STANDARD HIGH SCHOOL ZZANA
S.4 GEOGRAPHY PAPER TWO
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AGRICULTURE IN AFRICA

Agriculture is the growing of crops and rearing of animals on either a large or small piece of land for commercial or domestic purpose. It can also be categorized based on food crops for subsistence or cash crops for commercial use.

Agricultural systems in Africa can be subdivided into

- Subsistence /primitive farming- shifting cultivation, rotational bush fallowing, pastoralism.
- Modern/advanced farming- plantation farming, intensive scientific farming, ranching, etc.

(a) Subsistence farming

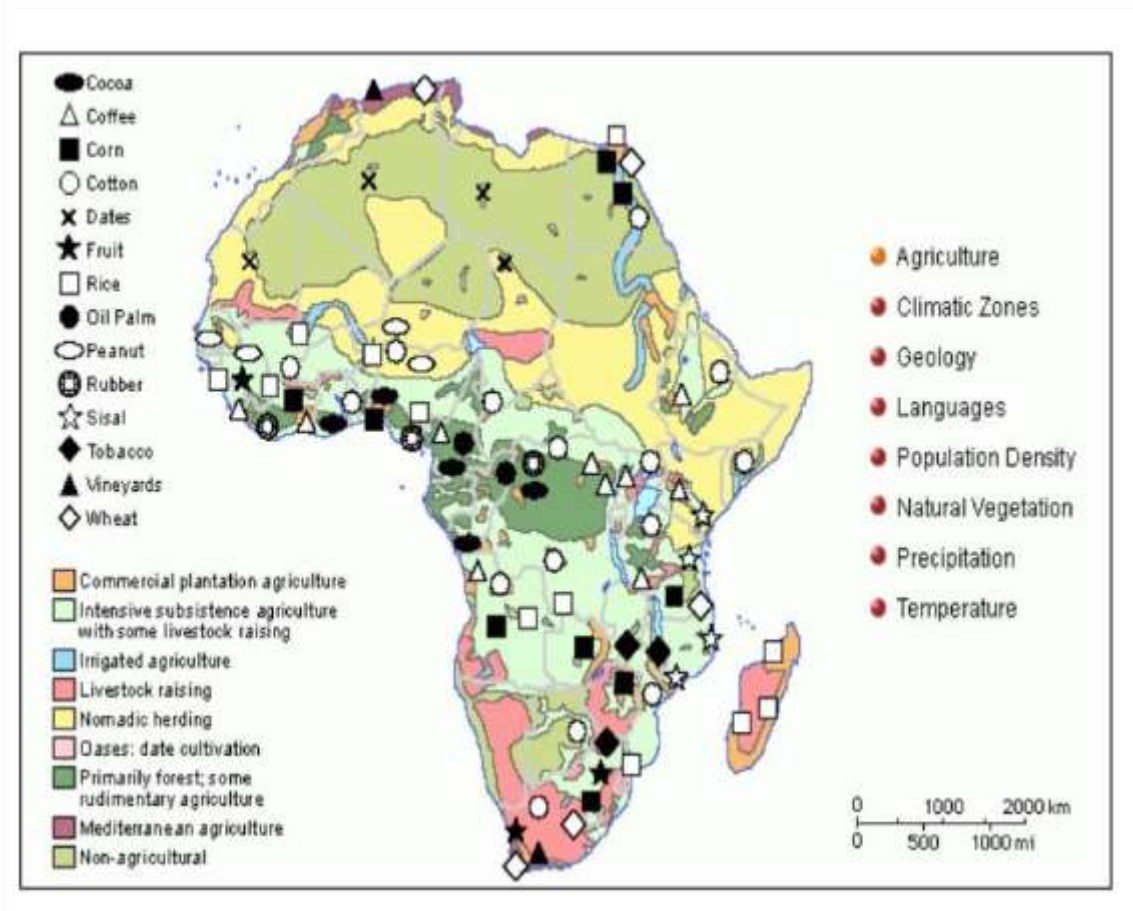
This is the practice where a farmer grows food and rears a few animals for home consumption mainly on a small piece of land.

Characteristics

- Use of family labor
- Use of elementary tools/rudimentary
- Food crops are grown
- Small piece of land is cultivated
- Plots are fragmented and scattered

- Basically meant for home consumption and no surplus for sell
  - No use of scientific methods
  - Supplemented by hunting, fishing, fruit/food gathering

Sketch map showing major crops and agricultural practices



Shifting cultivation

This involves the clearing away of natural vegetation so as to cultivate it; land is cultivated for 2 to 3 years after it is abandoned due to low crop yields thus moving to a virgin land. E.g. Azande

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of DRC, Bemba of Zambia, Benue of Nigeria and Chipinga district of Zimbabwe.

Characteristics

- Practiced on a small piece of land
- Family labor is used
- Plots are fragmented and scattered
- Clearing away of natural vegetation
- Use of elementary tools
- No care is given to the crops
- Mixed farming is practiced
- Involves shifting from the exhausted land to a virgin land.
- No use of scientific methods or inputs

Advantages

- High level of pest and disease control through weeding and bush burning
- Provides time for the practice of other activities like fishing, hunting, etc

  Very cheap due to use of family labor and elementary tools
- Less vulnerability to disease vectors and pests through mixed farming
- Soil gains fertility through burnt ash containing potassium, nitrate and sodium
- High chances of acquiring virgin fertile land

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Disadvantages

- Bush burning exposes land to agents of soil erosion
- Limited food production
- Only practiced in areas with sparse population
- Its time wasting moving from one place to another
- Promotes environmental degradation
- Promoted land fragmentation by scattering cultivable land
- Limits possibilities of commercial farming due to being subsistence

Rotational Bush Fallowing

This involves the sub-dividing of land into manageable cultivable pieces or blocs which are farmed at intervals. One plot or bloc which has been intensively farmed is left to rest by fallowing while the adjacent one is cultivated as is the case in Ghana, Zambia and Nigeria.

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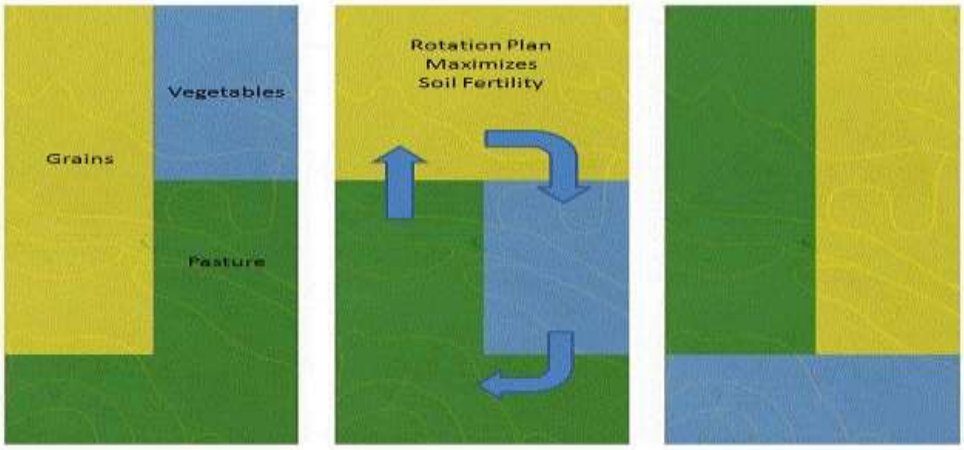

Illustration

Characteristics

- Use of family labor
- Limited use of scientific methods
- Mixed farming is practiced
- Limited bush burning practices
  Use of elementary tools
- Involves movement of the farmer in the gazetted bloc
- Permanent settlement of the farmer
- Land is subdivided into manageable blocs
- Crops and animals are cared for
- Exhausted land is left to fallow (gain its fertility)
- Food crops are grown and the surplus is sold

Advantages of Rotational bush fallowing

- Encourages growth of food and cash crops

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  - Land is sustainably used since one block is cultivated at a time
  - Helps maintain and increase on the soil fertility
  - High yields are obtained due to cultivating sizeable blocs
  - Provides room for modern farming through amalgamation of blocs
  - Crops are cared for hence high productivity
  - Relatively cheap due to use of family labor
  - Limited vulnerability to disease vectors
  - Limits environmental degradation since bush burning is limited
  - Growth of cash crops improves standards of living

Disadvantages

- Absence of scientific methods affects crop yields
- Fallowing tends to house disease vectors and wild animals in the bloc
- Use of family labor limits greater output
- A few cash crops are grown which does not guarantee a better living standard
- Limits extensive commercial farming due to the small blocs cultivated
- Land fragmentation leads to time wastage and misuse of land

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Pastoralism/ Normadic farming

This involves the rearing of livestock while moving from one place to another in search of water and pasture.

Normadic pastoralism is a cultural practice where rearing of animals is a dominant livelihood moving from one place to another searching for pasture and water.

Transhumance is the seasonal movement of pastoralists from one place (having unfavorable climatic conditions) to another (with better conditions).

In Africa, pastoralism is practiced by many communities like the Masaai of Kenya and Tanzania, Turkana and Pokot of Kenya, Karimojong of Uganda, Dinka and Fellahins in Sudan, Fulani of West Africa, etc.

Characteristics

- Large number of animals are reared with no respect for quality
- Local breeds are reared
- Land is communally owned
- Communal grazing is practiced
- Involves moving from one place to another in search for water and pasture.
- Animals are fed on natural pastures
- Family labor is used to graze animals
- Animals are kept for subsistence purpose
- Practiced in areas of aridity or areas with unreliable rainfall.

- Overstocking is practiced which brings about overgrazing.
- Bush burning especially at the end of the dry spell expecting fresh nutritious grass

Advantages

- Promotes unity and cooperation due to communal grazing and communal ownership of land.
- Helps preserve the nomadic culture since it's a cultural practice.
- Less prevalence of pests and disease vectors due to movement
- Less affected by natural calamities due to seasonal movement
- It's a basic form of employment to the natives where the herdsmen derive their livelihood.

