

Human geography – Resource security: Scheme of work

This scheme of work for the A-level Geography specification (7037) is designed to suggest possible activities and resources that you might find useful in your teaching.

3.2 Human geography

Human option

3.2.5 Resource security

Week 1

Specification content	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
<ul style="list-style-type: none"> • Concept of a resource. • Resource classifications to include stock and flow resources. • Stock resource 	<p>Use of key subject specific and technical terminology.</p> <p>To identify connections and interrelationships</p>	<p>Identify and explain the physical factors that affect the occurrence and availability of natural resources, including:</p> <ul style="list-style-type: none"> • geological structures • geomorphological features • climatic factors. <p>Identify, describe and explain the human</p>	<p>Definitions of:</p> <ul style="list-style-type: none"> • stock resources • flow resources • measured reserves • indicated reserves • inferred resources • possible resources 	<p>Wikipedia definitions</p> <p>Starting point on classification in the real world</p> <p>PowerPoint presentation</p>

<p>evaluation: measured reserves, indicated reserves, inferred resources, possible resources.</p> <ul style="list-style-type: none"> • Natural resource development over time: exploration, exploitation, development. • Concept of the resource frontier. • Concept of resource peak. • Sustainable resource development. • Environmental Impact Assessment (EIA) in relation to resource development projects. 	<p>between different aspects of geography.</p> <p>Research using the internet.</p> <p>Develop an awareness that different people and groups have conflicting demands on resources and the environment and that compromises may have to be made between the different demands.</p>	<p>factors that influence whether and to what extent resources are developed including:</p> <ul style="list-style-type: none"> • factors that affect demand • local, regional, national and/or global factors affecting the supply of the resources • development of technologies affecting the demand for and the supply of resources • the effect of sources and flows of capital on the development of resources. <p>Understand how the above factors combine to affect the levels of exploration, development, exploitation and decline of resources over time.</p> <p>Understand that the development of resources has to take into account both the present levels of demand and the possible long-term demands for that resource.</p> <p>Understand that the development of any resource has implications for the environment – both the physical and the human – and that responsible developers will take those implications into consideration when planning the resources exploitation.</p> <p>Make and justify classifications of</p>	<p>should be researched by students. Textbooks or the Wikipedia definitions can be used.</p> <p>Students can take this study further and look at practical definitions as used in the mining industry at a variety of sites in the 'Resources' column.</p> <p>Students work in small groups to research the concepts of:</p> <ul style="list-style-type: none"> • resource frontier • resource peak (possibly followed by a discussion of whether this is a useful concept, and how it could be used by different interest groups) • sustainable resource development (possibly followed by a discussion of how this concept differs from, and builds from. the more clear-cut concept of 'sustainable development'). <p>Students could study guidance for carrying out an EIA and consider how this</p>	<p>Illustration of Arctic Resource Frontier</p> <p>Article on deep sea mining</p> <p>The definition at the top of this Wikipedia page has useful ideas for A-level geographers.</p> <p>For a discussion of the concept of 'Peak Oil', compare these two sites:</p> <p>fool.com</p> <p>truthmove.org</p> <p>Read Sustainable use of natural resources and then go to FAQs for further development of ideas.</p> <p>Advice on carrying out an EIA (directed at real commercial or government organisations) can be found on the flow chart.</p>
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		resources.	might be applied in a development scheme that has been suggested in the local area or widely publicised in the press.	
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Weeks 2-3

Specification content	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
<ul style="list-style-type: none"> Global patterns of water availability and demand. Sources of water; components of demand, water stress. Relationship of water supply (volume and quality) to key aspects of physical geography – climate, geology and drainage. 	<p>Use of key subject specific and technical terminology.</p> <p>Online research.</p> <p>Construct and interpret distribution maps at a variety of scales.</p> <p>Comparison of maps to show how the distributions of phenomena are interrelated.</p> <p>Develop an awareness of the</p>	<p>Develop from understanding of the distribution of water on earth developed in the water and carbon cycles unit to understand how water is available for human use from:</p> <ul style="list-style-type: none"> direct precipitation rivers reservoirs and other stores soil water ground water recycled water desalination. <p>Build on understanding of water balance developed during the water and carbon cycle unit to show an understanding of how this affects the water supply for people. Understand the relationship between:</p>	<p>Revise/refresh key ideas on water cycle from work on water and carbon cycles.</p> <p>It is important to emphasise links and connections between topics in the spec.</p> <p>Use maps to describe and explain world patterns of water stress. Go on to consider how the patterns of water stress are likely to develop over the next 20 years.</p> <p>Consider the relationships between physical and human factors in water needs and stresses.</p>	<p>Water stress map</p> <p>Article on present day water stress</p> <p>Article on increased stress by 2040</p> <p>BBC News article on world water stress</p> <p>Series of maps of world water supply and water stress</p> <p>Explanation of the water balance equation and graphs</p> <p>Clear diagram of different types of</p>

