Each family would annually bring four acres back into cultivation and plant 1,000 acacias on the plots being retired. The fenced periphery of the block, rimmed with Neem trees, would be grazed by livestock, whose numbers would be strictly controlled.

Though presented as an original idea, the proposed model villages actually revived a suggestion that had been advanced twice during the last years of British rule, first in 1944 by the Soil Conservation Committee and then a decade later by F. P. Stebbing, a forester with long experience in India. Nothing had come of either proposal, and the model settlements proposed by the Special Fund study were at first similarly ignored. Between 1969 and 1974, however, the UNDP sponsored a very similar project elsewhere in Kordofan and farther west in Darfur. Known as the savannah Development Project, it had three objectives that built directly on the Special Fund study. It sought to reclaim one clay area for ranching, to reclaim another for mechanised farming, and to establish a model settlement on sand. The achievements of the project, however, were minimal. One knowledgeable observer, Martin Adam, wrote that the project "was staffed by diverse 'experts' who failed to get along with each other and faced numerous logistic problems". The experimental ranch, for example, was combined with one of the four pilot ranches that the government had begun near Babanusa in 1968. Under the plan, 24,000 acres of interspersed sands and clays would be seeded with introduced grasses and then grazed seasonally: the higher sands in the wet season, and the lower clays in the dry. Water would come from subsurface dams instead of from livestock-concentrating wateryards; nomads would instead use boreholes drilled on adjoining lands. The project had its innovative aspects, but nothing was done beyond reseeding, water development, and initial stocking.

Work on the farm on clay went further, as giant discs and chisel plows ripped 1,500 acres of clay plains at Bano, near El Obeid. The exercise brought no increase in sorghum production, because the clay sealed itself with the first heavy rain and remained impermeable as ever. The best results came instead from planting in furrows laid out on contour lines by a ridger; yields were 50% higher than those from un-contoured, un-ridged plots of sorghum, sesame, and peanuts. Apparently the site was later abandoned; in any case, the record of experiments ceased with the final project document in 1974.

The sand settlement was at Khamsat, 30 miles east of El Daem, in Darfur. Here 24,000 acres were subdivided into 100-acre farms for assignment to 240 families. Each family would cultivate four 6-acre plots, with two in millet, one in peanuts, and one in a crop of their choice. After four years, the fields would be replanted to acacia for the following 16 years. Almost 9,000 peripheral acres were reserved for the exclusive grazing use of the villagers' livestock. Work on the settlement, however, went no further than putting in a wateryard. FAO and UNDP subsequently turned their attention away from land-use planning in Sudan. They did not return to the theme until 1987. The British took up where the United Nations left off. Returning to Sudan after several years of severed relations occasioned by Israel’s Six-Day War, Great Britain funded four immense land-use studies in Sudan. Two concerned southern Darfur, one looked at the western slope of Jebel Marra, and the fourth considered the Nuba Mountains. The southern Darfur studies showed that nine-tenths of the population in the study areas had abandoned nomadism, although their animals often made a seasonal migration under the direction of a few family members or hired herders. So many people were looking for a bit of cropland that fallows were being reduced or eliminated. Yields were thus threatened, and conflicts with the remaining nomads were becoming more and more common as traditional ranges were taken over by cultivators. The situation, in short, was substantially the same as that encountered by the Special Fund study earlier in Kordofan.

The British also helped to implement the model-village proposal that had first been broached in 1944. In 1977, they joined with the World Bank and the Saudi Fund to support the Western Savannah Development Corporation. The project was cancelled in the midst of a domestic financial crisis and begun again in 1981 on a reduced budget, with a foreign contribution of approximately $17 million. In 1985 a second phase started; the World Bank, Britain, and the International Fund for Agricultural Development contributed almost $30 million. Headquartered in Nyala and working in a large area mostly south of that town, the savannah corporation continues to function. Some of its work derives directly from the old FAO projects. It has worked, for example, to see if mechanised plowing on clay soils can be adapted to smallholders. On the pilot-settlement side, it has

established several new villages on sand. Each has had room for several hundred families, to be given long leases to plots of nearby land. Much as the old models proposed, the plots have been designed for a 20-year rotation, with 16-year fallows and 4-year cultivation periods for fields covering almost 15 acres. The corporation also set out, however, to develop and disseminate new crop rotations and programmes of applying phosphate fertilisers that it and the bank maintain are economic and that, in conjunction with rotation, may make fallows unnecessary. In that event, each family will be able to cultivate permanently a large fraction of its holdings; to that end, the corporation is seeking to develop donkey-drawn plows and weeding implements. Meanwhile, the corporation has undertaken innovative range-management programmes. Several villages have been allowed to fence pastures, to which they now enjoy exclusive grazing rights, in exchange for agreeing to keep livestock out of the enclosure during the wet season, when seed sets. A programme has also begun for managing lands used by nomads. In one case, nearby sedentary farmers received exclusive dry-season rights to the land, while the nomads agree to recognise a division of the range into halves between which they will alternate from year to year. The community-based approach is remarkable; so is the absence of fencing for nomad-occupied lands, which are demarcated only with signal poles.