Disadvantage

- Communal grazing leads to easy spread of diseases
- Prone to cattle raiding and rustling due to the culture

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- Local breeds are reared leading to poor yields

  Long distances lead to tiredness of herdsmen and animals and death of animals

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- Bush burning destroys natural vegetation exposing the land to erosion agents like wind.
- It perpetuates primitive life styles in a modern civilized world

The practice of burning grass leads to environmental degradation which affects the natural vegetation and the soil texture.

Fulani community of West Africa

These are a typical nomadic community found in West Africa comprising of about 7 million people. They are traditionally referred to as the Fulah/ Foulah/ Fulbe or Peuls.

They are said to have originated from West Africa in Senegambia around the 4^{th} and 5^{th} century AD considered to be the largest nomadic group in the world characterized by lighter skin and straighter hair. They are subdivided into the nomadic pastoral Fulani and the settled Fulani (Fulbe wuro) speaking

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languages such as Pulaar or Fulfulde, Futa-toro, Futa-jallon and Masina.

Basically keep cattle, sheep and goats traversing the whole of West African territory from Mauritania, Senegal, Guinea, Gambia, Mali, Niger, Nigeria, Sierra Leone, Benin, Chad, Togo, Cameroon, Ghana, Liberia, Sudan and Central African Republic.

Sketch map showing the Fulani grazing land

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Factors for the practice

- Pastoral culture as a livelihood
- Communal owner ship of land

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Infertile sandy soils that can’t sustain arable farming

Limited open surface water

- Abundant pasture especially in the southern Savannah belt
- Sparse population in the region reserving large expanses of land
- Relatively flat land with few geographical barriers for easy movement
- Occurrence of natural calamities like drought, famine, etc
- Government negligence of not effectively caring for the normads
- Aridity of the Sahel region with limited water and pasture
- Prevalence of pests and disease vectors that harm herdsmen and livestock

Problems faced

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- Occurrence of natural hazards like floods, famine and drought hence death of animals and herders.
- Presence of pests and diseases like ticks, tsetse flies and nagana, foot and mouth disease, etc Migratory nature makes the animals lose weight and some die

  Raiding and cattle rustling leading to loss of cattle and human lives.
- Limited pasture and water due to overgrazing and aridity
- Desert climate with high evaporation rates this makes open surface water very limited hence death of animals.
- Wild animals as they look for water and pasture
- Rearing of poor breeds that cause poor yields
- Limited grazing land for individual livestock
- Political instability caused by religious differences
- Absence of well defined territorial boundaries leading to clashes with hostile tribes

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  - Poor infrastructure especially roads to link the area to market centers
  - Limited veterinary services and extension workers for the sick livestock
  - Overstocking leading to over grazing
  - Practice of bush burning leads to growth of coarse non-nutritious grass
  - Limited labor for effectively rearing animals

    Loss and mistaken identity of the animals due to communal grazing

    Poor shelter and living conditions for the herdsmen

(b) Modern/Advanced farming

This is a more advanced farming practice involving the growing of crops and rearing of animals on a large scale using scientific means for commercial purpose.

Modern farming in Africa has greatly improved from subsistence farming to plantation farming, irrigation

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farming, ranching and market gardening/fruit growing/truck farming, etc.

Characteristics

- Practiced on a large piece of land
- Crops are grown and animals reared basically for commercial purpose
- Its labor intensive with paid labor
- Capital intensive
- Highly mechanized
- Use of scientific methods
- A lot of care is given to crops and animals

- Involves record keeping to ensure quality
- High quality seeds and exotic animals are kept
- Specialization with dominant crop or animals

Plantation farming

This involves the growing of one cash crop on a large piece of land for commercial purpose. It is currently wide spread in Africa e.g. cocoa growing in Ghana, palm oil growing in Nigeria, rubber growing in Liberia, rice growing in Senegal, sugarcane growing in South Africa, etc

Characteristics

- Basically owned by foreigners or a joint venture with government
- Capital intensive
- Labor intensive
- Practiced on large piece of land
- Crops are perennial in nature like rubber, cocoa, etc
- Specialization
- Etc (as modern farming)

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Advantages

Effective utilization of land

- Very high productivity per unit area
- Source of employment opportunities
- Income earning by the farmers and plantation owners
- Government revenue through and taxation licensing
- Foreign exchange through export trade
- Promoted international trade and relations
- Infrastructure development for workers and communities around
- Provides market for industrial machinery
- Development of out-growers schemes market and for their produce
- Skill acquisition by the plantation workers
- Development of agricultural research and technology with better seeds

Disadvantages

- Promotes soil exhaustion due to monoculture

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  - Over utilization of fertilizers leads to acidity and distorting the texture
  - Exploitation of labor with little pay
    Environmental degradation as natural vegetation is cleared for farming
  - Distorts the climatic pattern of an area by replacing natural vegetation with crops that give little evapo-transpiration
  - Great losses incurred in case of a calamity
  - Price fluctuation due to high productivity and supply on the world market
  - High competition from other producers and substitutes
  - Profit repatriation by foreigners
  - Displacement of people when more land is needed
  - Crops have a long gestation of 3 to 6 years

Cocoa growing in Ghana

It is the second largest producer in the world after Ivory Coast with Kumasi as the main production area.

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Cocoa tree is a native of the Amazon basin that was brought in Ghana in 1879 and export started between 1911 to 1976 with a gestation period of 3 years. Cocoa growing is dominant in the forested areas of Ashanti, Brong-Ahafo, central, western, eastern and

Volta regions where rainfall is between 1000mm to 1500mm per annum with temperature ranges of 21° to 23°C on plots of less than 3 hectares with the growing calendar starting in October.

Sketch map showing cocoa growing areas


Key
cocoa growing region
capital city
other cities / towns
Bawku
Tumu
Han
Bolgatanga
Wa
Yendi
Tamale
Wenchi
Sunyani
Mampong
Kumasi
Cocoa Growing Region
Ho
Obuasi
Adjekrom
Koforidua
Tema
Accra
Cape Coast
Takoradi
ATLANTIC OCEAN

Factors for growth of cocoa in Ghana

- Extensive land especially in the south that enables expansion of cocoa plantations.
- Well drained fertile soils that enables the production of good yields
- Abundant drainage in the south that provides water for irrigation e.g. river Tano and Pra
- Conducive climate having rainfall totals of 1000 mm to 2500 mm and temperature of 21° to 23°C.
- Low altitude towards the Atlantic favoring mechanization
- Abundant/cheap labor required for planting, harvesting, etc
- Adequate capital to buy farm inputs
- Positive government policy favoring plantation farming by giving out land and part of capital to investors.
- Efficient transport and communication networks e.g. railway network linking Axim, Takoradi, Accra, etc
- Agricultural research providing good quality seeds

- Political stability in the south favoring investment
  Internal and external market for seeds and products
- Natural equatorial vegetation shielding the cocoa trees from strong winds

Harvesting and processing

- Cocoa matures in 3 years producing pods that turn yellowish when ripe
- Harvesting is done with the help of a cutlass twice in a given calendar year i.e. September to January and April to July.
- Pods are heaped on the ground and later split open using a panga
- Seeds are extracted and laid on the ground for fermentation covered with leaves for 4 to 6 days
- The fermented seeds are then placed on a raised platform for sun drying
- The dry seeds are then packed and taken to the state cocoa marketing board for exportation through port Tema, Takoradi, etc

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Uses

- Making chocolate
- Making cocoa butter and other cosmetics
  Making cocoa beverages
- Dry pods act as fire wood

Importance

- Employment opportunities to the farmers
- Skill acquisition in planting, harvesting and processing, etc
- Farmers earn income that improves on their standards of living.
- Government earns foreign exchange through export of cocoa and cocoa products.
- Revenue to the government by taxing and licensing cocoa processing industries.
- Promotion of international trade and relations with the importing countries like USA,United kingdom.
- Increased investment in the agricultural sector

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  - Favored out-growers schemes hence helping them earn a living.
  - Agricultural research has been enhanced for quality seeds and pest control
  - Avenues for academic research and study
  - Promoted industrialization especially beverage industries

    Food from cocoa products like chocolate
  - Infrastructure development especially railway linking Kumasi to exporting ports
  - Urbanization in the cocoa growing areas like Kumasi and Accra

Problems faced

- Competition for market from other producers like Nigeria and Cameroon
- Competition from substitutes like cinnamon, tea, vanilla, etc
- Pests and diseases like swollen shoot and black pod disease
- Limited labor especially during the harvest period

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  - Land shortage arising from competition for settlement an industrial development
  - Price fluctuation on the world market
  - Railway transport is slow affecting delivery
  - Unfavorable climatic conditions like heavy rains, floods in the low lands, prolonged dry spell, etc
  - Limited farm inputs like fertilizers, insecticides, etc

    Congestion at the ports especially Accra, Tema and Takoradi
  - Long gestation period

Palm oil growing in Nigeria

Oil palm is a native of West Africa referred to as ‘elaeis guineensis’ originating from Guinea. The oil palm can reach 60 to 80 feet in height in nature. It is grown mainly in southern Nigeria due to the natural vegetation and over 90% is from wild palms in groves around Warri, Onitsha and port Harcourt. It can also be propagated by seed using the F1 hybrid seed.

