MULTI PURPOSE RIVER PROJECTS

Multi-purpose river project these are river projects aimed at serving more than one purpose. A large dam and manmade lake behind it can provide solutions to problems caused by rivers to societies.

A dam with its manmade lake will provide answers to problems of power shortage, floods, seasonality, power for industry, etc. They can make crops grow where none grew before.

Fish can grow in the rivers. They will supply regular and efficient transport etc.

1. Aswan high dam on the Nile.
2. Kariba and Caborabassa dam on the Zambezi.
3. Akasombo dam on river Volta (R. Volta project)
4. Inga dam on River Congo.
5. Nzilo dam on river Congo (Lualaba).
6. Kainji dam on river Niger.
7. The Orange River scheme.
8. Calueque on Cunene (Kunene) in Botswana.

ASWAN HIGH DAM

At Aswan, there are two dams;

The first dam was built in 1903 but this dam was not large enough to hold back all the water of the Nile and therefore control floods.

was designed to completely regulate the flow of the Nile in Egypt. It was complete in 1970.

The dam is a rock filled wall dam, the largest in the world.

AIMS OF CONSTRUCTING THE ASWAN HIGH DAM

- There was a need to control the menace of floods in Egypt.
- The need to reserve water to be used for perennial irrigation.
- There was need to generate hydroelectric power and stimulate industrial growth.
- The need to create a manmade lake for fishing
- The need to generate employment opportunities for the population.
- The need to minimize on the problem of silt in the delta.

Lake Nasser, the world's second largest manmade lake was formed behind the Aswan high dam. The lake stretches for 500km reaching back nearly 150km into Sudan.

The lake stores over 10,000million of water for perennial irrigation.
The dam was fitted with 12 generators (turbines) with a capacity of 2.1 million kilowatts (3000 megawatts).

FACTORS THAT FAVOURED ESTABLISHMENT OF ASWAN HIGH DAM

- Presence of fast flowing water at Aswan to turn the turbines.
- Presence of waterfalls that could facilitate HEP generation.
- Presence of hard rocks at the water falls that provide a firm foundation for dam construction.
- Presence of a narrow valley or gorge that would hold all the flood waters and also reduce the costs of dam construction.
- The big population of Egypt created a big market for the electricity and also big food demand thus creating more demand for irrigation.
- Availability of adequate capital for dam construction provided by Russia.
- Availability of skilled and semi-skilled labour for dam construction.
- Availability of advanced technology by Russia during dam construction.
- Supportive government policy during the construction through financing the project.

BENEFITS OF THE PROJECT

- ❖ High floods no longer occurs because all the flood waters are stored in the manmade lake.
- ❖ Nearly, 400,000 hectares of land are being supplied with water for perennial irrigation from the lake. This has supported rice production in Egypt.
- ❖ 500,000 hectares of land were reclaimed from the desert.
- ❖ All irrigated lands are assured of a regular and sufficient supply of water from Lake Nasser.
- ❖ The level of the Nile is now regulated and it remains constant through the year. This facilitates many activities e.g. fishing and farming.
- ❖ 2100 kilowatts of power was added to the national supply of power.
- ❖ The old Aswan dam now produces a steady supply of electricity.
- ❖ Previously, the seasonal variation of water levels seasonally reduced power Output.
- ❖ Lake Nasser provides a 500km long water way which stretches into Sudan for 150km. This lake is a home for fish. It is also a tourist attraction.
- ❖ The project serves as a source of foreign exchange through power exports to Sudan.
- ❖ It has also enabled rural electrification which has caused rural development especially in the desert.

- ❖ The project greatly contributed to industrialization and exploitation of a countries resources (minerals).
- ❖ The lake have also used for water transport.