The success of both the settlement and range programmes is a matter of debate. Although three new, slightly modified settlements were added in the second phase of the project, occupation of the first settlements proceeded very slowly, in part because promised schools and clinics were not rapidly established. Moreover, the settlers themselves were ethnically heterogeneous and potentially unstable as a community, and outsiders attracted by water supplies have located beyond the settlement perimeters. They pose a threat to the settler retention of leaseholds, especially of the fallows. Consultants have gone so far as to recommend that the settlements be terminated, and a corporation-staff member has called them poverty traps that consign settlers to subsistence agriculture. If viewpoints like these become accepted, a long-held faith in planned settlements for the Sudanese grasslands will come to an end. The real test of the range experiments will come when the pastures are improved. At that point, livestock owners will be tempted to concentrate their herds on the improved areas. Unfortunately, the corporation has also fallen into the practice of providing water without simultaneously controlling land-use in the neighbourhood of the well; it has paid for the rehabilitation of more than 150 boreholes that are now creating new examples of the problem that the corporation was conceived largely to solve. Better livestock marketing would help, and to that end the World Bank lent $25 million in 1978 for the development of unit trains to carry cattle from Nyala to Khartoum, along with an additional sum in 1984 to establish a new stock trail to help cattle make the long walk to Khartoum. Sudanese railroads, however, are almost out of service, and work on the stock trail is progressing slowly. A better hope for short-term range improvement could lie in the now-apparent decline of livestock populations, a result of degraded ranges, the collapse of veterinary services, and political insecurity.

3.2. Agricultural research

Twenty years after the first foreign experts came to Sudan; aid agencies recognised that the improvement of grassland agriculture might require a long-term commitment to research. The dramatic result was the creation of the Western Sudan Agricultural Research Project (WSARP) in 1978. The World Bank and the United States Agency for International Development (USAID) contributed $30 million to the project, which had as its focus a commitment to research on farming systems. It was to be field based, undertaken in cooperation with farmers and livestock owners, and multidisciplinary, with as much attention to social and economic problems as to conventional agricultural science (Abdeen Mustafa Omer, 2008).

The origins of WSARP can be traced to the experience of USAID with two failed projects undertaken in 1974, when the United States restored diplomatic relations with Sudan. The first was the Abyei Project in southern Kordofan, which served a combination of southern Dinka and northern Arabs. This project enjoyed high-level support from the Sudanese government, which was eager to show that development projects could succeed along the uneasy line of contact between northerners and southerners. In 1981, after spending several million dollars, USAID terminated the Abyei Project because the Dinka wanted only mechanised cultivation and would not accept the alternatives offered principally animal traction or pesticides and no-till cultivation. The other USAID undertaking, upstream from Ed Damazin, the town at Roseires Dam, was the Blue Nile Integrated Rural Development Project. Envisioned as an experiment in research seeking "a viable systems approach to smallholder farms and livestock development which will be suitable for replication," this project provided extension and credit to 2,500 farmers, of whom 1,000 also received tractor services. It consumed approximately $15 million. In 1983,

when $12 million had been committed, the project manager noted that the credit cooperatives were developing slowly, with acute repayment problems, and that the range-management division, charged with "organising and modernising pastoral activity,"had"done little except to conduct a vaccination programme". By the time these projects began, AID realised not only that research was essential to developing Sudanese grassland agriculture but also that this research could not be done in the five years of a typical project. A 1977 study funded by the Ford Foundation offered the basis for a large-scale investment in research. The Ford study showed that agricultural research was dominated in Sudan by the Agricultural Research Corporation. Furthermore, it found that the 175 researchers of the corporation, two-thirds of whom held doctorates from American or British institutions, were strong on laboratory science but weak on fieldwork, strong on pure research but weak on applying it in rural communities. Drawing on the experience of the Ford Foundation in India and the Philippines, the study concluded that the corporation should replace disciplinary groupings with interdisciplinary teams, including social scientists, to address topics such as food grains, cotton, and water management. The study gave special emphasis to the need for research on rainfed agriculture, which had always been neglected by the corporation.

The World Bank joined AID in funding WSARP as a semiautonomous unit of the Agricultural Research Corporation. Four stations were to be established: two in Kordofan, at El Obeid and Kadugli, and two in Darfur, at El Fasher and Ghazala Gawazat, the station originally fenced by FAO in 1958. Although project funds were committed, the development of WSARP was painfully slow. After ten years the Darfur stations were still not operating. The Kadugli station, however, has now been functioning for several years, at first staffed by a handful of American scientists. Among the good things to come from it have been socioeconomic surveys of parts of Kordofan, important studies of intercropping legumes with grain, and initial plans for range management, with a proposal for cooperative programmes with the regional government to introduce land planning in tandem with new boreholes to open ungrazed clay plains. More recently WSARP has come under attack, in part because the work done there has become intellectually insular. Researchers seem less interested in cooperative field studies than in laboratory activities. The team responsible for evaluating the programme in 1986 expressed surprise that plant breeders had ignored the scores of local varieties of sorghum and instead had used whatever seeds they could obtain from the corporation headquarters in the Gezira. The evaluation also observed that the WSARP livestock programme had become focused on supplemental feeding with sesame cake during the dry season, a topic of more interest to animal nutritionists on the staff than to livestock owners.

3.3. Emergency programmes and private-sector initiatives

For WSARP these criticisms could hardly have come at a worse time: Sudan was deep in a crisis induced by drought and by the fall of the seventeen-year Nimeiri regime. USAID decided to concentrate its funds on emergency relief. Rather than try to get WSARP back to its intended purpose, USAID began planning to cut off further support, except for sorghum and millet breeding, as early as 1984. The agency's agricultural programmes shifted toward improved seeds and roads, rural credit, and water development. Land-use planning and research were almost completely discarded as USAID announced in 1984 that it would contribute $60 million to the construction of a $143 million paved highway from Kosti to El Obeid. The African Development Bank agreed to fund another $40 million segment of this highway. In 1985 USAID sponsored an $11 million programme for a southern loop connecting to the trunk. USAID was not alone in this reorientation. In 1980 the European Economic Community (EEC) had accepted primary responsibility for two area development schemes in western Sudan. The smaller of the two, the Nuba Mountains Rural Development Project, aimed at improving traditional farming by introducing ox-drawn hoes, seeders, and ridgers. The plan recognised that farmers would be tempted to plow more land at the expense of their fallows and suggested intercropping with acacia as one solution to the problem. Originally funded with approximately $5 million from the EEC, the project developed slowly. Only about 2,000 comparatively wealthy farmers, 1 percent of the total for the project, had bought the implements when funding expired in 1986. The chief problem, predictably, was a doubling of the cultivated area at the expense of fallows. The project had been justified by assertions that animal traction would boost yields by helping farmers sow on time, establish large plant populations, and weed more thoroughly. In fact, yields did not rise, probably because fallows were being reduced. An evaluation of the project's first phase warned that the area was already over-cropped and contended that research was needed on breeding, fertilisers, crop scheduling, and creation of a sustainable farming system. Yet in 1987, when the EEC budgeted $14 million to fund a second phase of the project, there was no mention of research to create sustainable cropping systems.