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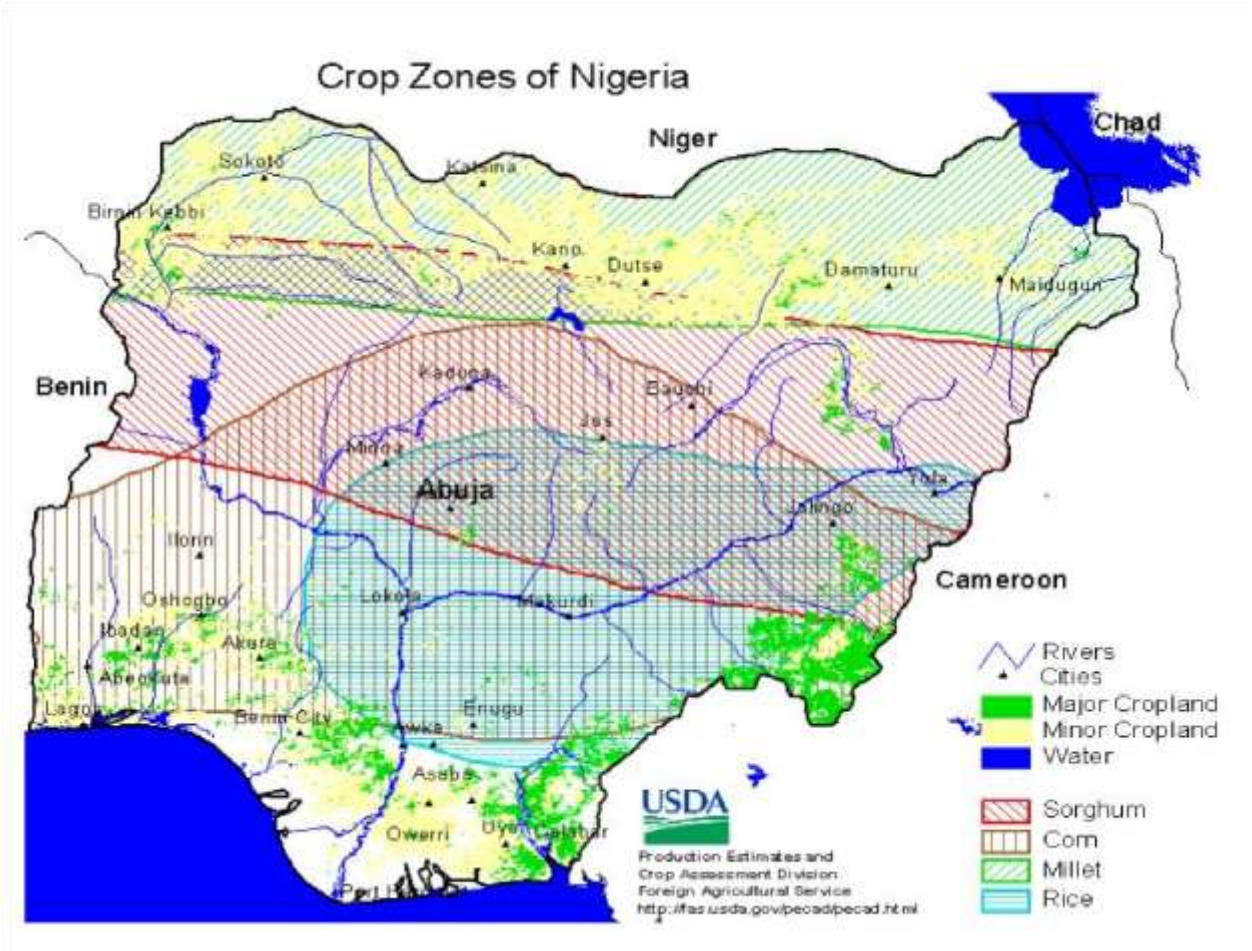
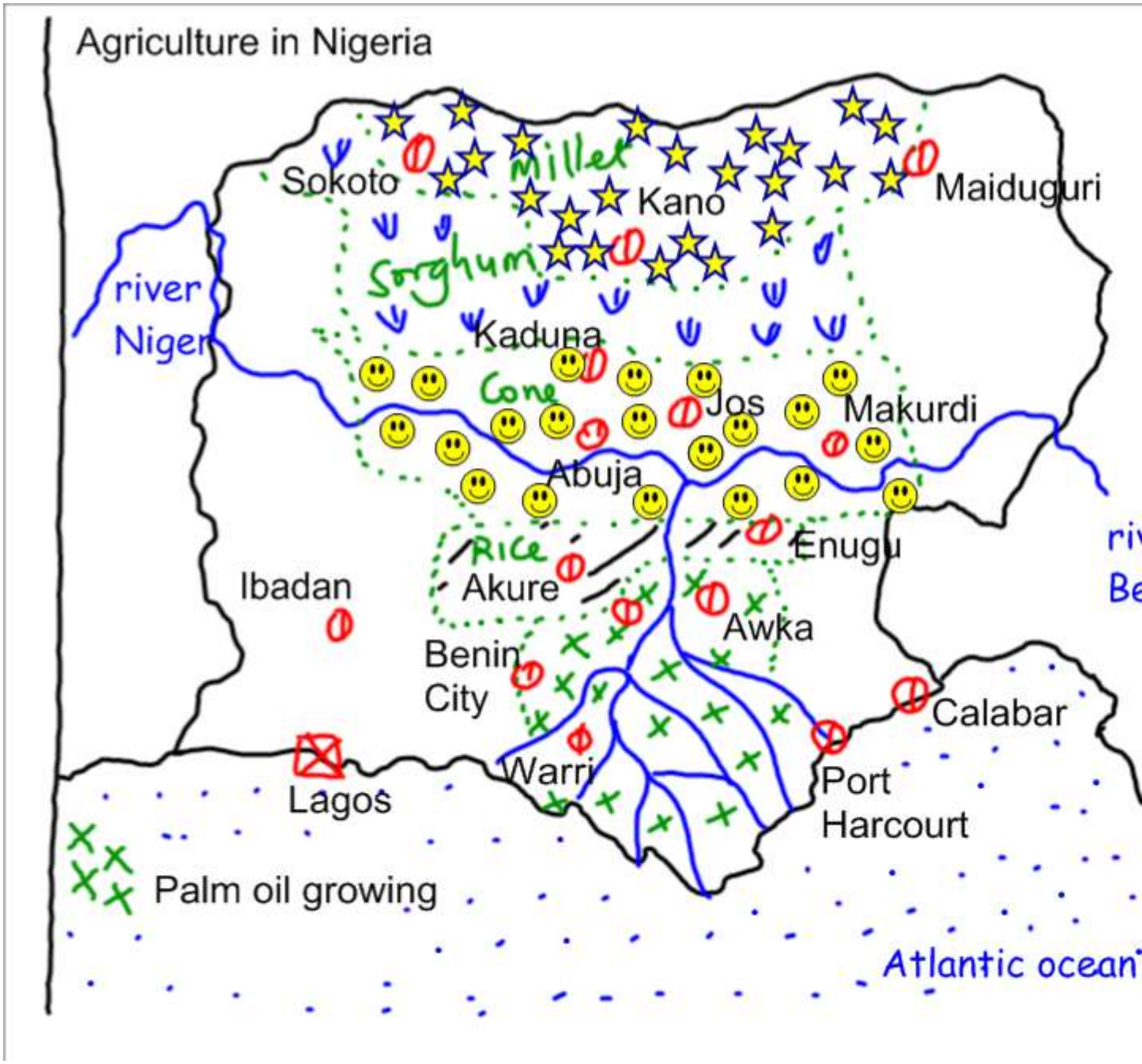
The mature trees grow up to 20 meters, palm fruit takes 5 to 6 months to mature from pollination to maturity. Nigeria grows other crops like cassava, yams, ground nuts, cotton, rubber, etc.

Other countries include Gabon, Benin, Ivory Coast, Togo, Sierra Leone, etc.

Sketch map showing crops grown


Crop Zones of Nigeria
Niger
Chad
Benin
Cameroon
Sokoto
Katsina
Birnin Kebbi
Kano
Dutse
Damaturu
Maiduguri
Kaduna
Bauchi
Jos
Minna
Abuja
Ilorin
Lokoja
Makurdi
Oshogbo
Ibadan
Akure
Abeokuta
Lagos
Benin City
Awka
Enugu
Asaba
Owerri
Uyo
Calabar
Rivers
Cities
Major Cropland
Minor Cropland
Water
Sorghum
Corn
Millet
Rice
USDA
Production Estimates and
Crop Assessment Division
Foreign Agricultural Service
http://fas.usda.gov/pecad/pecad.html



Factors favoring

- Extensive land in the marshy delta region and the riverine area/shores i.e. Benue and Niger.

- Fertile alluvial soils of the delta region.
- Favorable climatic conditions i.e. 21°C and rainfall of 1500mm per annum
- Abundant labor for planting harvesting and processing
- Adequate capital to buy farm inputs
- Availability of ready market within and outside for palm oil and its products.
- Positive government policy favoring large scale farming
- Efficient transport and communication services like roads that transport palm oil and its products.
- Agricultural research by the Nigerian institute of palm oil research
- Requires simple technology in processing
- Relative peace and stability in the south unlike the north bothered by religious wars

Harvesting and processing

Palm nuts mature in 3 years turning orange-red when ripe and each tree is visited 10 to15 days as bunches ripen throughout the year

- Bunches are harvested with the help of a chisel or hooked knives attached to log poles for short trees and ropes for tall trees
- Palm nuts are detached from bunches by stripping and crushed/smashed by pounding in the mortar or hollowed out tree stump to weaken the veins
- The pounded fibres/pulps are then mixed with water for heating or boiling to remove excess water
- Oil melts out or is strained from the fibrous pulp and floats on the surface of the water
- Oil is then scooped off and put in vessels (traditional method) for use or by the hydraulic pressing
- Oil can be further purified at the oil mills giving a more refined product
- The nut shells are also crushed when dry extracting the white substance that is processed for consumable oil

- Palm oil is stored in large steel tanks at 88-105F to keep it in liquid form during bulk transportation and the tank headspace is flushed with carbon-dioxide to prevent oxidation

Uses

- Making cooking oil, cheese and margarine
- Making soap and other cosmetics
- Making paint
- Making palm wine
- Dry fibres and nut shells act as fuel
- Palm leaves are used in craft
- Ingredient for making bread mixed in the dough
- Salad dressing for a good color and aroma preserving it for 30 days
- Making peanut butter
- Used in coffee whiteners or coffee creamers
- Vegetable oil is used to replace milk fat in dairy products

Importance

- Employment opportunities e.g people who work in the plantation during the planting

season,harvesting,marketeers,processors of palm oil etc.