<ul style="list-style-type: none"> • Strategies to increase water supply to include catchment, diversion, storage and water transfers and desalination. • Environmental impacts of a major water supply scheme incorporating a major dam and/or barrage and associated distribution networks. • Strategies to manage water consumption (including reducing demand). • Sustainability issues associated with water management: virtual water 	<p>interrelationships between different aspects of the specification - most notably between the water and carbon cycles and water security.</p> <p>Develop knowledge and understanding of the various sources of water available for human use.</p> <p>Develop extended writing skills.</p>	<ul style="list-style-type: none"> • precipitation • evaporation • infiltration • storages • drainage <p>and the seasonal balance between them.</p> <p>Develop knowledge of water conservation techniques, both in the home and in the wider world.</p> <p>Through a case study, develop knowledge and understanding of:</p> <ul style="list-style-type: none"> • water sources • distribution networks • sustainability issues • conservation • recycling • geopolitics • conflict and its resolution. <p>Through a case study, develop knowledge and understanding of a major water supply scheme/dam and its environmental impacts.</p>	<p>Interpret and draw graphs of water balance.</p> <p>Use cross section diagrams to understand concepts of 'ground water' and 'aquifers'</p> <p>Research how water use can be reduced.</p> <p>Note that one of these two case studies should be developed in more detail. See weeks 8/9 below.</p> <p>Research sources of water in the Middle East. Consider possible sources of conflict and ways of reducing or resolving those conflicts.</p> <p>Individuals produce and deliver presentations on aspects of the Middle Eastern water supply.</p> <p>Research a dam scheme and produce an essay on the nature of the scheme and its benefits and drawbacks.</p> <p>References to the Lesotho Highlands Water Project are provided as an example.</p>	<p>aquifer</p> <p>More complex aquifer diagram</p> <p>At a personal level</p> <p>At an architectural level</p> <p>Desalination in Israel</p> <p>Water transfers in Israel</p> <p>UN inventory of water use in Jordan basin</p> <p>BBC Bitesize - Advantages and Disadvantages of dams</p> <p>Lesotho Highlands water project</p> <p>Dam-affected people in Lesotho</p>
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<p>trade, conservation, recycling, 'greywater' and groundwater management.</p> <ul style="list-style-type: none">• Water conflicts at a variety of scales – local, national, international.• The geopolitics of water resource distribution, trade and management.				
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Weeks 4-5

Specification content	Subject-specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
<ul style="list-style-type: none"> Global patterns of production, consumption and trade/movements of energy. Sources of energy, both primary and secondary. Relationship of energy supply (volume and quality) to key aspects of physical geography – climate, geology and drainage. Energy supplies in a globalising world: competing national interests Components of demand and energy mixes in 	<p>Interpret a variety of charts, data, graphs and maps (especially atlas maps).</p> <p>Develop extended writing skills to explore issues.</p> <p>Analyse and present geographical data employing a variety of graphical techniques and descriptive statistics. (See skills checklist.)</p>	<p>Develop understanding of the distribution of energy resources on Earth, and understand how energy is available for human use from:</p> <ul style="list-style-type: none"> biomass, including fuelwood fossil fuels including: <ul style="list-style-type: none"> coal oil natural gas (including shale gas) hydro-electric power wave and tidal power wind power (on-shore and off-shore) solar power (photo-voltaic cells and concentrated solar heating) <p>Develop an understanding of the way energy supplies are influenced by physical factors including:</p> <ul style="list-style-type: none"> geology physical geography climate and weather. <p>Develop an understanding of different levels of stock energy reserve:</p> <ul style="list-style-type: none"> measured and indicated reserves 	<p>Introductory discussion/Q&A to establish what students know about classifications of energy sources and about their comparative advantages and disadvantages.</p> <p>Group research activity, with each student given a source to study (reserves, trade patterns, consumption) and then feedback shared with the group.</p> <p>Engage with a range of charts, diagrams, graphs and maps to be able to describe the characteristics of different energy sources, using the BP Statistical Review, and/or other sources.</p> <p>Students select a country</p>	<p>BP Statistical review of world energy - June 2016</p> <p>Global energy statistical yearbook 2017</p> <p>Glossary of terms</p> <p>National Academy of Sciences - what you need to know about energy</p> <p>International Energy Agency statistics search</p> <p>Russia's oil and gas production</p> <p>Russia's key energy statistics</p> <p>Wikipedia - energy in Russia</p> <p>Shell - natural gas in</p>