A similar shift away from research occurred at the other EEC western project, the Jebel Marra Rural Development Project, in which the EEC has invested some $25 million since 1980. Previous work in this area by FAO and several other groups had focused on irrigation, but that emphasis is now muted. Instead, the adaptive-research unit at the project is focused on improvement of traditional local methods of sorghum and millet production. Animal traction is an important component of this research, and the same problem of declining fallows is appearing here as in the Nuba Mountains project. When the first phase of the Jebel Marra project was evaluated in 1985, the chief criticism was that it gave insufficient attention to field-based, cooperative research.

The World Bank and UNDP, meanwhile, have jointly prepared an immense afforestation project. Tentative budgets in 1986 included a bank commitment of approximately $60 million, a sum that was later chopped back to $22 million. Although the bank remains committed to WSARP, the core of the afforestation project is tree planting, primarily by dissemination of seedlings to farmers. In the preliminary project documents there is no evidence of any attention to the crucial questions of land tenure or how the trees might be used in crop rotations. Even FAO, whose history in Sudan is longer than that of any other foreign agency, has succumbed to the new and impatient approach in its project to manage rangelands around the borehole at El Odaya, southwest of El Obeid. In relying on wholly uneconomic and finally useless barbed wire, it took a giant step backward from the progress made by the Western Savannah Development Corporation. Second-phase plans call for solar-powered electric fencing to be removed when live fencing has been established, but there is no reason to believe that such high-tech solutions will be any more permanent than the now-forgotten ranching experiments of the late 1960s. Other United Nations agencies are proceeding with equal disregard for the long-term consequences of their actions. For example, UNICEF is especially enthusiastic about rehabilitating boreholes but gives little attention to land-use planning around them.

The most promising element in this third phase of agricultural development for the Sudanese grasslands is the heavy emphasis by almost every developmental agency on local participation, although this often entrusted to nongovernmental organisations working as intermediaries between the donors and the Sudanese population. Most of these organisations came to Sudan to help with famine relief during the drought of 1984 and 1985. They then decided to stay in the country, subject to government approval and to continue funding not only from private donations but also from donors like USAID, for whom they often serve as implementing agents. USAID has shown a very strong interest in working with nongovernmental organisations. Its involvement with them in Sudan began with relief activity, afforestation, and distribution of hybrid sorghum seed. The Kordofan feeder-road project, however, also provided grain warehouses for the Agricultural Bank of Sudan and nearly $2 million for private organisations helping small farmers get credit from that bank. Enthusiastic about the activities of nongovernmental organisations in stimulating private-sector development, USAID proposed in 1986 to revise the Regional Finance and Planning Project, which would bring these organisations as USAID contractors into rural communities in Kordofan to help them obtain reasonably priced commercial services. The appeal of these organisations that work closely with rural people has become so great that some principal donors have themselves begun acting like nongovernmental organisations. After turning away from land-use planning in 1974, UNDP spent the next decade on an assortment of projects designed primarily to strengthen a wide variety of government ministries. In 1987, however, it published its third country programme for Sudan, and once again the focus was on rural development. Five districts were chosen as the sites for area-development schemes where United Nations volunteers would work with residents on improving crops and livestock, incomes, medical services, and water supplies. How these things will be accomplished is not explained in the project-identification document and is apparently to be determined largely on the spot by the volunteers.

Attractive as such programmes may be in the short-term, they run the risk of repeating the mistake of the early wave of developmental projects in Sudan. Responding to the need for water, in other words, they will contribute to the continued degradation of the surrounding land. Without effective land-use planning, it is difficult to avoid that result. The Ford Foundation has attempted to minimise the problem by providing funds for research and planning to nongovernmental organisations, but this type of assistance is essentially palliative. It cannot overcome the tendency of these groups to provide potpourris of services that are useful in a narrow sense and potentially calamitous in a broad one. The foundation's involvement is simply too modest to bring about successful land-use planning or to sustain fundamental research.

3.4. The nettle of land tenure

In fairness to the aid agencies, there is little point in putting money into programmes whose achievements are as minimal as those supporting land-use planning and grassland research in Sudan. The proper response, however, is not to abandon these things but to determine why they have failed in the past and how they can be made to succeed in the future. In approaching that problem, one is quickly brought to the difficult subject of land tenure. Although stabilising land tenure is of the utmost importance both for implementing land-use plans and for providing an incentive for sustainable farming systems, almost no progress has been made in Sudan even with land registration, the first step in the process. The problem is worsening. Twenty years ago, stabilising land tenure seemed manageable, because although land distant from the Nile River was rarely in registered private ownership, usufructary rights to most of it were recognised and administered by native authorities that often were well aware of the value of land-use planning.