Income to the farmers improving their standards of living.

- Skill acquisition in processing oil by the workers who operate different machines to bring out the bi-product as oil.
- Government revenue through taxing and licensing of the different companies that deal in the planting and processing of palm oil.
- Foreign exchange through export of palm oil and other products like cheese, margarine.
- Reduces government expenditure on importing palm oil and the related items like edible oil, margarine, etc.
- Domestic food stuffs like cooking oil, palm wine are provided at relatively cheaper prices.
- Promotion of international trade and relations with countries that import Nigeria's palm oil and its products.
- Industrial development of beverage industries

e.g. oil mills

- Development and improvement of infrastructure for purifying and marketing oil, transporting oil and other products etc.
- Agricultural research and modernization
- Ground for academic research and study

Problems faced

- Pests and diseases like anticrose and treekles
- Limited land for expansion due to competition from petroleum drilling, settlement, etc
- Limited labor especially during the harvesting season
- High cost of production and transportation
- Competition from other producers like Gabon, Ivory Coast that reduce the market potential.
- Competition from domestic substitutes like shear nuts, ground nuts, simsim that reduce projected profits and local market.
- Risks of death when climbing the trees
- Occasional flooding in the marshy areas affecting harvesting and transportation
- Price fluctuation in the world market
- Weeds that compete with the palm trees for nutrients in the marshy land

- Fire outbreak especially during the dry season through friction of leaves that claim acres of palm trees hence reducing quantity
- Pollution of land from the petroleum industries Civil unrest in the region of the Niger delta

Rubber growing in Liberia

This is called ‘coautehouc’ from latex a native of Brazil of the species of ‘hevea-brasiliens’ having a straight trunk and bark which is usually fairly smooth and grey in color growing to 40 m in the wild and 25 m when cultivated.

It is a perennial crop lasting for over 100 years but it is usually replanted after 25 to 35 years when the latex yields tend to reduce. It is grown in Nigeria,
DRC, Cameroon, Liberia, etc

Rubber flourishes in the tropics with annual rainfall of 2000mm to 4000mm evenly distributed and temperatures of between 24°C to 28°C. It was started by Harvey S. Firestone in 1926 with Harbel plantation as the world’s largest single estate covering 550 acres

or 220 hectares with 10 million hectares underdeveloped. Currently rubber is grown in the southern part with plantations at Harbel and Carvalla managed by Harbel and Firestone companies respectively.

Sketch map showing rubber growing areas

Factors favoring Rubber growing in Liberia

- Conducive climate with temperatures ranging between 24°C to 27°C and rainfall of 2500 mm
- Extensive land in the south e.g. around Cavalla.
- Available cheap labor from former freed slaves Vast drainage with rivers like Fring and Cavalla, St. John that provide water for irrigation and to be used in industries.
- Adequate capital from government and Firestone company
- Positive government policy to provide meaningful employment to freed slaves
- Large/ready market for the rubber within and outside Liberia
- Efficient/improved transport and communication network for latex i.e. Railway, water transport
- Agricultural modernization like propagation or grafting where a bud from a mature tree is grafted onto a young rubber tree
- Presence of out-growers who sell latex to the bigger companies hence increasing production.
- Nearness to the Atlantic ocean causing humid conditions in the south that are vital in the growing and harvesting of rubber.

- Political stability though with civil unrest but, the south has been relatively peaceful. **Harvesting and processing**
- Nursery stage for 9 months and propagation by grafting a bud from a mature tree taking 5 to 7 years for latex to be tapped.
- Latex is harvested very early in the morning by making a slanting cut on the bark of the tree at 35° done once every 2 days, in a small metallic bowl lasting for 10 to 20 years.
- Latex is then collected into bigger vessels and taken to processing factories
- At the factories, latex is diluted with water to avoid a sticky substance
- The solution is then mixed either with acetic or formic acid forming a spongy coagulated mass
- Coagulated mass is then rolled to drain out moisture/water and placed on rackets or platforms for sun drying to remove any moisture
- After removing the moisture a rubber sheet is formed from which materials for industrial and domestic use are got

Uses

- Making tyres and inflation tubes
- Making soles, gloves, condoms and safety boots
- Making insulators for electricity

  Making conveyor belts and winding engine belts
- Making stationery erasers

Importance

- Employment opportunities to the people e.g. rubber harvesters, managers of plantations, etc.
- Income to the harvesters hence raising their standards of living.
- Government revenue through taxation and licensing
- Foreign exchange through export of rubber and rubber products.
- Production of domestic and industrial items like tyres, insulators, safety boots that are sold at relatively cheaper prices to the home people.
- Growth of small scale out-grower schemes hence raising their standards of living.
- Skill acquisition by latex harvesters and processors
- Promotion of international trade and relations with Britain, USA, that import Liberia's rubber.

- Promotion of agricultural research through propagation or grafting.
- Development of other sectors from rubber profits e.g. health, education, etc
- Rubber trees help in climate modification through evapo-transpiration
- Plantations are used as demonstration farms for study and research

Problems faced

- Competition from other producers e.g. Nigeria and substitutes e.g. steel, plastics, synthetic fibres, etc
- Fire outbreak during prolonged dry seasons
- Limited skilled labor for harvesting and processing latex
- Wild animals that attack them when they are harvesting latex like snakes
- Long gestation period of 5 to 7 years affects projected profits
- Pests and diseases affecting the tree barks
- Rainy seasons waste time during the time of harvesting latex and the dry seasons make the latex sticky hence not dripping well .

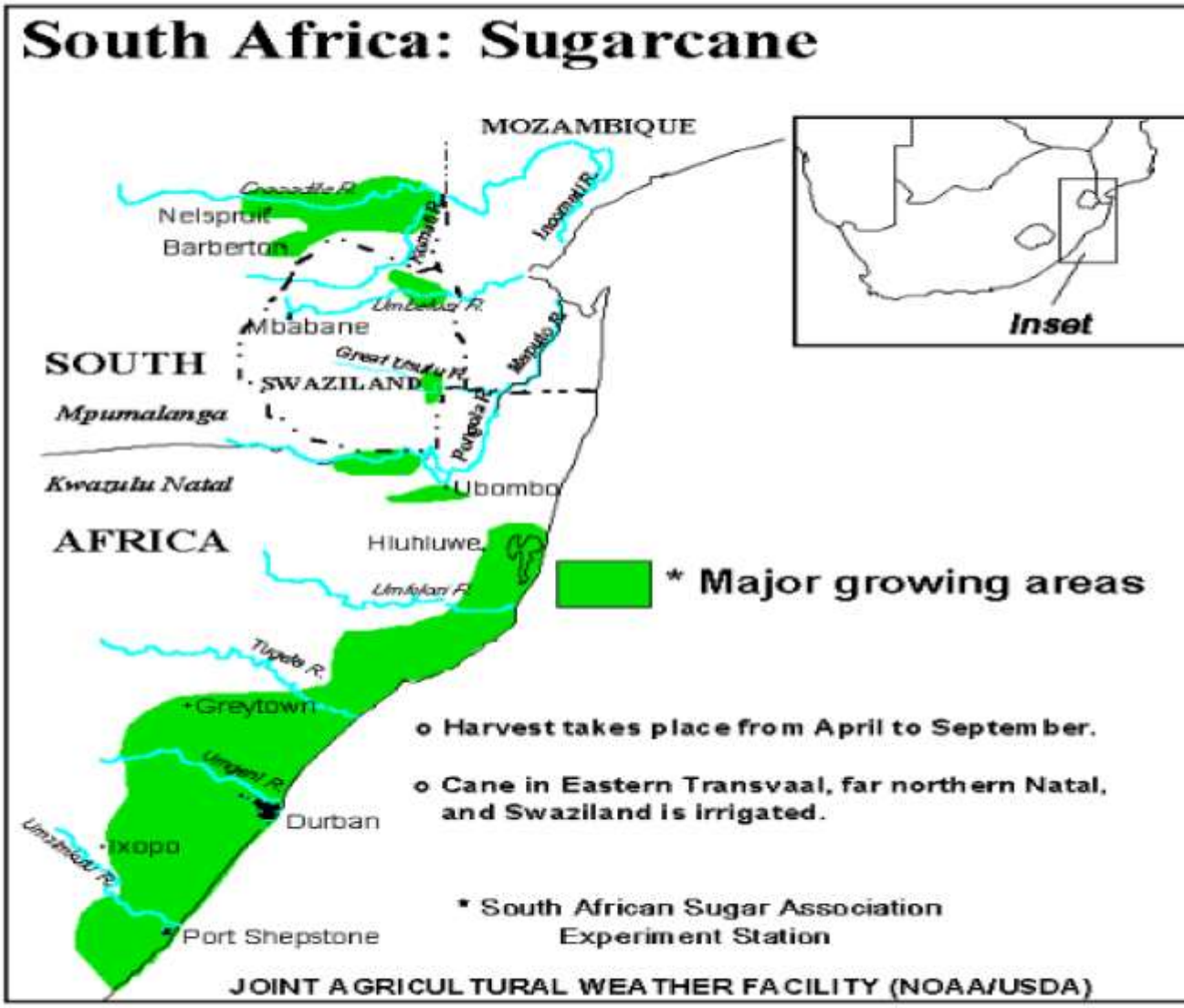
Changing government policies affecting the funding of rubber sector

Sugarcane growing in South Africa (Natal)

Sugarcane growing is dominant in Tongaat area in Kwa-Zulu Natal at the banks of Tongati river about 37 km north of Durban and 28 km south of Stanger. It is around 42,300 groves in Tongaat, Mpumalanga and eastern cape with 14 sugar mills e.g. at Maidstone, Darnall, Amatikulu and Felixton owned by 5 milling companies like Tongaat Hulett, Illovo and TSB sugar and a central refinery at Durban. Cane growing is restricted to the coastal areas stretching about 15 km inland covering 200,000 ha.

