OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL GEOGRAPHY

(9635)

Schemes of work

Physical geography 2: Ecosystems under stress

This scheme of work is not exhaustive or prescriptive; it is designed to suggest activities and resources that you might find useful in your teaching.

3.1 Physical geography

Physical option

3.1.6 Ecosystems under stress

Specification content Week number	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
Week 1 **Ecosystems and sustainability** • The concept of biodiversity. Local and global trends in biodiversity. Causes, rates and potential impacts of declining biodiversity. • Ecosystems and their importance for human populations in the light of continuing population growth and economic development. Human populations in ecosystem development and sustainability.	Use of key subject specific and technical terminology. To identify connections and interrelationships between different aspects of geography. Labelling and annotation of diagrams. Identifying, finding and using a variety of sources of geographical information. Using models in geography.	Students to have an overview of the concept of the terms 'biodiversity', 'ecosystems' and 'sustainability' as used by geographers. Students will become familiar with terms including: • biological diversity • measuring biodiversity – indicator species, species richness, living planet index • trends in biodiversity – global trends, mass extinctions, • factors contributing to changing biodiversity. Students will be able to evaluate the importance of ecosystems for human populations, especially in the context of:	Small group discussion/question and answer session followed by feedback – what does the term biodiversity mean? Students to use textbooks, library or the internet to identify local and global trends in biodiversity. Causes, rates and potential impacts of declining biodiversity. Small group discussion/question and answer session followed by feedback – what is meant by the term ecosystem?	A wide range of internet resources is provided here. There is a lot of overlap between them. Some of them might be useful for class use or for individual student research. Be selective and fit them to the specific needs of your classes. The concept of biodiversity: **biologydiscussion.com/biodiversity/biodiversity-concept-types-and-other-details-with-diagram/7132** Short TED talks video clip and lesson **ed.ted.com/lessons/why-is-biodiversity-so-important-kim-preshoff** Trends in biodiversity: **greenfacts.org/en/biodiversity/l-3/3-extinction-endangered-species.htm** (includes links to other useful resources, including data and maps

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	Research skills.
	
	Report writing.
	
	Group work.
		• population growth
		• economic development.
		
		This may include the concepts of:
		
		• ecosystem services – provisioning services, regulating services, supporting services, cultural services
		
		• wellbeing – security, basic material for good life, health, good social relations.
		
		Students will also be able to assess the role of humans in the development of ecosystems and their future sustainability.
		
		• Including scenarios that could result from human population growth and climate change. This could provide an opportunity to explore situations resulting from both:
		
		  • negative feedback loops
		
		  • positive feedback loops.
			Class to discuss:
			
			• the importance of ecosystems for human populations
			
			• potential impacts of population growth and economic develop
			
			• the role played by humans in ecosystem development and sustainability.
			
			Opportunity for an individual or group research task into the following in the context of ecosystems and their importance for human populations:
			
			• population growth
			
			• economic development
			
			• ecosystem services – provisioning services, regulating services, supporting services, cultural services
			
			• wellbeing – security, basic material for good
				and some teaching ideas: **enviroliteracy.org/ecosystems/biodiversity/trends-in-biodiversity/**)
				
				Causes and impacts of declining biodiversity: **eniscuola.net/en/argomento/biodiversity1/loss-of-biodiversity/causes-of-the-loss-of-biodiversity/**
				
				(many links to extra useful information on biodiversity: **wwf.panda.org/about_our_earth/biodiversity/threatsto_biodiversity/**)
				
				another link on biodiversity: **greenfacts.org/en/biodiversity/l-3/4-causes-desertification.htm**
				
				(with links to some interesting graphics: **learner.org/courses/envsci/unit/text.php?unit=9&secNum=1**)
				
				Ecosystems, population growth and sustainable development:
				
				Ecosystem change: **greenfacts.org/en/ecosystems/index.htm**
				
				Human population growth: **http://rewilding.org/rewildit/our-programs/population-growth/**
				