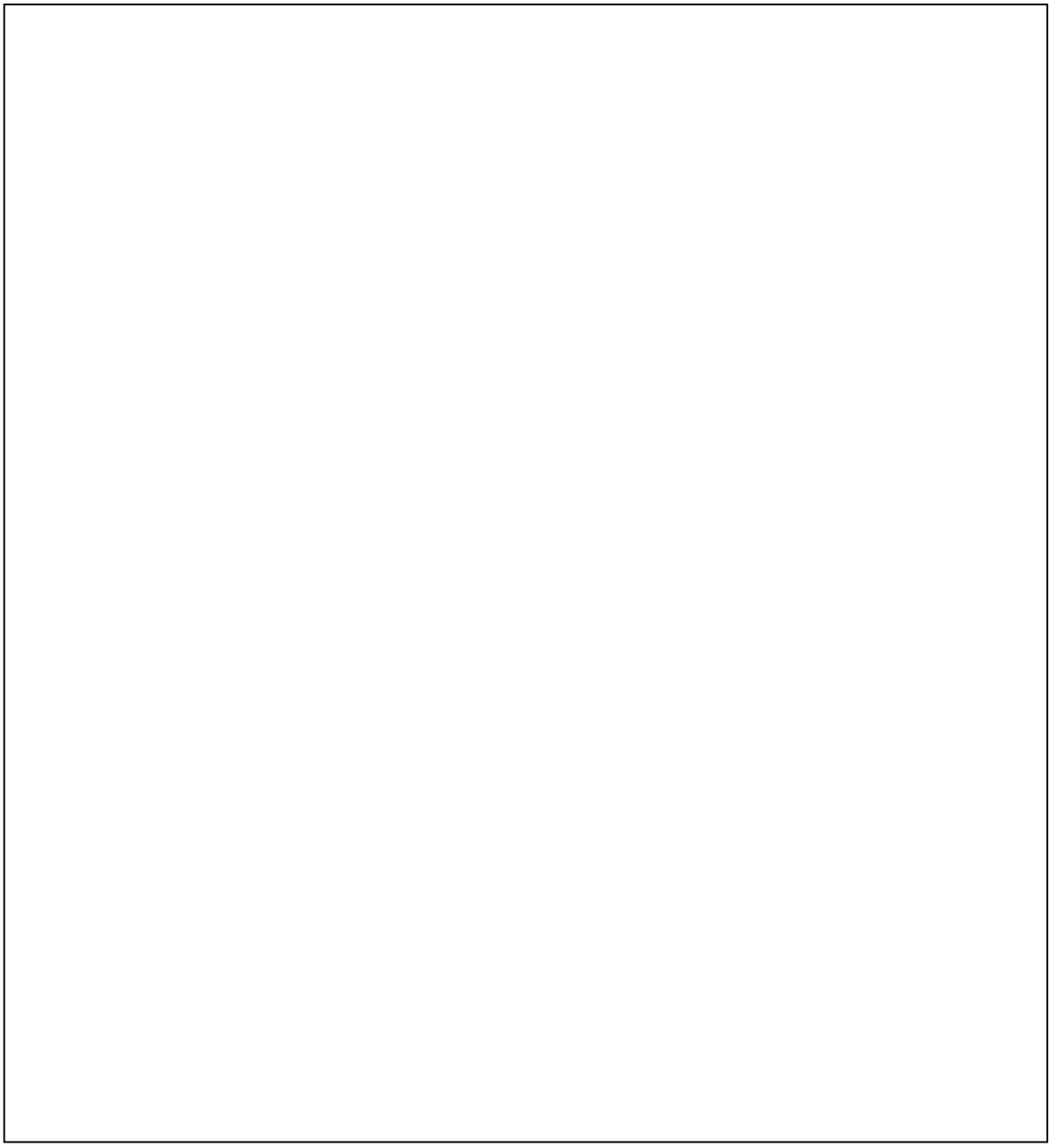
PROBLEMS THAT RESULTED FROM THE ESTABLISHMENT OF THE PROJECT

- Many people were displaced from their land because that land was flooded during the formation of Lake Nasser.
- The resettlement of the displaced people was very expensive. In Sudan the displaced people were compensated with an amount estimated at 12 million pounds.
- In Egypt, the resettlement of people in Kashim Elgirba was quite expensive as people were given double payments to the value of their land. There were connected to the national power and water for irrigation was also provided to them.
- The project disrupted drainage in Egypt. It is estimated that 10% of the annual flow is lost due to evaporation and infiltration of water from the manmade lake to the surrounding area.
- Extension of perennial irrigation is resulting into the spread of Bilharzia causing snails.
- The silt which used to help in maintaining fertility of the land now settle in the lake. This has forced farmers to artificially fertilizers their fields which has increased on crop yields.
- The project interfered with fishing activities in the delta because nutrients contained in the river water are now filtered out in the lake. This has deprived the river of nutrients which act as food for the fish.
- The fisherman therefore lost a lot of income as a result of this project.

