

# DP IB Geography: SL



Your notes

## Managing Extreme Environments

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## Agriculture in Hot Arid Environments

# Agriculture Opportunities & Challenges in Hot Arid Areas

- As long as water is available, the heat and sunlight in hot, dry regions allow for an extended growing season
- **Alluvium** deposits provide nutrient-rich, fine soils that warm up quickly, but they are at risk from wind erosion and flash floods
- A type of nomadism is still the most common way to farm
  - **True nomads** move around with their animals, looking for new places to graze **all year round**
  - Many are **semi-nomadic**, where they **move their flocks and herds** but have a **settled home** to take advantage of higher levels of supplies near villages and towns
  - With the increase in desertification and water scarcity, many people have become **sedentary** and have settled permanently in villages, towns and cities
- **Oases, desalination plants** and **exotic** rivers provide opportunities for **settled agriculture**
  - Egypt is the largest producer of dates in the world
  - Date palms are known as the 'bread of the desert'
  - They can be eaten and the Bedouins use dates to make bread
  - They are a traditional medicine for swelling and coughs
  - The bark can be used for roofing and fencing and the leaves can be plaited into ropes and mats
  - The Aswan dam ensures the Nile provides a continued supply of water throughout the year
- In a number of **oil-rich countries**, such as Saudi Arabia and the UAE, **desalination** plants provide constant water supplies
  - However, these have environmental impacts and are very energy-intensive
  - Desalination produces brine, which is extremely salty water, and is returned it to the sea, raising the salinity of the surrounding water
  - Due to the costs involved in producing the fresh water, desalination-produced food is more expensive
- **Agriculture** in hot areas could be more **sustainable** by:

- Planting vegetation that is drought-resistant or salt-tolerant for animal feed
- Reducing the size of herds will limit the pressure on vegetation
- Using animal dung as fertiliser
- Using solar panels to produce energy
- Using efficient forms of irrigation, such as drip irrigation
- Building small-scale dams and **micro-hydro's**



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## Irrigation in Hot Arid Areas

- The lack of **water** in dry areas is usually the **limiting factor** in **agriculture**
- **Irrigation** is typically used to **support** natural rain fall, but a regular water supply is hard to come by in hot, arid areas
- Also, **high temperatures and strong sunlight** cause water to **evaporate** quickly, adding to water scarcity
- **Natural water sources** can be diverted using:
  - **Advanced irrigation systems** such as **irrigation channels, weirs and small dams**, but the large surface areas leads to high rates of evaporation, plus they are not cheap to build or maintain
  - **Flood irrigation** is where farmers deliberately flow water over their crops. This is a low-tech but wasteful method of irrigation
  - **Spray irrigation** supplies water through a **centre pivot** sprinkler system
  - **Drip or micro-irrigation**, is a planned irrigation system where water is applied directly to the root zone of plants either above or below the soil, by applicators
- **Hydroponics** uses 90% less water to grow crops, but the system is expensive to set up
  - With this method, plants get all the **nutrients** they need from **special solutions** and do not need soil
  - **Crops grow twice as fast** as in traditional farming
  - Light, temperature and water are more controlled and monitored than plants grown in soil
  - Crops are also **pesticide-free**
  - Systems can be run on **solar energy**

## Salinisation Risk

- **Hot arid climates** are characterised with low mean annual precipitation



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- Leaving the **soil** with a **negative water balance**
  - **Output** is **high** due to rapid and continued evaporation and transpiration
  - **Stores** of water are typically **large (aquifers)** but **deeper** than the **root zones** of plants
  - **Input** is **low** through brief periods of heavy precipitation, leading to
    - Rapid runoff
    - Low rates of infiltration
    - Reduced soil water recharge
  - Therefore, **desert soils are arid (dry)** but **potentially fertile** (if water is added, the minerals and nutrients are released and the plants can access them)
- Other factors contribute to arid soils and include:
  - Low organic content from limited biomass
  - Low clay levels
  - Thin topsoil layer
  - High levels of soluble salts due to a lack of **leaching**
- **Salinisation** is where intense evaporation at the soil's surface encourages soil moisture and minerals to rise
- This leaves the soil with a high pH value
- When irrigation water is added to the land and allowed to evaporate, this increases the effect of salinisation
- Increased soil salinity restricts most plant growth by reducing water uptake by plant roots
- Some crops are more salt-tolerant than others and are called halophytes
  - Palm dates and cotton are halophytic