				Ecosystems and human health: **millenniumassessment.org/docume**

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			life, health, good social relations. Opportunity for group activity to explore different scenarios that could result from human population growth and climate change. This could provide an opportunity to explore situations resulting from both. Students could create negative and positive feedback diagrams. Ensure students have definitions of key terms used so far. All of the above provide opportunity for an independent research task. Students given a brief to research and create a short report on the key ideas relating to the concepts of biodiversity and ecosystems. Various opportunities above to assess learning with a range of exam-	**nts/document.763.aspx.pdf** – Millennium ecosystem assessment – Ecosystems and human health Sustainability: **environment-ecology.com/what-is-sustainability/247-sustainability.html** – Environment and ecology – sustainability Ecological balance: **wwf.panda.org/about_our_earth/teacher_resources/webfieldtrips/ecological_balance/** WWF – Ecological balance **learner.org/resources/series209.html** – links to documentary length videos about related issues. 5 Impacts on the environment: **youtube.com/watch?v=5eTCZ9L834s** – video introducing ecological issues.

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			style questions and peer assessment.	

Weeks 2–3
 	
Ecosystems and processes
 	
Nature of ecosystems – their structure, energy flows, trophic levels, food chains and food webs.
 	
Application of systems concepts to ecosystems – inputs, outputs, stores and transfers of energy and materials. Concepts of biomass and net primary production.
 	
Concepts of succession: seral stages, climatic climax, sub-climax and plagioclimax.
 	
Mineral nutrient cycling.
 	
Nature of terrestrial ecosystems and the inter-connections between climate, vegetation, soil and topography, which produce them. Ecosystem responses to
	Use of key subjectspecific and technical terminology.
	
	Opportunities to develop skills such as drawing, labelling and annotating diagrams.
	
	Online research into ecosystems and processes.
	
	Construct and annotate a range of graphs and use statistical skills.
	
	Developing extended writing skills.
	
	Using atlas maps.
	
	Producing annotated maps.
	
	Practicing exam-style questions. Including the use of peer assessment.
		Students will understand the nature of ecosystems, including:
		
		• their structure – the two main components:
		  • abiotic components – such as rain, wind, temperature, altitude, soil, pollution, nutrients, pH, types of soil, sunlight
		  • biotic components – producers, consumers, decomposers.
		• energy flows – ecosystems as open systems (see below)
		• trophic levels
		• food chains
		• food webs.
		
		Students will understand the application of systems concepts to ecosystem, including:
		
		• inputs – sun (solar radiation), plants (dispersal), animals (migration), soil organic matter (erosion/deposition)
			Opportunity to construct a range of diagrams to illustrate the nature of ecosystems including:
			
			• their structure
			• energy flows
			• trophic levels
			• food chains
			• food webs.
			
			Opportunity to use a range of exam question types and peer assessment for students to test their understanding of each of the above.
			
			Paired/small group discussion to identify the inputs, outputs and stores and transfers in ecosystems.
			
			Opportunity for students to use textbook, library or internet resources to help produce a generic
				The nature of ecosystems:
				globalchange.umich.edu/globalchange1/current/lectures/kling/ecosystem/ecosystem.html
				
				Structure of ecosystems:
				ecosystem.org/structure-and-function
				yourarticlelibrary.com/environment/ecosystem/ecosystems-concept-structure-and-functions-of-ecosystems-with-diagram/28211/
				
				Ecosystems – energy flows:
				learner.org/courses/envsci/unit/text.php?unit=4&secNum=3
				biologydiscussion.com/ecosystem/energy-flow-in-an-ecosystem-with-diagram/6740
				shmoop.com/ecology/ecosystem-energy-flow.html
				
				Trophic levels and food webs:
				nationalgeographic.org/encyclopedia/food-web/
				youtube.com/watch?v=mCHdhXMFhcU
				
				youtube.com/watch?v=v6ubvEJ3KGM
				
				Systems and energy flows:

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changes in one or more of their components or environmental controls. Factors influencing the changing of ecosystems, including climate change and human exploitation of the global environment.	Conducting independent and group research tasks. Making links within, across and beyond this area of the specification. Report writing.	• outputs – longwave radiation, heat, dispersal of plants, migration of animals, erosion/leaching of soil organic matter • sores and transfers of energy and materials – including ideas such as photosynthesis, biomass, consumption, decomposition, maintenance, respiration, heat transfers and outputs. Students will understand the concepts of: biomass in an ecosystem – community biomass; amount of one species; decaying material net primary productivity – including the ideas of primary productivity and of gross primary productivity. Students will be able to evaluate the concept of succession, including: • seral stages • climatic climax • sub-climax	systems diagram to illustrate the inputs and outputs of a typical ecosystem. They should also construct a diagram to illustrate the generalised energy flow and heat loss through an ecosystem. Students to research the concepts of biomass and net primary productivity. Students to explore the concept of succession, including: • seral stages • climatic climax • sub-climax • plagioclimax. This may involve the production of a traditional set of revision notes. Small group research task to explore the role of mineral nutrient cycling in ecosystems. Including the nature of nutrient transfers – students to	**youtube.com/watch?v=lnAKICtJIA4** Net primary production: **globalchange.umich.edu/globalchange1/current/lectures/kling/energyflow/energyflow.html** Interesting NASA animation of net primary productivity: **earthobservatory.nasa.gov/GlobalMaps/view.php?d1=MOD17A2_M_PSN** Primary productivity of plants: **physicalgeography.net/fundamentals/9l.html** Succession: **scienceclarified.com/Sp-Th/Succession.html** **physicalgeography.net/fundamentals/9i.html** Bozeman science video clip: **youtube.com/watch?v=V49lovRSJDs** CrashCourse video clip: **youtube.com/watch?v=jZKIHe2LDP8 s-cool.co.uk/a-level/geography/ecosystems/revise-it/succession-in-ecosystems** Mineral nutrient cycles: **ipni.net/article/IPNI-3326** Terrestrial ecosystems:

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		• plagioclimax.
		
		Students will be able to evaluate the role of mineral nutrient cycling in ecosystems. Including the nature of nutrient transfers between the different nutrient stores: soil, litter and biomass.
		
		Students will be able to analyse and evaluate the inter-connections between climate, vegetation, soil and topography and the characteristic terrestrial ecosystem they produce. Students will be able to assess how the terrestrial ecosystem responds to changes in one or more of their components or environmental controls.
		
		Students will be able to analyse and evaluate a range of factors influencing the changing of ecosystems, including:
		
		• climate change and human exploitation of the global environment – elements may include:
		
		  • urban planning
		
		  • trade
			produce a set of revision notes and construct a diagram to illustrate a model of the mineral nutrient cycle.
			
			When exploring the nature of terrestrial ecosystems and the inter-connections between climate, vegetation, soil and topography that shape them, and assessing how the terrestrial ecosystem responds to changes in one or more of their components or environmental controls. There is an opportunity for students to complete a research task into one specific ecosystem such as chalk downlands, leading to the production of a short report, research sheet, set of revision notes or electronic presentation.
			
			Small group/paired discussion to identify a range of factors influencing the changing
				nature.com/scitable/knowledge/library/terrestrial-biomes-13236757
				climate.nasa.gov/news/645/climate-change-may-bring-big-ecosystem-changes/
				
				Human exploitation of ecosystems: Ecosystem change: **greenfacts.org/en/ecosystems/index.htm**
				
				Action bioscience: Population and the environment – the global challenge: **actionbioscience.org/environment/hinrichsen_robey.html**

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		• resources use • rural land use • leisure and recreation • marine management • flood and erosion management • catchment management.	of ecosystems. Opportunity for small group research task into factors influencing the changing of ecosystems. Each individual to research one element (from below) and findings shared with the rest of the group: • urban planning • trade • resources use • rural land use • leisure and recreation • marine management • flood and erosion management • catchment management. Opportunity to use a range of practice exam questions to assess learning.	
Weeks 3–4	Use of key subject specific and technical	Students will understand the concept of the biome. Including	Small group discussion/question and	The concept of biome; **nationalgeographic.org/encyclopedi**

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Biomes
• The concept of the biome. The global distribution of major terrestrial biomes.
• The nature of two contrasting biomes: tropical rainforest and savanna grassland to include:
  • the main characteristics of each biome
  • ecological response to the climate, soil and soil moisture budget – adaptations by flora and fauna
  • human activity and its impact on each biome
  • typical development issues in each biome to include changes in population,
	terminology.
	
	Opportunities to develop skills such as drawing, labelling and annotating diagrams.
	
	Online research into biomes.
	