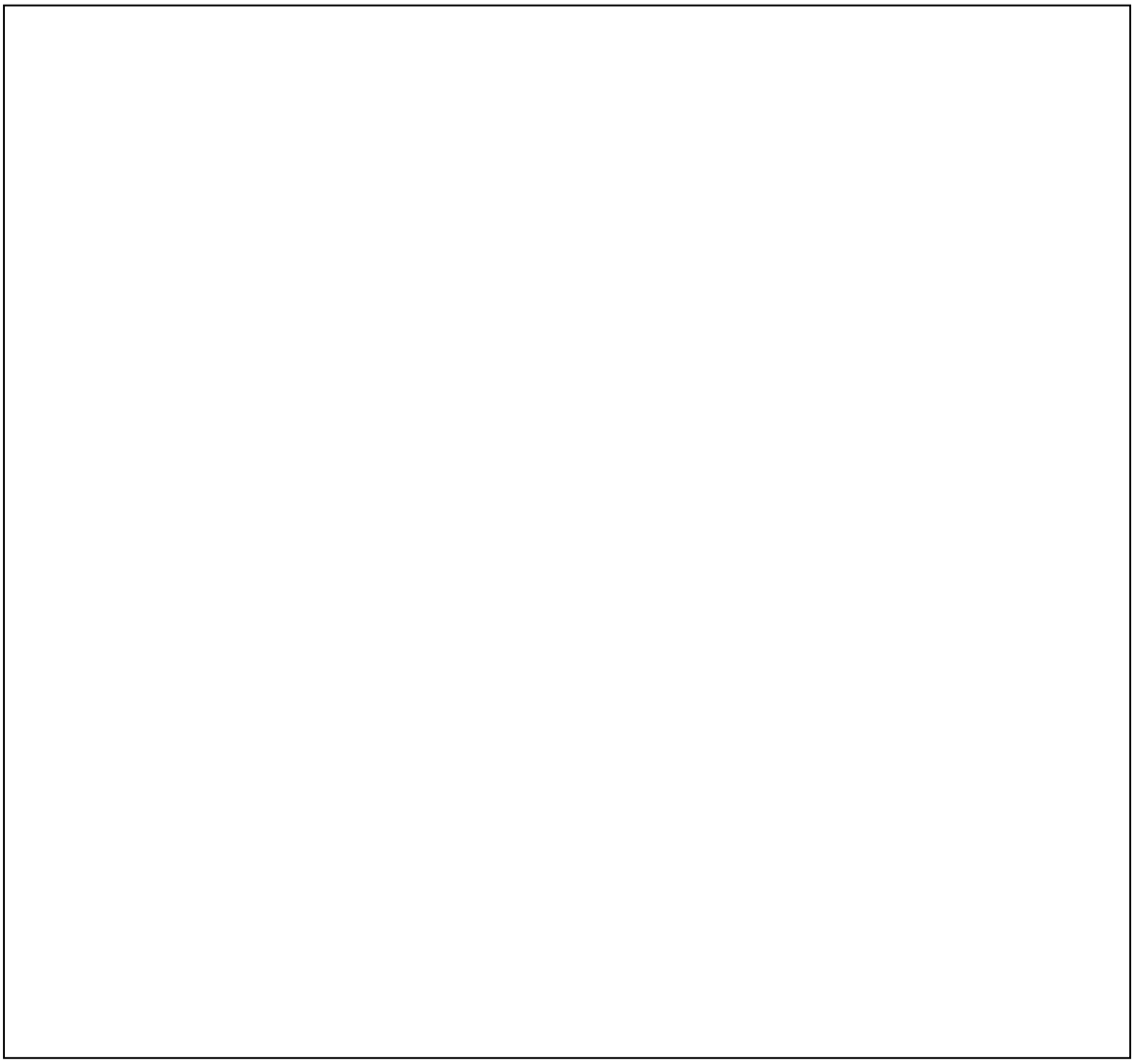
SOLUTIONS TO THE PROBLEMS

- Resettlement of the displaced people.
- Using of fertilizers to improve soil fertility.
- Planting of trees to reduce aridity.
- Spraying with copper sulphate and boiling water to fight bilharzia.
- Building health centres for treating bilharzia cases.
- Reclaiming more land from the desert to settle more people.
- Use of police to combat police.

LOCATION OF LAKE NASSSER AND ASWAN HIGH DAM.



POST-ASWAN DEVELOPMENTS IN EGYPT



THE VOLTA RIVER PROJECTS

The Volta project involved the construction of the Akasombo dam, creation of Lake Volta with an area of 8500km^2 which led to the generation of power, provision of a fishing ground and water transport.

The Volta project was developed at that point because;

1. There are tributary streams i.e. black, white and otti join to make the second largest river in Africa with a great volume of water.
2. The combined volume produced by the streams flowed through a narrow valley which provided a good sight for constructing a dam.
3. The tributary streams have many rapids which hinders the development of the power project.
4. The power could easily be transmitted to the coast where big towns existed (market for the power).
5. The basement rocks were hard to give a dam a strong foundation.

AIMS OF ESTABLISHING THE VOLTA RIVER PROJECT

1. To create power needs for aluminum smelting and bauxite refining at Tema.
2. River Volta used to flood in the rainy season hence the need to control floods motivated the construction of this project.
3. The need to construct a water reservoir and therefore control the water volumes in the river as it originates from the dry plateau of Bobo Dioualaso in Burkina Faso.
4. There was need to stimulate the development of manufacturing industries in order to create employment and for the population.
5. The area was densely populated and a lot of power was need by this population.

BENEFITS OF THE PROJECT

- It provides cheap electricity for smelting of aluminium ore at Tema.
- Besides, Tema has developed into a large industrial area because of the cheap electricity generated from the dam.
- Lake Volta was formed as a manmade lake. This lake serves as an artery for transport and trade between the South and the North.
- The lake has encouraged fishing. Some 68,000 tons of fish are harvested annually from Lake Volta. This fishing mainly practiced by the Bator tribes men provides a source of living in terms of food and income.
- The lake also modifies climate of the region leading to heavy rainfall.

- Many ports and towns have developed along the lake such as yeji which provide services to the people.
- The project ended up serving as a source of income through fish exports.
- The manmade lake provides water for irrigation and as a result a variety of crops can be grown on the soils exposed to erosion.
- As a result of the above the project has increased on the amount of food produced since the farmers are capable of producing food throughout the year.
- The project has resulted into creation of a number of jobs in the industrial sector, fishing and agriculture. This has improved the standards of living.

SHORT COMINGS OF THE PROJECT

One immediate problem of the project was the submergence of the area occupied by Lake Volta.

The submergence of this area led to displacement of about 8,000 people who lost their homeland.

The Eastern, Western, Northern and Southern communication was disrupted by the formation of the lake. The road was submerged and spoiled road transport. This now necessities a ferry service at Yeji.

Bilharzia is a common diseases along the shores of Lake Volta because of the shallow water which provides an ideal environment for bilharzia carrying vector.

Lake Volta is a shallow lake with very many trees stumps in some areas. It cannot therefore be used for navigation in such area.

