REGIONAL GEOGRAPHY OF RHINELANDS

Introduction

Rhinelands refers to the region in Western Europe that is drained by the great Rhine river comprising of five basic countries.

- Netherlands
- Germany
- Luxemburg
- Switzerland
- Belgium

Rhinelands has a land coverage of 350,000 sq.km and a population of about 120 million people. It is currently getting populated by migrants from all over the world seeking for jobs, citizenship, medication and education opportunities.

Latitudinally it extends from 42º- 54º N and 03º- 13º E.

It is bordered by the North Sea in the North, Poland, Czechoslovakia and Austria in the East, Italy in the South and France in the West.

(Sketch map of Rhine lands region)

Drainage

Rhine lands is drained by a diverse drainage system with the Rhine river as dominant plus its tributaries and other rivers which stream from different parts of the region and empty their water into large water bodies like North sea, Baltic sea, Black sea and Mediterranean sea. These include the following; Rhine, Rhone, Danube, Elbe, Inn, Ticino/Po, Weser, Scheldt etc.

- Rhine river- streams from the Swiss Alps through Switzerland, Germany and Netherlands into the North Sea.
- Rhone river- streams from the Swiss Alps through France to the Mediterranean Sea.
- Weser river- streams from Germany flowing into the North Sea.
- Elbe river- streams from Czechoslovakia through Poland and Germany into the North Sea.
- Danube river- streams from South Germany through Austria into the Black sea.
- Inn river- streams from the Swiss Alps through Austria and links with Danube in South Germany flowing into the Black sea.
- Ticino/Po river- streams from the Swiss Alps through Italy to the Adriatic Sea.
- Scheldt river- streams from Belgium through Netherlands into the North Sea.
- Oder river- streams from the Poland region into the Baltic sea via the Germany border

(Sketch map showing Rhine lands drainage)

Climate

Rhine lands receives varied climate patterns. These include;

- Maritime- this is the most wide spread climate experienced in Netherlands, Germany and Belgium. It has warm summers and cool winters.
- Cool Continental- this is particularly experienced in Southern Germany with short warm summers and cool winters.

- Alpine- this is dominant in Switzerland caused by the Alpine mountains/ Alps that induce snow throughout the year.

Comparative study between Rhinelands and East Africa.

- East Africa is made up of three countries- Uganda, Kenya and Tanzania including the Islands of Pemba, Zanzibar and Mafia. As per 2007, Rwanda and Burundi became part of East Africa following the revival of the East African Community. While Rhine lands is made up of five countries- Netherlands, Germany, Belgium, Luxemburg and Switzerland.
- East Africa has a population of about 110 million people with a population density of 25 persons per sq.km. While Rhine lands has a population of about 120 million people with a population density of 350 persons per sq.km.
- East Africa's total area is nearly 5 times than that of Rhine lands while Rhine lands is estimated to be nearly ¾ of Tanzania.
- East Africa has two out-spoken arms of the Rift valley (eastern and western) bordered by plateaux and volcanic features while Rhine lands has one major Rift valley – Rhine, which is short and narrow from Basel in Switzerland to Mainz in Germany.
- East Africa's landscape is largely influenced by vulcanicity while in Rhine lands; vulcanicity is limited to areas around the Black forest- at Harz and Eifel.
- East Africa comprises of old basement rocks punctuated with volcanicity while Rhine lands is made up of young basement rocks.
- In East Africa, glaciation is limited to Rwenzori, Kilimanjaro, Meru and Kenya mountains while in Rhine lands glaciation has largely influenced landscape.
- East Africa has many tribes with few ethnic groups while Rhine lands are basically made up of ethnic groups.
- East Africa's dialect is dominated by Kiswahili and English as official languages while in Rhine lands German is the official language used besides others like Dutch, Latin, Swiss, Spanish.
- East Africa is situated in the Tropics while Rhine lands are situated in the Temperate region.
- East Africa's highland areas are very fertile suitable for agriculture and settlement while the Rhine lands highland areas are infertile.
- In East Africa some rivers are not navigable while in Rhine lands all rivers are navigable e.g. Rhine, Danube, Scheldt, Iyssel, etc.
- East Africa experiences two climatic seasons – dry and wet, while Rhinelands has four climatic seasons- winter, spring, summer and autumn.

SWITZERLAND

This is one of the countries in the Rhinelands region located South of the region in the centre of Europe with a very mountainous relief e.g. Jura and Swiss Alps.

It has a population of about 7.7 million people with land coverage of 42,000 sq.km, ¼ of which is cultivable and the rest is covered with forests and snow.

The major economic activities practiced are dairy farming, tourism, sports and industrialization.

Today, it is highly industrialized with major economic/commercial centres like Zurich, Geneva, Lucerne, Neuchâtel, etc. and headquarters of international agencies like World Bank.

Relief

Switzerland is generally a mountainous country with three basic physical regions;

- Jura

- Swiss plateau
- Alps

The Jura
This makes up 10% of the land coverage in the Western part of the country composed of mountain ranges that rise up to 1500m above sea level stretching from the Southwest to the Northwest characterized by;

- Poor soils
- Rocky upland
- Underground caves
- Limited surface drainage
- Parallel ridges and valleys

The area is less inhabited with economic activities like forestry, dairy farming, fruit growing, salt mining and industrialization.

Swiss plateau
This makes up 30% of the general land coverage forming a corridor between the Jura and the Swiss Alps (Alpine foreland-mittchard) occupying the central part of the country stretching from the South to the North. It comprises of low undulating land that rises up to 580m above sea level characterized by;

- Undulating land with rolling stones
- Very fertile soils by moraine deposition from Alps, Jura and Black forest.
- Well drained with lakes like Thurn, Neuchatel, Geneva, Zurich and rivers like Aares, Sarire, etc.

The area is highly inhabited with mild climate receiving rainfall in summer and snow in winter suitable for arable farming, dairy farming, market farming, mixed farming and transportation.

Swiss Alps
This makes up 60% of the land coverage stretching from the central eastwards and from South to North. It has a general altitude of about 3000m forming a snow line characterized by;

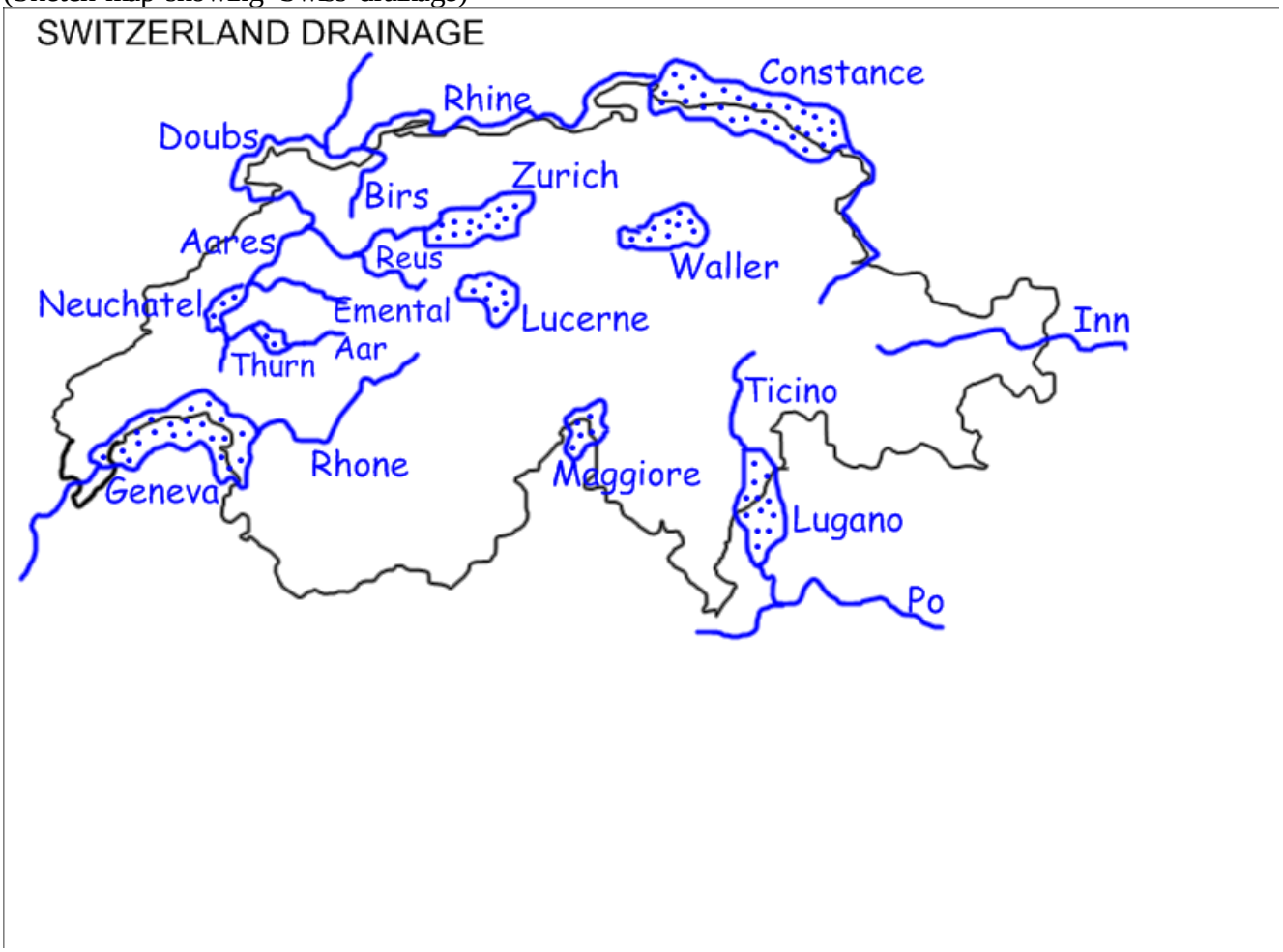
- Glacial features like arêtes, pyramidal peaks, U and V-shaped valleys, etc
- Thin and infertile soils
- Snow capped
- Watershed for many rivers like Rhine, Rhone, Ticino and Inn.

The area has limited economic activities particularly tourism, forestry, viticulture and dairy farming with settlement basically at the foothills.
(Sketch map showing Swiss relief regions)

Drainage
Switzerland has a well drained system dominated by the Rhine river and its tributaries which covers 2/3 of the drainage. The rivers include Rhine, Rhone, Ticino, Inn, Birs, Doubs, Aares, Reus, Emental, Aar, Sarire and lakes include Geneva, Zurich, Neuchatel, Thurn, Zug, Lucerne, Lugano, Maggiore, Constance and Waller.

Because of the nature and pattern of drainage, it earns Switzerland the title of "Fountain heart of Europe".

(Sketch map showing Swiss drainage)



Climate

The climate of Switzerland is dominated by high atmospheric pressure originating from Northeastern Europe causing sunny conditions in summer (16° -21°c) with convectional rainfall (80 – 100mm) and cool conditions in winter and spring.

Switzerland experiences a variety of climatic patterns influenced by its location and relief. These are;

- Cool Temperate Continental
- Alpine or Montanne
- Mediterranean

Cool Temperate Continental climate- experienced in the North and Central parts of the country receiving rainfall of 513 mm which reduces eastwards.

It has summer temperatures of about 18ºc and reduce to as low as ¯19°c in winter.

Alpine/ Montanne climate- experienced basically in the eastern part in the Swiss Alps arising from altitude that reduces pressure and increases precipitation.

Mediterranean climate- experienced in the South having hot dry summers with temperatures up to 21° c and rainfall of between 500 -750 mm per annum.

Vegetation

Switzerland's vegetation is varied mainly influenced by climate, altitude, soil and man's activities. Each relief region has a peculiar vegetation type such as;

The Jura

This is dominated by the deciduous and coniferous forests supported by a modified Cool Temperate Continental climate.

Swiss Plateau

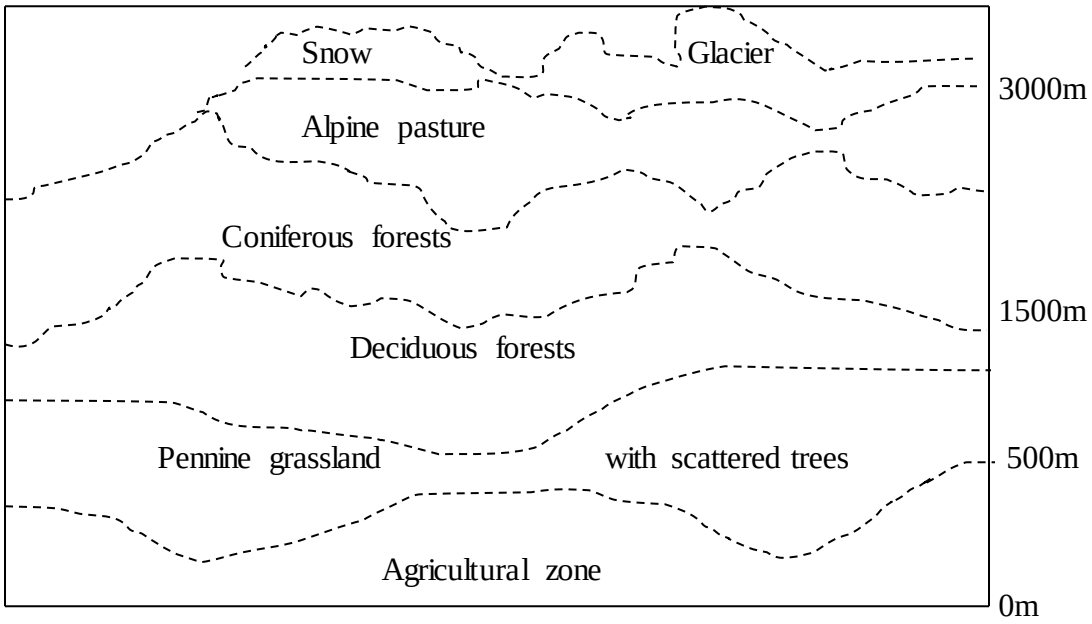
This was originally occupied by mixed forests and pasture which were later altered by man.

Swiss Alps

This has typical montanne vegetation that varies according to altitude, that is,

- 500- 1200m is an agricultural zone with fruit growing, tobacco, stone fruit grapes in areas of lake Geneva, river Ticino and Valais.
- 700- 1500m is a mountainous deciduous level in the Alps areas with species like spruce, beech, lime, walnut, mountain ash, accassia etc.
- 900- 1700m is dominated by vegetation of ahush, aletsh forests, aralla pine, yew, larch, juniper, silver fir, etc.
- Alpine snow line at 3000m comprising of alpine pasture, dwarf pine, alpine rose, scotch pine proceeded by bare rock, snow and permanent ice.

Sketch diagram showing Alpine vegetation



Economic importance of Relief regions
The physical landscape in Switzerland has got a variety of benefits to the country.

The Jura

- Industrialization at centers like Le locole, La chaux de fond, Bienne, etc.
- Forestry in the lower slopes with trees like elm and fir.
- Extensive farming in the south west due to loess soils.
- Pastoral farming with goats and sheep due to poor pasture on limestone rocks.

The Swiss plateau

- Industrialization at centers like Zurich and St. Gallen for textile and engineering.
- Arable farming for maize, wheat, fruits and fodder crops due to fertile soils.
- Dairy farming because of permanent pasture.

The Swiss Alps

- Arable farming on the slopes and valley areas having deposited soils.
- Fishing on rivers like Rhine, Inn, Ticino and Rhone.
- Winter sport center for domestic and foreign tourists.
- HEP production due to the hanging valleys and upland areas.
- Animal rearing particularly transhumance due to good pastures in spring.
- Forestry due to pine forests that exist
- Industry particularly smelting and refining non-ferrous metals.