Sketch map showing sugarcane growing in Natal

Factors favoring



- Hot temperatures of 15°C to 27°C caused by the warm Mozambique current
- Heavy rainfall totals of over 1000mm per annum

- Generally flat landscape favoring mechanization
  Fertile well drained soils in the natal province
- Abundant water for irrigation from river Mkuse, Umfolozi, Umzimkulu, etc
- Adequate capital from South African sugar association
- Cheap labor by the south African people and immigrants from Angola and Mozambique
- Ready market within south Africa and outside
- Efficient transport and communication network especially railway and roads
- Positive government policy attracting investors
- Political stability also attracting investors

Planting and harvesting

The cane industry is owned by the South African sugar association which is one of the biggest cooperatives in the world. Some of it is grown by prosperous farmers.

- For large scale growing, land is ploughed and reploughed using machinery, manual labor and adding of fertilizers

- Canes are chopped with disinfected knives in length of 40 cm and then immersed in hot water of 50°C killing disease vectors for two hours

- The cane is then planted at staggered intervals so as to ensure all year production
  - Fresh planted cane takes 18 to 20 months before harvesting
  - Harvesting is done for around 9 months between May and December when sucrose is very high by chopping down the stem but leaving the roots to re-grow best done during the dry season for about 11 months
  - After harvesting the cane leaves are removed and the cane tied in bundles to the processing factory
  - Cut leaves are spread on the ground of the sugarcane plantation to avoid loss of moisture and land is left to fallow or regain its fertility

Processing of Cane

- Harvested cane is transported to the factory by road on trucks or railway
- Cane is weighed, chopped and crushed
- Crushing is done by giant pressure machines or large roller mills so as to extract the juice and the cane fibre is carried away for use in the boilers

- Juice is mixed with slaked lime to settle out the dirt to be sent back to the fields
- Juice is then thickened up into syrup by boiling off the water using steam in the process called evaporation in order to improve the energy efficiency of the factory
- Syrup is placed into very large pans for boiling, more water is boiled off until conditions are right for sugar crystals to grow with the help of sugar dust
- Resulting mixture of crystals and mother liquor is spun in centrifuges to separate the two.
- Crystals are then given a final dry with hot air before being stored ready for dispatch to domestic and foreign markets
- The by-product of molasses is used for making cattle food and alcohol

Importance

- A lot of foreign exchange is earned through export sugar products.
- Job opportunities to many people e.g sugarcane transporters, marketeers, factory managers etc.

- A lot of income is earned by the workers improving their standards of living.

  Development of towns like Durban, Shepstone.
- Development of infrastructure and social amenities e.g roads and railways, hospitals etc.
- Industrial development of sugar mills, beverage companies, etc
- A lot of revenue through taxation and licensing of sugar factories and plantations is earned.
- Advancement in agricultural research and better varieties
- Food stuffs for the people like sweets, sugar, molasses, etc
- Areas of academic research and study i.e. the sugarcane plantations.

Problems

- Competition from other producers like Sudan , Egypt
- Labor shortage during planting, weeding and harvesting
- Soil exhaustion due to monoculture

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  - Fire outbreaks that occur accidentally or intentionally
  - Pests and disease vectors like leaf hopper and army worms, etc

Livestock Farming/ Ranching

Ranching is the modern way of keeping animals for commercial purpose in a well defined grazing land which is subdivided into paddocks rearing high or cross breeds.

In Africa ranching is practiced in areas of TransVaal and Natal in South Africa, Zambia, Botswana, Zimbabwe, Angola, etc.

Characteristics

- Animals are reared for commercial purpose
- Animals are kept in permanent farms
- Animals fed on natural pastures and supplemented by industrial animal feeds
- Farms are subdivided into paddocks which are fenced to avoid wandering
- Each paddock has a water trough for constant water supply
- The land or paddock that has been grazed is left to fallow as animals are taken to the next paddock for fresh grazing

- Quantity of animals in a given paddock is controlled to avoid overgrazing
- Pest and disease control is of great concern to ensure quality of livestock and products
- Selective breeding is carried out to ensure high quality livestock i.e. artificial insemination

Ranching in Botswana

Botswana is a landlocked country covering 581,730 km^2 with a population of about 2 million people and a population density of 2.9 persons/ km^2.

Batswana or Bechuana are a group of Bantu stock divided into eight principle tribes, the most important and most numerous being the Bamangwat speaking Tswana. They live primarily by subsistence farming and frequently tend herds of cattle.

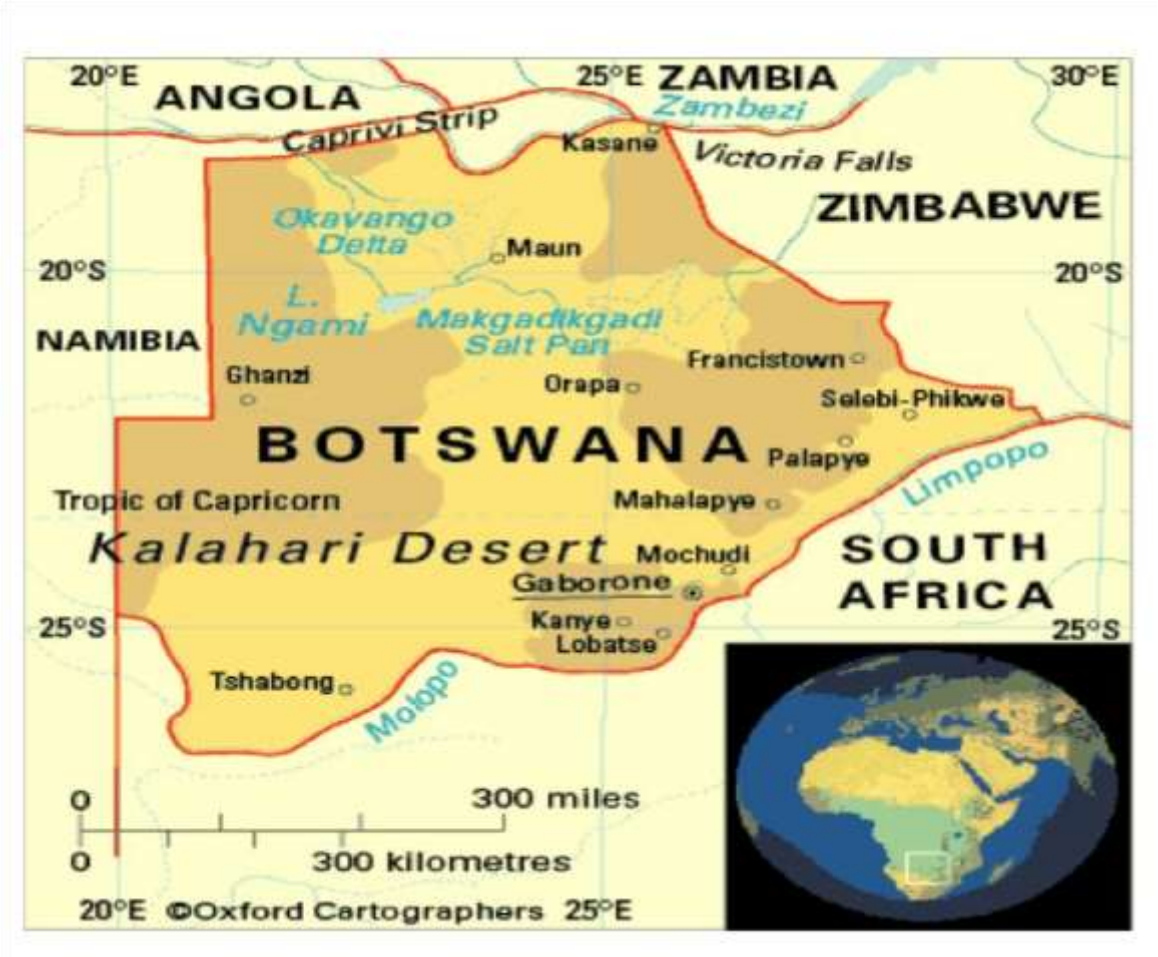
Less than 1% of total land area is arable and raising livestock has been the most important agricultural activity in Botswana keeping goats, sheep that adapt to drought better than cattle do.

Livestock rearing is practiced in areas of Okavango swamp, Kanye, Makarikari due to the relatively undulating/flat land (most cattle is reared for beef than

dairy products. Basic animal breeds are Aberdeen-angus, sanga/twana, taurine, zebus, tuli, barotse and American Brahman. Being largely a desert country in the Kalahari with plain areas that receive between 200mm to 400 mm of rainfall with scattered vegetation, has greatly favored ranching in the area.

The people of Botswana are not truly pastoralists since they engage in subsistence farming growing crops like maize and sorghum. Hence cattle rearing is the dominant commercial activity practiced with the help of the government and the European Economic Community.