The level of the lake Volta seasonally fluctuates which affects irrigation farming.

New town ships of Savalu, Kate Karachi and Nkwakubeu developed. These are congested areas where the displaced people were settled. In these areas people grow tobacco, rice and vegetables.

Since land is not enough, it has resulted into over utilization of the land.

A SKETCH MAP SHOWING LOCATION OF VOLTA RIVER PROJECT

(Leave space for the map)

KARIBA DAM PROJECT

The dam is located on Zambia Zimbabwe border on R. Zambezi and was built between 1955 and 1959. It is one of the largest dams in the world of 128m high and 579m high.

It is jointly owned by two countries, Zambia and Zimbabwe.

AIMS OF THE KARIBA DAM PROJECT

- To reduce imports of coal and petroleum for the generators.
- To facilitate mineral exploitation in the copper belt.
- To produce hydroelectricity.
- To expand manufacturing industries in Zambia and Zimbabwe.
- To control the flow of R. Zambezi which was subjected to heavy flooding during the rainy seasons.

A SKETCH MAP SHOWING LOCATION OF KARIBA DAM

(Leave space for the map)

CABORA BASSA DAM IN MOZAMBIQUE

This dam is located on R. Zambezi in Mozambique. The dam is 171m high, L. cabora bossa which over 240km long. The dam was planned and built by the Portuguese government which ruled Mozambique from 1498 to 1975.Construction begun in 1969 and the dam was opened in 1974.By agreement, ownership of Cabora Bassa Dam was transferred gradually from Portugal to Mozambique and finally Mozambique gained full control in 2005.

A SKETCH MAP SHOWING CABORA BASSA DAM

(Leave space for the map)

KAINJI DAM IN NIGERIA

Kainji dam is found across the Niger River in western Nigeria.

Construction of the dam began in 1964 and was completed in 1968.

The dam is one of the longest dams in the world. It extends for about 10km including a saddle dam which closes off a tributary valley.

The construction of the dam led to the formation of lake Kainji below it extending for about 135km and having a width of 30km at its widest point.

CONDITIONS THAT FAVOURED ESTABLISHMENT OF KAINJI DAM

- Existence of a narrow valley [gorge] that made the construction of the dam easy.
- Presence of a permanent Niger River that provided water for the generation of HEP.
- Existence of fairly fast flowing River Niger to turn the turbines.
- Presence of hard rocks that provided a firm foundation for the construction of the dam.
- The need to control seasonal flooding especially in the lower valley areas.
- Presence of waterfalls that enabled the generation of HEP.
- Existence of large land which was also flat that had a low population and also encouraged expansion and machinery for the project.
- Adequate capital that was used to construct the dam, buy machines and pay water.
- Adequate supply of skilled labour that constructed the dam.
- High level of technology used in the construction of the dam, simplified the construction.
- The supportive government policy that invested a lot of capital in the construction of the dam, imported advanced technology that was used in the construction of the dam.
- Large market for power consumption in Nigeria speeded up the construction of the dam.

CONTRIBUTION OF THE DAM TO THE DEVELOPMENT OF NIGERIA

- ❖ Generation of hydro-electricity which reduced on consumption.
- ❖ Led to establishment of industries due to large amounts of power generated and this increased revenue for the country as well as industrial growth.
- ❖ The construction of the Kainji helped in the control of floods in the area, creating safety to property and people.
- ❖ Generation of employment opportunities to those who constructed the dam, engaged in infrastructural construction which earned income to meet necessities of life.
- ❖ Generated revenue to government as a result of taxing the project and workers' income. So revenue is used in the establishment of social services.
- ❖ It led to increased agricultural sector due to irrigation farming e.g sugarcane hence generating employment opportunities to Nigeria.
- ❖ Improvement of water transport on Lake kainji, railway, roads, movement of services and distribution of goods in the country.

- ❖ The dam acts as a tourist attraction leading to earning of foreign exchange leading to importation of goods.

PROBLEMS CAUSED BY ESTABLISHING THE KAINJI DAM IN NIGERIA

- There was loss of grazing land hence reducing livestock rearing in the area.
- There was displacement of people who used to stay where the dam is. This increased the government expenditure to resettle the displaced people.
- Flooding continued around Yelwa destroying agricultural land.
- Pollution due to industrial development causing health challenges to people.
- High spread of waterborne diseases bilharzia, malaria from the shallow waters of Lake Kainji leading to death.
- High cost of resettlement of people who were displaced.
- Silting of the lakes and canals increasing maintenance costs.
- Constant dredging which is expensive.
- Loss of biodiversity due to destruction of vegetation.
- Increased salinity of the soil due to high evaporation rates leading to decline in agricultural activities.

STEPS TAKEN TO SOLVE THE PROBLEMS

- ➢ Regular dredging to remove the silt.
- ➢ Spraying with chemicals to kill pests and diseases.
- ➢ Treatment of industrial wastes before disposing them.
- ➢ Resettlement of displaced people.
- ➢ Construction of embankments to control floods.
- ➢ Setting up health centres eg clinics, hospitals for treatment of sick people.
- ➢ Use of fertilizers to improve soil fertility.