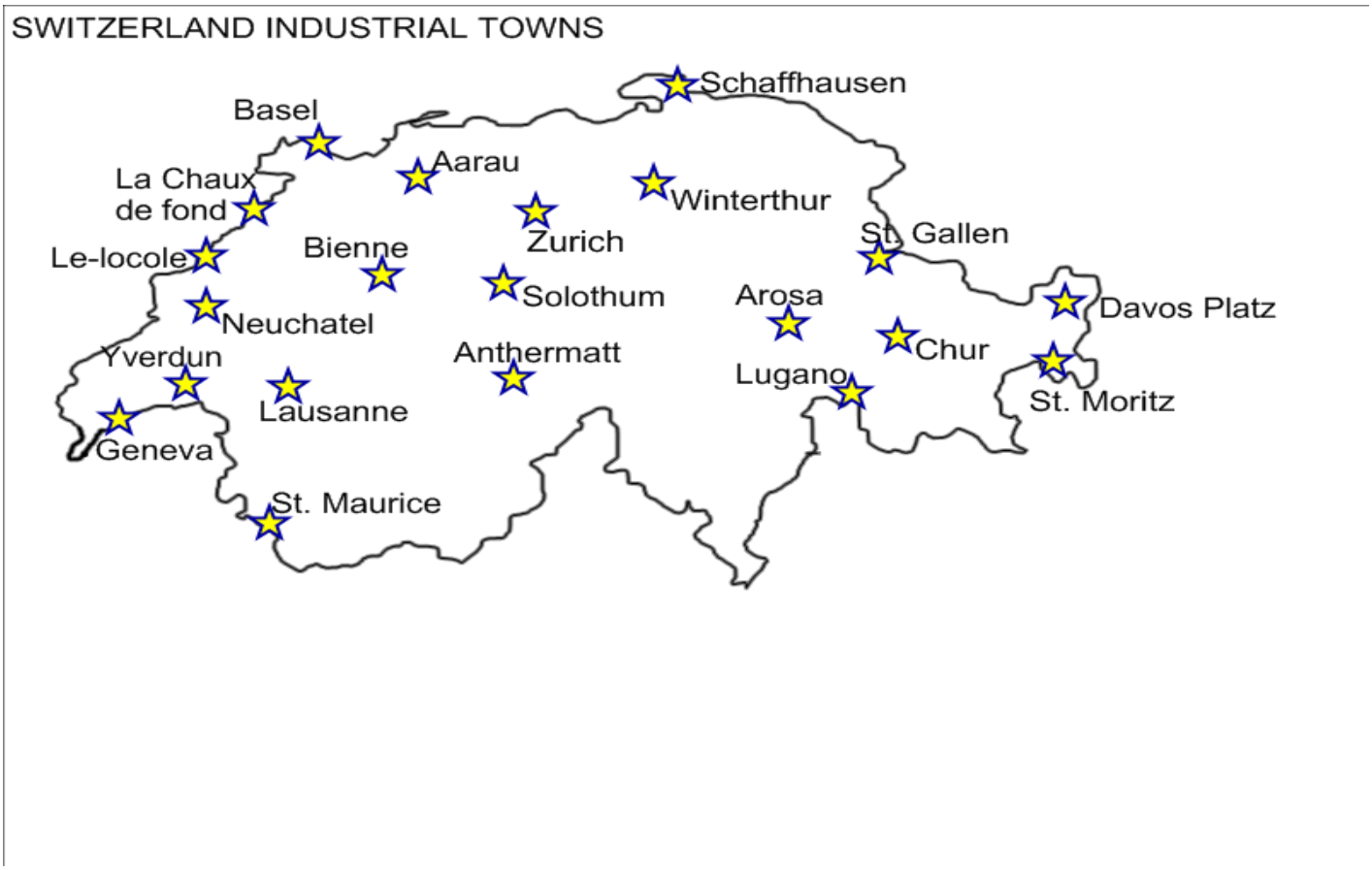
The Rhone valley
It stretches for 150 km in the Alpine zone bordered by the Bernesse-Oberland and Pennine Alps in the North and South and Gothard massif and lake Geneva in the east and west respectively. It is glaciated with steep slopes and a wide floor.

- Arable farming for rice, potatoes and vegetables
- Mining of oil and natural gas
- Tourism especially in winter and summer.
- Transportation acting as the corridor linking southern Switzerland to other parts of the world.

Industrialization
Switzerland is one of the most industrialized countries in Europe due to its neutrality dating back to the 16th century, diverse citizens and a central position which attracted investment.

Today the country boasts of a textile industries, engineering, watch making and precision industries at towns like Zurich, Bern, Basel, Geneva, St. Gallen and Winterthur.

(Sketch map showing major industrial centers)



Factors

- Raw materials like coal, non-ferrous metals and iron ore from France for iron and steel industries.
- Extent land in the Swiss plateau
- Well established transport and communication networks like water, railway, cable cars and road.
- Good government policy based on self reliance
- Domestic and foreign market for industrial products
- Advanced technology for converting raw material into finished goods
- Investment capital to buy factors of production
- Electricity from many dams like at scheff-haussen
- Abundant skilled and semi-skilled labor for innovation and production
- Involvement in international trade creating more market potentials
- Strategic location at the heart of Europe being accessible
- Abundant water supply facilitating industrial production
- Mountainous relief sparing no option but industrial development
- Political stability attracting domestic and foreign investors
- Technical biased education providing skilled labor
- Influx of refugees particularly the Jews and Italians.

Major industries

- Chemical and pharmaceutical industries- located at Geneva, Bern, Zurich and Basel making soap, plastic, insecticides, cosmetics, explosives, etc

- Engineering industry- located at Basel, Zurich and Neuchatel making machines, locomotives, turbines, electric appliances, etc
- Textile and footwear- located at Basel, St. Gallen and La chaux de fond making high quality skiing boots, lady shoes, synthetic fiber, etc
- Watch making industry- located at Le locole and La chaux de fond making high quality Swiss watches.
- Precision industry- located at Bern, Neuchatel, etc making optical instruments like binoculars, navigation and meteorological tools like telescopes, microscopes, survey cameras, etc.
- Others include food processing, cigarette making, tourism, etc.

Importance

- Cheap and good quality industrial products have been provided.
- Government revenue through licensing and taxation
- Foreign exchange through export
- Promotion of international trade and relations
- Industrial profits develop other sectors like tourism, agriculture, etc
- Market for local raw materials
- Employment opportunities
- Income to the workers improving their standard of living
- Improvement in transport and communication for goods and passengers
- Skill acquisition for better living
- Avenues for academic research and training
- Utilization of natural resources. However, industries have negative importances as explained below;
- Environmental pollution by releasing toxic waste in water bodies, land and air.
- Exposure to extreme body temperatures causing skin illnesses
- Unbalanced development in different parts
- Social imbalance in income for industrial workers and others
- Rural-urban migration where able-bodied men and women leave the countryside
- High crime rate especially by the unemployed
- Exploitation of semi-skilled and unskilled labor due to inadequate experience
- High labor mobility of skilled labor from one institution to another with better pay
- Profit repatriation by foreign investors.
- Limited land for settlement, expansion and future development.

Problems facing the Industrial sector

- Limited domestic market due to low population
- Limited labor to engage into the production process
- Limited raw materials causing dependence on imported items like cotton from Egypt and iron ore from France.
- Limited flat land for setting up industries due to mountainous nature
- Depreciation of industrial products due to change in global trend of technology
- Competition from other industrialized countries like Japan, USA and China.
- Landlocked nature limiting accessibility
- Limited electricity to run industrial machinery
- Duplication of industrial products and importation of sub-standard foreign goods

- Congestion on river Rhine which provides access to the outside market by water through port Roterdam
- High cost of production for high quality capital goods
- High cost of transport due to landscape which is mountaneous and being landlocked.

Tourism

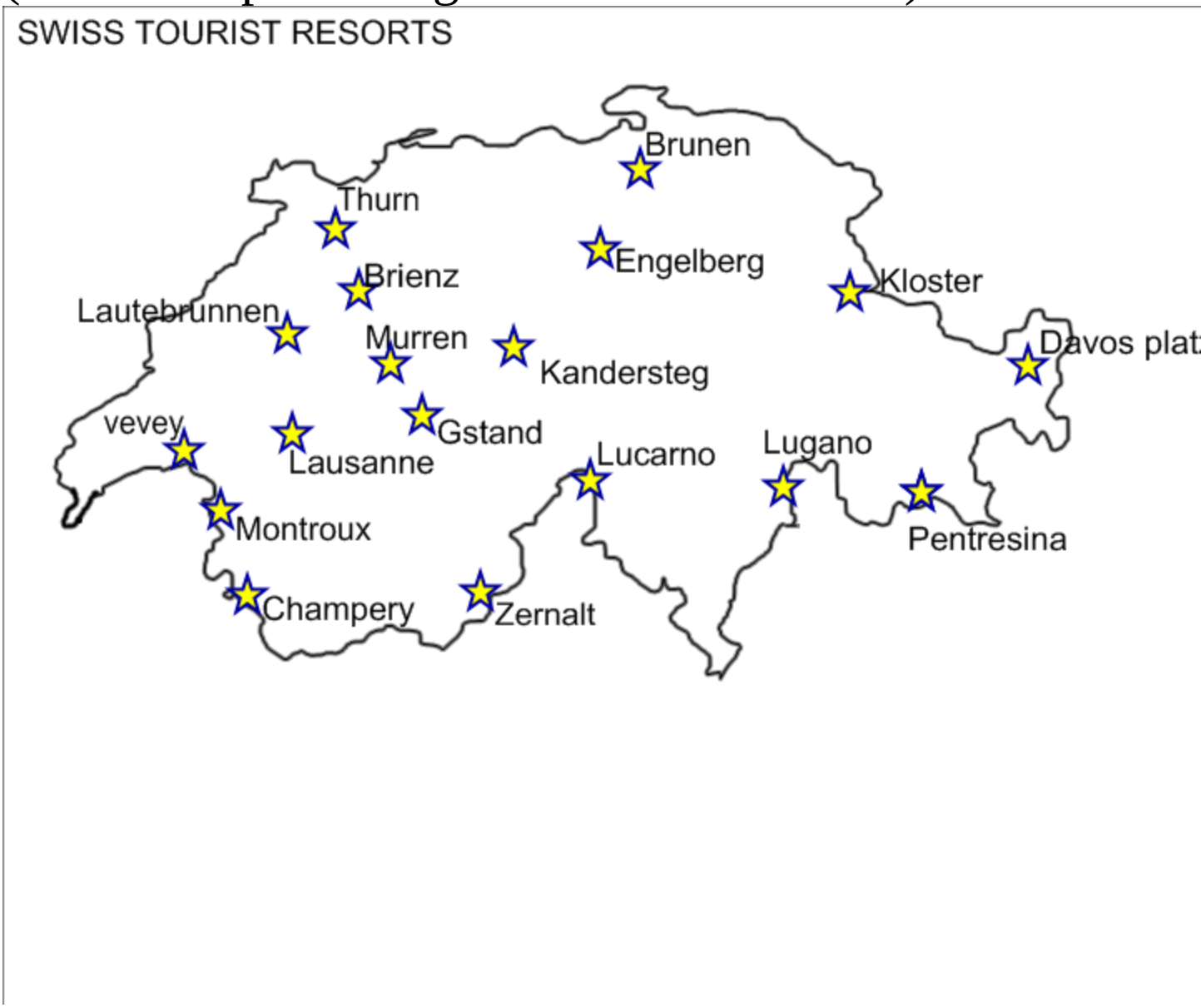
This is the art of visiting geographical places with an aim of appreciating the beauty of nature- ecosystem.

Tourism in Switzerland is one of the foreign exchange earner and an invisible activity which has been favored by the variety of tourism potential like fauna and flora, glaciated scenery, relief, culture drama and climatic variations.

These tourism potentials ranging from the Jura to the Alps earn Switzerland the title of the "playground of Europe". Tourism activities in Switzerland occur basically in two seasons.

- Winter season- major tourism centre are Zermatt, Gothland, Murren, Grandervolt, Lauterbrunnen, Kanderstag, Gstaad, Maritze, etc.
- Summer season- major tourism centres are Geneva, Ticino, Zurich, Bern, Mutterland, Brunnen, Lucarno, etc.

(Sketch map showing Swiss tourist resorts)



Factors

- Tourism potentials ranging from glacial features to flora and fauna.
- Neutrality and political stability dating back from the 16th century

- Developed transport and communication networks to tourism centres
- Improved social amenities like hotels, motels, restaurants, etc
- Positive government policy aimed at diversifying the economy.
- Abundant capital to invest in the tourism industry
- Hospitality of the Swiss people to foreigners
- Being multi-lingual with the ability to speak different languages like Latin, German, French, English, etc
- Strategic location of Switzerland located in the heart of Europe making it accessible.
- Affluent society that values recreation in life
- Domestic and foreign tourists who come to see the beautiful sceneries
- Skilled and semi-skilled labour that runs the industry
- Limited land for agriculture that prompted government to utilize the existing landscape in its natural state.

Importance

- A lot of revenue to the government by taxing tour agencies, hotels, etc.
- A lot of foreign exchange to the government by the foreign tourists
- Profits from the tourism industry is used to develop other sectors
- Many employment opportunities to the Swiss people e.g. as tour guides, drivers of cable cars.
- Improved international relations with countries where tourists come from
- Establishment/improvement of social amenities like hotels, hospitals, etc.
- Improvement in transport and communication services like railway, road and water transport.
- Provision of market for domestic goods and services e.g. banking, transport and agricultural products.
- Conservation of the eco-system thus conserving nature/environment

- Earning of a lot of income by the Swiss people thus improving their standards of living
- Proper utilization of marginalized land especially glaciated areas and rugged landscape
- Preservation of the native culture of the Swiss people
- Attraction of industrial investors to boost the tourism industry and other industries
- Environmental degradation of some fauna and flora species that are trampled upon as tourists travel to certain areas
- A lot of land is gazetted for tourism leaving little for other economic activities to be practiced.

Comparative study between Switzerland and East Africa Tourism Industries.

- Both have a variety of fauna and flora
- Both experience a variety of climate patterns based on latitudinal location
- Both have a rich peculiar traditional culture with songs, dance and drama

- Both have varied infrastructure suitable for tourism
- Both have a Well sculptured landscape with volcanic and glaciated features
- Both have relative stability in many parts
- Both have local small scale and large scale industries that make tourism tools
- Latitudinal location that attracts tourists like Switzerland in the temperate region and East Africa in the Tropics

Reasons for variation in development of tourism sectors.

- Switzerland has a large capital investment unlike East Africa
- Switzerland has enjoyed peace from as early as 1270 unlike East Africa
- Switzerland has limited agricultural land hence less options for survival unlike East Africa
- Switzerland is surrounded by an affluent society unlike East Africa

- Switzerland has high level of technology and industrial development unlike East Africa
- Switzerland has a mountainous nature of over 70% unlike East Africa
- Switzerland has more captivating social amenities unlike East Africa
- Switzerland has greater publicity and advertisement unlike East Africa

Agriculture

Switzerland is basically a mountainous country with limited cultivable land of nearly 14% particularly in the Swiss plateau. Switzerland caters for 6% of her food requirements and the rest is provided through international trade.

The Jura and Swiss Alps are ideal for forestry and pastoral farming. However agriculture has greatly improved due to advanced technology in agricultural machinery, provision of high yielding seeds and land consolidation.

Land use distribution

Land use	Percentage
Arable	6.3
Fodder	19.4
Pasture	23.2
Forestry	25.5
Unproductive land, lakes and glaciers	25.6

Major agricultural practices

- Arable farming- involves the growing of cereals practiced mainly in the Swiss plateau.
- Market gardening- involves the growing of fruits and vegetables for direct supply into the urban market centers mainly practiced in the Rhone valley.
- Pastoral farming- involves the rearing of animals particularly dairy farming for milk, beef practiced in the lower Alpine area rearing red spotted semental and schuzy breeds producing over 37,000 liters of milk per year.

Factors favoring agriculture in the Swiss plateau

- Fertile alluvial soils in the plateau areas deposited by running water and alpine glaciers
- Undulating land favoring mechanization
- Well drained area with required water
- Natural pastures and fodder crops in the low altitude areas that are fed to animals.
- Mild climate with a combination of Mediterranean and cool temperate continental climatic conditions for proper plant growth
- Well established transport and communication networks that ease accessibility to the gardens and markets.
- Positive government policy aimed at fully maximizing the limited arable land and that has encouraged the farmers to carry out agriculture.
- Availability of large sums of/adequate capital to invest in the agricultural sector.
- Abundant/cheap labor especially in the Swiss plateau which is greatly inhabited,

labor is needed in the planting harvesting and tending to the animals.

- Relatively sparse population providing enough land for agriculture

Factors limiting agriculture in the Alps

- Thin stony and infertile soils limiting plant growth
- Mountainous terrain limiting establishment of transport networks
- Difficulty in mechanization due to mountainous nature
- General altitude of the Alpine region favors forestry and alpine vegetation
- Presence of snow and glaciers limiting land for cultivation
- Alpine climate is very unfavorable for growth of arable crops
- Government prefers utilizing marginalized land for activities that maintain the natural eco-system like tourism
- Limited open surface water to support farming

- Occurrence of avalanches that destroy farmland at the foothills
- Floods in Spring and Summer seasons

Importance

- Provision of a lot of food to the people
- Provides raw materials for agro-based industries
- Provision of meaningful employment to many people working in farms and gardens
- Government earns a lot of revenue by taxing farmers and farm owners
- A lot of foreign exchange is earned by exporting agricultural products
- Micro-climate modification through evapo-transpiration
- Properly utilizing marginalized land especially the lower slopes of the Alps
- Improvement of social amenities like schools, hospitals that are used by the workers.

- Development of international trade and good international relations due to exporting of agricultural products to the neighboring countries like Belgium.
- Avenues of agricultural research and academic study
- Clearing of natural vegetation for cultivable land has degraded the environment
- Intensity of agriculture has limited land for the practice of other economic activities
- Agro-based industries led to environmental pollution by discharging dangerous industrial waste in the water and land.