<p>contrasting settings.</p> <ul style="list-style-type: none"> • The geopolitics of energy distribution, trade and management. • The role of transnational corporations in energy production, processing and distribution. • Environmental impacts of a major energy resource development such as an oil, coal or gas field and associated distribution networks. • Strategies to increase energy supply (oil and gas exploration, nuclear power and development of renewable sources). 		<ul style="list-style-type: none"> • inferred and possible reserves • proven and probable reserves • peak production. <p>Understand that human and economic factors will affect the viability of any reserve and understand how supply, demand, price, level of technological development and production are inter-related.</p> <p>Understand the factors that influence the energy mix of different countries, and develop detailed knowledge of one country's mix.</p> <p>Understand the importance of geopolitics in influencing the world trade in oil and gas.</p> <p>Develop knowledge of one energy TNC and an understanding of the way that TNCs influence the whole world energy market.</p> <p>Develop knowledge and understanding of the impact of oil and gas exploitation on the environment and on the people living in the area of exploitation.</p> <p>Develop knowledge and understanding of each of these topics.</p> <p>Develop knowledge of energy conservation techniques, both in the home and in the wider world.</p>	<p>and research its energy mix using IEA Statistics search as a starter.</p> <p>Students then use their results as a starting point to consider reasons for the energy mixes of different countries.</p> <p>Students to research the importance of Russia in the international trade in oil and gas, and the importance of that trade to Russia. This can be considered in terms of the geopolitics of energy.</p> <p>Students to research the role of one major TNC in all stages of the oil and/or gas industries. Shell is suggested as an example, but most other big TNCs have useful websites.</p> <p>Review the impacts of the industry, and of the TNC under the headings:</p> <ul style="list-style-type: none"> • human or physical • social, economic, environmental, demographic, political, 	<p>particular go to:</p> <p>About us, Who we are, What we do, Our major projects, Energy and innovation</p> <p>Shell in Nigeria - what are the issues?</p> <p>BBC - Shell 'failing to clean up Nigeria oil spills'</p> <p>Greenpeace - 8 reasons why Shell can't be trusted</p> <p>For a detailed and up-to-date but accessible account of exploration for and production of natural gas go to:</p> <p>Exploration of natural gas</p> <p>Extraction of natural gas</p> <p>Extraction of natural gas - onshore drilling</p> <p>Extraction of gas - offshore drilling</p> <p>History of nuclear</p>
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<ul style="list-style-type: none"> • Strategies to manage energy consumption (including reducing demand). • Sustainability issues associated with energy production, trade and consumption: <ul style="list-style-type: none"> • acid rain, • enhanced greenhouse effect, • nuclear waste • energy conservation. 		<p>Understand the causes of acid rain, but also are aware that much has been done to reduce or control the problems.</p> <p>Understand the links between the energy security topic and the carbon cycle and to other aspects of the spec.</p> <p>Understand the nature of nuclear waste and the issues involved in its management and storage.</p> <p>Understand how energy can be conserved, in the home, in transport and in industry.</p>	<p>etc.</p> <p>The basics will be covered in the text books but up-to-date details of the strategies for developing each of these can be found from industry sources:</p> <ul style="list-style-type: none"> • oil and gas • nuclear • renewable sources • energy conservation. <p>Research the causes, effects and solutions to the acid rain issue.</p> <p>Complete a mind map of the links between different specification areas, with the enhanced greenhouse effect at the centre.</p>	<p>energy</p> <p>Skim the early sections – up to 'nuclear revival'. Then go to 'a new generation' and to 'China'</p> <p>Comparison of sustainable energy</p> <p>Descriptions of different energy sources</p> <p>Acid rain factsheet</p> <p>Joint Nature Conservation Committee - the greenhouse effect</p> <p>Nuclear wastes - what are they?</p> <p>Greenpeace - nuclear power</p> <p>Energy saving trust</p>
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Weeks 6-7