Sketch map showing ranching areas



Factors favoring

- Desire by the government to improve on animal husbandry and beef production
- Commitment by the farmers to adopt to new animal keeping methods like ranching
- Existence of large pieces of land relatively flat and easy for animal rearing
- Sparse population in Botswana provided large expanses of land for animal grazing

- Existence of poor local animal breeds that necessitated the introduction of cross breeding and high quality livestock
- Presence of ready market for livestock products within Botswana and the outside world
- Availability of large sums/adequate capital for setting up paddocks, acquiring high quality cattle, etc
- Presence of large demonstration farms in the Okavango area through which the farmers acquired new skills in animal husbandry
- Efficient/developed transport and communication networks like the railway line from Franscistown to Lobatse
- Desert climate in Botswana with hot temperature, high evaporation rates and unreliable rainfall that did not favor arable farming.
- Relative peace and political stability which provided a good investment climate for domestic and foreign investors

Benefits of Ranching

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  - Many farmers have got employment which has helped them utilize inborn abilities

    A lot of foreign exchange is gained by the government through export of livestock products
  - Learning of new animal husbandry techniques like paddocking, artificial insemination, etc
  - Government earns a lot of revenue by taxing ranchers and imposing export duties
  - Farmers have acquired a lot of income through the sale of livestock products improving their standards of living
  - A variety of infrastructure has been set up like roads, slaughter houses, cattle dips, etc improving on the livestock industry
  - Desert land has been put to proper economic use through ranching
  - The practice has helped to diversify the economy from subsistence crop cultivation to commercial ranching
  - Promotion of industrialization especially related to livestock products like beef, milk, skins and hides, cheese, etc

- It has enhanced the handcraft industry by putting to use the horns, skins and hides, hooves, bones for decoration

  Promotion of international trade and relations between Botswana and other countries
- Provision of food stuffs to the general public in terms of proteins, carbohydrates, fats, etc
- Animal waste is used for making fertilizers that are used to improve on soil fertility thus supporting agriculture in the long run
- It has enhanced urbanization in the ranching areas dealing in livestock products like Kanye,

  Francistown, etc

Problems faced

- Presence of pests and diseases like tsetse flies, ticks, rinderpest, nagana, foot and mouth disease, rift valley fever, etc. that affect very many animals and reduces the output or expected profits.
- Severe desert conditions like low unreliable rainfall and prolonged drought leading to shortage of open surface water and pasture

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  - Limited open surface water particularly in the South leading to over dependency on underground water that lowers the water table.
  - Desert vegetation is not very nutritious hence poor and insufficient for the animals

    Some farmers have persisted in the traditional way of rearing animals which limits expansion of livestock ranching
  - Limited land for animal grazing due to increasing competition for land in respect to settlement and other economic activities.
  - Limited animal husbandry facilities to provide the necessary veterinary services and extension works
  - The new breeds are not very adaptive to the desert environment causing health problems and poor quality livestock products.
  - Limited market due to competition from other dairy farmers in Brazil, Texas, Arizona, Argentina, Norway and other sources of proteins like fish, beans, etc
  - Perishability of the livestock products leading to wastage and loss

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  - Sparse vegetation cover bringing about soil erosion that washes away the top soil and brings about tough coarse non-nutritious grass
  - Very expensive to manage the ranches because the animals require intensive care to harvest good quality products

Measures taken to improve Livestock farming

- Subdividing land into paddocks so as to regulate grazing
- Setting up demonstration farms to teach farmers new skills and principles of paddock farming
- Initiating quality breeds to check on the mixing of livestock and survival tactics
- Provision of water through boreholes, valley dams, water troughs, etc
- Provision of veterinary services through the mobile animal husbandry staff
- Establishment of animal facilities like cattle dips, slaughter houses, etc
- Establishment of Botswana Meat Commission that caters for the quality of livestock and marketing the products
- A system of disease control fences has been installed to prevent transmission of diseases from one herd to another.

Irrigation farming in Africa

This refers to the farming practice that deals with the artificial provision of water to support all year round production.

In Africa, irrigation farming is practiced in the semiarid areas and those that receive unreliable rainfall yet with high evaporation rates e.g. the Gezira irrigation scheme in Sudan, Richardtoll irrigation scheme in Senegal and Awash irrigation scheme in Ethiopia.

The Gezira Irrigation Scheme

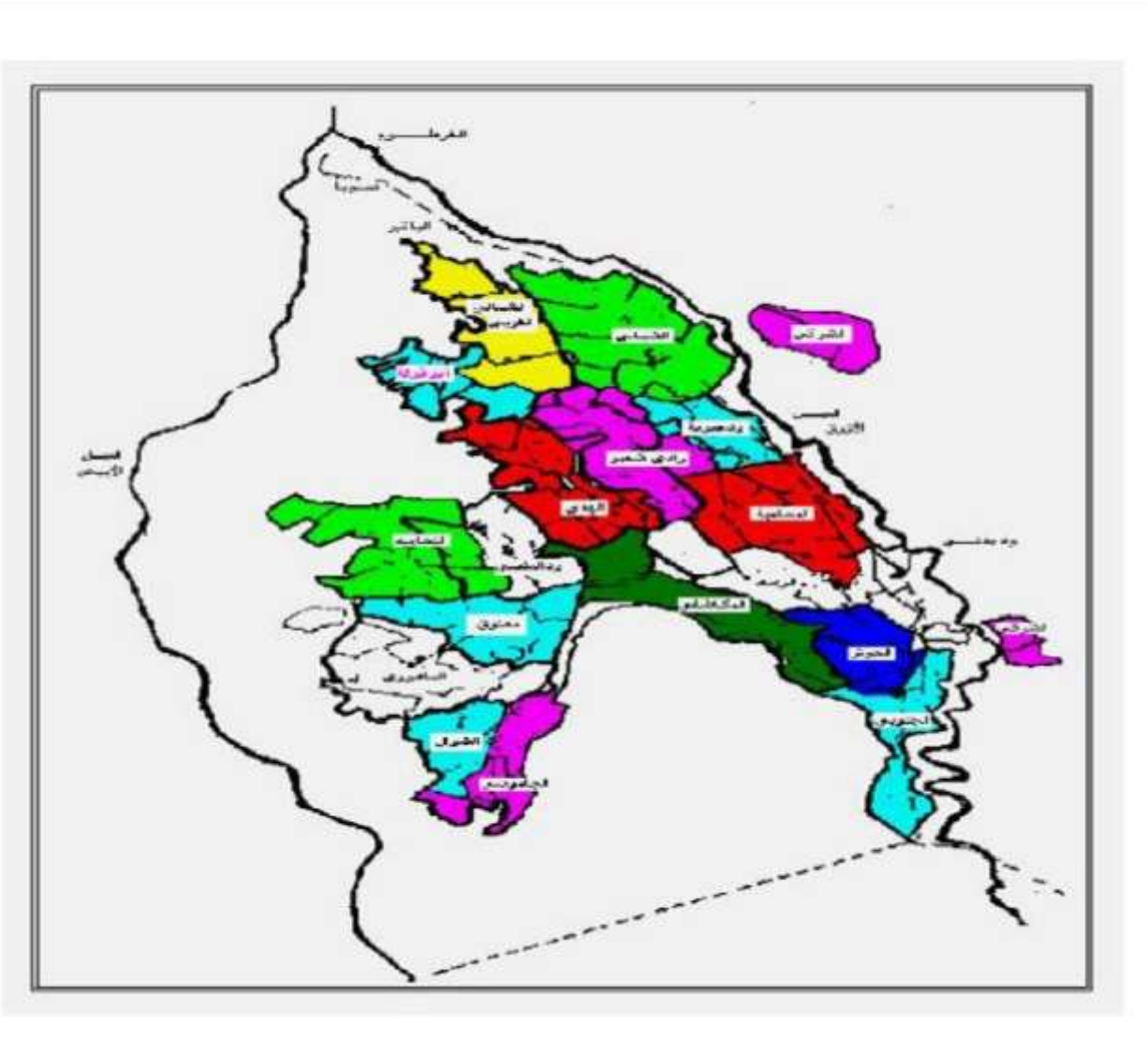
It is found in Sudan along the great Nile river particularly between the White Nile streaming from Uganda and the Blue Nile streaming from Ethiopian highlands.

The scheme is situated in the state of Aljazera covering 250 feddans (each is 1039 hectares) which was the initial land cultivated in 1911 and by 1962 it had increased to 2.1 million feddans.

Currently the Gezira scheme covers 850,000 hectares with a network of canals and ditches which are 2700 miles long originating from an area of 880 km^2. Further developments led to the extension of the cotton area to Managil/ Manaquil following the

completion of a new canal in 1950 and were finished in 1958.

A sketch map of the Gezira irrigation scheme



Cotton is the dominant crop grown with varieties such as;

- Very fine count cotton like margood, huda, shambat B
- Coarse count cotton like sudan acala, nubanebar, etc

There are other crops grown in the Gezira scheme like wheat, rice, millet, ground nuts, dura-sorghum, vegetables, fodder crops, etc

The scheme acquires its water from the Blue Nile with dams like Sennar, Washan Al-Qirbar,

Arusayris, etc.

Organization of the scheme

It is managed at three basic levels i.e.

- Partnership level (government)
- Co-operation level (Gezira)
- Control level (Fellahin tenants)

(a) Sudanese government- provides the land for cotton cultivation together with irrigation of the land

(b) Gezira board- concerns with the managing of land, providing seeds, fertilizers, machinery, field advisers, inspectors coupled with infrastructure

(c) Fellahin tenants- these are the real owners of the cotton with each allocated 2 to 4 hectares of cultivable land from which they harvest cotton and sell to the board.

After the sales, profits are partitioned as follows

- Government shares 36 %
- Gezira board shares 10%
- Community development initiative shares 4%
- Fellahin tenants share 50%

Currently the scheme management is subdivided into

- Engineering
- Investment
- Agriculture
- Finance
- Irrigation

The fields under agriculture administration are divided into 80 groups comprising 113 minor blocks.

The board of directors has 13 members representing different organizations chaired by the minister for agriculture and forests.