Problems faced

- Pests and disease vectors that attack the crops and reduce the yields.
- Limited labor for harvesting and planting hence, delays in production.
- Flooding in the plateau area that affects the crops grown.
- Inaccessibility of the mountainous areas in the Alps and the Jura

- Limited land for expansion in the plateau region
- Pollution from the industries that destroy the farm land
- High cost of irrigation and maintaining farms in the plateau area

Dairy farming

This involves the rearing of animals particularly dairy farming for milk, beef practiced in the lower Alpine area rearing red spotted semental and schuzy breeds.

Factors

- Warm summers which allow growth of pastures and out-door grazing
- Cold winters which permit indoor grazing
- Variety of pasture and fodder crops that are so nutritious.
- Presence of variuos co-operative movements providing subsidies and market
- Developed milk processing plants to preserve milk

- Large/ready market for milk and other dairy products within Switzerland and abroad.
- Sufficient capital to invest in the dairy industry
- Well developed transport and communication networks for transportation and marketing
- Supportive government policy that has encouraged diary farming in the area.
- Relatively flat land in the Swiss plateau that ease the movement of animals.
- Variety of animal breeds that are highly yielding e.g. The Red spotted segmental and scuzzy breeds.
- Advanced technology of automated milking that eases work.
- Intensive research to improve quality
- Cheap skilled labor to handle the cattle and produce
- Large quantities of fresh water for the animals
- Moderate rainfall for pasture growth

Contribution

- Source of a lot of food for the natives
- Many people have been employed in rearing and processing of dairy products
- Provision of abundant raw materials for agro-based industries like milk.
- Provided ready market for industrial and arable products
- Infrastructure development in the area e.g. roads and railways.
- Urbanization and its related advantages like provision of social services i.e. hospitals and schools.
- A lot of foreign exchange through exports of diary products to other countries.
- A lot of income to the natives improving their standards of living
- A lot of revenue to government through taxation and licensing
- Diversification of the economy reducing dependence on industry but also diary farming.
- International trade and improved relations with other countries that import Switzerland's diary products.

- Animal waste is used as fertilizers/ manure
- Development of research in animal breeds, fodder crops, etc
- Use of would-be waste land for transhumance
- Source of bio-gas for domestic use

Urbanization

Switzerland has steadily developed industrially leading to the emergence of industrial and other urban centers where commercial and administrative functions are carried out.

The major towns of concern include;

- Zurich- largest city in Switzerland though not the capital city with a population of nearly a million having a variety of industries like textiles, engineering, chemical and pharmaceutical industries among others.
- Geneva- is of international value housing headquarters of major international agencies like the Red Cross, International Labour

Organization, etc. It's a re-known industrial center for textile and precision industries.

- Bern- the federal capital of Switzerland and a major industrial center having industries such as engineering, paper and pulp, watch making, chemical and pharmaceutical, etc.
- Basel- a territorial town linking Switzerland with Germany and France and a major gateway on the Rhine river for importing and exporting Swiss products.

Basel- Factors for growth and development

- Strategic location with easy access to France and Germany
- Being at the headway of the navigable Rhine
- Great trade potential handling all the imports and the exports of Switzerland
- Availability of fertile soils that attracted human settlement for agriculture.
- Developed transport and communication network for easy movement
- Undulating relief with an altitude of 950m attracted settlement

- Conducive climate of Cool Temperate Continental with warm summers attracting tourists in the area
- Growing level of industrialization especially for heavy industries
- Prevailing peace and stability favoring human settlement
- Presence of large salt deposits that attracted industrial development
- Desire by government to set up calling stations in very remote areas

(Sketch map of Basel town/port)

Problems faced

- Limited land for expansion
- Occasional flooding during Spring and Summer seasons
- Congestion at the port and the Rhine water way
- Slum development with related problems ike easy spread of diseases
- High cost of living

- High costs of infrastructure development and maintenance
- High crime rate e.g. murder, theft and burglary, drug abuse.
- Unconducive weather like fog, frost which affect visibility and transportation

Transportation

Switzerland has a well-built transport and communication system ranging from air, water, road, railway and cable cars. This has made it very accessible to the outside world because it is a landlocked country.

- Air transport- well developed but shared with the neighboring countries for easy movement of tourists and other trade items. Air ports include Kloten at Zurich and Cointin at Geneva.

- Road transport- well laid out particularly in the Swiss plateau which is suitable for human settlement, agriculture and industry. Major road links are between Jura and

Basel, Rhine river and Leon, Paris and Geneva and the Rhone valley through to Italy.

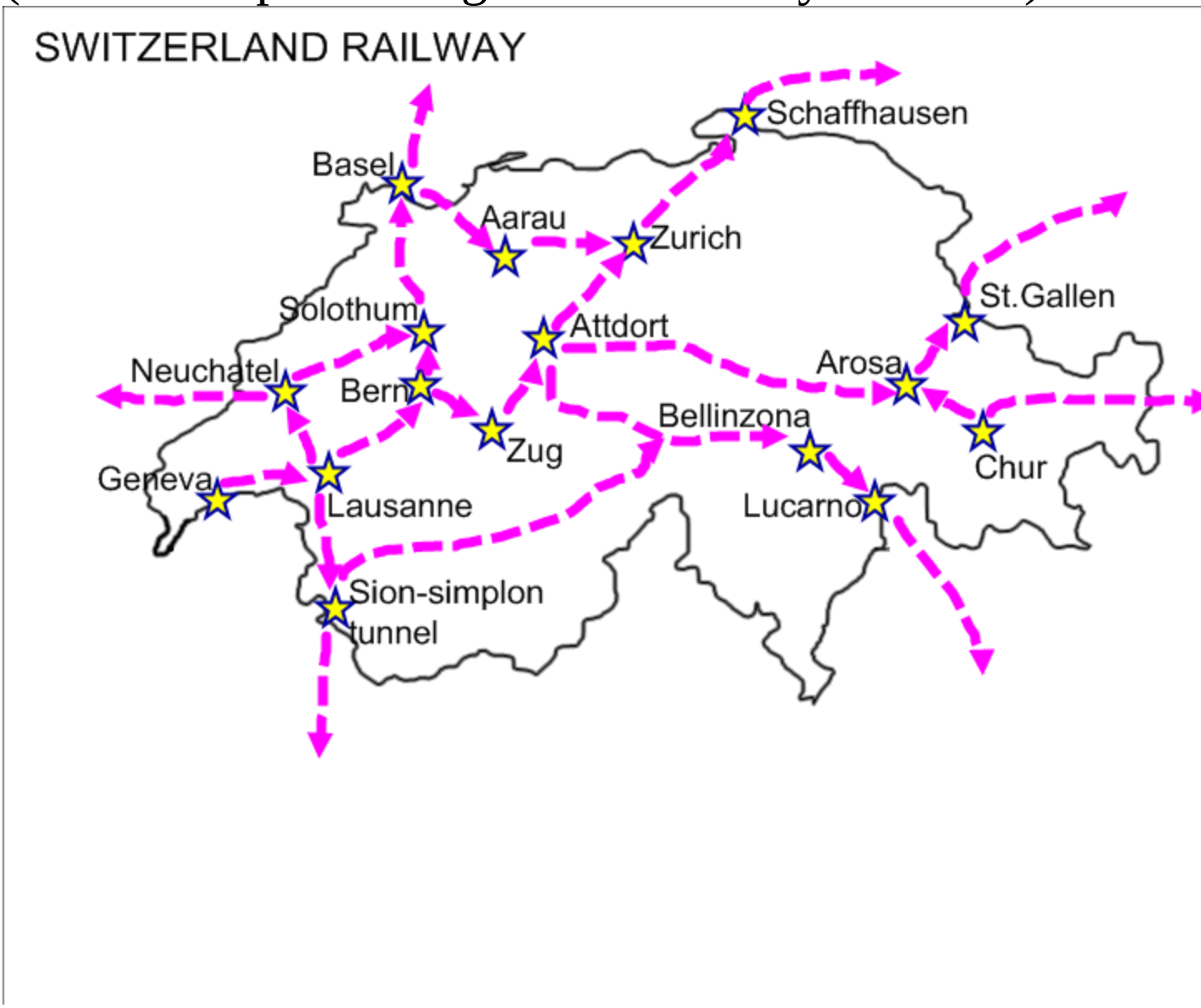
- Water transport- well developed on the Great Rhine linking Switzerland to the outside world via port Basel to the North Sea. Basel holds all the international river traffic of Switzerland with a fleet of 400 vessels.

- Railway transport- well spread linking Basel to all the major urban centers in the interior. There are also international links like;
  - North-South line stretching from Basel to Chiasso connecting with Germany to Italy through Gothland.
  - Bern-Mullen line through Sion-Simplon tunnel linking with Italy
  - Traffic line linking France through Valla-belauson passing through the Rhone valley and the Simplon tunnel.

- West-East line from Geneva through Bern and Zurich connecting with France, Germany and Austria.

Plans are underway to establish the Trans-Swiss canal linking the upper rail to Lake Constance and a water way along the foothills of the Jura using locks.

(Sketch map showing Swiss railway network)



Factors for development of the railway Network.

- Nature of relief that was not suitable for road and air transport
- Positive government policy to improve on transportation

- Increasing number of travelers with daily responsibilities
- Need to transport bulky industrial raw materials and finished products
- Prevailing political stability that attracted investment in railway transport
- Abundant electricity that necessitated electric train
- Availability of adequate capital for constructing and maintaining the railway network
- Need to facilitate the transportation of imports and exports through port Basel which handles all international river traffic
- Need to supplement on electric cable cars in order to promote tourism
- Presence of cheap/abundant skilled labour to manage the system
- Strategic location of Switzerland and need to link with neighboring countries
- Advanced technology that facilitated the modern electric train system

- Increasing level of industrial development with need to link industrial centers and market potential areas

Problems facing transportation in Switzerland

- High transport costs of bulky goods that hike the prices of goods.
- Conducive weather conditions like snow and glaciers in winter covering up roads, airports and rivers
- High cost of construction and maintenance due to good quality systems
- Congestion especially at the peak hours hence delays.
- Some rivers with sources in the Alps are not navigable with rapids and falls
- Limited manpower to man the system
- Being a landlocked country, limited access to the sea
- Mountainous nature of the Jura and the Alps limiting establishment
- Fuel shortage especially for the road and air transport

GERMANY

It is the largest country in the Rhinelands region that became one after the unification of East Germany (communist) and West Germany (capitalist) when the Berlin wall crumbled down.

Its located 55° 03' N-8° 24' E to the north, 47° 16' 12.39" N, 10° 10' 41.95" E to the south, 51° 1' N, 5° 53' E to the West and 51° 16' N, 15° 2' E to the east.

Germany has a land coverage of about 357,021 sq.km with 349,223 sq.km is land and 7,798 sq.km is water having the highest point of 2,962 m at Zugspitze and lowest point of 3.54 m at Neuendorf-Sachsenbarde. Having a population of about 81.7 million people.

Germany is bordered by the Baltic sea and the North sea in the north, Poland and

Czechoslovakia in the east, Austria, Switzerland and France in the south and Luxemburg, Belgium and Netherlands in the west.

Relief

Germany is subdivided in three relief regions, that is

- Northern lowland
- Central highland
- Southern highlands

Northern lowlands

This belongs to the Great European plain rising to 210m above sea level comprising of young quaternary rocks of alluvial and moraine debris like sand, clay, leos, boulders. The lowlands are further subdivided into;

- Marcheland- comprises the coastal zone of land reclaimed from the North sea covering 121,000 hectares made of pasture land and cultivable land with marine silts.

- Geestland- comprises of infertile sandy soils with less organic matter established during

the quaternary ice period with fluvial-glacial material. Today, the area is covered by heather because the original vegetation was cleared by man

- Borderland- stretches southwards to Saverland hills, the Rhine valley as far as Bonn, that is, Westphalia-Rhineland bay. The area is very fertile with loam and leos soils plus minerals like coal, potash, iron ore, which have favored mineral-based industrialization.

Central Highlands

This is sometimes referred to as Hercynian block that was formed due to folding and uplift. Due to continuous denudation/erosion, the anticlines were reduced to peneplanes whereas the synclines were filled with eroded materials forming sedimentary layers. The area is well drained with rivers like Rhine, Mossel and features like Rhine rift valley, Odenwald and Bohemian and Black forests.

The Central plateau comprises of granite and gneiss rock complex which are resistant to soil erosion.
Also between the Black and Bohemian forests, there is sand stone, limestone and alluvial layers. However, the area has infertile soils especially in the scarp lands being used for pastoral farming while the valley is used for cultivation.

Southern Highlands
This stretches up to Switzerland bordered by river Danube in the west undulating from 300m-900m comprising of mollases, that is, clay, moraine and drumlins. This area is covered by pine and fir forests with agriculture for resistant crops like wheat and barley in the settled areas.

(Cross-section of relief)

(Sketch map showing relief)

Climate

Germany experiences cool Maritime climate in the north and west parts due to the influence of the North sea.
The south and eastern parts experience cool Temperate Continental whereas the central upland areas experience local micro-climate due to their altitude, aspect and shelter.
Temperatures rise to 19° in summer from others around 3º and fall to ¯5º in the mountainous areas.

Soil

The northern lowlands have poor acidic soils due to glacial erosion and deposition through leaching, giving rise to sandy and clay soils.
The Bordeland area has loam and leos soils coupled with the Rhine rift valley and the Danube valley with non-acidic soils.

Vegetation

Germany originally had the deciduous forests in the low land and coniferous forests in the highland areas. However, man altered the

original vegetation in search for settlement, agriculture and industrial land.

Drainage

Germany is drained by many rivers like Rhine and its tributaries- Mossel, Necker, Main, Ruhr, Wesser, Ems, river Elbe and its tributaries- neissel, spree, harvel, river Danube and its tributaries- Iller, Isar/ Amper, Lech and Inn.
Germany is bordered by the North sea and Baltic sea in the north.

(Sketch map showing drainage)

Forestry

As noted earlier, Germany's natural vegetation is dominated by coniferous forests in Haardt mountain, Vosges mountain and Black forest mountain areas. There also exists temperate and deciduous forests in the low lying areas of the north.

Factors

- Presence of highland areas with very steep slopes
- Nature of climate especially cool temperate continental
- Presence of acidic soils suitable for coniferous trees
- Move to conserve nature or eco-system
- Government policy to protect the physical and natural heritage
- Abundant labour to work in the lumbering industry
- High altitude in central and southern Germany limiting other economic activities
- On-going afforestation programs
- Capital to invest in the forestry sector
- Political stability following the re-unification of East and West Germany
- Increasing level of industrialization needing raw material
- Good transport and communication networks linking forest centers to market areas for timber

Uses of forests

- Provides raw materials for forest related industries like paper and pulp, saw mills, etc
- Fuel wood for the natives of Germany
- Climate modification through evapo-transpiration
- Gaseous exchange in the environment by absorbing carbon dioxide and releasing oxygen through photosynthesis
- Habitat for fauna promoting tourism
- Controls soil erosion through shading off leaves reducing intensity of rain droplets and roots bind soil particles together
- Wind breakers reducing the effect of destructive air masses
- Soil formation as roots break down rocks into small particles mixed with decomposed matter
- Recreation grounds for vacations
- Water catchment areas where rivers stream from like Mosel from Haardt forest and Danube from the Black forest
- Provides materials for electrification and construction thereby improving people's standards of living

- Avenues for research and study in zoology, micro-biology, botany, etc

Problems facing forestry sector

- Fire outbreak during summer where temperatures rise to 19° C
- Limited labour especially during tree harvesting
- Difficulty in cutting and transporting logs because during winter the motorable roads get covered with snow while the rivers get frozen
- Rugged nature of landscape as forests are located in the mountainous areas like Vosges, Haardt, Saverland and Black forest
- Limited transportation networks due to remoteness
- Forest encroachment by people for settlement, agriculture, industry, etc
- Accidents during the lumbering process leading to loss of skilled labour
- Over exploitation of forests especially for coniferous trees that are on high demand

- Illegal cutting of trees leading to loss of valuable tree species
- Limited capital due to the on-going industrialization

The Rhine Rift valley

This is an outspoken physical feature in the western part of Germany extending from Basel in the south to the northern regions of Mainz. It extents for 290-300km long with a varying width of 32-40km.

It is bordered by the Vosges and Haardt mountains in the west and Odenwald and Black forest in the east.

The valley bottom is composed of soft rocks,clays,loams and considerable deposits of alluvium.

The Rhine gorge extends from Bingen to Bonn with a distance of 110km.