The Unregistered Lands Act of 1971 essentially abolished the existing tenure structures by declaring unregistered lands to be governmental property. Other legislation at that time reassigned many powers of traditional native authorities to local councils, which in theory could zone unregistered landuses, at least until 1983. The Civil Transactions Act, one of several Islamic laws passed that year, reverted to recognising usufructary rights to unregistered lands and with the fall of the Nimeiri regime in 1985 the powers of the native authorities were partially restored. The situation is confused because it is unclear whether the Civil Transactions Act has or has not been repealed. If it has not, the situation is theoretically as it was before 1971; if it has; unregistered lands remain governmental property, although the local governmental organisations that might plan their use no longer exist. Moreover, there are few legal experts to administer a registration programme even if one is begun. The instability of land tenure undermines the few continuing land-planning efforts. A resource inventory and rehabilitation-development strategy for Kordofan, for example, was recently prepared for the UNDP by the Institute of Environmental Studies, a unit of the University of Khartoum established in 1978 with a grant from the Ford Foundation. The institute drew on university staff for the assignments, and among its consultants were persons who worked in Kordofan on the FAO Special Fund study of 1967. Their influence can be seen in the new study's call for land-use zoning.

Other calls for land-use planning have run afoul of donor indifference. In 1976, for example, the government announced the Desert Encroachment Rehabilitation Programme. Although an essential element was the creation of an office with land-planning capabilities, the project was dissolved into a set of proposals, some of which were funded and some of which were not. Eleven years later, when the new Intergovernmental Authority for Drought and Development held its first donor conference, Sudan's plan was prepared by the same forester who had primary responsibility for the 1976 programme. Once again the plea for planning was ignored in favour of attention to specific projects, shelterbelts for mechanised farming, and fertilisers for traditional cultivators, sand-dune fixation, range rehabilitation, and fuelwood plantations. Donors, it seems, want visible results, not intangible ones, however valuable.

In defense of this orientation, it can be said that there is no point recommending land-use planning in an environment without secure land titles, nor any point in exploring new crop rotations and range management methods when those methods cannot be applied in the absence of secure land tenure. By elimination, donors are left to invest in infrastructure and the support of private enterprise, even though these undertakings threaten to bring back on a grand scale the environmental problems that worried the British 40 years ago.

3.5. Investment in professional development

What is to be done? Some hint of an answer arises from the fact that land tenure is not likely to be stabilised by anyone except the Sudanese themselves. When eventually they address it, they will discover that donors are probably unwilling to fund a triple-pronged set of programmes in land-use planning, research, and private-sector stimulation. All these things must be done, and they will probably only be done by the Sudanese themselves. Only they will be able to do it at a cost affordable to the country and its donors. Ensuring that the Sudanese are capable of implementing these tasks thus becomes a matter of the highest priority. It is by no means assured: the ranks of the civil service and the universities have been severely depleted, as well-trained persons have found financially rewarding opportunities in other countries. The collapse of telephones, mails, and internal air and rail transportation makes the necessary task more difficult each year.

Nonetheless, it is one of Sudan's more remarkable achievements to have created, almost from nothing 30 years ago, a corps of hundreds of professionals. Some able and capable personnel remain, and young professionals are returning even now from advanced training abroad. No one can say how long it will take, before the country gives them the support they need, but foreigners in the meantime can do few more useful things than help keep such people in Sudan. An excellent example is a recent Ford Foundation grant to Sudan's National Council for Research, which has used the funds to sponsor a research competition for multidisciplinary fieldwork in the grasslands. Young researchers have been given support under this programme to study labour costs, locally made plows, and wildlife populations. In the broad scheme the grant is small, but the research personnel are highly capable, and the council has helped Sudan retain some vital personnel.

Many donors will find this an unappealing suggestion, partially because it is neither dramatic nor immediately responsive to the country's urgent needs. Nonetheless, this alternative must be considered in the light of available choices. As this historical survey suggests, the other choices have consistently led to programmes that have been almost totally disappointing, despite initial enthusiasms. Today, the enthusiasm felt by development workers in Sudan is directly proportional to their ignorance of history. The more that history is weighed critically, the likelier will be the conclusion that Sudan needs a more cautious approach, even a temporising one like the one proposed here. Figure 3 shows the states of Sudan.

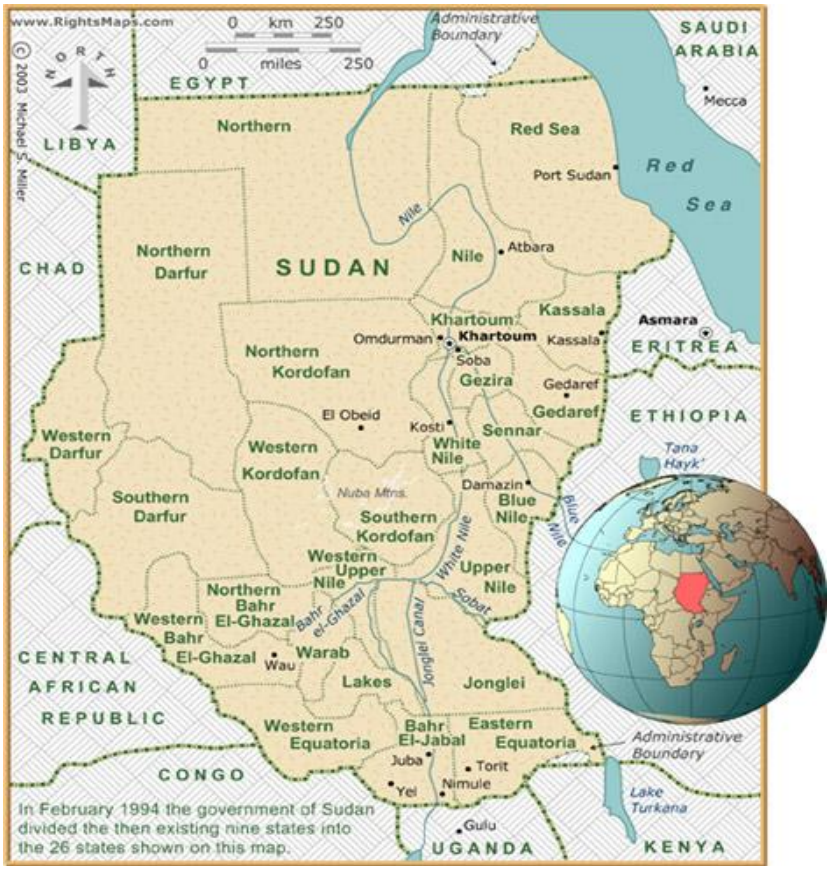

Fig. 3. Map of Sudan.