	Construct a range of graphs and use statistical skills.
	
	Developing extended writing skills.
	
	Using atlas maps.
	
	Producing annotated maps.
	
	Practicing exam style questions. Including the use of peer assessment.
	
	Conducting independent and group research tasks.
	
	Making links within, across and beyond this area of the
		the factors that lead to their overall character, including:
		• climate
		• topography
		• soil
		• plant and animal life
		• ecosystem functioning.
		
		Students will be able to analyse and evaluate the global distribution of major terrestrial biomes.
		
		Students will be able to analyse and evaluate the nature of two contrasting biomes – tropical rainforest and savanna grassland. Analysis and evaluation of the following:
		• The main characteristics of each biome.
		• Ecological response to the climate, soil and soil moisture budget – adaptations by flora and fauna.
		• Human activity and its impact on each biome.
		• Typical development issues in
			answer session – what is a biome?
			
			Students to find a map of the distribution of the major biomes/vegetation zones of the world. Paired discussion followed by annotation of map to try and identify factors affecting this distribution.
			
			Ensure students understand that the nature of a biome is influenced by:
			• climate
			• topography
			• soil
			• plant and animal life
			• ecosystem functioning.
			
			Students should reflect on how they have completed previous geographical research, and then be given clear instructions and guidance about creating a detailed study of two contrasting
				a/biome/
				scienceclarified.com/everyday/Real-Life-Biology-Vol-3-Earth-Science-Vol-1/Biomes.html
				
				classroom.synonym.com/difference-between-biome-ecosystem-6468.html
				
				Terrestrial biomes:
				ucmp.berkeley.edu/glossary/gloss5/biome/
				
				factmonster.com/ipka/A0769052.html worldbiomes.com/
				youtube.com/watch?v=0fb8143ndo8 introductory video.
				
				Tropical rainforests:
				blueplanetbiomes.org/rainforest.htm
				earthobservatory.nasa.gov/Experiments/Biome/biorainforest.php
				ypte.org.uk/factsheets/rainforests/what-are-the-threats-to-the-rainforests – development issues
				
				tropicalrainforestscience10.weebly.com/human-impacts.html
				
				Savanna grassland:
				blueplanetbiomes.org/savanna.htm
				
				ucmp.berkeley.edu/exhibits/biomes/grasslands.php
				
				environment.nationalgeographic.co

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economic development, agricultural extension and intensification, implications for biodiversity and sustainability.	specification. Engage with remotely sensed satellite data.	each biome to include changes in population, economic development, agricultural extension and intensification, implications for biodiversity and sustainability.	biomes – tropical rainforest and savanna grassland. To include the themes listed in the previous column. Student should be encouraged to be creative in the method used to present their findings. These could be traditional reports, revision sheets, mind maps, or electronic presentations to share on a VLE. However, as a guide it should include the information listed in previous column (there are opportunities for students to work together, or independently.) Also, opportunities for discussion and debate of the issues involved. Opportunity to use a range of practice exam questions to assess learning.	**m/environment/habitats/grassland-profile/** **thewildclassroom.com/biomes/tropicalsavanna.html** – with introductory video **atree.org/research/sscbc/ecosystems_global_change/Indian-savanna-project/ISP-threats-to-savanna-grasslands** – development issues **worldwildlife.org/habitats/grasslands** – summary
Weeks 5–6	Use of key subject specific and technical	Students will be able to analyse and evaluate the succession and	Question and answer session/small group discussion – what is the	Seral stages **home.earthlink.net/~yvonr/trees/scie**