Formation

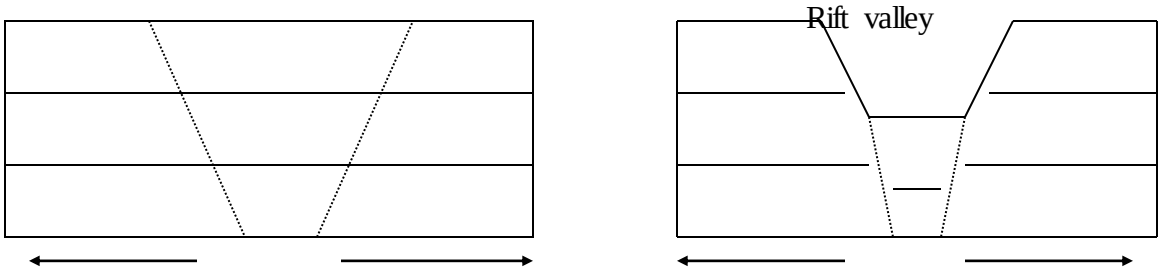
The Rhine Rift valley was formed by tectonic forces particularly faulting which can be explained in three basic theories;

- Tensional force by Gregory
- Compressional force by Waylland
- Differential uplift by Dixey and Troupe

Tensional force theory (Gregory)

The earth's crust is acted upon by tensional forces that pull away the earth's core forming normal lines of weakness. The crust is sub-divided into blocks where the adjacent blocks are forced to rise while the central block forms a trough called a rift valley.

Illustration

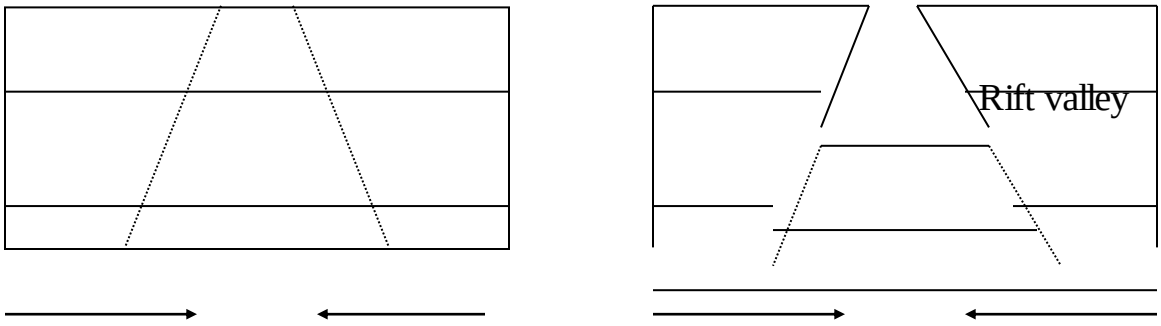


Compressional force theory (Waylland)

The earth's crust is acted upon by compressional forces that pull towards the earth's core forming reverse fault lines. This sub-divides the earth's crust into blocks where

the adjacent blocks rise with projected scarps which are acted upon by denudation forming a well structured rift valley.

Illustration

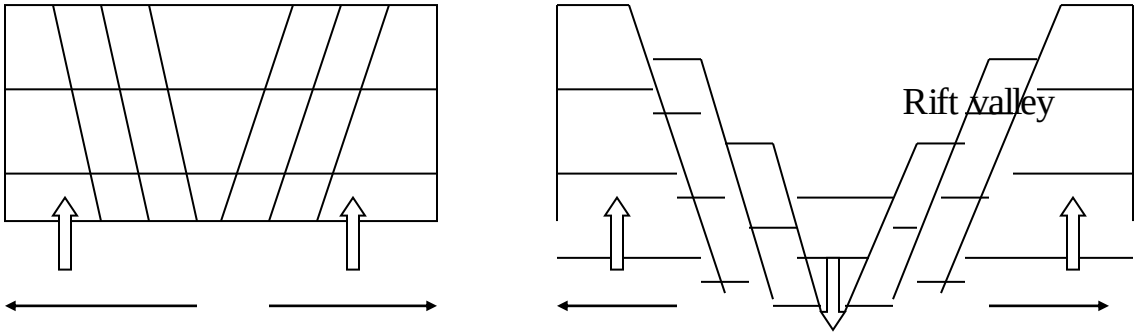


Differential uplift theory (Dixey and Troup)

The earth's crust is acted upon by severe tensional forces forming various lines of weakness which are also supplemented by up-warping and down-warping raising the adjacent blocks to different heights. This leaves the central block at a lower elevation forming the rift valley.

This theory best explains the Rhine rift valley of Germany with the Vosges mountain in the west and the Black forest mountain in the east.

Illustration



(Sketch map of the Rhine Rift valley, with major relief, rivers and towns)

Agriculture

It is well developed in the western part of Germany particularly in the Rhine rift valley areas with farming practices like;

- Mixed farming- is the growing of crops like oats, potatoes and fodder crops coupled with animal rearing

- Market gardening- is the growing of vegetables and fruits for the urban market centers like grapes, apples, peaches, orchards, pears, in southwestern Germany

- Arable farming- is the growing of cereals like barley, wheat, sugar beet, etc

After the Second World war (1945), Germany's agricultural sector was modernized from peasant family holdings of about 12 hectares to a mechanized farming practice which helped reduce land fragmentation.
About 34% of Germany's land is cropland and various measures have been taken to improve on agriculture.

Measures taken to improve agriculture (1955-65)

- Small family holdings were merged together
- Mechanization was introduced using tractors and combined harvesters
- Fertilizers were applied in farmlands
- Irrigation was introduced using canals
- Dykes were constructed in low lying areas to control flooding and erosion
- Government provided financial assistance through loans

- Co-operative unions were established to organize farmers and buy improved seeds plus selling agricultural products
- Information was provided to the farmers relating to crop management, animal husbandry and farm management
- 1955, an Agricultural Act was passed so as to modernize Germany's agriculture. This was supplemented by the Green Plan

(Sketch map showing agricultural patterns)

The Green Plan

This came about following the Agricultural Act of 1955 aimed at modernizing agriculture in Germany to be competitive as that of other states of the European community.

Aims

- To enlarge the farms that were originally small family holding
- To compensate farmers who were willing to offer their land for consolidation

- To resettle farmers whose land had been merged or consolidated
- To encourage better animal husbandry by setting up large livestock farms
- To give tax concessions like subsidizing agricultural products
- To improve on farm management since large agricultural land was attainable

The Green Plan has brought about comprehensive mechanization where by Germany food requirements are now almost catered for at home is.

Agriculture in the Rhine Rift valley

This is the most productive land in Germany particularly the valley floor and the western part of the rift valley.

Arable farming is practiced in the rift valley growing wheat, barley, maize, sugar-beet and also fruit growing for lettuce, onions, tomatoes, orchards, pears, peaches, etc.

Factors

- Presence of fertile soils in the valley floor deposited by wind and running water
- Relatively flat valley slopes favoring cultivation and mechanization
- Improved transport particularly the Rhine water way and railway
- Cheap skilled labour by the Germans and refugees particularly Jews
- Aspect- the south facing slopes receive direct sun light providing warm conditions
- Increasing level of industrialization necessitated agro-raw materials
  Positive government policy aimed at reviving Germany's economy that was destroyed during the Second World War (1939-45)
- Availability of large sums of capital for accessing farm in-puts
- New trend of science and technology favoring mechanization
- Presence of abundant water from river Rhine providing irrigation water in summer.

- Presence of co-operative unions which mobilize farmers to buy and sell inputs
- The valley is sheltered from strong winds by the Vosges in the west and Black forest in the east.
- Large market for agricultural products within Germany and outside.

Vine growing in the Rhine valley

This is a vital activity in the Rhine valley stretching from areas of Basel up to Koblez. The major producing area is Pfalz with a research center at Geisenheim growing breeds like kernner, scheurebe and enrenfelser.

(A cross section through the Rhine Rift valley)

The Vine calendar

Activities involved from vine growing to marketing can be categorized as follows;

- December to March- pruning of vines, applying fertilizers and filtering last year's wine
- March to April- stretching vines on stakes along rows and carry the grapes

- May to June- vines are sprayed, weeds removed and last year's wine is bottled
- July to September- grapes form and later ripen due to conducive sunny summer conditions
- October to November- ripe grapes are harvested, crushed into juice and collected in wooden barrels
- November to December- grape juice is then left to ferment giving rise to consumable wine

Wine processing

- When the grapes are ripe, they are harvested and crushed.
- Juice is then led into wooden barrels or metal tanks
- Juice is then left to ferment for about 3 months
- Juice is then filtered to extract the wine and later bottled for the market

The major wine brands are

- Champagne

- Burgurdy
- Beaujours

Wine produced in Germany is consumed mainly at home and the rest is exported to countries like Austria, Switzerland, etc

Problems faced

- Unfavorable climatic conditions especially frost during winter that delays production.
- Soil exhaustion due to intensive cultivation
- Presence of pests like moth, red spiders, worms and diseases like oldum, perenospera affecting leaves and the plant in general
- Limited labor especially during the harvest time
- Competition from other wine producers like France and Italy that lowers the market potential.
- Price fluctuation on the world market that discourages farmers.
- High costs involved in growing, maintaining the vine farms and making wine
- Delay in delivery due to congestion of the Rhine water way

- Steepness of the Rhine valley slopes limiting mechanization
- Adjacent landscape is very rugged like Vosges limiting mechanization
- Severe soil erosion that washes away the top soil leading to poor soil that does not support proper plant growth.
- Occasional flooding in the Rhine valley
- Limited land for expansion in vine growing leading to low production.
- Occurrence of natural hazards like hurricanes and other destructive air masses which destroy farms and drought during the growing season wasting away the grapes before ripening
- Perishability of the grapes before crushing and fermentation

Rhine water way

This is a major water way in Europe with a 800km navigable stretch from Basel in Switzerland to the North sea via Rotterdam in Netherlands.

Factors for development

- Presence of Rhine and its tributaries like Mosel, Ruhr, Lippe, Emscher, Maine, etc
- Ice free conditions almost throughout the year
- Large productive hinterland with exports and imports like grain, iron ore, coal, oil, etc
- High level of technology using concrete and brick sides with canals
- Skilled labour for manning the water way
- Availability of capital from the Rhine basin countries
- Industrialized region that needed transportation of the raw materials and products
- Cheap and ideal mode of transport for bulky products
- Inter-state co-operation in developing the water way

Benefits

- Employment opportunities for many people of the region

- Urbanization in the region like Basel, Cologne, Dusseldorf, Rotterdam, etc
- Agricultural sector development especially vine growing and tobacco along the valley floor
- Stimulation of trade in the countries where it traverses
- Regional co-operation amongst France, Switzerland, Belgium, Germany, Luxemburg and Netherlands
- Foreign exchange through trade and tourism
- Improved standards of living in the areas due to income, transportation and industrialization
- Infrastructure development like canals, roads, railway and water ferries
- Revenue to the governments through taxation, trade and tourism

Problems faced

- Silting of the water way affecting travel of large ships
- Traffic congestion at Rotterdam, Basel, etc
- Pollution from oil spills

- Poor visibility due to fog and frost
- Flooding at the lower Rhine delta region after Rotterdam port
- Narrowness at the Rhine gorge
- Accidents claiming lives and goods

Solutions

- Containerization to avail more working space
- Utilizing other modes of transport like railway
- Timetabling of arrival and departure of ships
- Radar system to determine the direction, distance and size
- Regular dredging of the water way and canals
- Legislation of fumes to reduce pollution
- Building of concrete and brick sides for protection
- Co-operation among member states to maintain and manage

(Sketch map of the Rhine Water way)

Industrialization and Mining in Germany

Ruhr industrial complex

This is a major industrial and mining center in Europe comprising of over 5 million people in a conurbation of 5 towns.

The region is encompassed by river Lippe, and river Wupper extending for about 70 km eastwards. The Ruhr area is the biggest iron and steel center in Europe also with coal and chemical center.

Major industries

- Iron and steel industries- dominant in areas like Essen, Bochum and Dortmund using iron ore extracted from Germany and that imported from Sweden, France and Liberia. By 1813, iron smelting was a traditional practice in the southern part of the Ruhr within the Wupper valley in the villages of Reinsherd and Solingen producing items like agricultural tools, surgical equipment, cutlery, etc

- Chemical industries- dominant in Dusseldorf, Mullen, Brunnen, Leverkussen using coal and oil from Elms and Saxony. The products are transported using pipeline linking up the Ruhr region

- Textile industries- dominant in Krefeld, Dusseldorf, Gladboch and Wuppertal using silk, cotton, rayon from Krefeld and Dusseldorf.

However there are other industries in the region such as oil refineries at Diusburg, petro-chemical industries at Cologne and food processing at Bonn, etc.

Major industrial towns

- Diusburg-Ruhroft- at the confluence of river Rhine and river Ruhr being the biggest inland port in Europe with industries like iron and steel, petro-chemical, engineering, food processing, port handling, steel rolling, etc

- Dusseldorf- administrative capital of North Rhine Westphalia region with industries like iron and steel, textile, banking and insurance, railway and commercial centers
- Essen- largest city in the Ruhr conurbation with industries like iron and steel, textile, glass works, chemical, railway locomotives, furniture centers, etc
- Cologne- the biggest city in the Rhinelands cities with industries like engineering, car construction, food processing, banking and insurance, cultural center, etc
- Wuppertal- located near river Wupper but outside the industrial center well known for the cotton industry making dye-stuffs, rayon and carpets
- Hamburg- regional capital of the North and was an entry port during the second world war with industries like steel and aluminium plants, banking and a major service center
- Wolesburg- famous for making Volkswagen cars which started in 1938 east of Brunswick.

(Sketch map showing major industrial towns in the North)

Importance

- Employment to many German people reducing human resource wastage both skilled and unskilled.
- A lot of income is earned by improving the standards of living of the workers.
- Self-reliance due to production of nearly all desired goods and services
- A lot of revenue to the government through taxation and licensing
- Attracting more investment in the region thus large capital base
- A lot of foreign exchange is earned through the export of industrial products
- Proper utilization of the would-be idol resources e.g. coal
- Urbanization with major industries like at Dusseldorf, Wuppertal, Hamburg.
- Infrastructure development especially road and railway supplementing the Rhine water way

- Industrial innovation, research and academic study plus training
- Skill acquisition by the industrial workers
- However, industries pollute the environment by discharging toxic wastes in the water bodies.
- Deformation of the landscape as land is destroyed to give way for construction of industries
- Natural vegetation in central Germany has been destroyed altering the eco-system and causing deforestation
- Rural-urban migration with its evils like prostitution and slum development.
- Increasing crime rate due to unemployment in the urban centers since the population is dense.
- Racism against non-Germans causing untold suffering and death
- Duplication of industrial products and importation of low quality goods in Germany.
- Over-utilization of natural resources like coal in south Ruhr

The Ruhr Coal Fields

This is the largest coal mining center in Europe with 120 mining points producing over 150 million tons of coal per annum.

The fields are bordered by river Lippe in the north, river Wupper in the south and subdivided into the northern belt with deep coal deposits and the southern belt with shallow coal deposits.

There exists 3 major coal varieties in Germany, that is;

- Coke coal- for smelting iron, steel and making good burning coal
- Coal gas- for lighting and domestic use

- Anthracite coal- for heating in boilers due to its high carbon content

Methods of Coal mining

- Shaft- especially in the northern belt where coal appears at a greater depth in the earth's crust. The method involves construction of tunnels to reach the coal seams/veins
- Open cast- especially in the southern belt where coal is near the surface of the earth's crust. The method involves the excavation of the top layer of the earth to access the coal deposits.

(Sketch map showing coal mining fields)

Factors favoring Coal mining in Germany.

- Extensive coal fields in the northern and southern belts

- Advanced technology like shaft method that is used to extract coal that exists at a greater depth.
- Large sums capital used to buy mining machines, pay labor, etc
- Cheap skilled and unskilled labor to work in the mines
- Ready/wide market for Ruhr coal with in Germany and the outside world
- A variety of coal with domestic and industrial uses e.g. Coal gas, anthracite coal and Coke coal
- Rhine water way providing transportation of bulky coal and access to the world market
- Positive government policy aimed at utilizing the natural resources for the good of the people
- Prevailing political stability after the second world war attracted mining

investors and companies into the Germany-Ruhr region

- Occurrence of coal near the surface especially in the southern belt made it easy for extraction
- Various power sources like oil, natural gas and electricity helping in the processing of coal
- Increasing level of industrialization where coal acted as an energy source and raw material.

Problems faced

- Exhaustion of coal especially in the southern belt
- Reduced demand for coal as new technologies require less of it in production
- Competition from other coal producers like China, Russia and

South Africa that limit their market potential.

- Presence of substitutes like natural gas, petroleum, electricity uranium/nuclear
- Limited unskilled labor for extraction and skilled labor for processing the coal which prefer working in industries
- High costs involved in mining and processing coal
- Closure of some mines in the south affecting quality
- Presence of other minerals of relative importance like iron ore which attracted government attention
- Inadequate capital to inject in coal mining which requires huge capital to realize profits

- High transport costs due to the bulkiness of the coal

NETHERLANDS

This is one of the Rhineland's countries found in the northwest region mainly occupied by the delta of river Rhine and its tributaries together with river Scheldt. Netherlands refers to the Northern Province of Holland with a capital at Amsterdam (de jure capital) and The Hague (de facto capital) as the seat of government.