MINING IN AFRICA

Mining is the exploitation of minerals. Africa mineral wealth is renowned both for its abundance and variety. In many countries, this mineral wealth is only beginning to be discovered and probably a lot of mineral wealth is yet to be exploited especially in the vast deserts, the thick forests zones and hug rugged mountains areas. The mining industry is old in some countries while in others, it is still very young.

Almost all major minerals are found in Africa in commercial quantities e.g.;

i. Fuel minerals (fossil mineral) e.g. coal, natural gas and petroleum.
ii. Africa has major industrial minerals e.g. copper (17%), iron ore.
iii. Ornamental minerals e.g. diamond and silver.

Despite the existence of all those minerals, mining is often not an easy job on the continent. The activity is faced by a number of obstacles such as the following.

1. Mining companies are often unable to recruit sufficient and skilled labour.
2. Challenges of transport networks especially railway transport which is the recommended form for transport for the movement of minerals is not widely developed.
3. Inadequate capital to invest in the mining sector i.e. the buying of equipment, surveying mineral deposits where the mineral are found, training labour and improve transport.
4. Political instabilities such as DRC, Sudan Angola etc. in these countries, mining activities have been disrupted by wars and rebel activities.
5. Problems created by climate e.g. rain fall which makes working conditions in mines very difficult thereby limiting development of mining industry.
6. Insufficient power supply yet mining requires a lot of power for the refining of the ores.
7. Most minerals deposits are scattered over wide areas and exists in small quantities. This makes mining very expensive.
8. Deep location of minerals deposits which increases work depth and thus high mining costs.
9. Constant price fluctuation on world market which has kept the cost of mining and make mining business less profitable and therefore discourages investors.
10. Competition from other mining countries e.g. coppers copper faces competition with Chile in South America.
11. Poor government policies in mining e.g. most African countries do not invest in mining.

COPPER MINING IN ZAMBIA

Copper is Zambia's greatest export to the world market in monetary terms. Africa produce 20% of the world's copper and Zaire and Zambia are the leading producers in Africa.

Zambia and Zaire form the copper belt of Africa mining zone which stretches for 250 miles. In Zambia, copper counts for about 90% of the exports. Copper is mined from the Zambian copper belt which stretches from Luanshya in the south to Ndola.

The mines spread over a wide area (50km wide) with several mining centers such as Nkana, Bwana Mkubwa, Antelope, Chibuluma, Baluba, Mchanga etc.

The copper belt has both exposed and concealed copper. Open cast method is used to mine the ore which is near the surface. The concealed ore is mined using the shaft methods where vertical and horizontal tunnels are dug up to the deposit underground. Cages are used to take the miners underground from where the ore is blasted and then brought to the surface for smelting.

The copper belt in Zambia is a complex of mining centers or towns with a very big population of over ten million people. The largest mining town is Kitwe with many processing factories (smelters).

Besides copper, cobalt is also mined at Chibuluma, gold and silver are extracted at Nkana and coal is also extracted to supply power or energy.

The **following conditions have favoured copper mining in Zambia.**

- The nearness of copper deposits to the surface which makes mining less expensive.
- The presence of high grade copper found in large reserves.
- Presence of skilled labour provided by expatriates and migration labour.
- Abundant supply of local unskilled labour to work in the mines.
- Adequate hydroelectric power generated from river Kafue. This power is used in smelting of the ore.
- Availability of a wide market for copper since it is put to use in several ways.
- The presence of large sums of capital provided by mining companies. This has been invested infrastructure which has facilitated the mining.
- Presence of large reserves of water from river Kafue. The Water is useful in the refining process.
- The copper belt has a relatively flat relief hence allowing easy construction of roads and railways for transporting the ores and the workers.

- Presence of efficient and cheap transport based on the railway and roads for transporting the ore to smelting plants.
- The favourable government policy especially when the government privatized the mining activity. This allowed the development of the mines as foreign investors bought different deposits.

PROBLEMS FACING COPPER MINING IN ZAMBIA

- Accidents in the mines which cause death of the workers.
- Zambia is a landlocked country hence the need for a commercial outlet through other countries. This makes Zambia's copper expensive.
- Price fluctuations on the world market which affects the profits and therefore thee incomes of the workers.
- Frequent strikes by workers leads to losses.
- Zambia's copper deposits are scattered over a wide area which increases the cost of mining.
- Frequent power failure which affects copper smelting.
- There is completion from other copper producers especially DRC and Chile.
- Political problems in the neighboring countries through which Zambia exports her copper also affects the mines e.g. political instabilities in Angola and Mozambique through the port of Lobito and Maputo respectively.
- Some deposits produce a lot of impure copper technology in Zambia is not also very advanced hence the final product is not very pure which affects marketing.
- Over dependence of the economy on copper has resulted into over exploitation and depletion of the reserves.

IMPORTANCE OF MINING TO ZAMBIA

Explain the contribution of the mining sector to the development of Zambia.

1. Mining is a source of raw materials for some industries for example copper smelting industries thus industrial development.
2. The mining sector has provided employment opportunities to a large portion of the population e.g. those who work in the mines and those who transport the copper hence improved standards of living.
3. Mining sector is a source of government revenue through taxation from mining companies.
4. It is a source of foreign exchange after exportation of the mined products and this helps to boost its economy.
5. It has led to development of towns (urbanization) for example, Chibuluma, Mchanga among others.