The economy of Sudan depends heavily on agriculture for employment, production and consumption. The share of agriculture in Sudan's gross domestic product and exports during the period 1987 –1994 was 31% and 85%, respectively. The available resources– in terms of arable land, water and livestock – suggest that agriculture in Sudan provides the best opportunities for future economic growth and development. Yet, the country's agriculture is largely traditional and is characterised by low and fluctuating productivity, which means that modernisation and development are imperative (Figure 4).

Fig. 4. Cotton cultivation in Sudan.

4. Conclusion

The agrarian credit market has recently undergone significant developments in connection with macroeconomic policy reorientation. To correct growing internal and external imbalances and to achieve desirable growth and stability, a medium-term three years National Economic Salvation Programme (NESP) was launched in 1990. With economic liberalisation as an overall objective, the programme sought to reallocate resources to enhance production particularly in agriculture in order to achieve food security and to generate export surplus; to boost the role of the private sector; to remove price and exchange rate controls; to privatise public entities; and to achieve financial stability. By 1992 several price and exchange rate controls were removed. By and large, the most important implication of the recent financial policy is that formal agricultural credit, which between 1970 and 1989 depended almost exclusively on government sources, has since 1990 been assigned to private sources. Indirect measures were taken by the NESP to enhance the involvement of formal financial institutions especially in irrigated agriculture. For example, the activities of the Agricultural Bank of Sudan have been expanded through government support, and commercial banks consortium (CBC) was set up in order to raise credit availability and lower individual bank exposure by means of risk pooling. Nevertheless, it was difficult in the early 1990s to predict the response of Sudan's the fragmented agrarian credit market to the new macroeconomic environment. There was doubt about the ability of the formal financial system to create efficient financial instruments that are compatible with Islamic principles as well as the nature of agriculture. To examine the issues involved, the study sets out two main objectives:

- To describe the institutional structure, practice and limitations of the agrarian credit market in Sudan.
- To develop and estimate a model of household participation in the rural credit market.

The literature on farm economics has come a long way from the early focus on the behaviour of individual farmers within a neo-classical framework, and the rudimentary assumptions of flexible land access and absence of a labour market. In early studies, a production function is normally specified and the marginal conditions for optimal resource use derived, given various consumption and production constraints, and assuming that farmers have choice over the type and quantities of inputs and outputs. One of the major limitations of early models is the assumption that there is complete certainty so that production and consumption decisions are separable. The household fixes a production level and accordingly decides how much labour to hire in or out, how much to lend or borrow, and how much to consume of home-produced and purchased goods in order to attain a desired utility level. The assumption of a perfect capital market implies that credit supply and demand are easily derivable from the utility maximisation model, i.e., given an unconstrained loan supply at a certain interest rate, loan demand is determined at the point of tangency between the utility curves of the borrower and the lender.

Appendix 1. Documents

2005 Global Refugee Trends: Statistical Overview of Populations of Refugees

Hamadab Dam Project: Critical Juncture for Peace, Democracy, and the Environment: Sudan and the

Merowe/Hamadab Dam Project
Beyond Firewood: Fuel Alternatives and Protection Strategies for Displaced Women and Girls
Capacity Building for Sustainable Development: An overview of UNEP environmental capacity development initiatives
Challenges facing returnees in Sudan
Country Pasture Forage Resource Profiles Sudan
Darfur's turbulent times
Developments in Forestry Education in the Sudan
Ecology, Politics and Violent Conflict
The United Nations Work Plan for the Sudan 2005
Forest Genetic Resources
Forestry and the Development of a National Forestry Extension Service: A Sudan Case Study
Fuels 2006: a survey of the humanitarian fuels situation in the context of humanitarian and peacekeeping operations
Fuels 2006: a survey of the humanitarian fuels situation in the context of humanitarian and peace keeping operations
Internal Displacement: global overview of trends and developments in 2005
Guns or Growth? Assessing the impact of arms sales on sustainable development
Improving Traditional Grassland Agriculture in Sudan
Joint Assessment Mission (JAM) Volume I: Framework for Sustained Peace, Development and Poverty Eradication
Joint Assessment Mission (JAM) Volume III: Cluster Reports
Juba Assessment Report: Sudan Local Governance and Capacity Building through Strategic Participatory Town Planning.
Manual on Compliance with and Enforcement of Multilateral Environmental Agreements
New appeal for drought-hit Sudan
Official Sudan Oil and Gas Summit
Oil and Violence in Sudan
Profile of Internal Displacement: Sudan
Raising the stakes: Oil and conflict in Sudan
Report and Recommendation of the President for the Western Sudan Resources Management Programme
Ridding the World of POPs: a guide to the Stockholm Convention on Persistent Organic Pollutants.
Rising Tensions over the Nile River Basin
Scarcity and Surfeit: the ecology of Africa's Conflicts
Statistical Year Book 2001
Strategic Action Programme for the Red Sea and Gulf of Aden
Studies on consumption of forest products in the Sudan - Woodfuel consumption in the household sector
Country Operations plan - Sudan: overview
Sudan Country Profile 2006
Sudan Millennium Development Goals: Interim Unified Report
Sudan to ship 400,000 barrels of new crude
Sudan Millennium Development Goals : Interim Unified Report
Summary Report Darfur Rapid Environment Impact Assessment
Sustainable return depends on collaborative approach
The Nuba Mountains of Sudan: Resource access, violent conflict, and identity
The scorched earth: oil and war in Sudan
Tide of censure for African dams
Populations of Concern to UNHCR: A Statistical Overview