Following the joint customs union of 1947, Belgium, Netherlands and Luxemburg came to be known as the BENELUX countries.

Netherlands is relatively a young country located in the mid-western plain bordering the North Sea. It is found between 51º- 54º N and 4º- 7º E with a land coverage of 41,525 sq.km of which 33,883 sq.km is land and 7,643 sq.km is water.

It has a population of about 16 million with 83% Dutch and 17% of non-white origin with major languages of Dutch and Frisian.

Netherlands is bordered by the Frisian Islands in the north, Germany in the east, Belgium in the south and the North Sea in the west.
It consists of delta dunes of river Rhine, river Lek, river Waal, river Meuse, river Scheldt and the lowlands adjacent to the North Sea drained by river Iyssel.

Relief

Netherlands can be sub-divided into 2 basic relief regions,

- Low and flat lands in the west and north like polders and river deltas.
- Higher lands with minor hills in the east and south like Ardennes mountains and Vaalsserberg with the highest point at Vaalserburg- 322m above sea level and the lowest at Zuidplaspolder -7m below sea level.

The relief of Netherlands can be further sub-divided into the following major patterns;

- Polders- consist of delta lands of the Rhine, Meuse/Maas and Scheldt rivers with the coastal areas of Zeeland-noard and Zui-Holland

provinces. They extend to the Frisian Islands and Groningen area.

- Rhine-Meuse valley- a joint flood plain of river Rhine and Meuse covered with clay soils and protected from sea floods by clay dykes.

- North-south Geestland- forms a relatively higher portion of the country ranging between 50 - 100m above sea level covered by sandy soils which are colonized by poor pastures and shrubs (the sandy dunes are used for afforestation, market gardening and arable farming).

- Lumburg plateaux- rises to over 300m above sea level covered by chalk, marble and sand soils together with

deposited loes soils. This area is dissected by river Meuse.

(Sketch map showing relief regions)

Climate

Netherlands experiences mild maritime climate due to its closeness to the North sea. However, the south and east of the country experiences cool temperate continental climate with cool summers and mild winters.

Rainfall is received throughout the year with temperatures ranging from ¯5º C in January to 16º C in July.

Soils

These are basically hydromorphic requiring artificial drainage. It should be

noted that 90% of the soils have underground water within 14cm of the soil surface in winter.

Netherlands soils can be categorized into 3;

- Sandy (Pleistocene) soils- covering the east, central and southern parts of the country. The dry sandy soils are used for forestry while the old sandy soils are for arable farming and the low-river Rhine mid sandy soils are for grazing.

- Marine clay (Holocene) soils- covering the west and northern regions deposited by ocean currents (clay soils) forming part of the Zuyder Zee soils. The old marine soils are used for grazing while the

young marine soils are used for arable farming.

- River (alluvial) soils- are clay in nature formed by river deposition. These have been leveled into a foreland for grazing, fruit growing while the natural leeves are for grazing and arable farming. The basin clays are for grazing and dyke-deposited soils are for horticulture.

Drainage

Netherlands is drained by river Rhine, Meuse/Maas, Ijssel, eemska and Scheldt.

- River Rhine- streams from Switzerland flowing through the eastern frontiers of France, Germany then Netherlands up to the North Sea.
- River Meuse/ Maas- streams from Belgium forming a major natural

boundary between Netherlands and Belgium flowing into the North Sea.

- River Ijssel- streams from Lake Ijsselmeer in Netherlands and flows to river Rhine linking with the sub-tributary called river Lek of river Rhine and empties its water into the North Sea at Rotterdam port.
- River Scheldt- streams from Belgium into Netherlands emptying its water into the North Sea through the Scheldt estuary.
- River Eemska-streams from Germany through Netherlands empting its water into lake Ijsselmeer and Waden sea

(Sketch map showing drainage)

Agriculture

This is a basic activity due to the generally flat land in Netherlands especially Bolderland through the Zuyder Zee area stretching to Groningen in the north.

The land used in the region can be sub-divided as follows.

Land use	Percentage
Arable	25
Permanent crop	3
Permanent pasture	25
Forest and woodland	8
Others	39

Over 90% of the total land area is cultivable with 43% grass land, 22% arable land and 4% horticulture land.

Characteristics

- Carried out in polders
- Export oriented i.e they mainly produce crops and livestock products for export.
- Scientifically managed i.e there is use of chemicals like fertilisers,herbicides.
- Government inspection is carried out
- Production is very high both in livestock and crop production.
- It is very intensive i.e carried out on large pieces of land and a lot of care is given to the crops and animals.

Factors favouring agriculture in Netherlands.

- Relief is predominantly flat attracting mechanized farming

- Extensive land especially in the western, central and northern parts of the country
- Fertile soils of clay, sandy and alluvial nature
- Favorable climatic patterns like marine and cool temperate continental climate with cool summers and mild winters
- Advanced technology in reclaiming land, crop science and machine development
- Developed transport and communication networks such as Rhine water way, air, railway and road transport linking Rotterdam to other parts of the country.
- Cheap skilled labor with expertise in farm management, crop handling and marketing

- Adequate capital invested in agricultural research, land reclamation and others
- Netherlands is not densely populated hence having land for cultivation
- Wide/ready domestic and international market for agricultural products i.e. Russia, China, Germany, Belgium all buy her agricultural products.
- Positive government policy aimed at utilizing the existing land resource to meet the basic needs of the people
- Fresh water from rivers like Rhine, Meuse and Scheldt used for irrigation during severe drought
- Prevailing political stability attracted investment in agriculture
- Various co-operative societies mobilizing farmers, provide inputs

and marketing the agricultural produce

- Increasing level of industrial development in Western Europe created a need for raw materials
- High level of agricultural specialization where people are positioned with respect to their skills like horticulture, dairying, arable farming, etc.

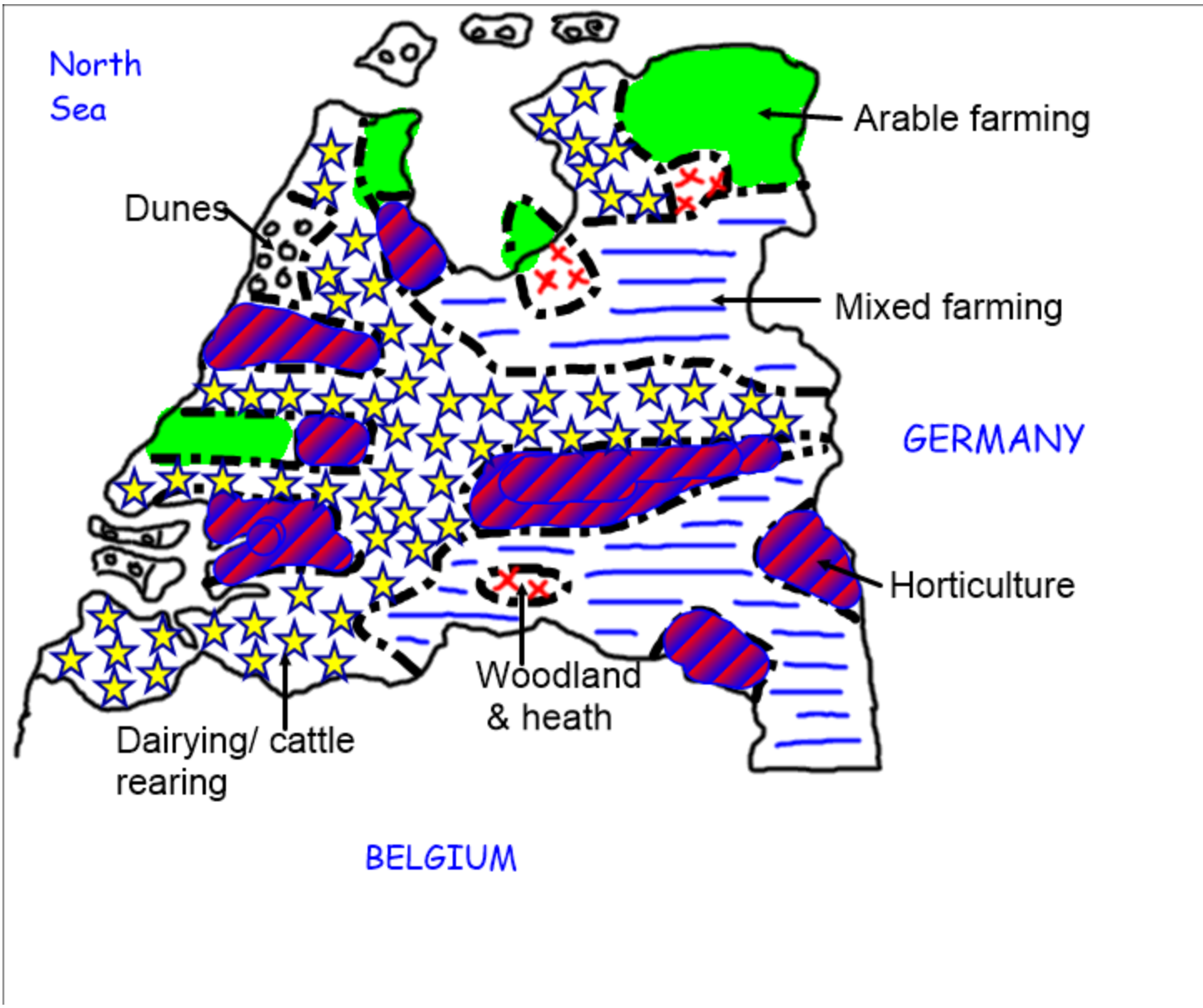
Types of Agriculture

Agriculture in the Netherlands can be sub-divided into;

- Horticulture- practiced in southern Amsterdam, the Meuse valley plus the west and south of The Hague.
- Mixed farming- practiced in the east, north and southern parts of Netherlands

- Arable farming- practiced in the north and southern parts with well drained sea-clay soils
- Dairy farming- practiced mainly in the low-lying clay areas stretching from the central to the western part and partly the north

(Sketch map showing land use)



Dairy farming

This occupies the largest part of Netherlands' cultivable land giving about 68% of the gross value and rearing breeds like the white and black fresian cows for milk, meat, hides, etc mainly in

the frisian islands, the northern region around Groningen, the central part and south of Holland.

Characteristics

- High quality cattle
- High level of specialization
- Highly mechanized and scientifically managed
- Intensively used with constant utilization of manure
- Animals feed on fodder crops and manufactured feeds
- Use of highly skilled manpower with necessary gears
- Basically oriented towards milk production and other milk products
- Very high output

Horticulture/ Market gardening

This concern the growing of vegetables, fruits and flowers for the urban market mainly practiced in the western and central parts plus the south. Major areas include- Leyden, Haalem, Breda, Waal-Meuse, Aalsmeer, etc growing tomatoes, cabbages, onions, cucumber, lettuce, flowers, etc.

Arable farming

This concerns the growing of cereal crops like wheat, barley, sugar beet, oats and potatoes used for making glucose and rye for making bread, etc.

It is mainly practiced in the reclaimed lands of Zuyder Zee which is in the north east of Netherlands, the Groningen area and the delta region in the west.

Mixed farming

This concerns the growing of crops and the rearing of animals dominant in the eastern and southern parts of Netherlands stretching from Mapple to Apeldcorm and also in the areas from Breda to Maastrich.

Problems faced

- Occasional flooding especially in the spring and summer seasons when snow melts issuing large volumes of water
- Salination of the soils where by sea water containing salt particles finds its way into the reclaimed land affecting crop production.
- Western farming lands face land sub-mergence or sea incursion where strong waves strike the coastal areas destroying the farm land

- Limited domestic market for agricultural products due to other food supplements and different tastes and preferences
- Limited fresh water in the area especially during summer (high capillarity) leading to stunted growth
- Water logging (hydromorphic) since the water table is too close to the surface making crop growing difficult
- Limited land for cultivation since the existing one is highly competed for by other economic activities like industry and mining
- Continuous utilization of fertilizers has altered the soil texture in that soils become acidic and weak
- High costs of production due to scientific management and relatively poor soils

- Limited skilled labor to manage the farms and process agricultural products as many prefer the industrial sector
- Over production of agricultural products yet domestic market is limited
- Farmers rent the polders at a high cost which affects the expected profits
- Climate sometimes is not very favorable like inadequate rainfall in summer and frost in winter affecting growth and crop yields
- The Rhine water way is very busy while the railway transport is not very effective for certain fragile products
- Perishability of agricultural products like dairy products and horticultural products

- Price fluctuation on the world market due to increased supply of agricultural products from other countries like Israel, Denmark, Brazil, South Africa, etc
- Competition from genetically modified agricultural products, fast foods and other food supplements limiting consumption of organic foods

Solutions

- More land is being reclaimed from the sea
- Water logged areas are being drained of water by building canals that lead excess water back to the north sea
- Co-operative unions are being strengthened by providing them with more capital

- Domestic market is being expanded by promoting the consumption of home-made agricultural products
- Crop science and agricultural technology have been improved to reduce on fertilizer use and producing good quality products
- Dykes are being constructed in the western block to control flooding from the north sea and wave action
- Better farm management skills are being imparted onto the people for agricultural development

Irrigation Agriculture.

This is dominant in the reclaimed lands of Netherlands i.e. around Delta area and Zuiderzee area.

Factors favoring Irrigation Agriculture

- The generally flat relief that allow gravity flow of water\undulating.
- Presence of fresh water from L.Yessel used for irrigation.
- Occurrence of occasional drought which calls for irrigation
- Presence of high demand for food which calls for large scale production through irrigation.
- Improved technology\high levels of technology used in the construction of canals.
- Large sums of capital to buy the machines and pay the workers.
- Presence of cheap/abundant skilled labour to carry out irrigation farming.
- Presence of fertile alluvial clay soils which have high retention capacity.

- Postive government policy of giving tax holidays and any necessary help.
- Fertile soils which attract irrigation farming to produce food.
-

Problems facing irrigation farming (note the tense)

- High costs of maintaining the project i
- Salinity of the soils that does not favour proper growth of crops.
- Silting of canals that leads to flooding.
- Sea incursions\flooding.
- Water logging in the formally sea lands.
- Sinking land because of their proximity or nearness to the water table.
- Frost that interrupts irrigation activities.

- Pests and diseases in the area i.e. waterborne diseases.

Steps taken to improve irrigation farming in Netherlands.

- Construction of more dykes to limit on flooding.
- Dredging of canals to reduce on the silting.
- Creation of fresh water sources so as to reduce on the salinity of the soils.
- Carrying out co-operative farming
- Spraying using chemicals.
- Planting reeds.
- Addition of fertilizers
- Application of garbage
- Application of lime

- Blowing warm air /use of green houses.
- Use of pump stations to pump out water.
- Digging canals leading to pump stations.

Industrialization

Industrialization is the period of social and economic change that transforms a group from an agrarian society to an industrial society. Netherlands is one of the most industrialized nations in the world with major industrial centers at Rotterdam and Amsterdam in the west and basically in the south and east where the land is raised. The industrial sector employs over 40% of the population and

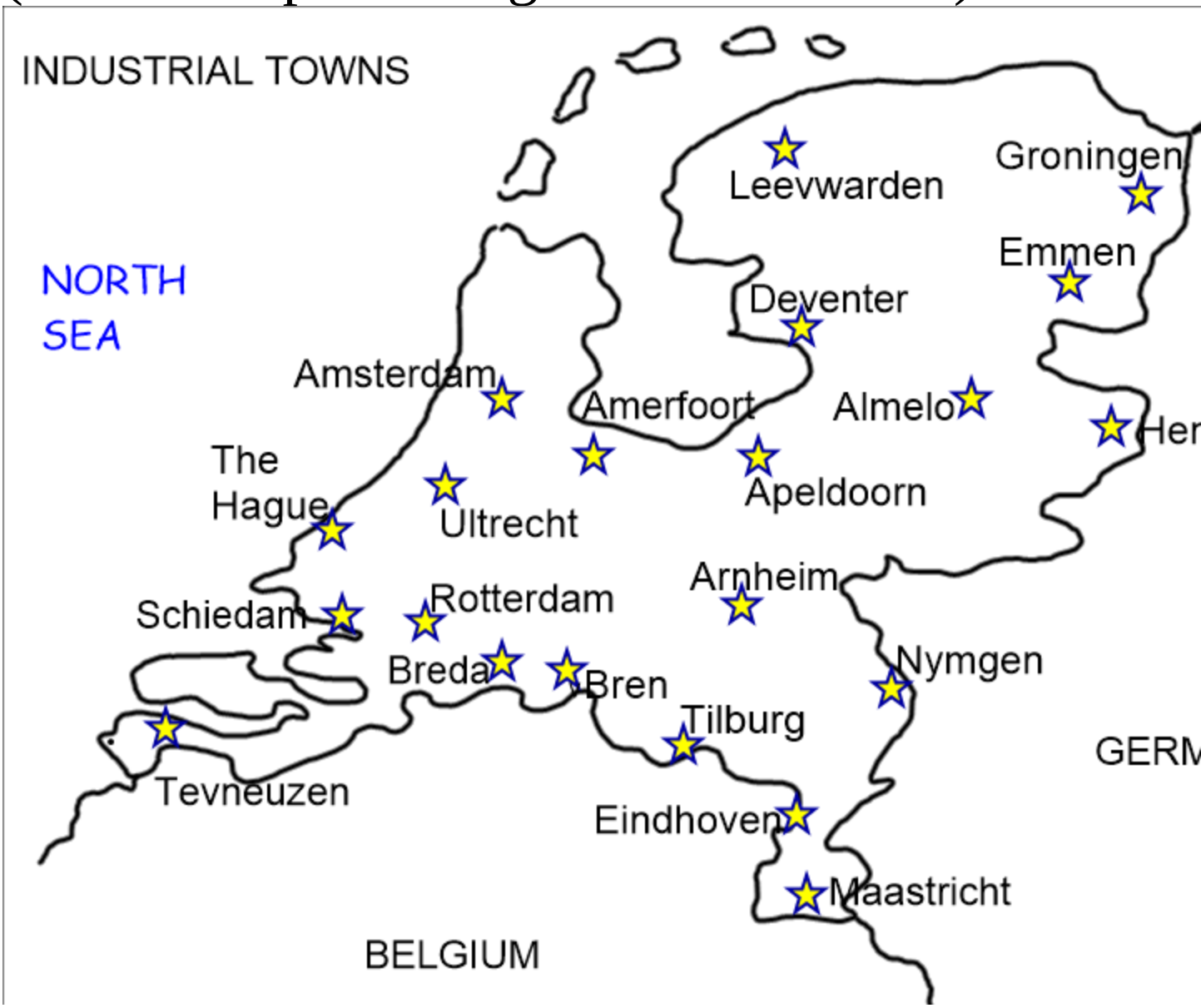
producing a variety of industrial products.