## Examples of salinisation

- Salinisation has made a lot of land in the **Thar desert of Pakistan** infertile
- Irrigation should always be done with drainage where salinisation is a risk
- In Pakistan, 13% of all irrigated agricultural soils were classified as strongly saline, totalling some 6.8 megahectares (Mha)
- **In India**, this **secondary salinisation** has become a serious problem

- The use of large irrigation schemes, many without effective drainage plans, has changed and disturbed the water balance in many parts of the once fertile lands of **Uttar Pradesh state** and inside the **Indo-Gangetic plains**
- Salinisation and alkanisation have affected 5.26 Mha of land in India



### Examiner Tips and Tricks

Do not confuse aridity with infertility. Many soils in the desert are potentially fertile, as they have minerals and nutrients within them. All they need is water to activate them. Although the Nile basin in Egypt is arid, the soil has rich alluvial deposits from the Nile flooding each year.

## Land Ownership

- Deserts provide opportunities for large-scale commercial agriculture with the availability of large expanses of unused land, long growing season and soils with nutrients
- For areas that rely on farming as their main source of income, land ownership is important for families to succeed and survive
- Land ownership disputes can arise between indigenous populations, government entities, and private companies
- The competition for control over agricultural land increases because of the major role it plays in securing water rights
- Furthermore, competition also increases socio-economic inequalities and perpetuates gender disparities, as traditionally, land is owned by men and women face obstacles in accessing and owning land



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## Resources in Cold Environments

# Opportunities in Cold Environments

- Valuable minerals are found in many cold environments, such as nickel, gold, iron ore and diamonds in northern Canada and coal, tin and uranium in Russia
- The development and exploitation of these resources puts cold environments at risk while providing benefits, such as
  - Developing large areas of underpopulated and remote areas
  - Providing employment
  - Generating income from exports
- Opportunities include:
  - **Mineral extraction**
    - There are valuable reserves of minerals and **rare earth elements** such as gold, silver, neodymium, terbium, etc.
    - Russia has large uranium and phosphate deposits and the Yukon, Alaska, is renowned for its gold
  - **Energy**
    - Gas and oil are abundant
    - The US government is extracting oil from the oilfields near Prudhoe Bay, Alaska
  - **Fishing**
    - The cold coastal waters have good fish stocks and attract commercial fishing vessels
    - The deep, cold water is ideal for unusual fish species, such as the Patagonian Toothfish, that command a high price in markets around the globe
  - **Tourism**
    - Wilderness and adventure tourism to extreme cold environments is a growing industry for countries and local communities
    - Tourism to the world's northernmost urban community: Longyearbyen, Svalbard, Norway, or taking part in the Yukon Quest dog sled race, which is worth \$4 billion a year
- The benefits can be considered as:



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- **Local**, where communities can benefit from income and job opportunities
- **National**, where a country benefits from extra taxes paid by companies and employees
- **Global**, where other countries can benefit from imports of resources
- **Social** improvements such as better insulation in homes and education
- **Economic** growth from the development of roads and hotels
- **Political**, where a country holds power over resource supplies, etc.
- **Environmental** benefits are limited, but development can raise environmental awareness

## Challenges in Cold Environments

- Development and processes within cold environments occur slowly
- Any changes will quickly cascade, and once damaged, the ecosystem takes a long time to recover, if at all
- This makes **cold environments fragile**
- The main challenges facing resource development in cold environments include:
  - **Attracting workers** to live and work in hostile environments is costly
  - **Protecting people** and equipment from the harsh weather conditions
  - **Accessibility**, management and operating difficulties
  - Meeting and protecting the **rights of local Indigenous peoples**
  - **Environmental concerns**, such as damage to periglacial ecosystems, pollution from oil spills or overfishing
  - **Changes** in economic and political circumstances
- **Relief/physical geography**
  - The rugged and mountainous terrain make these areas inaccessible for vehicles to deliver goods and materials for development and day-to-day living
  - The ground can be frozen up to surface level for many months of the year, making farming, building and mining very difficult
- **Extreme temperature**
  - Very low temperatures and long hours of darkness make building anything difficult
  - Working practices have to be adapted; some employees take warming-up breaks to prevent frostbite and hypothermia



