THE DUKERIES ACADEMY

PAPER 3 : PEOPLE AND ENVIRONMENTAL ISSUES

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Unit 7: People and the biosphere

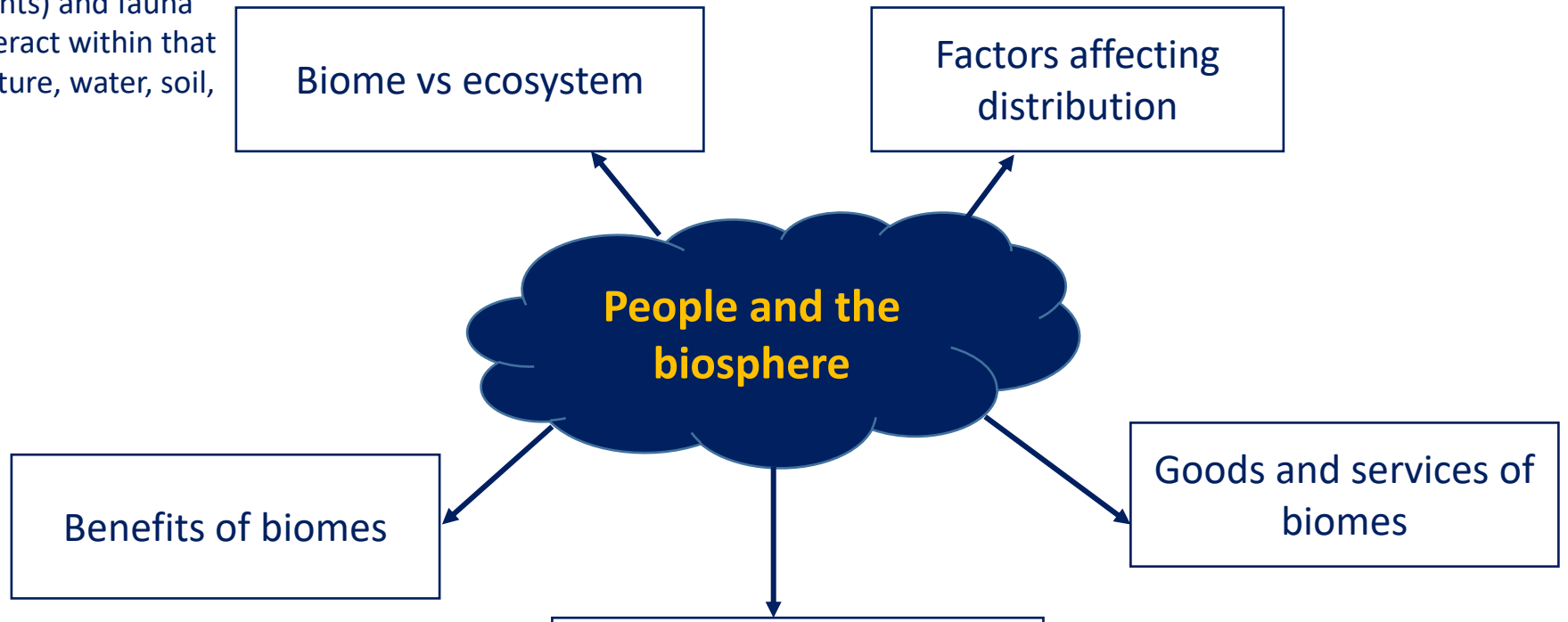
You should know…	Revised?
Enquiry question: Why is the biosphere so important to human wellbeing and how do humans use and modify it to obtain resources?	
How the global distribution and characteristics of major biomes (tropical, temperate and boreal forests, tropical and temperate grasslands, deserts and tundra) are influenced by climate (temperature, precipitation, sunshine hours)..	
Local factors (altitude, rock and soil type, drainage) can alter the biome distribution locally and how the biotic (flora, fauna) and abiotic (soils, rock, water, atmosphere) components of biomes interact.	
How the biosphere provides resources for indigenous and local people (food, medicine, building materials and fuel resources) but is also increasingly exploited commercially for energy, water and mineral resources	
How the biosphere regulates the composition of the atmosphere, maintains soil health and regulates water within the hydrological cycle, providing globally important services	
The global and regional trends increasing demand for food, energy and water resources (population growth, rising affluence, urbanisation and industrialisation) and theories on the relationships between population and resources (Malthus and Boserup)	

A biome is a global scale ecosystem; a natural environment with specific living and non-living components. Biomes consist of:

- Biotic (living) part – plant and animal life
- Abiotic (non-living) part – the atmosphere, water, rock and soil.