Types

- Textile- shifted from the traditional yarn like cotton, wool and linen to synthetic rayon and nylon.
- Food/drink and tobacco- deals with processing indigenous products for export e.g. vegetables, soft drinks, cigars, etc.
- Chemical industry- for producing fertilizers, plastics, medicine, paints, cosmetics, synthetic fibre, etc. attributed to the expansion of the oil refinery and chemical wax which attracted the Dutch companies.
- Engineering- largest employer of labor and widely spread in the country

producing items like generators, transistors, household appliances, etc

(Sketch map showing industrial towns)



Factors that have led to the development of Industries.

- Presence of abundant raw materials used in the production process e.g minerals like copper and agro raw materials.
- Presence of abundant water used in cooling of machines
- Availability of large sums capital invested in purchasing industrial tools
- Cheap skilled and semi-skilled labor required in the industrial sector
- Positive government policy aimed at utilizing natural resources
- Domestic and international market for industrial products
- Developed transport and communication networks like the Rhine water way, North sea-Rotterdam canal, railway that transport the industrial products to market centres etc

- Increasing level of technology which has provided better means of production
- Extensive flat land eased the construction of industries and transport networks
- Abundant\cheap electricity like hydro, thermal, solar which helps in running machines
- Desire for self-reliance in nearly all the basics of life
- On-going industrial research following the foundation laid by the industrial revolution enhanced production

Importance

- Utilization of would-be redundant resources to meet the basic needs of life

- Increase on capital stock as many investors have invested in Netherlands
- Employment opportunities have been provided to the people like industrial managers, accountants, field workers,farm managers etc.
- Government earns revenue by taxing industrialists
- Foreign exchange is earned by exporting industrial products
- Cheap industrial products have been provided domestically hence reducing on the would be expenditure on imports.
- Industrial skills have been acquired by the workers i.e. management skills, farming skills, how to operate machines,etc.

- Infrastructure has been developed like roads, housing, hospitals, etc.
- International trade and relations have been enhanced between Netherlands and other countries that import Holland's goods e.g. Britain, Germany, Luxemburg, etc.
- Market has been created for domestic products
- Industrial wastes and fumes pollute the environment i.e water, air and the soil.
- Degrading the landscape by constructing industries i.e the clearing of the vegetation,and reclaiming sea land.
- Some industrial products are substandard which harm human life
- Limited land for the practice of other economic activities

- Land fragmentation as the existing land is being competed for by other activities

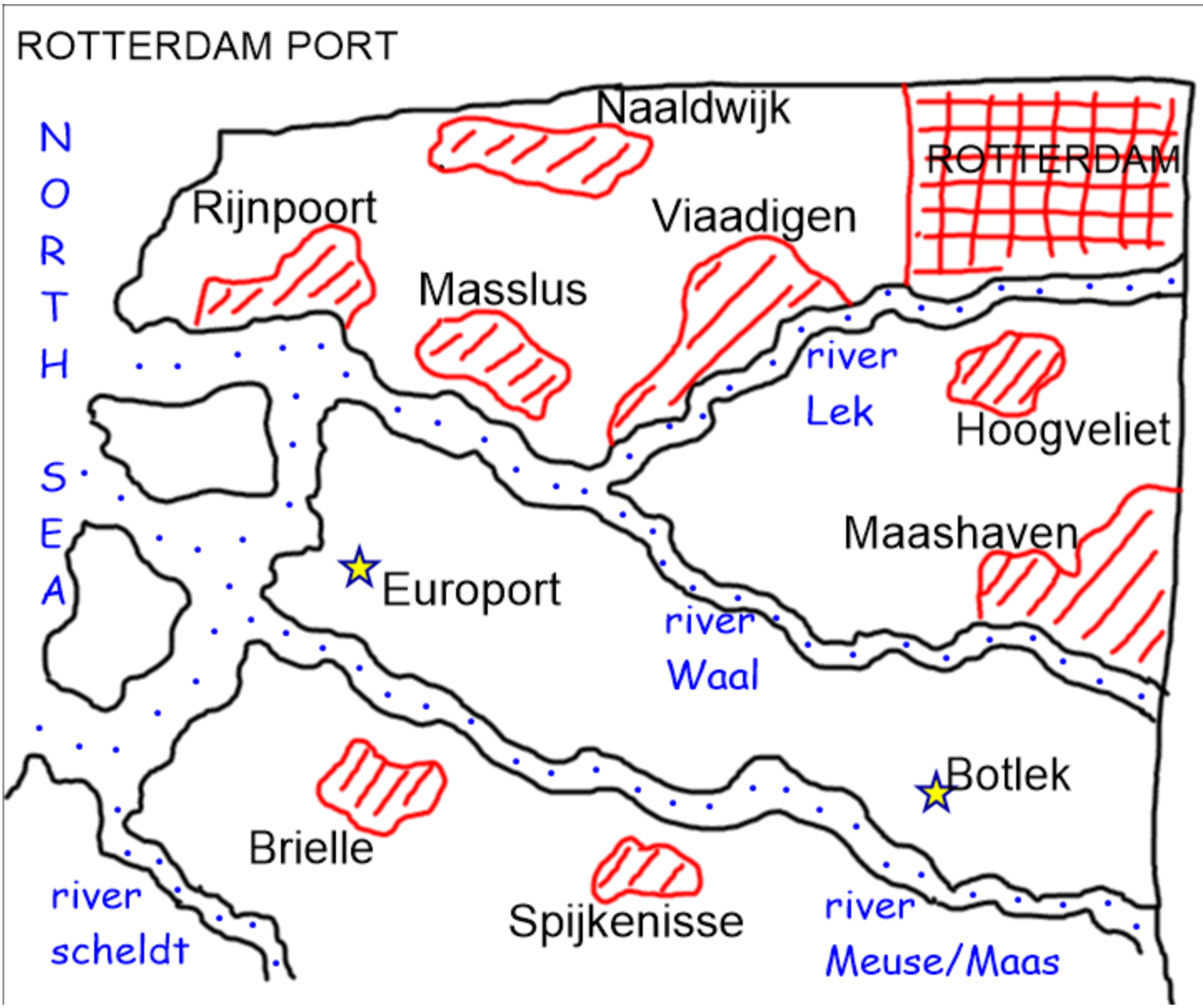
Urbanization-Rotterdam

It is a very important entry-port in Europe serving a very large hinterland comprising of the BENELUX countries and Western Europe at large.

It started as a small town/port sandwiched by two grand neighboring ports of Antwerp (Belgium) and Amsterdam (Netherlands).

Rotterdam is located on the delta of river Rhine and river Meuse preferably river Lek, one of the navigable sub-tributaries of river Rhine.

(Sketch map showing Rotterdam port)



Functions of Rotterdam

- Entry-port handling nearly all the imports and exports of Netherlands and distributing them to the respective destinations
- Commercial center with trading activities

- Administrative center for public and private institutions which monitor the delivery of goods and services
- Residential center for natives and foreigners with giant hotels and rest rooms.
- Industrial center having oil refineries, petro-chemical industries, marine engineering works, etc
- Transport and communication center ensuring the transfer of goods and services to and from the hinterland

Factors for growth

- Presence of a rich hinterland like Germany, Austria, France, Belgium, Switzerland, etc
- Strategic location easily linked with the Rhine water way with access to

the North sea to continents like Africa and North America

- Experience ice free conditions throughout the year favoring trade and navigation
- Advanced shipping technology with modern port facilities like a container terminal, passenger stations, shipping yard
- Sheltered from strong destructive winds by the Zee-land (delta project reclaimed land)
- Low tidal range making it less vulnerable to flooding
- Existence of the Rhine water way linking Rotterdam to the sea enabling easy sailing of ships and canals linking it to the Hook of Holland together with a bypass channel from Europort

- Western Netherlands is predominantly flat, enhancing easy construction of port facilities
- Presence of large sums of capital to set up the necessary port facilities and maintain high quality handling services
- Its location on the navigable river Lek improved on water transport and shipping making it a preference
- Presence of abundant imports and exports to be transported from the hinterland to the outside world
- Positive government policy aimed at improving accessibility to the sea via internal drainage
- Political stability in Netherlands attracted trade and other commercial activities in the area

Problems faced

- Congestion at the port arising from the increase in population and trade activities
- Pollution of the environment arising from the discharge of toxic fumes and wastes from the industries.
- Growth of suburbs/ slums and their related problems
- Occasional flooding arising from the melting of ice in spring and summer because the area is low-lying\below sea level.
- Siltation of the water way by flooding water which deposits sediments making it shallow and hence un navigable.
- Unemployment as people are very many yet the jobs are few

- High crime rate due to limited survival means
- Limited land for expansion as the would-be land is used for settlement
- Occurrence of fog which affects visibility especially during the morning hours
- Competition from the internal commercial towns like Amsterdam and ports like Middleburg and external ports like New York in the USA
- High cost of maintaining port facilities and ensuring quality service delivery
- Unfavorable winter conditions with low temperatures that are not conducive for human activities

Land reclamation and Polder construction

Land reclamation is the practice of acquiring or creating dry land where it was not from either a water body or marshy land (swamp).
Netherlands is referred to as a low-lying country because of its relief nature part of which lies below the sea level. This calls for land reclamation (impoldering) where the dyke is constructed to enclose the desired land and protect it against high water levels (flooding) caused by high tides.

The pieces of land reclaimed range from 44,000 hectares to 133,000 hectares referred to as polders.

Land reclamation started early in the 14th century but became effective in 1927 with the Zuyder Zee project in the north and in 1960 with the Delta project in the west.

Types of land reclamation
There are basically three types of land reclamation in Netherlands

- Acquiring land from the sea
- Draining river banks and marshy land
- Upgrading the existing Geestland

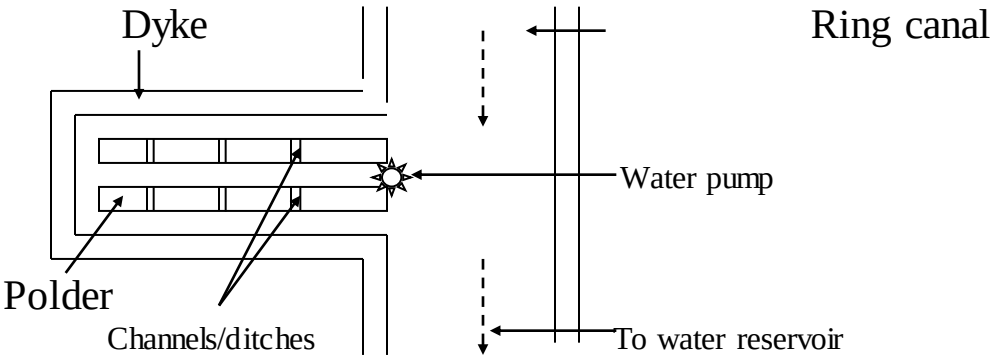
Mode of reclaiming land
The form of acquiring land from the sea or marshy land for economic use is undertaken in a process of four stages

- Stage 1- land is identified then surrounded by a dyke together with a

provision for a ring canal to protect it from high water levels

- Stage 2- the enclosed land is then sub-divided into rectangular portions by building canals which discharge water out of the reclaimed land
- Stage 3- a water pump is constructed on a founded dyke to remove all the excess saline water from the polder into the ring canal discharging it either back to the sea/ marshy land or directed into a water reservoir
- Stage 4- saline soils in the polders are dissolved to free away the saline/salty particles using either fresh or rain water. The dissolved solution is then pumped out of the polder and the land is deeply ploughed or cultivated normally.

Sketch diagram of a polder



RECLAIMED LAND/ POLDERS

Reasons for land reclamation

- Need to acquire more land for cultivation and settlement
- Need to control flooding caused by the high tides of the North sea

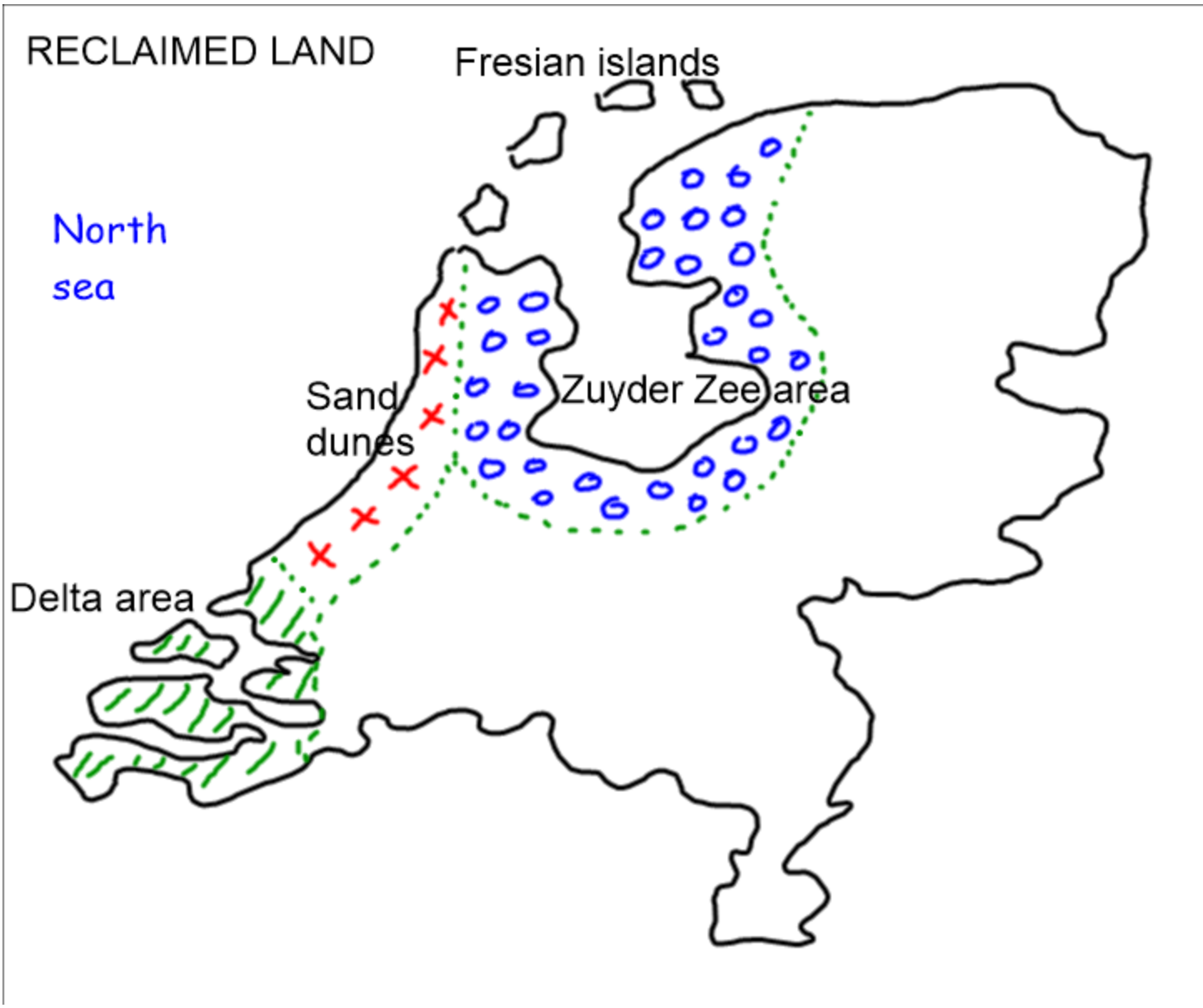
- Increasing population necessitated more land
- Being a low-lying country especially in the northern and western regions covered with sand dunes needed protection from the sea
- Need to create a fresh water reservoir like at Iysselmeer south of the Warden sea
- Need to protect land from salination through underground seepage of sea water
- To safeguard the coastal features particularly beaches to promote tourism
- Desire to shorten the coastline in the western region particularly the delta area of river Rhine and river Meuse

Factors that favored land Reclamation in Netherlands.