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- Calorie intake has to be increased to cope with extreme temperatures and keep healthy
- Engine oil can freeze, rubber tyres can become brittle and steel can shatter under low temperatures
- Water cannot be used to process 'ores' as it freezes and special dry methods have to be used, increasing the costs of mining
- **Infrastructure**
  - Building roads, railways and pipelines for water and electricity supplies is very difficult on frozen ground that is liable to melt
  - Pipelines need to withstand freezing as they cannot be buried underground due to the permafrost
  - Traditional methods of building are unsuitable and alternatives such as using jet engines to thaw permafrost or dynamite to blast away ice and rock are used
  - Many roads are only passable during the summer months and only if it hasn't rained or they become waterlogged
    - Flying is the usual means of transport but this adds to pollution and maintaining a runway or helicopter pad adds to costs
- **Buildings**
  - Creating solid foundations for buildings is difficult (frozen and unstable ground), making any further development difficult
  - Reducing heating costs through triple-glazed homes and geothermal power
  - Homes are raised on stilts to prevent their heat from melting the permafrost, which can cause the land to sink and subside)
  - Domestic pipes are above ground
    - This prevents damaging the permafrost
    - Allows access to the pipes
    - Prevents them freezing underground
- **Permafrost**
  - This underlies the periglacial environment and is easily damaged with mining
  - The permafrost melts as a result of drilling heat, causing the land to sink
  - Oil spills also cause catastrophic damage to periglacial and polar regions, as the fragile ecosystem cannot remove the oil quickly, affecting the ecosystem



- Waste materials (tailings) from mining cover natural vegetation and change the depth of the active zone of the permafrost freeze-thaw cycle
- Transport produce heat that damages the permafrost
  - Alaskan roads are built on 1–2–metre-thick gravel pads that stop heat transferring from vehicles to the soil beneath, which would cause permafrost to melt and roads to crack
  - Parts of the Trans-Alaska oil pipeline are raised on stilts to prevent permafrost melt and unstable ground



Your notes

## Resource nationalism

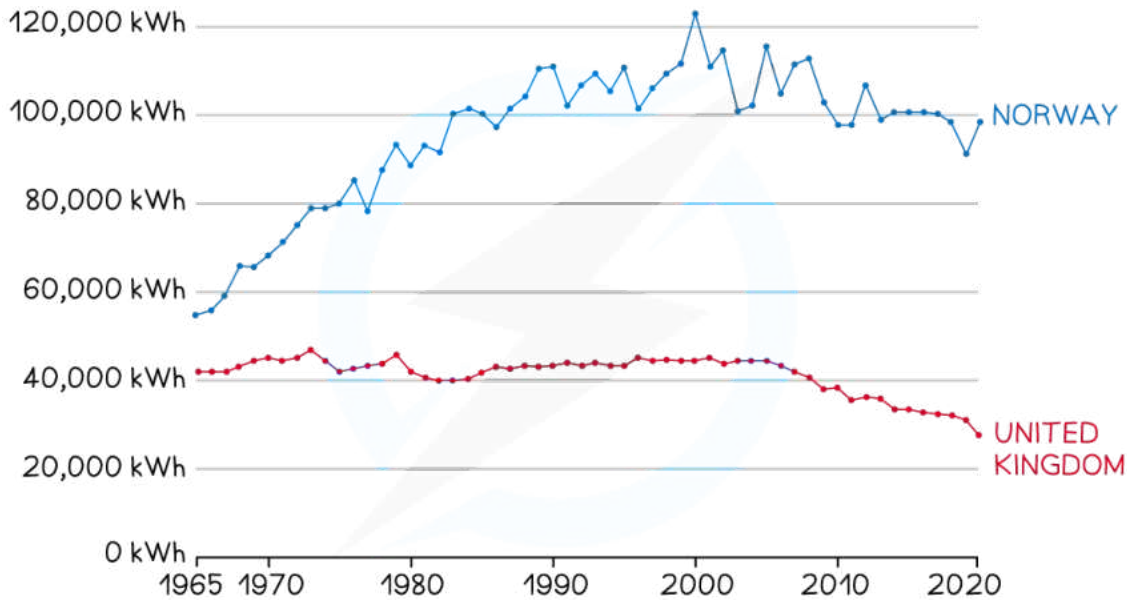
- Norway is in northern Europe
- Its demand for energy is one of the highest in the world
- The population is mainly urban, with 83% of people living in towns and cities



Your notes

**ENERGY USE PER PERSON**

ENERGY USE NOT ONLY INCLUDES ELECTRICITY, BUT ALSO OTHER AREAS OF CONSUMPTION INCLUDING TRANSPORT, HEATING AND COOKING



SOURCE: OUR WORLD IN DATA BASED ON BP & SHIFT DATA PORTAL  
 NOTE: ENERGY REFERS TO PRIMARY ENERGY – THE ENERGY INPUT BEFORE THE TRANSFORMATION TO FORMS OF ENERGY FOR END-USE (SUCH AS ELECTRICITY OR PETROL FOR TRANSPORT).