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Ecosystems over time • Succession and climatic climax as illustrated by lithoseres or haloseres or psammoseres or hydroseres. • The characteristics of the climatic climax of the chosen community. • The effects of human activity on succession – illustrated by sub-climax and plagioclimax communities.	terminology. Opportunities to develop skills such as drawing, labelling and annotating diagrams. Online research into ecosystems in the British Isles over time. Construct and a range of graphs and use statistical skills. Developing extended writing skills. Using atlas maps. Producing annotated maps. Practicing exam style questions. Including the use of peer assessment. Conducting independent and group research tasks. Making links within, across and beyond	climatic climax of: • a lithosere ecosystem - any ecosystem that starts on a bare rock surface, eg recently glaciated landscape, cliff, quarry, scree slope, exposed rocky coastline • **or** a halosere - any ecosystem that forms on a salty environment, eg a salt marsh, estuarine mud-flat or mangrove swamp • **or** a psammosere - any ecosystem that develops on coastal sand • **or** a hydrosere - any ecosystem that develops in an area of fresh water, eg the shallow water at the edge of a lake. Students may address the following (with reference to a lithosere succession): • dominant ecological problems including aridity and the soilless surface • extremely slow soil formation • colonisation and successive	meant by succession and climatic climax? Students to use a range of textbook, library and internet resources to research the succession and climatic climax in the chosen sere. This could be completed as a paired task with each partner working on one ecosystem and then sharing his or her findings. Group discussion about what students think are the characteristics of the climatic climax in the home area or the area studied. Students could construct a small project on the chosen sere. This should include: • distribution within the country studied • characteristics – climate, vegetation, structure (canopy layer, sub canopy	**nce/success.html** Lithosere; **tutorvista.com/content/biology/biology-iv/biotic-community/lithosere.php** **prezi.com/dqd_tubatxw3/lithosere/** **getrevising.co.uk/diagrams/lithosere_a_succession_beginning_with_bare_rock** Halosere **prezi.com/yuksgcie0ccr/succession-in-a-halosere/** **prezi.com/prbqjfmsol9b/what-is-a-halosere/** **theseashore.org.uk/theseashore/Saltmarsh%20Section/Saltmarsh%20mig%20and%20col.html** **tutor2u.net/geography/reference/halosere-succession** Mangrove succession: **edis.ifas.ufl.edu/in195** Hydrosere Wetland example of succession in action: **countrysideinfo.co.uk/successn/hyd**

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	this area of the specification. Engage with remotely sensed satellite data.	plant cover of lichen, mosses, grasses and shrubs • hydrolysis and chelation as the main weathering processes to help soil formation and liberate nutrients for further development and succession • subsequent arrival of soil fauna and microorganisms, which speed up the rate of soil formation. (Specific detail will depend on the chosen ecosystem.) Students will be able to analyse and evaluate the succession and climatic climax of a hydrosere ecosystem. Any ecosystem, which starts in a freshwater lake or pool. Students may address the following: • the early colonisation of rushes, reeds and sedges • waterlogged soils posing problems of nutrient availability • the role of plants like in fixing atmospheric nitrogen	layer, herb layer), succession stages, vegetation adaptations. Students could be encouraged to be creative in the method used to present their findings. These could be traditional reports, revision sheets, mind maps, or electronic presentations to share on a VLE (there are opportunities for students to work together or independently). Question and answer session/group discussion – in what ways do students think human activity affects succession? What is a plagioclimax? Students to work in pairs to produce a report/ presentation/electronic resource to evaluate the impacts of human activity on succession in heather moorland. This should	**ro.htm** **tutorvista.com/content/biology/biology-iv/biotic-community/hydrosere.php** Plagioclimax – heather moorland Video: 5 human impacts on the environment: **youtube.com/watch?v=5eTCZ9L834s** Heather Moorland: A plagioclimax: **biogeography.weebly.com/plagioclimax.html**

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		• climax of terrestrial shrubs and trees as soil levels build up above the water table.
		
		(Specific detail will depend on the chosen ecosystem).
		
		Students will be able to evaluate the effects of human activity on succession – illustrated by one plagioclimax such as a heather moorland. Areas of study may include:
		
		• the concept of plagioclimax
		
		• characteristics of heather moorland – including distribution, soils, fauna and flora
		
		• human impacts including arresting factors: harvesting, grazing, burning
		
		• secondary succession
		
		(Specific detail will depend on the chosen ecosystem).
			include material on:
			
			• the concept of plagioclimax
			
			• characteristics of heather moorland – including distribution, soils, fauna and flora
			
			• human impacts including
			
			  • arresting factors: harvesting, grazing, burning
			
			  • secondary succession.
			
			There is opportunity here to discuss or debate findings as a class.
			
			(Specific detail will depend on the chosen ecosystem.)
			
			Opportunity to use a range of practice exam questions to assess learning.	