6. The mining sector has also promoted international co-operation between Zambia and the neighbouring countries through which copper is transported.
7. The mining sector has provided market for some industries products such as mining implements.
8. Mining has led to development of infrastructures such as roads and railways for example the tanzam railway.
9. It has led to improvement of social services in mines for example, schools, and hospitals. The cause provides housing to employees and their dependents and also extend medical attention and recreational facilities.
10. Mining has diversified the economy of Zambia.
11. It is one way through which modern technology can be transferred to Zambia.
12. Mining also attracts tourists and this a source of foreign exchange.
13. Mining is a source of energy for running machines e.g. coal.

EFFECTS OF MINING ON THE PHYSICAL ENVIRONMENT

- ✓ IT has led to pollution of the environment (water, land and air) by way of dust released in air and ores deposited on land and water.
- ✓ It has led to clearing vegetation cover to make way for mining activities.
- ✓ It has caused erosion and floods in the mining area because drainage is affected by digging ditches and pits.
- ✓ Piles of waste left behind are a menace to the scenic beauty.
- ✓ It has led to loss of agricultural land due to dumping of wastes which causes loss of fertility.
- ✓ It has led to emergency of towns with urban related problems.
- ✓ Stagnation of water in open pits creates breeding spaces for pests and diseases in mining cones.
- ✓ It has led to displacement of people in mining areas.
- ✓ Collapse of the mines cause accidents and thus death of people.
- ✓ It has led to lowering of the water tables leading to dirty water for agriculture.

USES OF COPPER

- Making of electric wires used in electric appliances.
- Making of currency copper coins.
- Making of military hardware – bullet shells.
- Making house hold utensils.

IRON ORE IN LIBERIA.

LIBERIA has vast reserves of iron ore which contribute about 65% of export of the export income.

Deposits of iron ore exists in Wologisi Mountains near vionjama. There are deposits in the Bie hills and Bomi hills on the border with Sierra Leone.

Iron ore in Liberia is mined by the Liberian, America, Swedish mineral company which is owned by government and foreign investors from America and Sweden.

Mining of iron ore in Liberia is favoured by the following factors.

a. Presence of large deposits of iron ore in Bie hills and Bomi hills.
b. Accessibility to mineral areas by railway and road.
c. Strategic location to Liberia along the coast simplifies exportation.
d. Positive government of encouraging the foreign investors to develop the mining sector.
e. Large market for iron ore in USA, Belgium, Germany and Sweden.
f. Skilled and semi-skilled labour provided by foreigners and natives.
g. Liberia has high quality of iron ore which easy to market.
h. Availability of adequate capital that has been invested sector by foreign investors and government.
i. Modern technology imported from foreign countries.

NB; for effects, benefits and problems faced by mining in Liberia (refer to Zambia).

OIL AND PETROLEUM

The modern world runs on oil for example oil is used in transport (roads, air, water and railway), energy in generators, heating houses. In industries, it is used in the manufacture of chemical products like plastics.

In Africa, Nigeria is the largest producer of oil and petroleum. Commercial production of oil began when the rich oil deposits in the Niger delta.

Ore deposits were discovered off shore in the Atlantic Ocean and there is hope for more discovery.

Today, Nigeria produces 2 million barrels of oil a day and Nigeria is a member of OPEC, other than Nigeria, Gabon produces oil from Gabindo. Zaire has oil from the river Congo estuary. Ghana started mining oil from the Atlantic Ocean.

Other than, the Sub-Sahara countries listed above, North African countries have a lot of oil wealth e.g. Libya, Egypt, Mauritania. Oil and petroleum has benefited Nigeria in many ways;

- It has created jobs and therefore income.
- It a source of foreign exchange through exports of crude and final oil products.
- It has increased/improved government savings by reducing oil imports.
- It has stimulated urban growth e.g. towns like Wari, Lagos, Harcourt.
- It has led to development of roads and other infrastructures.
- Growth of petro-chemical industries.
- It is a source of internal energy used by industries.
- It is a source of revenue on mining.
- It has diversified Nigeria's economy.

  However, oil mining has created many problems in Nigeria such as the following;
- Destruction of properties and death of people due to accidents of fire cause dry striking walkers.
- It has increased political instabilities in the oil region of the Niger delta as a result of ethnic/civil wars based on oil wealth.
- Environmental degradation in the delta which has involved the destruction of the mangrove vegetation.
- There is excessive pollution of the coastal waters and the fresh waters of the Niger as a result of oil spillage.
- Mining oil has multi agriculture and thus people have gone to look for jobs in the mining areas and as a result the fertile land has been
- There is profit repatriation by the mining companies involved in mining oil in Nigeria.

A MAP OF THE NIGER DELTA SHOWING THE OIL FIELDS

(Leave space for the map)

OIL IN LIBYA

Oil is the most important mineral mined in Libya and also the major export. About 80 percent of Libya's proven oil reserves are located in the siirte basin which is also responsible for 90 percent of the country's output.

Its however hoped that with more mineral prospecting, more fields will be discovered especially in the remote areas of the country.

Other than oil, Libya has vast reserves of natural gas at zeltan, assumud, sahi, befa-waha and attahadi.