- Adequate capital for building dykes and maintaining them
- Advanced technology of tapping water and reclaiming the land underneath (hydro-engineering)

- Skilled labour with hydro-engineering technology of building ring canals, dykes, demarcating polders, etc
- Positive government policy at providing more land for sustainable development
- Low-lying nature of relief which was prone to flooding
- Long experience of reclaiming land dating back to the 14th century
- Increasing population necessitated more land
- Invention of the wind mill that helped to pump out water from the polders in the 17th century
- Desire for fresh water to be used in livestock breeding, crop cultivation and maintaining the quality of polders (desalination)
- Desire to improve and maintain the quality of existing soil by freeing it from salination
- The on-going agricultural modernization requiring extensive practice in fertile land

(Sketch map showing reclaimed land)



Uses of reclaimed land

- For arable farming cultivating wheat, rice, potatoes, sugar beet and horticulture growing flowers, fruits and vegetables
- Damper parts are used for grazing the white and black fresians
- For settlement and re-settling the high population

- Urban development and industrial development
- For recreation and promoting tourism
- For afforestation to improve on the vegetative scenery
- For establishing social amenities to provide social services to the people
- Helped to enlarge the boundary of Netherlands especially towards the North sea and the Fresian islands

Problems faced

- Excess water logging due to nearness to the sea and being below the sea level
- Flooding of the areas near the north sea due to high tides and increase in water in the marshy land
- Soils are very sandy due to deposition of sand dunes by sea waves
- High costs of renting the polders
- High costs involved in constructing and maintaining the dykes
- Salination arising from underground water seepage of sea water increasing the alkaline content in the soil
- Shortage of fresh water in the polders for desalination

- Limited land for expansion since the reclaimed land is enclosed by very strong dykes that cannot be broken for expansion
- Siltation of the canals and water channels

The Zuyder Zee project (1927)
Is located in the northern region bordered by the Warden Sea with reclaimed land of about 1430 sq.km. This was started in 1927 with a major aim of creating a fresh water body referred to as Lake Iysselmeer.
During reclamation, a dyke of approximately 200 miles long was constructed and a dam 30 km long with a width of 300 meters. This barrier dam was built at the mouth of the Zuyder Zee stretching from Waringen to Fresian island.

Aims
- To create more land for agriculture and settlement
- To control flooding which was destroying the coastal land
- To create a natural fresh water reservoir for livestock farming, agriculture and human use.

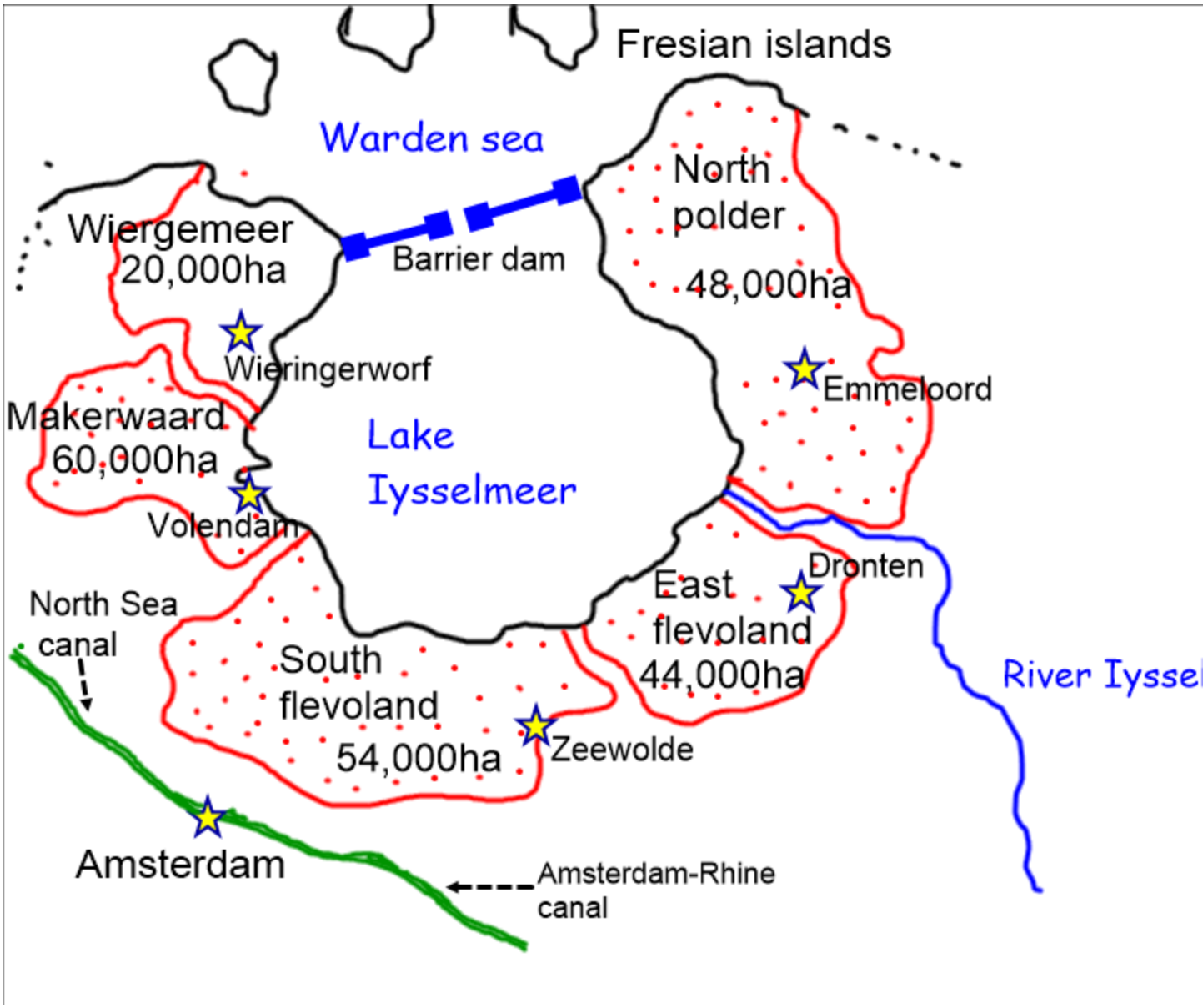
- To control and avoid salination of the area affected by underground water seepage
- To create a better drainage system with not only internal rivers but also a lake
- To control the tidal gulf water of the Warden sea into a fresh water lake
- To enhance agricultural modernization by providing not only fresh water but also fertile land

Benefits

- More land has been reclaimed like North polder, markerward, south and east flevoland
- Flooding in the low-lying area has been controlled
- Fresh water has been provided by creating a water reservoir
- Internal drainage has been improved upon from having a river to a lake
- Coastal areas of the north have been sheltered from the sea to a tune of 320 km
- Saline water has greatly reduced in the neighboring land where by fresh water is used for desalination.

- Sea incursion brought by a rise in water levels due to a high tidal range that can cause submergence of coastal lands has been reduced
- Reduction in siltation through dredging and this silt is now used to enhance agriculture
- Construction of the Barrier dam has helped to reduce the loss of fresh water from internal rivers like Iyssel
- Laid ground for agricultural modernization due to presence of large fertile cultivable land
- Lake Iysselmeer acts as a water catchment area during winter when one of the internal area is affected with freezing

(Sketch map showing the Zuyder Zee area)



The Delta plan project (1960)
The second major land reclamation activity based in the western part of the country started in the 1960 which involved dumping off sand dunes with the exception of western Scheldt and Rotterdam new water way so as to pave way for easy access to port Rotterdam and Antwerp.

The work of dumping and building dykes was done by sinking ballasts, after which a fresh hard dyke of shale

(metamorphic rock) and basalt (igneous rock) were laid down. Then a line of concrete was floated and sunk into its position.

Aims

- To shorten the coastline
- To combat the penetration of salty/saline water threatening the Rhine and Meuse rivers
- To link up the island of Zeeland with Rotterdam
- To develop and establish new recreational facilities for the natives and the foreigners
- To protect the land adjacent to the sea from sea incursion
- To prevent flooding and incursion of the inland waters like river Lek, Waal, Scheldt and Meuse

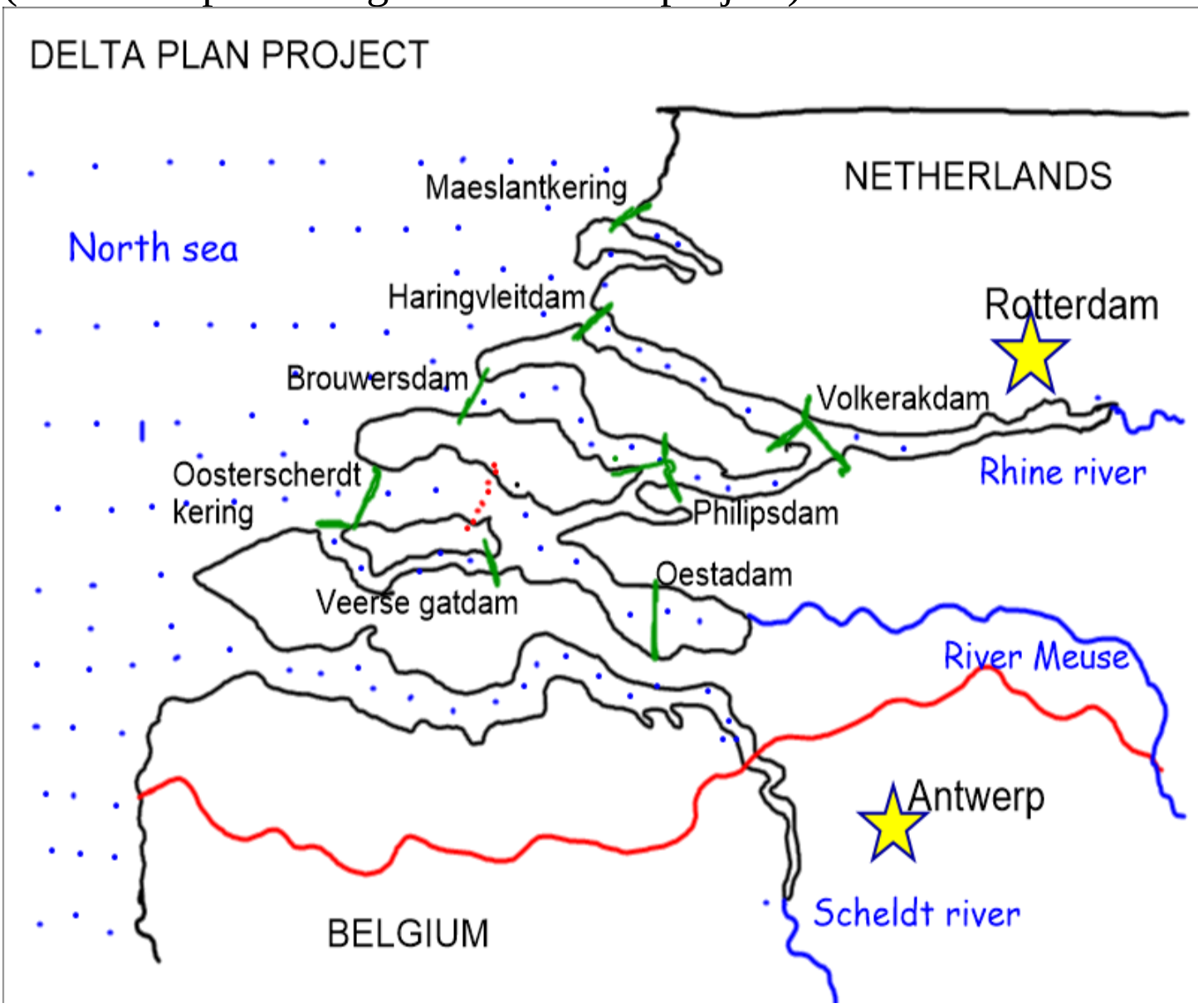
Benefits

- The south western parts have been saved from occasional flooding
- Various fresh water bodies have been created behind the numerous dams providing fresh water for irrigation
- Dams have helped to check on salination and pollution of inland water
- The highlands of Zeeland have an accessible road network linking all of them
- The coastline has been reduced by 80 km from the original 800 km to 720 km and the road distance has

reduced from 150 km to 110 km linking western Scheldt to Rotterdam

- The area has been made accessible especially that adjacent to the North sea attracting industries like oil refineries
- Area has been transformed into recreational center where natives and tourists spend their leisure time with very many clear sandy beaches

(Sketch map showing the Delta Plan project)



BELGIUM

It is referred to as the Kingdom of Belgium that got her independence in 1830 from Netherlands.
It is the second smallest country in the Rhinelands region followed by Netherlands in the north, Germany in the east, France in the west and Luxembourg in the south.

Latitudinally it is at 50°50'N, 4° 00'E with a population of approximately 10 million people and 336 persons/sq.km inhabited in three provinces of Flanders, Wallonia and Brussels.

It has land coverage of 30,528 sq.km, having 30,278 sq.km as land and 250 sq.km as water with a coastline of 66.5 km.
This is further sub-divided into Wallonia covering 16,844 sq.km, Flanders covering 13,522 sq.km, Brussels Capital covering 161 sq.km and the sea water covering 3,462 sq.km.

Climate

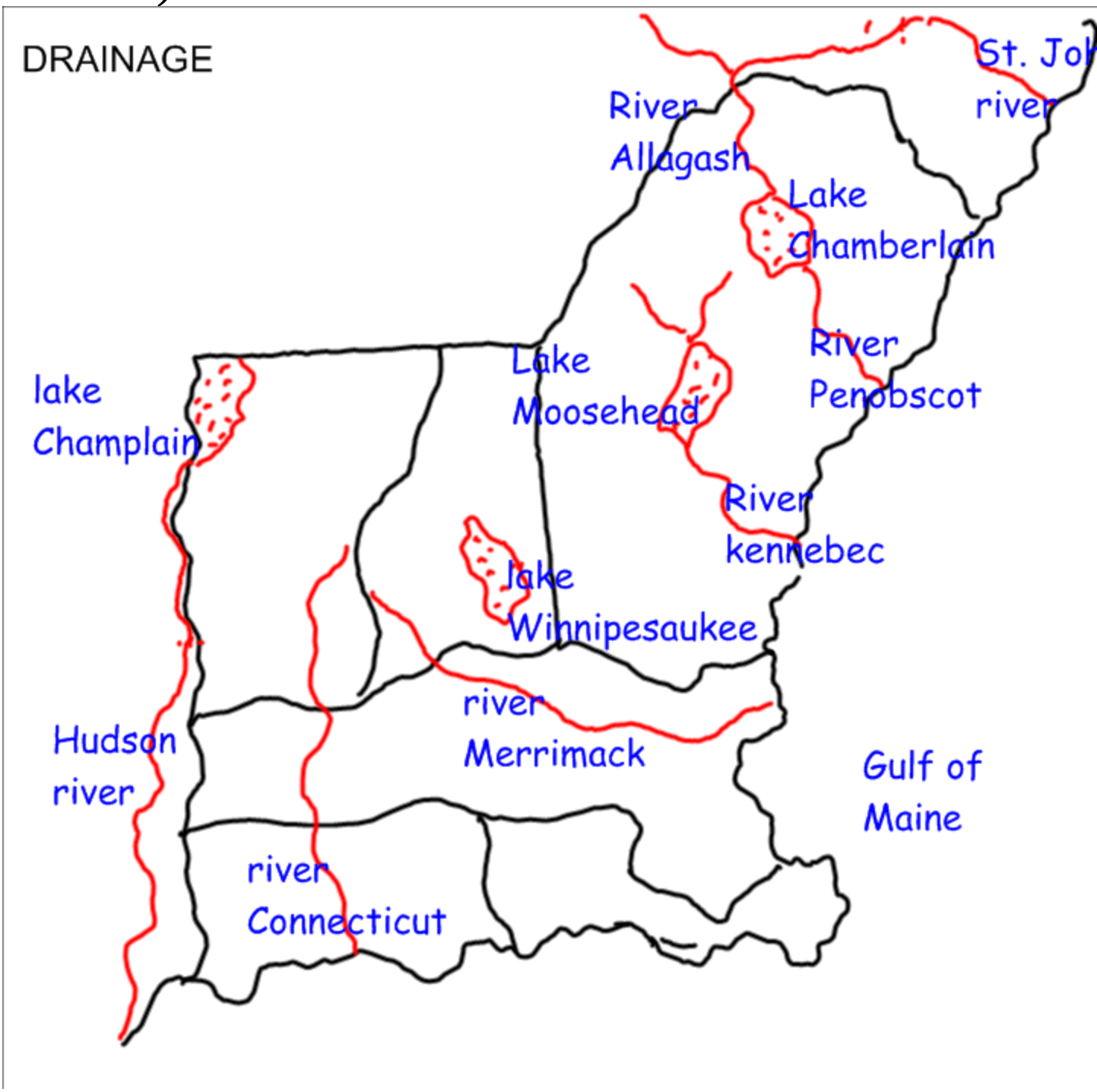
- Mainly cool temperate maritime with warm summers (17℃) and cool winters (1℃) receiving moderate rainfall except for the Ardennes being cool all the year with 1,200mm of rainfall. To note is that January has a temperature of 3℃ with 66mm of rainfall and July has 18℃ with 78mm of rainfall having mild winters and cool summers which are rainy, cloudy and humid (having 200 days of rain a year).