An ecosystem is a natural environment and includes the flora (plants) and fauna (animals) that live and interact within that environment (air temperature, water, soil, climate etc.)

- Latitude = determines the temperature, precipitation and sunlight hours e.g. equator is hot and humid as it is close to the sun.
- Rock and soil type = acidity and nutrients affect plant growth.
- Water availability and drainage – some pants prefer wet soil, others dry soil.
- Altitude – temperature decreases with height, rainfall increases.



- Healthy air – biomes remove carbon dioxide from the atmosphere through carbon sequestration and photosynthesis.
- Healthy soils – soil health is maintained by the nutrient cycle
- Water supply and flood risk – plants and rock purify water and reduces surface runoff

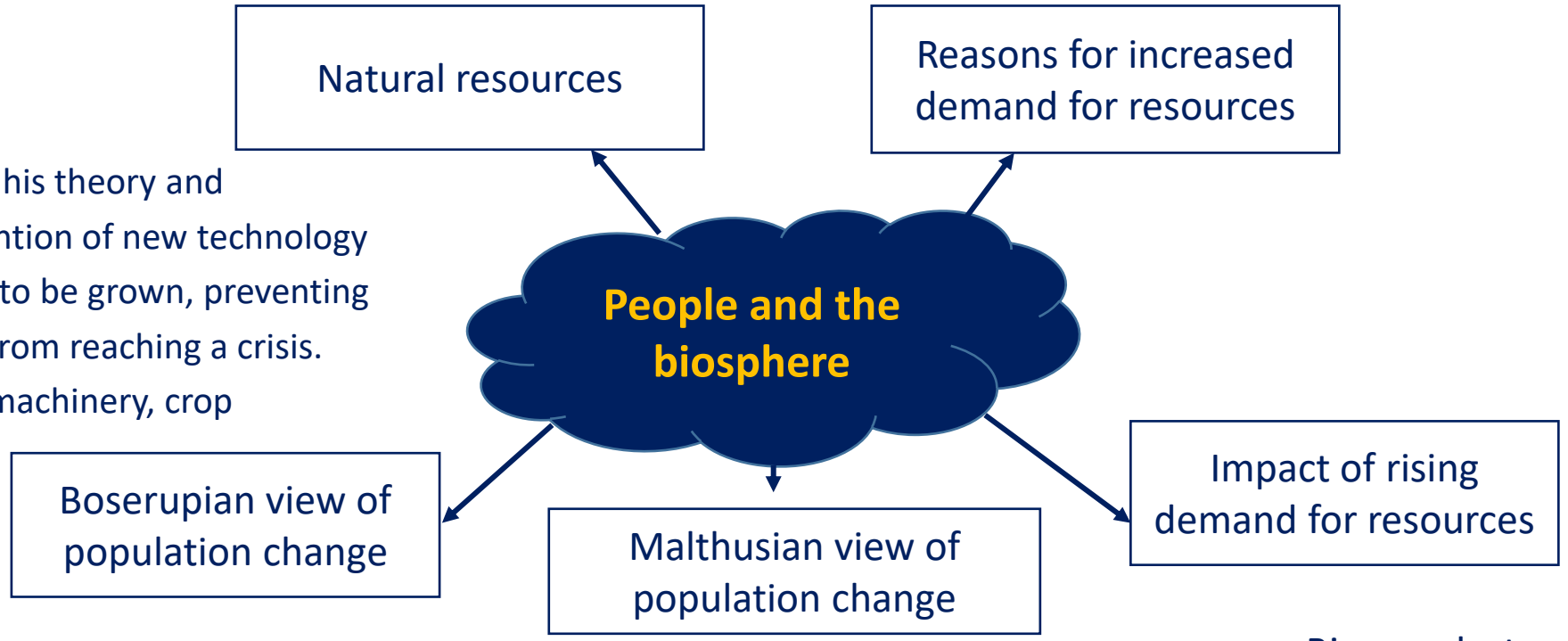
- Commercial farming
- Mining metal ores
- Timber
- Construction of dams for HEP and water supply.