Specification content	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
<ul style="list-style-type: none"> Global patterns of production, consumption and trade/movements of ore minerals. With reference to iron ore or a specified globally traded non-ferrous metal ore, eg copper, tin, manganese. Sources of the specified ore. Distribution of reserves/resources. End uses of the ore. Components of demand for ore. Role of specified ore in global 	<p>Comparative graphing techniques.</p> <p>Extended writing to levels descriptors.</p> <p>Collect, analyse and interpret information from a range of secondary sources – including factual, numerical and spatial data.</p> <p>Critical questioning of information, and sources of information.</p> <p>Evaluating and presenting findings from research.</p>	<p>Develop knowledge and understanding of a key mineral in world trade through a detailed study of the nature, location, mining and trade in porphyritic copper ores, and then through a detailed study of the Bingham Canyon mine in Utah.</p> <p>Develop an understanding of economic, environmental and social aspects of the geography of this mineral.</p>	<p>What are minerals?</p> <p>What is copper ore?</p> <p>Where are the world's resources of copper?</p> <p>Where is it mined?</p> <p>What is the market for copper?</p>	<p>BBC Bitesize – simple science</p> <p>Clear science</p> <p>Geology explained, particularly Porphyry Deposits</p> <p>Copper statistics and information, select data for the relevant year</p> <p>Rio Tinto, study the first 6 or 7 slides</p> <p>Details of the market for copper, Figs 1, 2, 6, 7 and 8 are particularly useful</p> <p>Virtual tour of Bingham Canyon, Utah mine (but be selective)</p> <p>Or YouTube video</p>

<p>commerce and industry.</p> <ul style="list-style-type: none">• Key aspects of physical geography associated with ore occurrence and working: geological conditions and location.• Environmental impacts of a major mineral resource extraction scheme and associated distribution networks.• Sustainability issues associated with ore extraction, trade and processing.• The geopolitics of ore mineral resource distribution, trade and management.				
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Weeks 8-9
Case study 1

Specification content	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
<p>Case study of water resource issues in a specified regional setting to illustrate and analyse theme(s) set out above, their implications for the setting including the relationship between resource security and human welfare and attempts to manage the resource.</p>	<p>Collect, analyse and interpret a range of qualitative and quantitative data from a range of primary and secondary sources – this could include discursive/creative material when looking at the experiences of people in place.</p>	<p>Describe, explain and evaluate a number of themes relating to aspects of water supply detailed above in weeks 2-3.</p>	<p>One of the case studies from the water resources section of the scheme of work should be developed in this section.</p>	<p>Develop the references above on either the Middle East (Israel/Palestine) or Southern Africa (Lesotho).</p>

Weeks 8-9
Case study 2

Specification content	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
<p>Case study of a specified place to illustrate and analyse how aspects of its physical environment affects the availability and cost of energy and the way in which energy is used.</p>	<p>Techniques to evaluate the geographical enquiry process.</p>	<p>Describe, explain and evaluate a number of themes relating to aspects of energy security detailed above in weeks 4-5.</p>	<p>Students select an aspect of energy production or conservation in a specific small or local area. It could be:</p> <ul style="list-style-type: none"> • a site for sustainable energy <ul style="list-style-type: none"> • wind • solar • hydro • wave. • a site for fossil fuel exploration <ul style="list-style-type: none"> • fracking for gas • opencast coal mining. • a scheme for energy conservation <ul style="list-style-type: none"> • new-build housing • retro-fitting housing • industrial plant. 	

Week 10

Specification content	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
Alternative energy, water and mineral ore futures and their relationship with a range of technological, economic, environmental and political developments.		Complete the case studies outlined above, ensuring that possible future developments have been considered.	When the case studies have been completed all students report back to a full class plenary to present their results and to discuss the issues raised in their studies. The use of the case studies in essay writing and examinations should be discussed and practiced.	

Quantitative and qualitative skills

Students must engage with a range of quantitative and relevant qualitative skills, within the theme water and carbon cycles. Students must specifically understand simple mass balance, unit conversions and the analysis and the presentation of field data.

Making connections

Students must consider connections between the subject matter studied and be able to apply their geographical knowledge and understanding in different contexts including within a unit, between units and to novel situations, ie geographical contexts beyond the specification. As water and carbon cycles is a core element of the specification it may be taught early in the teaching programme to allow students to then make links back to the core from their optional units.