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**Energy use per person in Norway**

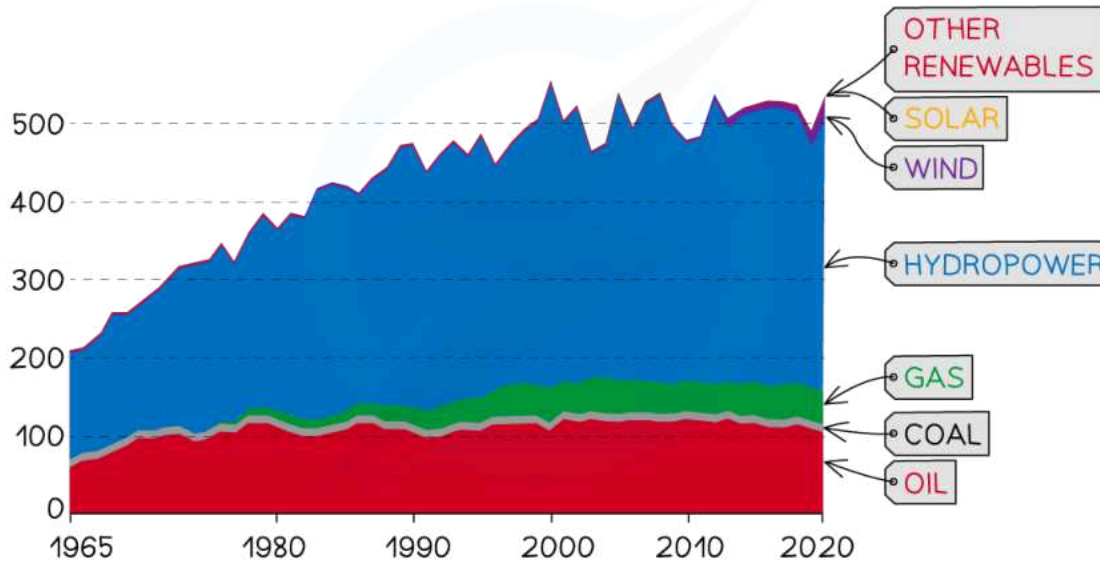
- Norway is one of the world's largest energy exporters and has significant energy resources, including:
  - Over 1% of the world's gas reserves (17th in the world)
  - Approximately 0.3% of the world's oil reserves (22nd in the world)
  - There are also some coal reserves
  - Hydropower generates 90% of Norway's electricity, accounts for 65% of energy use and has enabled the development of energy-intensive industries with limited greenhouse gas emissions



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**ENERGY CONSUMPTION BY SOURCE, NORWAY**

PRIMARY ENERGY CONSUMPTION IS MEASURED IN TERAWATT-HOURS (TWh). HERE AN INEFFICIENCY FACTOR (THE 'SUBSTITUTION' METHOD) HAS BEEN APPLIED FOR FOSSIL FUELS, MEANING THE SHARES BY EACH ENERGY SOURCE GIVE A BETTER APPROXIMATION OF FINAL ENERGY CONSUMPTION.



SOURCE: BP STATISTICAL REVIEW OF WORLD ENERGY  
NOTE: 'OTHER RENEWABLES' INCLUDES GEOTHERMAL, BIOMASS AND WASTE ENERGY.

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**Graph showing the breakdown of Norway's energy mix over 50 years**

- Oil and gas account for 1/3 of Norway's export earnings and are vital to the economy
- Around 8 000 people are directly employed by oil-related businesses
- Almost 250 000 jobs are attributed directly or indirectly to the oil and gas industry
- At first, Norway mostly relied on the expertise of foreign companies to extract the energy
- Over time, the industry has fully developed and Norway's expertise is in demand all over the world
- The Norwegian government has maintained a strong national resource policy from the outset by:
  - Maintaining at least a 50% share of all gas and oil fields
  - Establishing a state-owned limited petroleum company, Petoro, in 2001

- Investing the profits of its resources back into a welfare pension fund for its citizens

## Case Study:



Your notes



*Map of Alaska highlighting the main cities and industrial regions*

## Development opportunities in Alaska

- Oil and gas:** Over half of Alaska's income comes from the oil and gas industry