Each biome provides a range of goods and services:

- Goods – physical materials e.g. timber (wood), food (nuts, berries etc.), fuelwood
- Services – functions e.g. produce oxygen, store carbon, purifying water, nutrient cycling.

A natural resource is a material that humans use such as food, water, energy and minerals. Demand for these resources has increased over time.

- Rising population
- Economic development
- Industrialisation
- Rise in technology



Ester Boserup criticised his theory and suggested that the invention of new technology would allow more food to be grown, preventing the human population from reaching a crisis.
E.g. irrigation systems, machinery, crop rotations.

For = we have prevented disaster through the use of technology.
Against = technology can't fix our destruction of biomes.

Thomas Malthus came up with a theory in 1798 called the 'principle of population.' He believed that the human population would soon be in crisis as population was rising quicker than food production.
For = Not likely our current resources can sustain a growing population
Against = Food production has increased due to technological advances

- Biomes destroyed e.g. deforestation
- Reduction in food availability as biomes destroyed
- Destruction to nutrient cycle
- Pollution of air, water and soil

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Forests under threat

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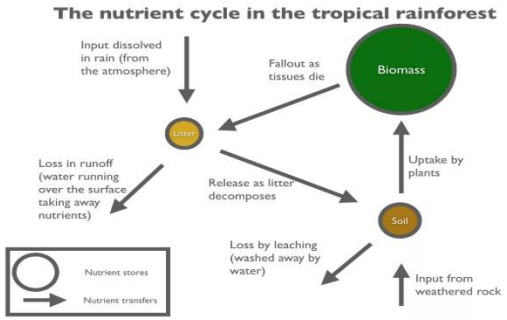
Unit 8: Forests under threat

You should know…	Revised?
Enquiry question: What are the threats to forest biomes and how can they be reduced?	
How biotic and abiotic characteristics are interdependent (climate, soil, water, plants, animals and humans), how plants (stratified layers, buttress roots, drip tips) and animals are adapted to the climate.	
Why tropical rainforests have a very high rate of nutrient cycling which, in turn, supports high levels of biodiversity and complex food webs	
How biotic and abiotic characteristics are interdependent (climate, soil, water, plants, animals and humans), how taiga plants (cone-shaped, needles, simple structure) and animals (migratory) are adapted to the climate	
Why the taiga has lower productivity, with less active nutrient cycling and much lower levels of biodiversity.	
Causes of deforestation: commercial hardwood logging, subsistence and commercial agriculture, local demand for fuel wood and how demand for biofuels, mineral resources and electricity (HEP) contribute to deforestation	
Why climate change is an indirect threat to the health of tropical rainforests (ecosystem stress, drought).	
Direct threats from logging for softwood, pulp and paper production and indirect threats resulting from the exploitation of minerals, fossil fuels and HEP potential.	
How acid precipitation, forest fires, pests and diseases and forest fires contribute to a loss of biodiversity.	
Advantages and disadvantages of global actions (CITES, REDD) designed to protect tropical rainforest species and areas and why deforestation rates are rising in some areas but falling in others.	
The challenge of achieving sustainable forest management and why alternative livelihoods (ecotourism, sustainable farming) might better protect the remaining tropical rainforest.	
Challenges of creating and maintaining protected wilderness areas, national parks and sustainable forestry in the taiga.	
Reasons for conflicting views on protecting or exploiting forest and natural resources in the taiga.	

- They are found close to the equator (approximately 0°-20° north and south of the equator)
- The largest expanse is the Amazon Rainforest in South America
- Tropical rainforests are also shown on the western coast of central Africa and Indonesia

- Hot and humid
- Temperature remains high all year round, between 27-29˚C.
- Rainfall patterns are higher between December – May and lower between June-November.



The nutrient cycle is the circulation of nutrients between biotic and abiotic elements, ensuring that plant life receive elements.

The rainforest nutrient cycling is rapid. The hot, damp conditions on the forest floor allow for the rapid decomposition of dead plant material.