Objectives of the scheme

- To control flooding especially on the Blue Nile due to heavy rains in the Ethiopian highlands
- To expand cultivable land
- To ensure all year round crop production in desert land
- To diversify the agricultural sector from cotton to rice, millet, sorghum, wheat, ground nuts, etc
- To promote and provide employment to the normadic Fellahins.
- To improve on the pastoral life of the Fellahins by practicing crop cultivation
- To invest the surplus capital from the oil exploitation thus engaging in plantation farming

Activities of the Scheme

- Between July and October- planting and weeding due to rainfall received in the region for cotton, dura sorghum, millet, rubia beans, vegetables, ground nuts, etc
- Between November and January- irrigating the land due to the dry season where water is extracted from the river and distributed in the

cultivable land. However, sorghum is harvested together with canal dredging

- Between February and April- harvesting season for mainly cotton done by the Fellahins with some migrant labor. The cotton is then transported to ginneries at Barakat, Hasa-Heisa and Marangani for processing and export
- Between May and June- fallow period where land is given rest to regain its natural fertility and resume planting in July

Methods of Irrigation

- Perennial/Gravity- here the canals, ditches, channels are dug linking up the farm land to the water source flowing into the irrigation areas with a natural flow
- Archimedian screw- a water pipe is fastened on a motor like stand with a perforated coil on top. The spreading of water in the cultivable land is determined by the acceleration pressure of the water.
- Overhead lining- a perforated pipe is elevated higher than the basic crop height and well distributed in the irrigation land. When the water is released, it finds its way into the farmland through the outlets on the raised pipe.

Factors that favored the establishment of the Gezira Irrigation scheme.

- Extensive land in the Aljazera state where irrigation farming is done.
- Abundant water supply from the Blue and White Nile that is used in irrigation
- Fertile alluvial soils deposited by the Blue Nile in the Gezira valley that supports the growth of crops.
- Occasional flooding between the White and Blue Nile bringing not only silt but also excess water
- Arid climatic pattern with rainfall of between 200 to 300 mm that necessitated irrigation for proper plant growth
- Aridity that limits the survival of pests and disease vectors
- Desert like vegetation of basically grassland that was easy to clear
- Gently sloping and low altitude land which was conducive for natural water flow
- Land is basically above the water table which prevents water logging hence proper crop growth.

Sparse population in the Aljazera state provided extensive land for cultivation

Abundant labor by the Fellahins and migrant labor for planting and harvesting of crops.

- Adequate/large sums of capital from the government for buying machinery, farm inputs, etc
- Ready market potential within and outside Sudan
- Positive government policy that encouraged the utilizing of marginalized desert land so as to improve on the normadic way of life of the Fellahins
- Improved transport and communication network especially the railway line linking the scheme to towns like Barakat, Sennar, Khartoum, WadiHiafa, etc
- Rampant industrial growth and development where cotton was needed as a raw material e.g. textile industries at Marangani, Hasa-Heis and Barakat
- Advanced level of technology in irrigation science like overhead lining and Archimedean screw methods

- High demand for food by the people of Sudan which called for large scale food production through irrigation.

Importance of the scheme and Cotton growing

Many job opportunities to the Fellahins and immigrants e.g. in harvesting,planting,controlling the irrigation gadgets etc

- A lot of income has been earned by the people improving their standards of living
- Government earns a lot of revenue by taxing the Fellahins and its share of 36%
- A lot of foreign exchange is earned through the export of cotton to Britain and USA
- Infrastructure development like railways and roads that transport the cotton and other items from the gardens to market centres and refineries.
- Increase in cultivable land through irrigation hence increase in food production.
- Industrial development like ginneries and textile industries at Hasa-Heis etc

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- Promotion of good international trade and relations between Sudan and other countries due to the agricultural exports.

  Reduction of destructive effects of flood water which is now reserved for irrigation

  Urbanization in the Aljazeera state like Khartoum, Sennar, Barakat, Marangani, HasaHeisa, etc
- Agricultural modernization through research via demonstration farms and research centres
- Provision of abundant hydro-electric power through dam construction at Sennar, Rahad, Jebel-Aulia, etc
- Enhanced economic diversification from agriculture to industry, transport, etc

Problems faced

- Competition from other cotton producers like Egypt that reduces their international market.

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  - Competition from cotton substitutes like silk, leather, rayon, greatly reduces the projected profits.
  - Price fluctuation on the world market due to over supply of cotton hence reduction in the projected profits.
  - Presence of pests and diseases like curl virus, rhizorme pest, and black arm disease that reduces not only the quantity but also quality.

    Occasional flooding in the Gezira area due to heavy rains in the Ethiopian high lands

    Arid climatic conditions affecting proper crop/cotton growth and early ripening of cotton
  - Siltation of the canals used for irrigation reducing volume of water
  - Over production of cotton affecting projected profits
  - Limited market for cotton as the latest technology does not require much cotton to produce consumer goods

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- High expenses involved in irrigating land and dredging the canals
- Salination of the soil in the Gezira due to perennial irrigation making the soil salty and so not so fit for crop growth.
- Fluctuation in water levels especially during the prolonged drought season reducing the water table
- Presence of water weeds that congest irrigation canals and compete for soil nutrients
- Limited capital to fully invest in the agricultural mechanization and modernization which affects the quantity produced at the scheme.

  Changing government policies due to the rising administrative priorities

  Practice of monoculture leading to soil exhaustion
- Fellahins are often affected by the farm reptiles like snakes and scorpions that harm their health

AWASH

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Irrigation Scheme

This is found in Ethiopia on River Awash stretching 120 km long from the mountain west of Addis Ababa to Lake Abe on the Djibouti border in

Danakil desert.

River Awash is one of the 10 main river basins in Ethiopia with a total drainage area of 1010 sq.km originating from an elevation of 300m in the central highlands o f Ethiopia flowing northeastwards along the rift valley into the Fare region pouring its water into lake Abe at 250 m

The scheme has about 180,000 hectares of irrigation land accounting for 67% of the total irrigation land. However approximately 69,000 hectares is under continuous cultivation.

The scheme is subdivided into three .i.e.

- Wongi for sugar cane

- Malika-Amibara for cotton, tobacco and maize
- Tendaho for cotton

Awash has an irrigation potential of 2.7 million hectares earning Ethiopia the title of “water tower of Africa” with basins like Tekez-Atbara flowing to Sudan and Eritrea, Gibe-Omo flowing to Turkana in Kenya, Wabi-Shebelle and Genale-Dawa flowing to Somalia coupled with the Blue Nile and Baro-Akobo flowing to the Nile in Sudan.

Sketch map showing Awash Valley authority

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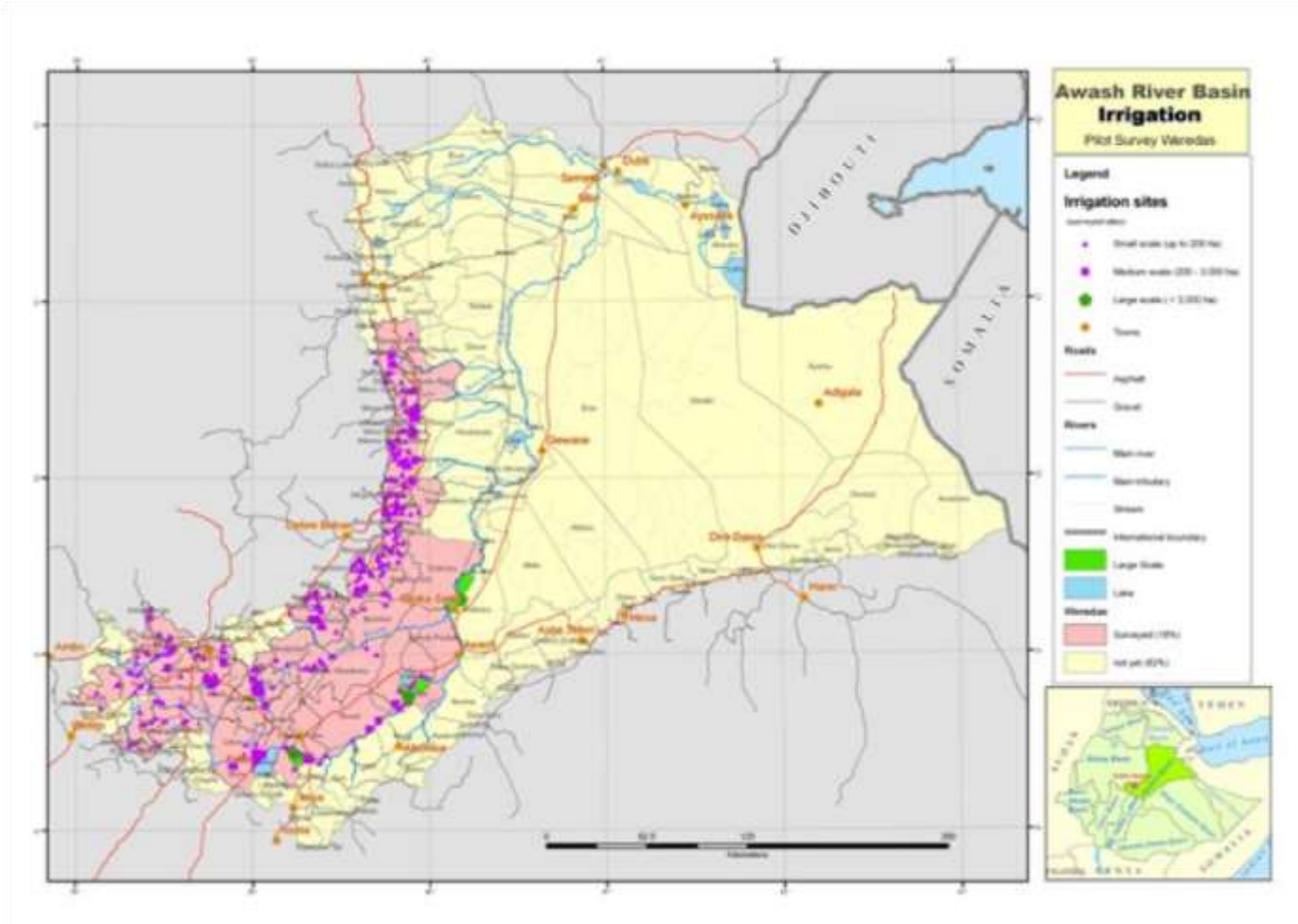

Objectives of the Scheme

- To utilize the flood waters of river Awash that was being wasted in the Allideghi plains.
- To increase food production particularly maize in desert land
- To expand cultivable land in between the central plains and Ethiopian highlands which had fertile soils

- To ensure proper crop growth due to aridity where rainfall is of 250 t0 750 mm on the leeward side of the Ethiopian highlands

Factors that favored the establishment of the Scheme.