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- Most oil fields are around Prudhoe Bay and the Trans-Alaska oil pipeline links the oil fields to Valdez where the oil can be shipped out
- The Trans-Alaska Pipeline System (TAPS) is 800 miles long and built to transport the oil across Alaska rather than ship due to the Arctic sea ice in winter
- **Mineral resources:** Gold, silver, iron ore and copper ore are mined particularly in the Tintina gold belt region
  - Tintina Gold Belt extends for 150,000 square kilometre in an arc-shape across Alaska
  - First mined during the Klondike gold rush of 1898 and continues to this day
  - Approximately 30% of Alaska's wealth comes from the gold industry alone and accounted for over \$900 million
  - Total contribution of mineral resources to the Alaskan economy is estimated at over \$2.2bn (2021)
- **Fishing:** Salmon, crab and pollock are fished in the waters around Alaska
  - It employs 100,000 people and contributes over \$6 billion to Alaska's economy
- **Tourism:** Tourists are attracted to Alaska's wilderness scenery
  - Over 2 million tourists visit Alaska each year
  - Each year in Anchorage, tourism creates thousands of jobs, brings in approximately \$290 million in direct spending, more than \$38 million in local taxes, and im

## Challenges to development in Alaska

- Access to resources, finding a workforce, providing buildings, infrastructure and **protection from extreme weather are particularly challenging in Alaska**
- **Extreme temperatures**
  - Annual temperature is around  $-9^{\circ}\text{C}$  with snow and strong winds
  - Exposure to them can kill and healthcare is usually at a distance
  - Vehicle and equipment failures are common and getting them repaired is difficult and time-consuming
  - Extremes in the amount of daylight: in winter, it can be dark nearly all the time and mental health issues are common
- **Accessibility**
  - Alaska is over 21 hours by road from the US
  - Many areas are extremely remote, and the mountainous terrain makes access difficult and expensive

- In winter, access to some towns is either by air or on dangerous ice roads
- In summer, due to ground melt, some main roads are impassable as they are too soft to drive along
- With a small and scattered population, people in small towns can be a long way from employment opportunities, services and goods
- Everyday goods (food, drink, clothing, toys, etc.) are very expensive as they have to be shipped in and during the winter months, it can take weeks or months for shipments to arrive
- **Buildings and infrastructure**
  - Buildings and infrastructure need to cope with the frozen ground and weather conditions
  - This makes it difficult and expensive to build in Alaska
  - Most building work has to take place during the summer, as the days are longer and temperatures are warmer
  - The value of Alaskan resources, means finding ways to adapt to the challenges:
    - Parts of the Trans-Alaska oil pipeline are raised on stilts, this prevents the permafrost from melting and makes the ground unstable
    - In areas of permafrost, houses are raised on stilts to prevent their heat from melting the frozen ground beneath (which can cause the land to sink and subside)
    - Reducing heating costs through triple glazed homes and geothermal power
    - Alaskan roads are built on 1–2–metre-thick gravel pads that stop heat transferring from vehicles to the soil beneath, which would cause permafrost to melt and roads to crack



Your notes



Your notes

## Resources in Hot Arid Environments

# Opportunities in Hot Arid Environments

- Hot arid environments provide a range of opportunities for development, including:
  - Energy**
    - Solar energy in areas such as the **Mojave, Desert**
    - Wind, including the Tarfaya complex in the **Sahara Desert**
    - Coal mining, such as the **Thar coalfield**
  - Mineral extraction**
    - Reserves of a range of minerals include copper, uranium, and coal in the **USA Western Desert**, phosphorus and gypsum in the **Thar Desert**
  - Tourism**
    - Desert safaris in the **Kalahari Desert**
    - Horseback riding in the **Namib Desert**
    - Staying in a traditional **Ger (Mongolian Yurt)** in the **Gobi Desert**
    - Balloon flights such as those over the **Namib Desert**
  - Agriculture**
    - Irrigation enables large scale agriculture in areas such as the **Arabian Desert** and **Gobi Desert**
    - Subsistence farming occurs in many desert environments

# Challenges in Hot Arid Environments

- The harsh, hot, and arid environment pose a range of challenges for any development
- Water availability**
  - The lack of readily available water increases costs and can deter people from moving to areas for work
  - However, as the population increases, the demand for water also increases, but not all aquifers are usable
    - Some aquifers are hyper-saline (they are many times saltier than seawater)