Weeks 7–8 **Marine ecosystems**	Use of key subject specific and technical terminology.	Students will be able to evaluate the distribution and main characteristics of coral reef	Question and answer session/group discussion to ascertain what	**seaworld.org/en/animal-info/animal-infobooks/coral-and-coral-reefs/habitat-and-distribution** –

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• The distribution and main characteristics of coral reef ecosystems. Environmental conditions associated with reef development.
• The following aspects should be examined with reference to a named, located coral reef: Factors in the health and survival of reefs:
  • natural: water temperature, acidity, salinity, algal blooms.
  • human activity and its impacts: major drainage basin schemes, onshore development, desalination, pollution, tourism, fishing.
  • future prospects for coral reefs.
	Opportunities to develop skills such as drawing, labelling and annotating diagrams.
	
	Online research into marine ecosystems – coral reefs.
	
	Construct and a range of graphs and use statistical skills.
	
	Developing extended writing skills.
	
	Using atlas maps.
	
	Using weather maps.
	
	Producing annotated maps.
	
	Practicing exam style questions. Including the use of peer assessment.
	
	Conducting independent and group research tasks.
	
	Making links within, across and beyond this area of the
		ecosystems, including:
		• deep-sea cold-water coral reefs
		• tropical coral reefs.
		
		Students will be able to analyse the conditions associated with reef development.
		
		Students will be able to analyse and evaluate factors in the health and survival of a named located coral reef system, to include:
		• natural: water temperature, acidity, salinity, algal blooms.
		• human activity and its impacts: major drainage basin schemes, onshore development, desalination, pollution, tourism, fishing.
		• future prospects for coral reefs.
		
		(Specific detail will depend on the chosen supporting example).
			students know about coral reef ecosystems.
			
			Students to produce an annotated map to illustrate the distribution of coral reef ecosystems.
			
			Research task for students to produce an assessment of the characteristics of coral reef systems and the conditions associated with their development.
			
			Opportunity for independent/paired or group research task. Students to be given clear instructions to conduct research into a named, located coral reef. This should cover the factors in the health and survival of reefs:
			• natural: water temperature, acidity, salinity, algal blooms.
			• human activity and its impacts: major drainage basin schemes, onshore
				simple introduction to coral reefs
				
				coral-reef-info.com/coral-reef-biome.html
				
				oceanservice.noaa.gov/education/kits/corals/coral04_reefs.html
				
				youtube.com/watch?v=Bn2xkIJhte4&list=PLlOe1Mr8YbsqPlcBioZc1-tEOMJNh_U_f
				
				Resources for specific case studies will depend on those chosen by the individual student/centre.
				
				Factors in the health and survival of coral reefs:
				
				wwf.panda.org/about_our_earth/blue_planet/coasts/coral_reefs/coral_threats/ – coral bleaching impacts.
				
				mesfiji.org/resources/environment/threats-to-coral-reefs-human-impacts
				
				Tourism and recreational impacts: **reefresilience.org/coral-reefs/stressors/local-stressors/coral-reefs-tourism-and-recreational-impacts/**
				serc.carleton.edu/eslabs/corals/5b.html – human activities that threaten coral reefs.
				
				youtube.com/watch?v=A2KmFJu1yP

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	specification. Engage with remotely sensed satellite data.		development, desalination, pollution, tourism, fishing. • future prospects for coral reefs. Students could be encouraged to be creative in the method used to present their findings. These could be traditional reports, revision sheets, mind maps, or electronic presentations to share on a VLE. Opportunity to use a range of practice exam questions to assess learning.	A – short summary video clip of some threats to coral refs. Future prospects for coral reefs: celebrating200years.noaa.gov/visions/coral/welcome.html gbrmpa.gov.au/managing-the-reef/threats-to-the-reef/climate-change/what-does-this-mean-for-habitats/coral-reefs globalissues.org/article/173/coral-reefs
Weeks 9–10 **Local ecosystems** • The main characteristics of a distinctive local ecosystem (such as an area of forest, managed parkland, mangrove, dune system). Ecological	Use of key subject-specific and technical terminology. Opportunities to develop skills such as drawing, labelling and annotating diagrams. Online research into local ecosystems.	Students will be able to analyse and evaluate the main characteristics of a distinctive local ecosystem (such as an area of heathland, managed parkland, pond, dune system). This could involve the study of: • abiotic environmental factors and biotic communities • key habitats	Students could be given the opportunity to choose which distinctive local ecosystem to study or the whole group could study the same – one from an area of heathland, managed parkland, pond, dune system. Students to use a variety of recourses to research	Resources for specific case studies will depend on those chosen by the individual student/centre. Dune system: wildlifetrusts.org/wildlife/habitats/coastal-sand-dunes geography-site.co.uk/pages/physical/coastal/dunes.html macaulay.ac.uk/soilquality/Dune%20