Drainage

- River Scheldt from France through Belgium to the North sea via Netherlands with tributaries like Lys and Dendre, Senne and Rupel
- River Meuse also from France through Belgium to the North sea via Netherlands

with tributaries of sambre, Lesse, Ourthe and Sauer.

(Sketch map showing drainage, relief and climate)



Relief

- Coastal plains having sand dunes and polders i.e. Low Belgium (100m) stretches for 65 km long from the west behind the coastline with polders- lower coastal land often affected by flooding, flemish plains- sandy area, stet- having poor soils, moors, lakes and swamps.
- Central plateau having valleys, caves, small gorges and water ways i.e. Central Belgium (100-200m) stretching beyond the Flemish plains and kempin gently rising to valleys of sambre and meuse. It's a low plateau and a fertile area.

- Ardennes uplands having very rocky, thickly forested plateaux and very rugged i.e. Upper Belgium (200-500+m) is sparsely populated and wooded area of sambre, meuse with condroz plateau, a fertile area stretching from Fagne/Famenne up to the Ardennes.

N.B the highest point stands at signal de Bontrage- 694m above sea level and lowest point is North sea -0m.

This is further sub-divided into

- Sand dune coast of 2 km wide used for sheep pasture, fishing and resorts
- Polders not below sea level like those in Netherlands but reclaimed from low lying marshy lands
- Campine is low lying covered by infertile sand, gravel and outwash deposits like in Antwerp
- Flanders plains is relatively flat with soils of clay, sand and alluvium
- Central plateau or Mid-Belgium plain is covered by fertile loess soils and the most productive land
- Ardennes made of hills forested with coniferous used for dairying

- Belgium Lorraine of scarped sandstone and limestone hills facing north and clay lowlands used for pasture of dairying and pigs

Summary table of Land use

Land use	Ha. '000	%
Arable	939	30.8
Permanent pasture	732	24.0
Forests	601	19.7
Builtup/wasteland	779	25.5

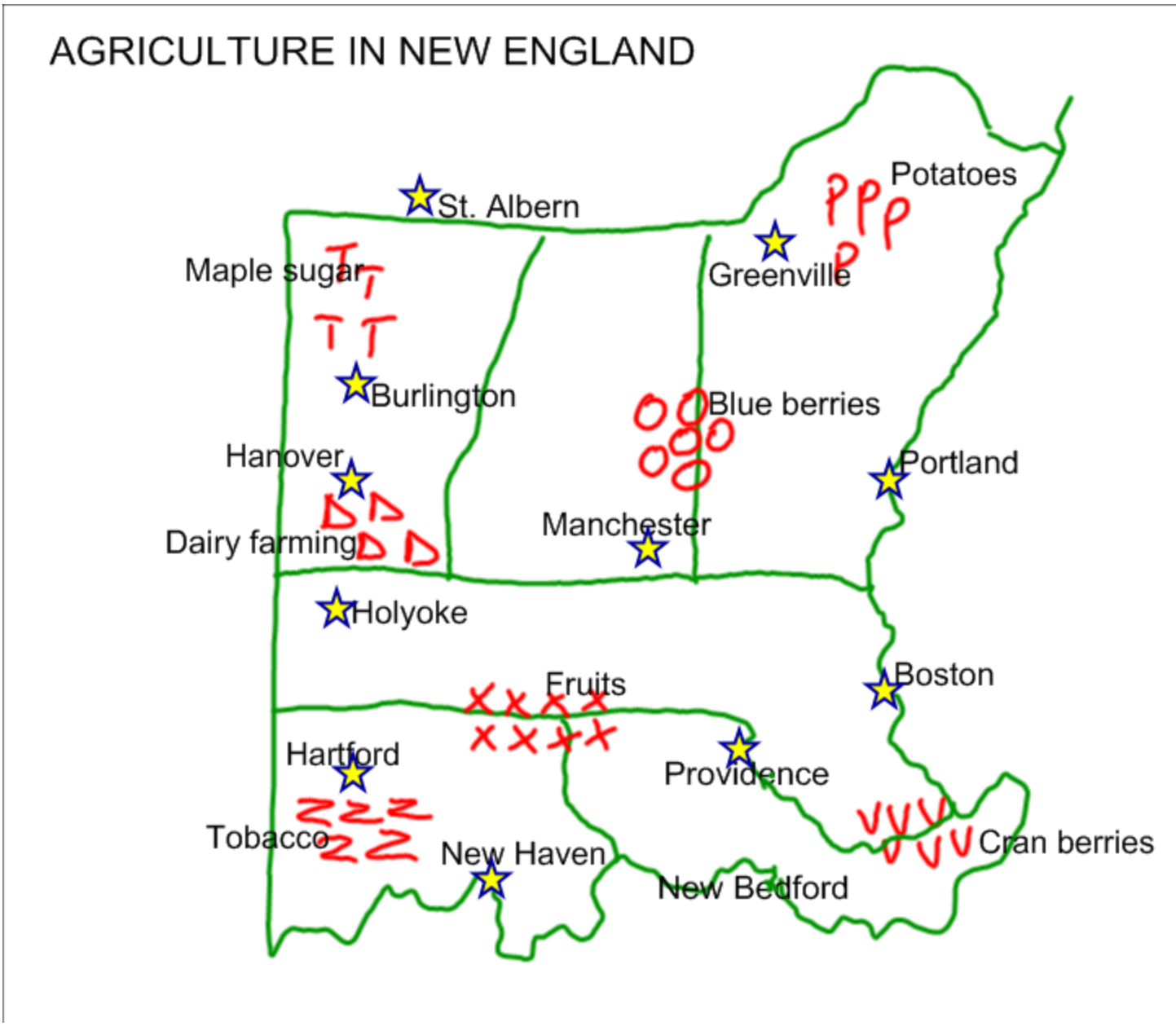
Agriculture

Cares for 80% of the population's food requirements and arable farming is the most important land use divided into

- Horticulture and market gardening growing tomatoes, orchards, grapes, etc

- Cereal growing with maize, barley, oats in the Central plateau
- Sugar beet growing on reclaimed land in Furnes, Ostend and Knokke
- Dairying and pig breeding
- Other crops include tobacco, beans, peas, flax, hops, etc

(A sketch map showing agricultural patterns)



Factors

- Fertile soils in the Central plateau
- Generally flat relief for mechanization
- Mild maritime climate

- Access to Rhine river as main water way
- Diverse drainage system i.e. rivers like Dendre, Lys providing water
- Large market in the European Union
- Growing level of industrialization that needs different agro raw materials
- High and advanced technology
- Adequate capital for investment from government and foreign investors.
- Well developed and efficient transport and communication
- Presence of co-operatives improving farming
- Skilled labor to engage in farming
- Agricultural research for high breeds
- More reclaimed land from the marshy lands
- Supportive government policy towards farming

Importance

- Provision of food at cheaper prices hence saving the government would be expenditure on food.
- Employment opportunities e.g. farm attendants, book keepers, drivers etc.
- Foreign exchange through export of agricultural products
- Development of infrastructure like canals, roads, railway, etc
- Market for industrial products like milking machines, tractors etc.
- Diversification of the economy from industrialization to agriculture.
- Promotion of international trade and relations between Belgium and the countries that import her products like Germany.
- Earning of income and improving standards of living by the workers.

Problems facing agriculturalists of Belgium

- Intensive farming causing soil exhaustion that leads to poor output.
- Limited land for more cultivation hence inadequate supply of agricultural products.
- Flooding in the low lying coastal areas i.e. the reclaimed marshy lands that destroy crops grown.
- Salination from sea water that does not favorably support crop growth.
- Limited labor to engage in cultivation
- High costs of production and maintenance of machines and farms that discourages farmers.
- Infertile sandy soils in Campine and Ardennes
- Priority given to livestock farming (pig breeding) instead of arable farming that has reduced crop output.
- Occurrence of pests and diseases

Industry

Belgium is highly an industrialized country with 95% of the population in industry and service sector leaving only 5% in agriculture.

Types

- Engineering- making electrical appliances, machines, motor vehicles, etc
- Chemical- using oil and coal to make plastics, synthetic rubber, nylon, detergents, etc
- Textile- making linen, cotton, jute, synthetic fibres, etc
- Steel- for steel works formerly in Liege, La Louviero, Camberoi now in coastal areas of Zelzate
- Non-ferous metals- making ultra pure materials for electronics, aeronauticals and space industry

Industrial towns

- Brussels- with engineering, printing and publishing, brewing and distilling, sugar refining, iron and brass casting, textile, electronics, furniture, etc
- Antwerp- with oil refineries, diamonds cutting, ship building, automobile, chemical, electronics, etc
- Liege- with engineering, ornaments, chemicals, glass, rubber goods, electronics cutlery, etc
- Ghent- with textiles, leather, paper, machinery, tobacco currying, etc

Factors

- Industrial revolution ideas
- Power in form of coal and electricity
- Raw materials like coal, zinc, cobalt, copper and agro-products
- Advanced technology
- Large market base locally and internationally.

- Good transport routes like canals, water, railway, etc
- Abundant water for industries from rivers like……..,……,……..,.
- Supportive government policy i.e. giving tax holidays and loans to potential investors.
- Investment capital from foreign companies like Ford and Volvo

Problems faced

- Mineral exhaustion like coal
- Limited domestic raw materials leading to importing oil, cotton, iron ore, etc
- Competition from other industrialized countries like Japan, USA, etc
- Limited home market because of the imported products.
- Limited land for expansion
- High production costs for high quality goods

Urbanization

Antwerp

It is the second largest after Brussels found at the bank of river Scheldt, 90 km from the North sea.

Factors

- Has a direct route to the North sea
- Developed transport and communication networks e.g. railways and roads that connect to different towns.
- Large canals like Albert from Liege linking river Meuse to Scheldt estuary
- Third largest port in the world with imports like minerals, petroleum, palm oil, coffee and exports like nails, marble, candles, glass, textile, etc
- Large productive hinterland serving Belgium, Luxembourg and northern France

- Abundant water for industrial and domestic use.
- Industrial development e.g. manufacturing industries, steel and Rolling, processing industries that calls for dense population to engage in industrial activities.
- Relatively flat land for setting up infrastructure
- Over 50 quays i.e. facilities for loading and off-loading

Problems faced

- Limited land for expansion.
- Occasional flooding during spring and summer
- Congestion because of the existence of many facilities like industries, quays etc.
- Pollution from industries
- High crime rate

LUXEMBOURG

It is the smallest of the five Rhineland countries that got her independence in 1839 referred to as Grand Dutchy of Luxembourg
It is made up of three provinces/districts of Diekirch, Grevenmacher and Luxembourg.

Latitudinally it is at 49° 45'N and 6° 10'E with a land coverage of 2,586 sq.km having 2,586 sq.km as land and 0 sq.km as water.

The country is bordered by Germany in the east, Belgium in the west and France in the south.

Climate

- Modified continental (marine west coast climate) with mild winters and cool summers experiencing dense fog between august and april.

Drainage

- River Mosselle streaming from Germany, a tributary of the Rhine through Luxembourg to France
- River Our streaming from Belgium joining river Mosselle at the border
- River Sure streaming from Belgium joining river Our and river Mosselle in the east
- River Woltz and Clert streaming from Belgium of northern Luxembourg joining river Sure and Our into river Mosselle
- Rive Alzette streaming from southern Luxembourg joining river Sure, Our and later river Moselle
- River Eisch from Belgium joining river Alzette and Sure into river Moselle

(Sketch map showing drainage and major districts)

Relief

- Oesling- is part of Ardennes uplands making up the northern half (1/2)
- Guttland- is part of the scarp land of the Lorraine and low land making up the larger south (2/3)
- The lowest point is wasserbilling in the Moselle river at 133 m below sea level and highest at Kneiff in Troisvierges-Buurgplaatz at 559 m above sea level.

(Sketch map showing relief)

Summary table of Land use

Land use	Percentage
Arable land	23.28
Permanent crops	0.4
Permanent pasture	20
Forest and woodland	21
Others	34

Population

It has a low population of 468,571 people but one of the most densely populated in Western Europe with density varying from one region to another.

(Sketch map showing population distribution)

Factors for low population

- Rugged terrain
- Thin infertile soils
- Poorly linked to transport and communication networks
- Remoteness of the areas
- Reserved and gazetted for forestry

Factors for medium population

- Low land relief
- Covered by out-wash gravel

- Fairly developed transport and communication networks
- Relatively industrialized

Factors for high population

- Low land
- Loess fertile soils
- Industrialization
- Well developed transport and communication networks
- Abundant minerals like iron ore

Industry

Luxembourg's economy depends on the iron and steel industry with iron deposits in south western region and that imported from France-Lorraine, Sweden, etc

Factors

- Abundant iron ore deposits

- Well developed transport and communication networks
- Highly skilled labour
- Large market in the European Union
- Investment by international companies
- High level of technology
- Capital to buy the industrial inputs, etc
- Power sources like electricity
- Abundant water from internal rivers

Importance

- Foreign exchange through export
- Job creation
- Diversification of the economy
- Promotion of international trade and relations
- Skill acquisition by the workers
- Urbanization of the areas e.g…….
- Infrastructure and institutional development

Problems being faced

- Exhaustion of iron ore and closure of some mines
- Increasing costs of mining with increasing depth
- Small home market
- Shortage of capital to invest in heavy industries

Measures

- Importation of iron ore from France and Sweden
- Improving on technology
- Producing export oriented goods
- Attracting foreign investors
- Recycling of waste products

Mixed Farming

Agriculture takes place in the relief regions i.e.

- Guttland lowland growing vines/ grapes, wheat, barley and rye
- Oesling upland growing oats, rye, potatoes and barley

Exporting countries

- Belgium, France, Germany, Spain, Holland/ Netherlands, Switzerland, Britain, etc

Factors favoring

- Guttland lowland which is relatively flat for cultivation
- Fertile soils for pasture growth and crop cultivation in the low land
- Warm moderate temperatures favoring crop and animal growth
- Adequate capital for investment
- Wide market for agro-products within and outside Luxemburg
- Efficient transport and communication network i.e. water, road, railway, etc

- Industries that supply inputs and use agro-raw materials
- Skilled labor to man the industry
- Advanced technology used in the arable and dairy industries
- Improved research on quality of crops and animals
- Supportive government policy towards agriculture
- Adequate water supply for animals from rivers like Sure, Alzette, Moselle, etc
- Adequate pasture for grazing the animals
- Extensive land for cultivation and grazing

Contribution

- Revenue to government through taxation and export duties
- Employment to the natives
- Food for nutrition and health
- International trade and relations with other countries

- Infrastructure development like roads, canals, railway, etc for movement
- Animal waste used as fertilizers
- Urbanization and its related advantages
- Diversification of the economy to reduce dependence on other sectors
- Income to the natives improving their standards of living
- Foreign exchange through export trade
- Provide raw materials for agro-based industries
- Revenue to government for infrastructure development

Urbanization
Luxembourg
It is the capital found at the confluence of Alzette and Petrusse rivers.

Functions

- Administrative with ministries and public buildings
- Commercial centre
- Industrial centre with steel, chemical, textile, food processing, electrical, etc
- Tourist centre
- Residential centre with 80,000 people

Factors

- Low relief attracting settlement
- Efficient transport and communication network
- Navigable river Alzette
- High population
- Industrialization
- Government policy to develop the area

Problems faced

- Limited room for expansion
- Congestion of traffic and population
- Slum development at the out scats

- Pollution of the environment i.e. water, air & land by fumes/waste from industries.
- High level of unemployment
- Inadequate accommodation
- High Crime rate due to unemployment.

Steps taken

- Vertical expansion by building sky scrappers
- Recycling and treating of waste
- Strengthening of the police force
- Constructing underground tunnels and expanding the railway network
- Encouraging planned housing
- Promoting development of industries

GLORY BE TO GOD PRAISE BE TO HIS NAME