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- Some become polluted by mining processes, such as the use of arsenic in gold extraction
- Many arid regions have deep-level aquifers and where pit mining occurs, water flows into the pit from the aquifer
  - The Pilbara region of Australia lies on a water-bearing aquifer that is just 100 to 250 metres below surface
  - Many commercial mining operations in the region start below the water table and have to pump the water out of the pit daily
  - Water is pumped to a holding tank and then used to process the 'ores' or sprayed on roads to dampen dust
- **Extreme temperatures:** which can reach 50 °C
  - This leads to high levels of evaporation and water shortages
  - It makes working very difficult and tiring
- **Mineral extraction**
  - The abundant stores of natural resources can lead to political tensions over contested land or borders
    - Western Sahara has rich phosphate reserves, but there has been a long-running territorial dispute between Morocco and its indigenous Sahrawi people
  - **Abandoned** pits can flood, creating artificial lakes, although if polluted or hyper-saline, they have no economic or recreational value
  - **Open-cut mining** creates unstable slopes and are environmentally damaging as it exposes previously-covered toxic or dangerous materials
    - Uranium is open-mined in the Sahel Desert (in Niger), where the rock is crushed before being dumped for **chemical leaching**
    - There are enough harmful substances and radon emissions in the mining tailings to damage the local ecosystem for many generations
  - **Underground mines** can collapse and cause land subsidence
- **Accessibility**
  - There is a lack of roads due to low population
  - Pipelines, roads and railways need to be built to withstand the high temperatures
  - Sand often covers the roads
  - Most of the desert areas are inaccessible and are only accessed by flying into the region

## Case Study: Thar Desert



## Development opportunities in the Thar Desert



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*Location of the Thar Desert*

## Opportunities

- **Subsistence farming**
  - In depressions between the sand dunes, any precipitation collects; grasses grow and animals can graze
  - Goats provide milk and meat for the communities
- **Commercial farming**
  - The construction of the Indira Gandhi canal allows irrigation



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- This enables crops such as wheat and cotton to be grown for sale on a commercial scale
- **Tourism**
  - Tourists are attracted to seeing the different species found in the deserts on desert safaris
  - The desert is a hub for migrating birds, which many tourists visit to see
  - There has been an increase in **ecotourism**
- **Mineral Extraction**
  - The extraction of gypsum, limestone, feldspar, kaolin and phosphorus all takes place within the Thar Desert
- **Energy**
  - The **Jaisalmer Wind Park** is the world's fourth-largest wind farm
  - Coal extraction: It is estimated there are reserves of 175 billion tonnes of coal
  - Oil and gas: Large reserves of oil and gas have been found under the Thar Desert
  - The **Bhadia Solar Park** covers more than 22 square miles and is one of the world's largest

## Challenges

- **Extreme temperatures**
  - In the hottest months of May and June, temperatures often reach 50 °C.
  - Working in the high temperatures for miners, farmers, etc... is extremely challenging
- **Water supply**
  - Precipitation in the Thar desert is very low (120–240 mm)
  - Evaporation rates are high
  - Natural ponds: called **tobas**, provide people with water in remote areas
  - In some areas, over-irrigation has led to salinisation when the water evaporates, leaving the salt behind
  - The 650–kilometre Indira Gandhi Canal provides water for drinking and irrigation
- **Inaccessibility**
  - The Thar Desert is over 230,000 km<sup>2</sup>
  - The road network across the vast area is limited
  - On the roads that do exist, tarmac may melt due to the high temperatures

- Roads quickly become covered in sand
- City of Jaisalmer has become a honeypot tourist site because access to other areas is so expensive and difficult



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## Tourism in Extreme Environments



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# Tourism in Cold Environments

## Opportunities

- Globalisation has brought many distant places closer and with long-haul flights becoming cheaper and the ability of people to 'surf' for the best prices, cold environments, have become places of mass tourism
- The dramatic landscapes make these areas attractive to visitors
- Adventure tourism to extreme cold environments is a growing industry for countries and local communities
  - There are a variety of activities for people to do:
    - Hillwalking and climbing
    - Mountain biking
    - Mountaineering: professional climbs such as Everest and K2
    - Skiing and snowcat rides
    - Glacial walking and climbing
    - Heli-rides and skiing on glaciers
    - Ice caves and ice hotels
    - Cruises to Antarctica, South Georgia and around the Antarctic peninsula
- Tourism boosts the local economy and provides a variety of jobs (directly and indirectly)
  - Places such as Antarctica have seen an increase in the number of tourists
  - In the Chamonix Valley, France, roughly 5 million tourists visit each year, and this generates 2500 jobs seasonally, with railway companies and ski-lift engineers in high-demand
  - Tourism in Alaska contributes \$1.8 billion to the economy, and tourism accounts for one in eight Alaskan jobs
- Tourism has a multiplier effect
  - It helps thousands of businesses as tourists take their tours, dine in their restaurants, and stay in their guest rooms
  - It leads to improvements to airports, roads and ferries

- A safe, well-maintained infrastructure encourages new visitors and benefits locals as well