MAP SHOWING LIBYA'S OIL AND GAS MINING AREAS

(Leave space for the map)

ALGERIA

Algeria is Libya's western neighbor and has a lot of oil fields. Algeria is the fourth largest producer of crude oil in Africa after Nigeria, Libya and Angola and was the sixth largest producer of natural gas in the world in 2008 after Russia, USA, Canada, Iran and Norway.

In all the above countries, large multi-national companies are involved in the mining such as shell, total, Arabian Gulf oil company (ARAMCO).

SECTION THROUGH A TYPICAL OIL FIELD

A SKETCH MAP SHOWING LIBERIA'S IRON ORE

(Leave space for the map)

MINING IN THE REPUBLIC OF SOUTH AFRICA

South Africa owes her economic development to the mineral wealth and has one of the most developed mining industries on the continent. The country produces athird of the world's gold, ahalf of the world's diamond annual output and other minerals including coal, copper, uranium, iron ore, manganese, silver, limestone, etc.

FACTORS CONTRIBUTING TO THE DEVELOPMENT OF THE MINING INDUSTRY IN South Africa REPUBLIC

- ✓ The presence of a variety of minerals such as gold, coal, diamonds, iron ore, uranium that have attracted huge investment in mining.
- ✓ Presence of high quality minerals than the rest of the world making it the most profitable business in South Africa.
- ✓ Presence of large reserves of minerals eg South Africa has the largest gold reserves in the world.
- ✓ The existence of many minerals in one place ie minerals are found side by side hence mined together which reduces the cost of mining.
- ✓ Availability of water especially for processing and as a coolant mainly from River Vaal and underground which greatly contribute to development of mining.
- ✓ Availability of large sums of capital for purchasing mining equipment and establishment of all relevant infrastructure for the mining process; Most of the capital comes from Europe and America and a little of it internally generated.
- ✓ Availability of a variety of sources of power in adequate amounts eg fuel minerals especially coal, hydro-electricity and of recent nuclear which greatly facilitated the processing of minerals.
- ✓ Well-developed transport routes especially railway transport for transportation of minerals from the interior to coastal ports for export.
- ✓ High levels of technology which has made the mining process efficient for greater output.
- ✓ Availability of a large market for minerals, both at home and abroad which has made the mining industry very profitable.
- ✓ Availability of adequate skilled labour both the nationals and migrant workers from the neighbouring countries such as Botswana, Zimbabwe which has made it possible for the use of modern equipment for high output.
- ✓ Supportive government policies especially in financing the industry offering initiatives and encouraging foreign investors.

CONTRIBUTIONS OF THE MINING INDUSTRY TO THE ECONOMY OFSOUTH AFRICA

- ✓ For a long time, most of the minerals were for the export market therefore generating foreign exchange for the development.
- ✓ Millions of people are employed which has greatly contributed to development of people's standards of living.
- ✓ Some minerals e.g. coal provides energy which has the back borne of industrial development.
- ✓ The mining sector is a very big source of revenue for the government of South Africa thereby contributing to the development of social services.
- ✓ The mining sector also is a very big source of raw materials for the manufacturing and processing industries thereby contributing to the development of social services.
- ✓ The mining sector also is a very big source of raw materials for the manufacturing and processing industries thereby contributing to industrial development which leads to various social and economic benefits.
- ✓ It is also a very big source of income for the people which results into improved standards of living.
- ✓ The mining industry has resulted into the development of physical, social and economic infrastructure thereby contributing to the development of economic activities and improvement in the quality of life of the people.
- ✓ It has also led to urbanization i.e. what begun as mining villages have now developed into major urban centres which leads to social service provision to the people and stimulate more economic activities e.g. Witwaters and conurbation.
- ✓ Mining inn South Africa has greatly helped in diversification of the economy which has led to more income, employment, revenue and other benefits.
- ✓ Today, the mining industry is a very big tourist attraction thereby fetching more foreign exchange for social and economic development.
- ✓ Through exportation of minerals, the mining industry has led to development of international relationships thereby promoting international trade, co-operation, peace and development. etc.

PROBLEMS FACING THE MINING INDUSTRY IN SOUTH AFRICA

- Shortage of water especially for processing since huge amounts of water are needed and the rand is located at a water shade.
- Fluctuation of prices of minerals on the world market hence affecting the profitability of the industry.
- Exhaustion of minerals leading to closure of mines and the creation of ghost towns.
- Shortage of labour leading to difficulties in extraction of minerals.
- Labour unrest especially strikes by workers leading to disruption of mining activities and some bringing the entire mining process to a standstill.
- Accidents such as collapse of mines leading to destruction of property and loss of human lives.
- Flooding of mines mainly caused by underground water which also results into disruption of mining activities and sometimes loss of human lives.
- For many minings, increased depths of mining which presents a lot of challenges to the mining industry.
- Due to the depth of working, extremely high amounts of temperatures making the underground conditions unbearable for the workers.
- Deadly underground fires which are mainly caused by sparks from machines and the pockets of deadly underground gases leading to destruction of property and loss of lives.
- Pollution especially air, water and noise pollution which greatly affects the life of people within the mining areas.
- The mining industry has indirectly affected the agricultural sector since many people have abandoned farming for mining and a lot of agricultural land has been converted into mines leading to low agricultural output and scarcity of food.
- It has also led to deformation of the landscape especially where open cast mining is practiced since open pits and deep holes are created with heaps of rock waste on the surface.