Distribution

Climate

Tropical rainforest

Nutrient cycle

Characteristics and adaptations

Stratification

Animal:

- Sloth = large claws to hand on branches
- Jaguar = camouflages fur to allow them to hide from prey

1. Emergent layer = tallest trees, hardwood trees, maximum sunlight.
2. Canopy layer = dense, home to most animals, abundance of food e.g. berries
3. Understorey layer = young trees and bushes, lots of insects
4. Forest floor = darkest layer, decomposition occurs

Plant:

- Lianas (vines) = vines which grow up the trunks of trees to gain more sunlight to photosynthesis
- Drip tip leaves = leaves with pointed ends to allow water to fall off the leaf, preventing it from breaking

Tropical rainforest

Threats to the rainforest

Direct threats – deliberately cutting down trees (deforestation):

- Logging – cutting down or felling of trees for timber. This is the main cause of deforestation worldwide and accounts for ~3% in Brazil
- Mineral extraction – trees need to be cut down to access the minerals found underground such as gold, tin and iron
- Cattle ranching (commercial farming) – large areas of land is cleared to allow cattle to graze on the land. This accounts for ~80% deforestation in Brazil

Indirect threats – pollution, climate change or disease

Impacts of deforestation

- Fewer trees means fewer habitats and food sources for animals and birds. This reduces biodiversity by ~50,000 species every year
- Rivers can become polluted with soil and from mining killing fish
- Trees remove carbon dioxide from the atmosphere when they photosynthesise, so without them less is removed causing climate change
- A lot of money is made from selling timber, mining and commercial farming
- Governments can pay off debts they owe governments of other countries

Sustainable management

- CITES – is an international treaty adopted by 180 countries that protects species e.g. African elephants and the banning of the ivory trade. However, protecting species does not prevent deforestation and global warming.
- REDD – is a UN project that aims to stop deforestation with governments and TNCs funding projects to conserve forests in development countries. However, it is difficult to police so illegal logging often takes place.

Reducing deforestation

- Selective logging – individual trees are felled, only when they're mature (reach a certain height or age).
- Debt relief - conservation swaps or debt-for-nature swaps are a way of reducing a country's debt and benefitting nature and conservation at the same time.

Why does deforestation occur?

- Poverty – no other way to make money in LICs and lots of people are already very poor.
- Debt – LICs and NEEs are driven to cut down trees because they need to pay off debts to other countries.
- Economic development – tropical rainforests are in developing countries who rely on primary and secondary industry.
- Demand for resources – need for fossil fuels, food and land

- The taiga is found between 50-70°
- Found in the northern hemisphere
- Covers large parts of Canada and Russia

- Short, wet summers (June-August)
- Long, dry winters (September – May)
- Temperatures are only above 20°C in June and July
- Temperature are below 0°C for most of the year

Distribution

Climate

Taiga

Nutrient cycle

Characteristics and adaptations

Stratification

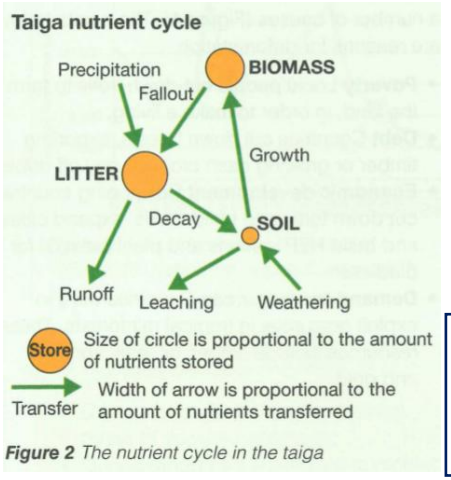


Figure 2 The nutrient cycle in the taiga

- The nutrient cycle works much slower as the climate is colder
- Precipitation is lower
- Weathering is limited by cold temperatures
- Pine needles decay slowly in cold temperatures and release nutrients slowly
- Trees grow for a few months of the year

The taiga consists of only one vegetation layer.

Plant:

- Coniferous trees = cone shaped so the snow falls off. Pine needles make the soil acidic

Animal:

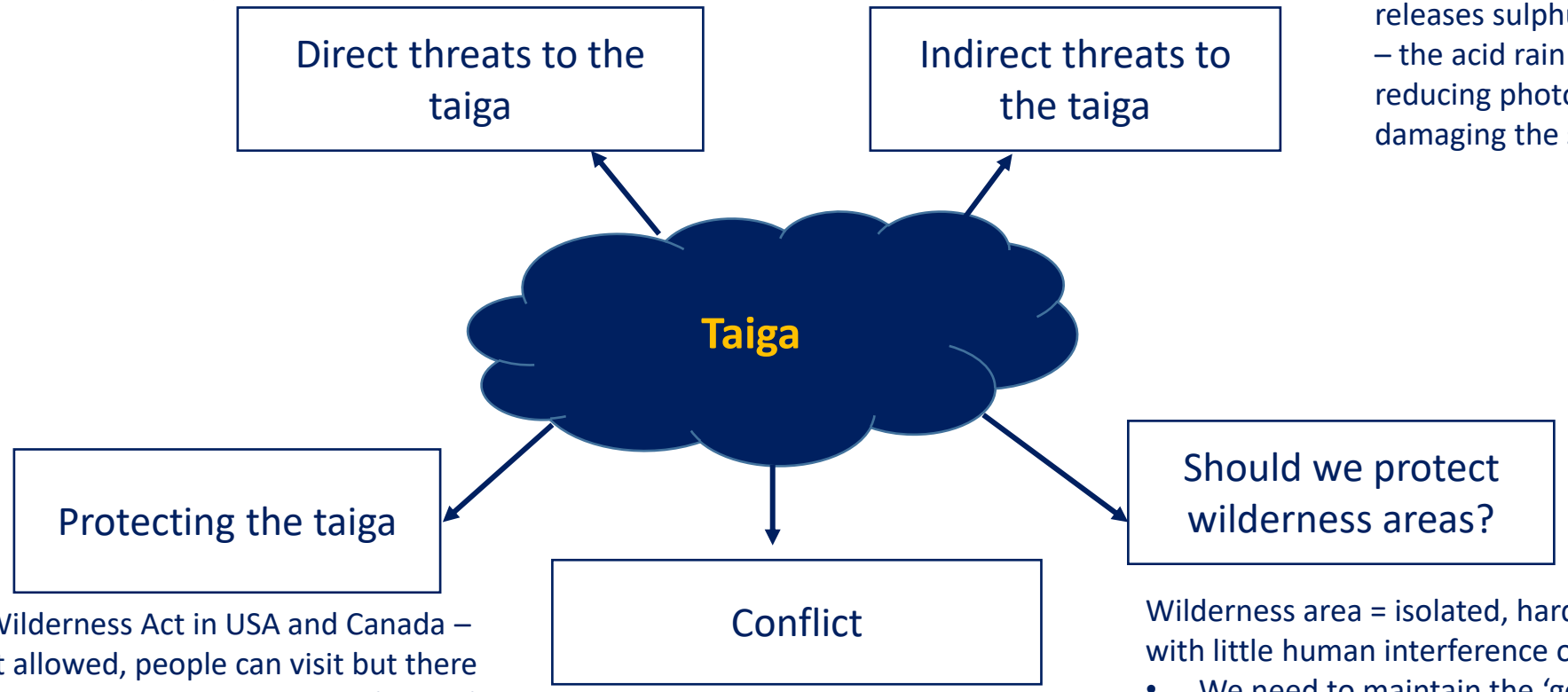
- Moose = thick, oily fur to retain body heat. Migrates to find food in winter.
- Brown bear = thick, oily fur to retain body heat. Hibernates in winter when food sources are low.

Direct threats:

- Paper – comes from softwood trees (e.g. fir and pine).
- Construction – softwood is used for construction (for roofs).
- Mining – clearing forest for minerals (e.g. gold and iron ore).
- Fossil fuels – extraction of oil and gas (and tar sands).
- HEP – building dams also destroys taiga.

Indirect threats:

- Forest fires – hot and dry summers make the forest prone to fires from lightning strikes.
- Pests and diseases – warmer temperatures increase insect infection and diseases in coniferous trees.
- Acid rain – burning of fossils releases sulphur dioxide into the air – the acid rain weakens trees by reducing photosynthesis and damaging the soil.



- Laws created e.g. 1964 Wilderness Act in USA and Canada – motorised transport isn't allowed, people can visit but there must be no trace of their activities, certain activities banned (mining, logging, road building).
- Creation of National Parks - area of land protected for conservation. These parks are legally protected, open to the public for recreation and have park rangers which monitor the parks.
- Selective logging – cutting down individual trees of a certain height or age

- World Wildlife Federation (conservation NGO) – For conservation – Human activities cause pollution
- Canada's national government – Against conservation – exploiting resource boosts the economy

Wilderness area = isolated, hard to reach places with little human interference or settlements:

- We need to maintain the 'gene pool' of wild organisms, so genetic diversity is maintained.
- Scientists need to have access to environments undisturbed by people to study.
- There should always be some places on Earth that are left in their natural state, so we can understand how much developed places have changed/impacts of human actions.