Urban Intensification in Metropolitan Khartoum: Influential Factors, Benefits and Applicability
Water, Sanitation and Hygiene Links to Health
Fact sheet: Sudan - Women, agriculture and rural development
2006 Work Plan for Sudan
Analysis of Nine Conflicts in Sudan
Brief Overview of Sudan Economy and Future Prospects for Agricultural Development
Ecology Textbook for the Sudan
Independent Review of the Environmental Impact Assessment for the Merowe Dam Project
Experience Sharing Tour and Workshop on Shelterbelts and Fuel Wood Substitutes in Sudan
Forest Resources of Tropical Africa Part II Country briefs
Gash Sustainable Livelihoods Regeneration Project
Gezira Scheme
Grasslands of the world
Identification and concentration of organochlorine residues in blood of Sudanese workers at Gezira Agricultural scheme
Inter-Country Workshop On Public Health Pesticides Management In The Context Of The Stockholm Convention On Persistent Organic P
Lateritic Soils in Distinct Tropical Environments: Southern Sudan and Brazil
Local governance to secure access to land and water in the lower Gash watershed, The Sudan
Management Of Public Health Pesticides In Sudan
National Report to the Fifth Session of the United Nations Forum on Forests
Nuba Mountains Land and Natural Resources Study
Southern Sudan: Antelope Survey Update No. 5
State of Forest Genetic Resources in Sudan
A Country Study: Sudan
The Impact of Conflict on Wildlife and Food Security: The Case of Boma
Watershed Erosion and Sediment Transport.
Prevention and disposal of obsolete and unwanted pesticide stocks in Africa and the Near East.
Under-Secretary-General for Humanitarian Affairs warns of Sudan disaster 600,000 people at immediate risk of starvation
UNHCR Global Appeal 2006
Vector Control Situation within the Context of Sectoral Coordination in Sudan

Appendix 2. Facts about Sudan

Location:	Northern Africa, bordering the Red Sea, between Egypt and Eritrea
Geographic coordinates:	It extending between latitudes 3º'N and 23º'N, and longitudes 21º 45'E and 39º'E.
Map references:	Africa
Area:	total: 2,505,810 sq km land: 2.376 million sq km water: 129,810 sq km
Area - comparative:	slightly more than one-quarter the size of the US
Land boundaries:	total: 7,687 km border countries: Central African Republic 1,165 km, Chad 1,360 km, Democratic Republic of the Congo 628 km, Egypt 1,273 km, Eritrea 605 km, Ethiopia 1,606 km, Kenya 232 km, Libya 383 km, Uganda 435 km
Coastline:	853 km

Maritime claims:	territorial sea: 12 nm contiguous zone: 18 nm continental shelf: 200-m depth or to the depth of exploitation
Climate:	tropical in south; arid desert in north; rainy season varies by region (April to November)
Terrain:	generally flat, featureless plain; mountains in far south, northeast and west; desert dominates the north
Elevation extremes:	lowest point: Red Sea 0 m highest point: Kinyeti 3,187 m
Natural resources:	petroleum; small reserves of iron ore, copper, chromium ore, zinc, tungsten, mica, silver, gold, hydropower
Land use:	arable land: 6.83% permanent crops: 0.18% other: 92.99% (2001)
Irrigated land:	19,500 sq km (1998 est.)
Natural hazards:	dust storms and periodic persistent droughts
Environment - current issues:	inadequate supplies of potable water; wildlife populations threatened by excessive hunting; soil erosion; desertification; periodic drought
Environment - international agreements:	party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Law of the Sea, Ozone Layer Protection signed, but not ratified: none of the selected agreements
Geography - note:	largest country in Africa; dominated by the Nile and its tributaries
People	Sudan
Population:	40,187,486 (July 2005 est.)
Age structure:	0-14 years: 43.2% (male 8,865,331/female 8,488,982) 15-64 years: 54.5% (male 10,952,566/female 10,930,218) 65 years and over: 2.4% (male 513,679/female 436,710) (2005 est.)
Median age:	Total: 18.07 years male: 17.86 years female: 18.29 years (2005 est.)
Population growth rate:	2.6% (2005 est.)
Birth rate:	35.17 births/1,000 population (2005 est.)
Death rate:	9.16 deaths/1,000 population (2005 est.)
Net migration rate:	-0.02 migrant(s)/1,000 population (2005 est.)
Sex ratio:	At birth: 1.05 male(s)/female under 15 years: 1.04 male(s)/female 15-64 years: 1 male(s)/female 65 years and over: 1.18 male(s)/female total population: 1.02 male(s)/female (2005 est.)
Infant mortality rate:	Total: 62.5 deaths/1,000 live births male: 63.29 deaths/1,000 live births female: 61.67 deaths/1,000 live births (2005 est.)
Life expectancy at birth:	Total population: 58.54 years male: 57.33 years female: 59.8 years (2005 est.)
Total fertility rate:	4.85 children born/woman (2005 est.)
HIV/AIDS - adult prevalence rate:	2.3% (2001 est.)
HIV/AIDS - people living with HIV/AIDS:	400,000 (2001 est.)