MEASURES TAKE TO SOLVE PROBLEMS FACED BY THE MINING INDUSTRY IN SOUTH AFRICA

- Recruitment of migrant workers to minimize challenges caused by shortage of labour i.e. workers from countries such as Swaziland, Lesotho, Mozambique, Botswana, Zimbabwe, Zambia etc.
- Mechanization of mining activities to reduce dependence on human labour and increase efficiency.
- Construction of a series of dams on Vaal and Orange rivers so as to store water and increase water supply to the mines.
- Recycle and treat waste water so that it can be used again.
- Recycle, treatment and proper disposal of wastes so as to minimize pollution.
- Strengthening of police force to fight crime and enforce law.
- Improvement in the working conditions especially wages so as to minimize unrest and strikes.
- Recycling of rock wastes to extract other minerals so as to minimize the costs of production and increase profitability.
- Processing of minerals into manufactured goods so as to minimize effects of price fluctuations and also increase the value of exports for high profitability
- Pumping fresh air in to the mines so as to reduce suffocation and temperature in order to make working conditions favorable.
- Pumping out underground water so as to minimize the effects of excess water in the mining process.
- Carrying out tests on underground gases before blasting of the rocks so as to prevent underground fire.
- Mineral exploitation in order to discover new mineral deposits as a way of minimizing effects of mineral exhaustion.
- Extending the current mining to a greater deposit so as to avoid closure as a result of mineral exhaustion.

EFFECTS OF MINING ON THE PHYSICAL ENVIROMENT

- Pollution of the environment eg air, water and land pollution.
- Deforestation or devegetation as mines are being established.
- Deformation of the landscape through large open pits and dumping of waste materials.
- Large areas are turned into waste lands due to dumping of waste materials especially liquid wastes and raw materials.
- Displacement of people as settled areas are turned into new mines.
- Health hazards especially open pits holding stagnant water which act as breeding grounds for mosquitoes that cause malaria.

- Large areas have been made infertile due to dumping of rock wastes which greatly affects agricultural products.

GOLD MINING IN SOUTH AFRICA

Gold is a heavy fairly soft yellow metal and the most important mineral mined in South Africa.

The republic is the largest world producer of gold and has the biggest known gold reserves in the world.

Gold is found in layers of rocks known as reefs and in a rock known as banket. It is mined together with other minerals such as uranium and silver.

Most of the gold fields are found in the rand.

N.B;

Other African countries with significant gold deposits are Ghana, Zimbabwe and DRC.

A SKETCH MAP SHOWING VARIOUS MINERALS IN SOUTH AFRICA

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A DIAGRAM SHOWING HOW GOLD IS EXTRACTED

HOW GOLD IS MINED

Underground is mainly used i.e. vertical shaft are dug from which horizontal shafts are run to the mineral bearing rock.

The ore is extracted by drilling and blasting using explosives .The shafted rock is transported to the vertical shafts using conveyor belts and small rail wagons.

It is then brought to the surface using a winding gear (lifting) system and then transported to processing factory either conveyor belt or rail wagons.

PROCESSING

On reaching the processing factory, the ore is crushed powdery dust, then put in large tanks containing water and mixed with water until it dissolves in to thin mud.

A poisonous chemical called cyanide is added to dissolve the gold content is removed by electrolysis.

Therefore, it is smelted and cast in to bars and finally polished for export.

USES OF GOLD

Internationally, gold is used as money and therefore as a standard of monetary system and as a medium of exchange in the country.

It is also used for making jewellery.

It is used in gold craft industry.

DIAMOND MININIG IN SOUTH AFRICA

Diamond is the hardest known metal on earth and they are associated with volcanicity. In south Africa diamonds concentrate around the Kimberlite volcanic pipe and erosion that has taken place over the years has led to the washing and scattering of diamonds to the nearby lowlands and along the valleys of the vaal and orange rivers down the coast around the mouth of river orange and the adjacent coastal lands.

Diamonds found in such deposits are called alluvial diamonds. The major mines are found in Pretoria, Bloemfontein, jagersfontein, kaffirsfonttein. The continent of Africa produces around 30 percent of the world's diamond, out of which DRC produces 30 percent, South Africa 17 percent and Ghana 6 percent.

MAP SHOWING DIAMOND FIELDS IN SOUTH AFRICA

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COAL MINING IN SOUTH AFRICA

South Africa has extensive reserves of bituminous coal in Orange Free State, south Transvaal and natal. The coal bearing rock occurs few meters from the surface which encourages mechanical methods (open cast) and so costs are comparatively low or cheap.

The present chief mines are Witbank, springs, Middleburg in Transvaal and Newcastle, Dundee, Vryheid in natal.

The coal fields were developed to meet the power needs of the mines in the rand in Kimberly. Natal has excellent coking coal and for many years it has been mined. It's especially important today in the iron and steel industry. Coal mining has been important in the manufacturing sector as a source of power.

Other minerals mined in South Africa include uranium which occurs in the gold deposits and used in nuclear plants for power production. There is iron ore, copper, asbestos, silver, etc.

MAP SHOWING COAL FIELDS OF SOUTH AFRICA

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