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Consuming energy resources

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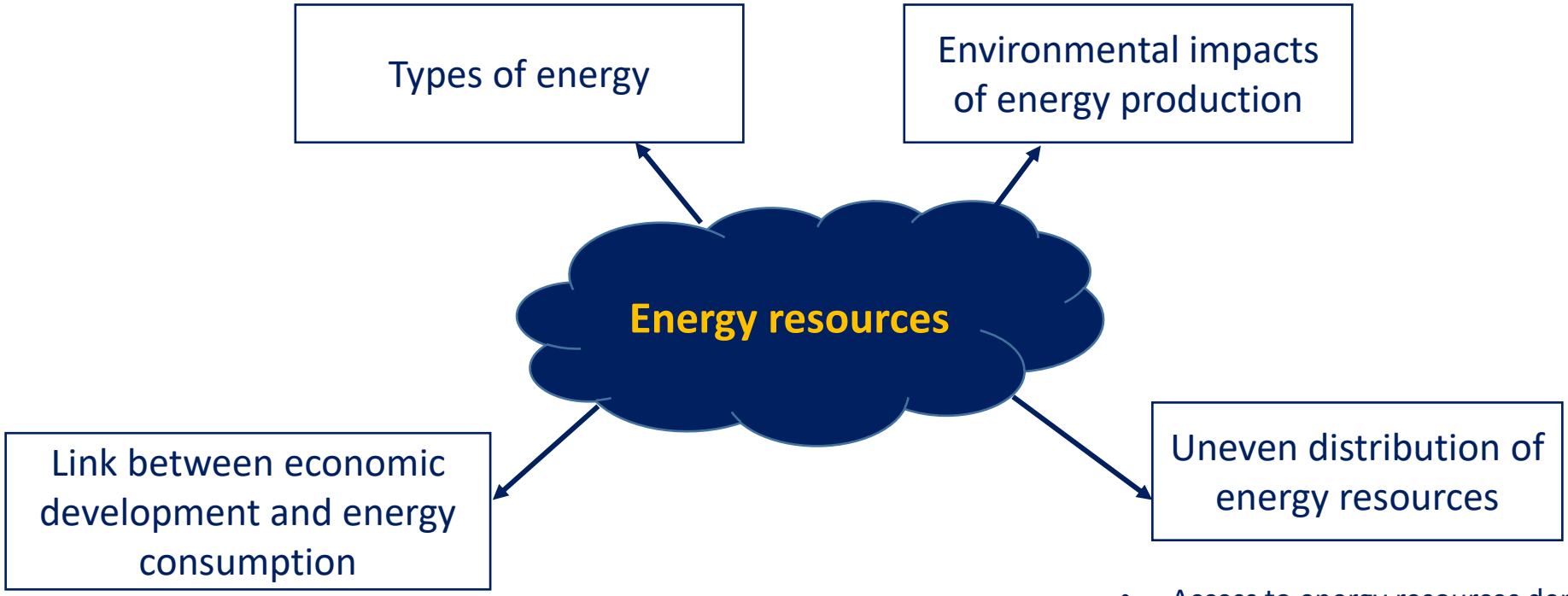
Unit 9: Consuming energy resources