HIV/AIDS - deaths:	23,000 (2003 est.)
Major infectious diseases:	degree of risk: very high food or waterborne diseases: bacterial and protozoa diarrhoea, hepatitis A, and typhoid fever vectorborne diseases: malaria, dengue fever, African trypanosomiasis (sleeping sickness) are high risks in some locations water contact disease: schistosomiasis respiratory disease: meningococcal meningitis (2004)
Nationality:	noun: Sudanese (singular and plural) adjective: Sudanese
Ethnic groups:	black 52%, Arab 39%, Beja 6%, foreigners 2%, other 1%
Religions:	Sunni Muslim 70% (in north), indigenous beliefs 25%, Christian 5% (mostly in south and Khartoum)
Languages:	Arabic (official), Nubian, Ta Bedawie, diverse dialects of Nilotic, Nilo-Hamitic, Sudanic languages, English note: program of "Arabisation" in process
Literacy:	Definition: age 15 and over can read and write total population: 61.1% male: 71.8% female: 50.5% (2003 est.)
Government	Sudan
Country name:	conventional long form: Republic of the Sudan conventional short form: Sudan local long form: Jumhuriyat as-Sudan local short form: As-Sudan former: Anglo-Egyptian Sudan
Government type:	authoritarian regime - ruling military junta took power in 1989; government is run by an alliance of the military and the National Congress Party (NCP), formerly the National Islamic Front (NIF), which espouses an Islamist platform
Capital:	Khartoum
Administrative divisions:	26 states (Wilaya, singular - Wilaya); A'ali an Nil (Upper Nile), Al Bahr al Ahmar (Red Sea), Al Buhayrat (Lakes), Al Jazirah (El Gezira), Al Khartoum (Khartoum), Al Gedaref (Gedaref), Al Wahdah (Unity), An Nil al Abyad (White Nile), An Nil al Azraq (Blue Nile), Ash Shamaliyah (Northern), Bahr al Jebel (Bahr al Jebel), Gharb al Istiwa'iyah (Western Equatoria), Gharb Bahr al Ghazal (Western Bahr al Ghazal), Gharb Darfur (Western Darfur), Gharb Kurdufan (Western Kordofan), Janub Darfur (Southern Darfur), Janub Kurdufan (Southern Kordofan), Junqali (Jonglei), Kassala (Kassala), Nahr an Nil (Nile), Shamal Bahr al Ghazal (Northern Bahr al Ghazal), Shamal Darfur (Northern Darfur), Shamal Kurdufan (Northern Kordofan), Sharq al Istiwa'iyah (Eastern Equatoria), Sennar (Sennar), Warab (Warab)
Independence:	1 January 1956 (from Egypt and UK)
National holiday:	Independence Day, 1 January (1956)
Constitution:	12 April 1973; suspended following coup of 6 April 1985; interim constitution of 10 October 1985 suspended following coup of 30 June 1989; new constitution implemented on 30 June 1998 partially suspended 12 December 1999 by President BASHIR
Legal system:	based on English common law and Islamic law; as of 20 January 1991, the now

	defunct Revolutionary Command Council imposed Islamic law in the northern states; Islamic law applies to all residents of the northern states regardless of their religion; some separate religious courts; accepts compulsory ICJ jurisdiction, with reservations
Suffrage:	17 years of age; universal, but non-compulsory
Executive branch:	chief of state: President Lt. Gen. Omar Hassan Ahmad al-BASHIR (since 16 October 1993); First Vice President Salva KIIR (since 4 August 2005), Second Vice President Ali Osman TAHA (since 20 September 2005); note - the president is both the chief of state and head of government head of government: President Lt. Gen. Omar Hassan Ahmad al-BASHIR (since 16 October 1993); First Vice President Salva KIIR (since 4 August 2005), Second Vice President Ali Osman TAHA (since 20 September 2005); note - the president is both the chief of state and head of government cabinet: Council of Ministers appointed by the president; note - the National Congress Party or NCP (formerly the National Islamic Front or NIF) dominates al-Basher's cabinet elections: president elected by popular vote for a five-year term; election last held 13-23 December 2000 (next to be held NA) election results: Field Marshall Omar Hassan Ahmad al-BASHIR re-elected president; percent of vote - Omar Hassan Ahmad al-BASHIR 86.5%, Jaafar Muhammad NUMAYRI 9.6%, three other candidates received a combined vote of 3.9%; election widely viewed as rigged; all popular opposition parties boycotted elections because of a lack of guarantees for a free and fair election note: al-BASHIR assumed power as chairman of Sudan's Revolutionary Command Council for National Salvation (RCC) in June 1989 and served concurrently as chief of state, chairman of the RCC, prime minister, and minister of defense until mid-October 1993 when he was appointed president by the RCC; he was elected president by popular vote for the first time in March 1996
Legislative branch:	unicameral National Assembly (360 seats; 270 popularly elected, 90 elected by supra assembly of interest groups known as National Congress; members serve four-year terms) elections: last held 13-22 December 2000 (next to be held NA) election results: NCP 355, others 5
Judicial branch:	Supreme Court; Special Revolutionary Courts
Political parties and leaders:	the government allows political "associations" under a 1998 law revised in 2000; to obtain government approval parties must accept the constitution and refrain from advocating or using violence against the regime; approved parties include the National Congress Party or NCP [Ibrahim Ahmed UMAR], Popular National Congress or PNC [Hassan al-TURABI], and over 20 minor, pro-government parties
Political pressure groups and leaders:	Democratic Unionist Party [Muhammad Othman AL-MIRGHANI]; National Democratic Alliance [Muhammad Othman AL-MIRGHANI, chairman]; Sudan People's Liberation Movement/Army [Dr. John GARANG]; Umma Party [Sadiq al-MAHDI]
International organization participation:	ABEDA, ACP, AfDB, AFESD, AMF, AU, CAEU, FAO, G-77, IAEA, IBRD, ICAO, ICCt (signatory), ICRM, IDA, IDB, IFAD, IFC, IFRCS, IGAD, ILO, IMF, IMO, Interpol, IOC, IOM, ISO, ITU, LAS, MIGA, NAM, OIC, OPCW, PCA, UN, UNCTAD, UNESCO, UNHCR, UNIDO, UPU, WCO, WFTU, WHO, WIPO, WMO, WToO, WTO (observer)
Diplomatic representation in	chief of mission: Ambassador (vacant); Charge d'Affaires, Ad Interim Khidir