## Challenges

- Cold environments are under pressure from continued exposure to increased tourism and some are becoming very fragile landscapes
- Approximately 170,000 tourists visited Antarctica in 2020 and large cruise ships increase pollution in the area, both from the ship and the tourists themselves
  - Seeds from non-native species, caught on tourist clothing, are being seen growing in the ice-free coastal areas, threatening the continent's biodiversity
- Developments such as roads and hotels disrupt wildlife and damage habitats and migratory patterns, leading to reduced biodiversity
  - In the European Alps, social mobility and wealth have increased the rate of deforestation for ski resorts and supporting infrastructure, leading to habitat loss and fragmentation
- Tourism increases demand for energy and water resources
  - In Zemt, Switzerland, snow cannons add artificial snow to the slopes, but they are energy-intensive and add chemical and biological additives to the soil in the process
- Tourism isn't limited to the traditional single areas but attracts mass tourism to places such as Iceland, Greenland, Alaska, and Svalbard
  - Trekking causes damage to fragile mountain ecosystems
  - Plant communities, such as tundra flower meadows, need just 25 people a week and damage begins
  - These environments provide cultural, aesthetic and spiritual value as they are mostly unspoilt wilderness with Creation Stories linked to their vast landscape and open, dark skies
  - However, mass tourism has direct and indirect impacts through removing vegetation, building of infrastructure and indirectly through pollution



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## Tourism in Svalbard

- Svalbard, Norway, is part of a group of islands (archipelago) in the Arctic Ocean
- Svalbard means 'the land with the cold shores'
- Located between mainland Norway and the North Pole (74° and 81° north latitude), it contains areas of unspoilt, raw Arctic wilderness of glaciers and tundra sheltering polar bears, Svalbard reindeer and Arctic foxes
- Svalbard is known for the Northern Lights, which are visible during winter, and the 'midnight sun', where it is daylight for 24 hours a day during the summer

## Map of Svalbard



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*Located north of Norway, tourism has become the main industry in Svalbard*

## Tourism

- 60% of Svalbard is covered by snow and ice, with more than half being covered with glaciers of varying size
- Just 6–7% of Svalbard is covered with any type of vegetation; it has a very short growing season, a lack of precipitation, and barren ground soil
- Svalbard is the highest latitude where visitors can see the disappearing Arctic ice
- Tourists can take wilderness expeditions to see polar bears, along with extreme ski and snowmobile adventures and kayaking to see glaciers
- It is a popular destination (approximately 70 000 tourists), of which 30 000 arrive on cruise ships and the harbour has been enlarged to accommodate large cruise ships

- This brings in much-needed money, which is returned to Svalbard's economy, and aids in supporting the remote location and its people
- Tourism provides jobs for locals, providing accommodation and acting as tour operators. This allows people to support their families
- The sea ice no longer freezes around Svalbard and cruise ships can dock in the winter, extending the tourist season to all year round
- The longer tourist season boosts the local economy and provides more opportunities to remain sustainable
- The most common way to travel to Svalbard is by plane, which has daily flights to and from the mainland
- Svalbard's energy comes from coal mining, and most of its consumer goods are imported to the island

## How is it sustainable?

- The aim is to reduce the overall environmental footprint, make better sustainable choices, and balance economic growth with environmental protection
- Over 60% of Svalbard islands are protected in some way
  - Strict limits on the use of vehicles
  - Tour operators and visitors have to get permission to visit nature reserves
- Different zones have different levels of protection, with nature reserves allowing very little activity
- Longyearbyen has achieved the certification 'Sustainable Destination' and has committed to reducing the negative effects of tourism through schemes such as:
  - Electric snowmobiles charged using 100% renewable energy
  - Fishing with hybrid, silent boats
  - No picking flowers to protect the vulnerable flora
  - All visitors to Svalbard pay into the Svalbard Environmental Protection Fund through their airline tickets. Resources from the fund are used to protect Svalbard's natural environment
  - Buying locally made goods such as knives, chocolates, woollen garments, wooden cutting boards, soap, art and jewellery
  - Encouraging rental of equipment instead of buying for a single trip
- Local companies have made changes such as:
  - Energy for the Svalbard Brewery comes from burning waste from its production processes and any surplus energy is used for heating and hot water in Longyearbyen



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- Investments in solar and wind power systems help charge boats and snowmobiles, which contributes to more environmentally friendly transport solutions for both for residents and tourists
- The Svalbard Global Seed Vault is located in Longyearbyen and opened in 2008; it can store millions of seeds as a global backup if seeds are lost due to events such as mismanagement, natural disasters, and sabotage
- Hotels are built on stilts and constructed from sustainable wood that is triple-glazed and well-insulated to prevent heating of the permafrost below the foundations. Water is heated before entering the hotel to stop it from freezing and renewable energy is used to run the hotel
- Recently, a ban on the most polluting fuels was put in place and it has meant that large cruise ships are unable to visit areas around Svalbard