You should know…	Revised?
Enquiry question: How can the growing demand for energy by met without serious environmental consequences	
How energy resources can be classified as non-renewable (finite stocks of fossil fuel coal, oil and gas), renewable (flows of solar, wind, HEP) and recyclable (nuclear, biofuels	
How mining and drilling can have environmental impacts (landscape scarring, oil spills, carbon emissions, removal of forests) and the landscape impacts of renewable energy (HEP flooding, land use for wind turbines and solar panels).	
How access to energy resources is affected by access to technology and physical resources (geology, accessibility, climate and landscape influences on renewable potential).	
The global pattern of energy use per capita and the causes of variations (levels of economic development, reliance of traditional fuel sources, demand from different economic sectors).	
How oil reserves and production are unevenly distributed and why oil consumption is growing (rising per capita GDP, rapid industrialisation in emerging economies).	
How oil supply and oil prices are affected by changing international relations (conflicts, diplomatic relations) and economic factors (periods of recession versus boom, over or under supply).	
Economic benefits and costs of developing new conventional oil and gas sources in ecologically-sensitive and isolated areas.	
Environmental costs (negative impacts on water quality and ecosystems) of developing new unconventional oil and gas sources (tar sands, shale gas) in ecologically-sensitive and isolated areas.	
The role of energy efficiency and energy conservation (in transport and the home) in reducing demand, helping finite energy supplies last longer and reducing carbon emissions	
Costs and benefits of alternatives to fossil fuels (biofuels, wind, solar and HEP) and future technologies (hydrogen) aimed at reducing carbon footprints, improving energy security and diversifying the energy mix.	
How different groups (consumers, TNCs, governments, climate scientists and environmental groups) have contrasting views about energy futures (business as usual versus sustainable	
How, in some developed countries, rising affluence, environmental concerns and education are changing attitudes to unsustainable energy consumption and reducing carbon footprints.	

- **Non-renewable** – finite resources (fossil fuels), once used up, it cannot be replaced (e.g. coal, oil and gas).
- **Renewable** – infinite resources, they will never run out (e.g. wind power, solar power and hydroelectric power).
- **Recyclable** – energy sources that can be reused (e.g. nuclear and biofuel energy).

- Wind turbines kill birds and scars the landscape
- Mining for oil scars the environment and pollutes land, water and air
- Fracking for shale gas contaminates water sources
- HEP disrupts the flow of rivers which impacts fish