the US:	Haroun AHMED (since April 2001) chancery: 2210 Massachusetts Avenue NW, Washington, DC 20008 telephone: [1] (202) 338-8565 FAX: [1] (202) 667-2406
Diplomatic representation from the US:	chief of mission: Ambassador (vacant); Charge d'Affaires Gerard M. GALLUCCI embassy: Sharia Abdul Latif Avenue, Khartoum mailing address: P. O. Box 699, Khartoum; APO AE 09829 telephone: [249] (11) 774611 or 774700 FAX: [249] (11) 774137 note: US Consul in Cairo is providing backup service for Khartoum
Flag description:	three equal horizontal bands of red (top), white, and black with a green isosceles triangle based on the hoist side
Economy	Sudan
Economy - overview:	Sudan has turned around a struggling economy with sound economic policies and infrastructure investments, but it still faces formidable economic problems, starting from its low level of per capita output. From 1997 to date, Sudan has been implementing IMF macroeconomic reforms. In 1999, Sudan began exporting crude oil and in the last quarter of 1999 recorded its first trade surplus, which, along with monetary policy, has stabilised the exchange rate. Increased oil production, revived light industry, and expanded export processing zones helped sustain GDP growth at 6.4% in 2004. Agriculture production remains Sudan's most important sector, employing 80% of the work force, contributing 39% of GDP, and accounting for most of GDP growth, but most farms remain rain-fed and susceptible to drought. Chronic instability - resulting from the long-standing civil war between the Muslim north and the Christian/pagan south, adverse weather, and weak world agricultural prices - ensure that much of the population will remain at or below the poverty line for years.
GDP (purchasing power parity):	$76.19 billion (2004 est.)
GDP - real growth rate:	6.4% (2004 est.)
GDP - per capita:	Purchasing power parity - $1,900 (2004 est.)
GDP - composition by sector:	Agriculture: 38.7% industry: 20.3% services: 41% (2003 est.)
Labour force:	11 million (1996 est.)
Labour force - by occupation:	Agriculture 80%, industry and commerce 7%, government 13% (1998 est.)
Unemployment rate:	18.7% (2002 est.)
Population below poverty line:	40% (2004 est.)
Household income or consumption by percentage share:	lowest 10%: NA highest 10%: NA
Inflation rate (consumer prices):	9% (2004 est.)
Investment (gross fixed):	16% of GDP (2004 est.)
Budget:	Revenues: $3.057 billion expenditures: $2.965 billion, including capital expenditures of $304 million (2004 est.)
Public debt:	79.7% of GDP (2004 est.)

Agriculture - products:	cotton, groundnuts (peanuts), sorghum, millet, wheat, gum Arabic, sugarcane, cassava (tapioca), mangos, papaya, bananas, sweet potatoes, sesame; sheep, livestock
Industries:	oil, cotton ginning, textiles, cement, edible oils, sugar, soap distilling, shoes, petroleum refining, pharmaceuticals, armaments, automobile/light truck assembly
Industrial production growth rate:	8.5% (1999 est.)
Electricity - production:	2.581 billion kWh (2002)
Electricity - production by source:	fossil fuel: 52.1% hydro: 47.9% nuclear: 0% other: 0% (2001)
Electricity - consumption:	2.4 billion kWh (2002)
Electricity - exports:	0 kWh (2002)
Electricity - imports:	0 kWh (2002)
Oil - production:	345,000 bbl/day (2004 est.)
Oil - consumption:	70,000 bbl/day (2004 est.)
Oil - exports:	275,000 bbl/day (2004)
Oil - imports:	0 bbl/day (2004)
Oil - proved reserves:	1.6 billion bbl (2004 est.)
Natural gas - proved reserves:	99.11 billion cu m (2004)
Current account balance:	$-763.6 million (2004 est.)
Exports:	$3.395 billion f.o.b. (2004 est.)
Exports - commodities:	oil and petroleum products; cotton, sesame, livestock, groundnuts, gum Arabic, sugar
Exports - partners:	China 66.9%, Japan 10.7%, Saudi Arabia 4.4% (2004)
Imports:	$3.496 billion f.o.b. (2004 est.)
Imports - commodities:	foodstuffs, manufactured goods, refinery and transport equipment, medicines and chemicals, textiles, wheat
Imports - partners:	China 13%, Saudi Arabia 11.5%, UAE 5.9%, Egypt 5.1%, India 4.8%, Germany 4.5%, Australia 4.1%, Japan 4% (2004)
Reserves of foreign exchange and gold:	$1.652 billion (2004 est.)
Debt - external:	$21 billion (2004 est.)
Economic aid - recipient:	$172 million (2001)
Currency (code):	Sudanese Dinar (SDD)
Currency code:	SDD
Exchange rates:	Sudanese Dinars per US dollar - 257.91 (2004), 260.98 (2003), 263.31 (2002), 258.7 (2001), 257.12 (2000)
Fiscal year:	calendar year

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