- Unreliable rainfall that could not support natural growth of crops
- Fertile alluvial soils in the valley area suitable for maize, cotton, sugar cane, tobacco, etc
- Sunny arid climate with high evaporation rates leading to too much water loss
- Abundant water supply from the Awash river
- Sparse population on the lee ward side of the Ethiopian highlands
- Extensive land in the Awash valley area and central plains favoring plantation farming
- Nature of vegetation being grassland and low cost involved in clearing it
- Gently sloping land that favored gravitational flow of water from the river into the irrigation land
- Domestic and foreign market for the cotton and sugar cane

- Positive government policy of modernizing agriculture and transforming the marginalized desert land into the food basket of the region

Importance of the Scheme

- Nomads of the central and northern territory of Ethiopia now live a settled life as workers in the scheme
- Flooding has been greatly controlled and its destructive effects
- Food production has increased in the region like maize and sugar cane
- Industrial development at areas like Nazret and Kembolaha especially processing cotton, tobacco and sugar cane
- Job opportunities to many people e.g managers of the scheme,those who work at the water pumps.
- A lot of income to the farmers thus improving their standards of living
- A lot of foreign exchange through the export of cotton and sugar cane
- Infrastructure development of roads linking Addis Ababa to Nazret, Kembolaha, etc

- Dams have been constructed providing water for irrigation and power
- Urbanization in the region like Deso, Mojo, Nazret, etc
- Skill acquisition in the processing of cotton, tobacco and sugar cane
- Academic research and study in plantation agriculture

Richardtoll Irrigation Scheme

It is found in Senegal located within the Saloum and Casamance river areas extending from Ziguincoz to Kaolack.

The scheme deals in ground nuts which is the major export crop of Senegal, however some peanuts are grown.

The Richardtoll headquarters are located on river Senegal over 60 miles from its mouth at St. Louis. Its development was due to the flat land and the dam which could facilitate mechanization and irrigation respectively.

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Objectives of the Scheme

To control flooding on river Senegal which was causing severe soil erosion

- To resettle farmers who were highly populated in the Kaolack area which was the potential cultivable land
- To diversify food production with respect to maize, millet and cassava
- To control monoculture in Senegal by introducing a favorable cash crop

Sketch map showing Richardtoll scheme

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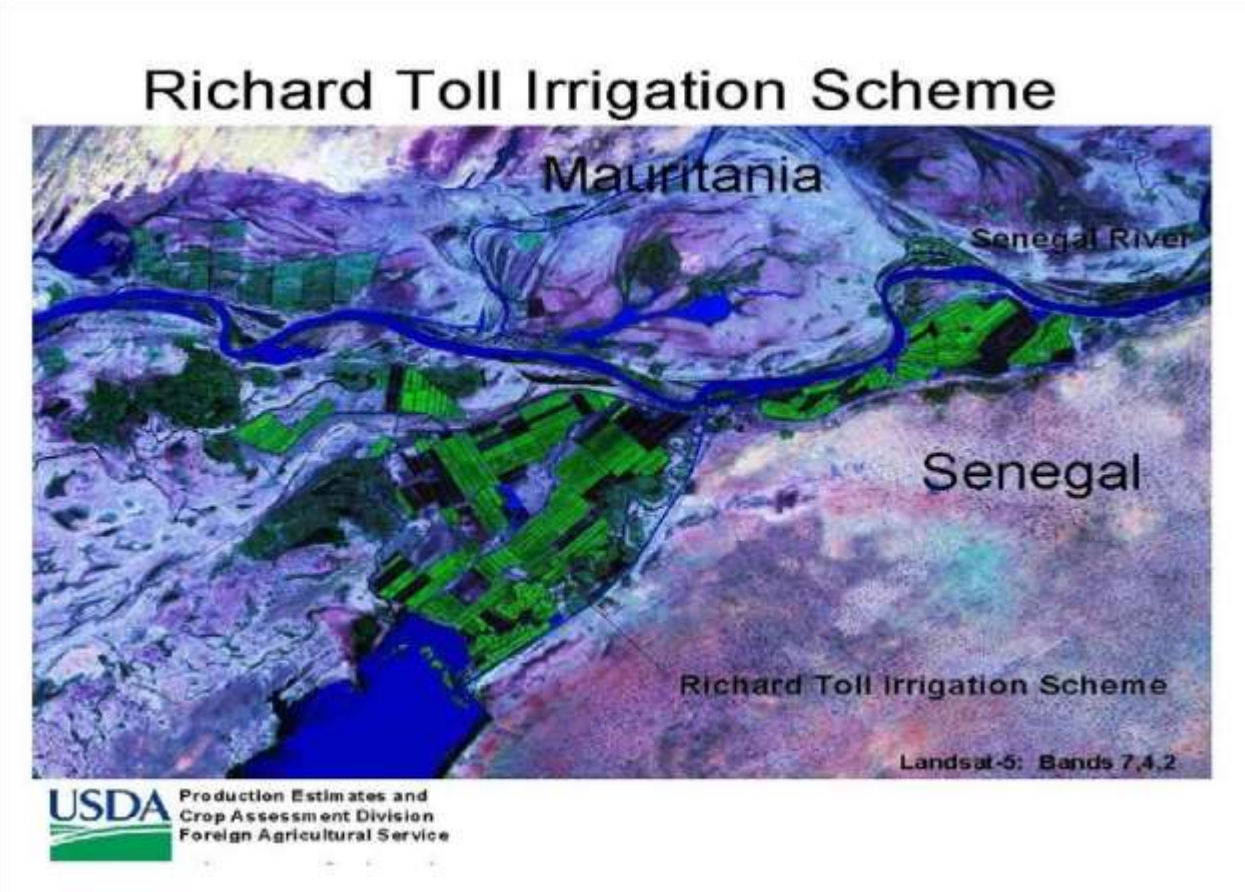
Richard Toll Irrigation Scheme
Mauritania
Senegal River
Senegal
Richard Toll Irrigation Scheme
Landsat-5: Bands 7,4,2
USDA
Production Estimates and
Crop Assessment Division
Foreign Agricultural Service

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Organization of the Scheme

It is managed in three sectors i.e.

- The government which owns the land issues it to the scheme for crop cultivation
- The scheme board provides water for irrigation, seeds, machines and fertilizers through a cooperative society
- Tenants mainly grow the ground nuts mixed with peanuts, rice, maize and cotton
- However some migrant labor is used during the harvesting from Mali, Mauritania and Guinea

Senegal spends over 33% of its income on food importation particularly rice which is their staple food.

Factors that favored establishment of the scheme.

- Extensive land from river Senegal to river Casanance on which irrigation is carried out.
- Relatively flat land for mechanization extending about 2000 miles
- Positive government policy aimed at reducing on food importation and encouraged irrigation farming.

- Need to diversify the agricultural sector from subsistence to cash crop
- Availability of adequate/large sums capital to buy necessary farm inputs and the irrigation equipment.
- Abundant water from river Senegal, Casanance and Saloum and a water reservoir for irrigation during the dry season
- Fertile soils conducive for ground nut production
- Need to utilize the flood waters of the Senegal River to ensure all year round food production.
- Favorable modified desert climate by the cold canary current with relative rainfall and high temperatures
- Abundant/cheap labor within Senegal and from Mali, Guinea, etc
- Domestic and foreign market for ground nuts
- Strategic location of Senegal at the border with Atlantic ocean is close to market centres in Europe and USA

Importance of the Scheme

- A lot of land is under cultivation to a tune of 12,800 hectares

  Dam construction that helped control flooding
- Provision of irrigation water that supplements rainfall to ensure all-year crop production
- Many people have been resettled especially in the Kaolack area
- Reduction in dependence on rice importation which was increasing on government expenditure
- Economic crop diversification from ground nuts to maize, cassava, rice, etc
- Job opportunities to many Senegalese in planting, harvesting, marketeers.
- Income earning thus improving the standards of living
- A lot of government revenue through the taxation of tenants, transporters, etc
- A lot of foreign exchange is earned by exporting the ground nuts
- Urbanization of the areas like Thies, Kaolack, Touba, Ziguincoz where different crops are grown.

- Promoted good international trade and relations between Senegal and the countries that import her products
- Industrial development which is agro-based due to the provision of the agro raw materials.
- Enhanced agricultural research and study in plantation agriculture and irrigation farming.

Problems faced

- Salinity of the irrigation water due to high rates of evaporation.
- Harsh climatic conditions in the Sahel region i.e. too hot temperatures and low rainfall that calls for heavy expenditure on irrigation.
- High costs of maintaining the irrigation canals, dredging, etc
- Price fluctuation on the world market leading to losses.
- Pollution of the water by fertilizers and industrial wastes.
- Shortage of land due to increasing population and industrial growth hence low production.
- Presence of pests and diseases affecting the harvest

- Labor shortage during the harvesting of ground nuts leading to delays in production.
  Limited capital to fully invest in the agricultural sector