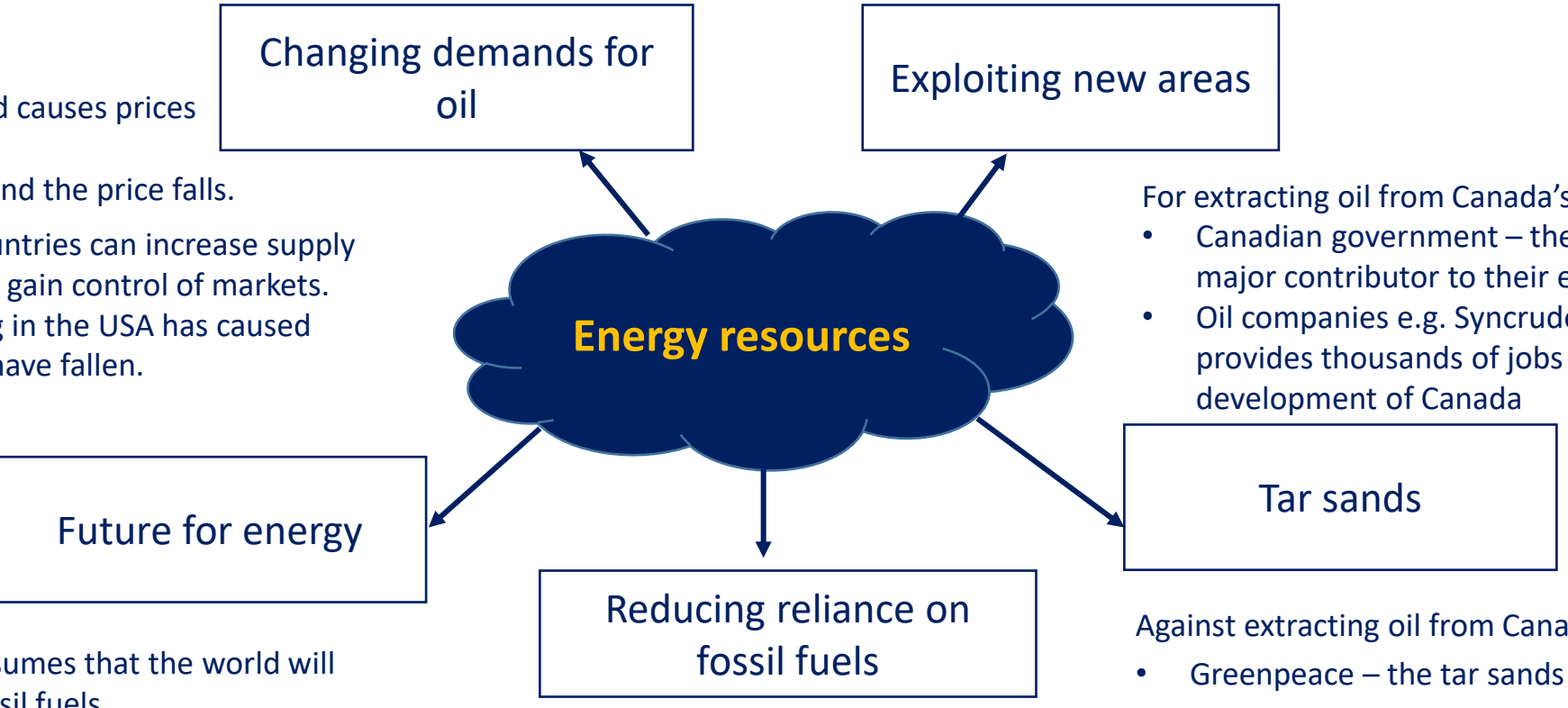


- Low-incomes countries (LICs) e.g. Malawi, have mainly primary economies, using only a small amount of energy, mostly in the home. Many LICs suffer from energy poverty, lacking electricity, or money to pay for it, collecting fuelwood or dung as an alternative.
- Newly industrialising or emerging economies (e.g. India) use large amounts of energy for manufacturing (coal).
- People in high-income countries (HICs) consume more products increasing the demand for energy (gas and oil). However, with these products made elsewhere, carbon footprints have sometimes declined.

- Access to energy resources depends on **technology** and **accessibility**.
- Coal was an important energy source to the UK but has since declined owing to the high cost of mining.
- Although technology makes mining possible, coal is often more expensive than other energy sources.
- The present UK energy mix includes Natural gas, renewable energy and recyclable energy (nuclear).

- Oil reserves and production are unevenly distributed.
- Exactly how much oil lies underground is unknown.
- Oil is finite and will run out one day, but it's not known when. Some believe that peak oil (where half of known reserves have been used) has already passed. Oil consumption continues to rise as emerging countries develop.

- High profits and new technology (drilling, seismic imaging and liquefaction) have enabled oil and gas companies to drill in regions previously too expensive or difficult to access.
- The Arctic has up 25% of the world's remaining oil and gas and is therefore at risk from exploitation.



Oil prices vary because:

- Demand – high demand causes prices to rise.
- Supply – too much oil and the price falls.
- Political decisions – countries can increase supply to increase income and gain control of markets.
- New supplies – fracking in the USA has caused oversupply and prices have fallen.

For extracting oil from Canada's tar sands:

- Canadian government – the oil industry is a major contributor to their economy
- Oil companies e.g. Syncrude – their industry provides thousands of jobs and supports the development of Canada

1. Business as usual – assumes that the world will continue to rely on fossil fuels.
2. A sustainable future – renewables are adopted to reduce CO_2 emissions.

Why are people changing their attitude towards energy consumption?
Affluence (wealth), environmental concerns and increase in education.

- Energy efficiency and conservation measures can cut the amount of energy used at home (e.g. solar water heating and energy efficient lights).
- Use renewable energy sources e.g. wind or solar

Against extracting oil from Canada's tar sands:

- Greenpeace – the tar sands industry has led to a decline in caribou, lynx and wolverines as well as the death of millions of birds
- Tribal communities e.g. Saami – mining reduces their land, heritage and food availability

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Decision making exercise

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Assess questions – 8 marks

Two of the questions will be an ‘assess’ style question, which links to the resource booklet AND your own knowledge.

You need to use facts from the resources and explain your points.

Structure:

1. Introduction – opinion or define key term
2. Paragraph 1 – point, evidence from the figure, explain, say how significant that point is.
3. Paragraph 2 – point, evidence from the figure, explain, say how significant that point is.
4. Conclusion – opinion overall and justify why

HUMANITIES

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Decision making exercise

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DME question – 12 marks + 4 SPaG

Read through the options and choose the best one in your opinion.

<u>You need to justify your choice:</u>

- Introduction – state your opinion
- Paragraph 1 – Explain what is good about the option you chose? (advantages) Explain a limitation with your choice (disadvantage).
- Paragraph 2 – Explain why have you rejected the other options (disadvantages). Explain at least one positive with the other option(s).
- Conclusion – justify why your choice is the best. Link this to sustainability

** MAKE SURE YOU EXPLAIN YOUR POINTS AND INCLUDE FACTS FROM THE RESOURCE BOOKLET **