## Tourism in Hot Arid Environments

### Opportunities

- Tourism is limited in arid and semi-arid environments due to:
  - Heat
  - Lack of water
  - Inaccessibility
- Traditional tourism has been focused on historical and archaeological visits to places such as:
  - Palmyra in Syria
  - Petra in Jordan
  - Pyramids of Egypt
  - Uluru monolith in Australia
  - Grand Canyon in the USA
- However, there is a growing trend for adventure tourism, such as:
  - Desert safaris in the **Kalahari Desert**
  - Quad biking dunes in the **Namib Desert**
  - Staying in a traditional **Ger (Mongolian Yurt)** in the **Gobi Desert**
  - Balloon flights such as those over the **Namib Desert**
- Locals benefit from economic development, which provides employment and a wage
- Traditional cultures and local knowledge are kept alive, and intercultural understanding is promoted



- Tourism can improve environmental quality by reducing reliance on marginal agriculture

## Challenges

- Large holiday resorts encourage tourists to spend most of their money in the hotel complexes, excluding the wider community
- Often work is low-paid, menial, or seasonal
- Tourist's behaviour can offend local people (drinking, etc.)
- Loss of access to local sites (beaches, forests, etc.)
- Tourist activity can disturb or damage habitats and wildlife; water skiing can damage coral reefs, ivory poaching
  - 4x4 vehicles are being accused of damaging the ecology of the Sahara Desert and contributing to the world's growing dust storm problem
  - Over the last 25 years, the number of dust storms on the margins of the Sahara has increased
  - In Mauritania during the early part of the 1960s, there were an average of 5 days per year with dust storms, compared to an average of 80 days per year in the early 2010s
  - Since the 1990s, 4x4 Land Cruisers have replaced the camel as transport
  - These vehicles are gradually destroying the thin layer of lichen and gravel that keeps the desert surface stable during high winds
  - In the worst-affected regions, estimates suggest that 1270 million metric tonnes of dust are thrown up each year, which is ten times more than half a century ago
  - The dust, which may contain harmful microbes and pesticides, is transported high into the atmosphere during storms and deposited as far afield as the Alps, seen as a red layer on top of the snow



Your notes

## Tourism in the Nile Valley of Egypt

- Tourism in hot/arid environments has a strong relationship with political, economic, social, and environmental impacts
- Tourism is important to Egypt's economy
  - Produces 10% of the country's GDP
  - Employs about 12% of the workforce
  - Contributes to 14% of foreign income
- 90% of Egypt's tourism is within the Nile Valley and is based mainly on history and culture



Your notes

- The dry Valley provides a well-preserved view of past temples, ruins and monuments
  - The pyramids of Giza were built as tombs for the pharaohs of ancient times and the Bent Pyramid at Dahshur is particularly important as one of the first pyramids to be built smooth-sided rather than stepped
  - Luxor city is the site of the ancient city of Thebes, whose ruins attract thousands of tourists as the world's largest city between 1500 BCE and 900 BCE
  - The 13th-century BCE ancient archaeological site of Abu Simbel is home to two huge temples carved into the mountainside and has four 20-metre-high sitting statues of Ramses II guarding the entrance, along with smaller statues of his mother, some of his favourite wives and a few of his 110 children
  - Although this is not the original site (that was flooded when the High Aswan Dam was built), each stone was moved and rebuilt on higher land beside Lake Nasser
- Other activities include camel riding and sightseeing by boat on the Nile River
  - River Nile cruises are popular and range from small boat trips to cruises of several days on luxury floating hotels
- The infrastructure along the Nile Valley varies
  - Hotels range from basic, locally owned guesthouses to multi-storey international hotels
  - Very few foreign workers are employed in the Nile Valley tourism industry and the large international hotels employ local residents for most of their positions
  - Transport is mainly by train, which is reliable, cheap, efficient and air-conditioned
  - Air travel is possible between Cairo, Luxor and Aswan, but most people travel by train to enjoy the landscape
- Recent political instability in Egypt has presented a challenge for tourism
  - The 2011 Egyptian revolution resulted in a 37% decrease in foreign tourism
  - Terrorist attacks in Cairo and elsewhere have also reduced the number of tourists to the country
    - Although this creates cheaper holidays, it has caused hardship for locals reliant on tourism