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responses to the climate, soil and soil moisture budget – adaptations by flora and fauna. • Local factors in ecological development and change (such as agriculture, urban change, the planned and unplanned introduction of new species). • The impacts of change and measures to manage these impacts. Conservation strategies and their implementation in specific settings.	Construct and a range of graphs and use statistical skills. Developing extended writing skills. Using atlas maps. Producing annotated maps. Practicing exam style questions. Including the use of peer assessment. Conducting independent and group research tasks. Making links within, across and beyond this area of the specification. Engage with remotely sensed satellite data.	• its food chain and trophic levels • succession in the chosen ecosystem. Students should be able to assess the local factors in ecological development and change – this could relate to the chosen local ecosystem above – to include: • agriculture • urban change • the planned and unplanned introduction of new species. Again, this could relate to the chosen local ecosystem and students will be able to assess the impacts of change and measures to manage these impacts. Students will then be able to evaluate strategies that have been implemented in the chosen local ecosystem settings. (Specific detail will depend on the chosen supporting example).	the chosen local ecosystem, to include: • distinctive characteristics (as listed in the previous column) • ecological responses to the climate, soil and soil moisture budget – adaptations by flora and fauna. Opportunity to use a variety of practice exam questions to assess learning. Opportunity for a group research task to collaboratively produce a resource that explores local factors in ecological development and change to include: • agriculture • urban change • the planned and unplanned introduction of new species. This also gives an	**Succession.pdf** simple lesson idea on vegetation characteristics: **ucnrs.org/host/curricula/duneplants.html google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=8&cad=rja&uact=8&ved=0ahUKEwi6p_GMxsPOAhUrlsAKHUSaDKcQFghQMAc&url=http%3A%2F%2Fwww.field-studies-council.org%2Fmedia%2F473961%2Fplant_adaptations__2_.doc&usg=AFQjCNG5i1CB9PP9UC6TVqFUCS6o48nEIA&bvm=bv.129422649,d.d24** – FSC resources on dune adaptations. **snh.org.uk/publications/on-line/heritagemanagement/erosion/appendix_1.2.shtml** – dune conservation issues. **web.unep.org/coastal-eba/content/dune-and-beach-conservation-and-restoration** – UNEP Dune and Beach conservation and restoration.

Specification content Week number	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
			opportunity for a group discussion or debate about issues raised above. Students should use the internet (or textbook) resources to research how impacts of change in a local scale ecosystem are being managed. This leads to an exploration of conservation strategies and their implementation in specific settings. Opportunity to use a range of practice exam questions to assess learning. (This whole section could feed into the completion of coursework for the Non-examination assessment element of the specification).	
Week 11 **Case study 1** Case study of a specified	Collect, analyse and interpret a range of qualitative and quantitative data	Much of what is taught here will depend on the region chosen. Students should understand that	Opportunity for group discussion to identify a specified region experiencing ecological	Resources for specific case studies will depend on those chosen by the individual student/centre.

Specification content Week number	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
region experiencing ecological change to illustrate and analyse the nature of the change and the reasons for it, how the economic, social and political character of its community reflects its ecological setting and how the community is responding to change. The extent of such an area will vary according to the local circumstances of the centre. However, a National Park might make a sensible region for such a case study.	from a range of secondary sources. Report writing.	specific regions are experiencing ecological change. Students should be able to identify, analyse and evaluate: • the nature of the change • the reasons for the change. Students will be able to assess how the economic, social and political characters of the people living there reflect their ecological setting. Students will be able to evaluate how the population living there is responding to the ecological change.	change. Students should reflect on how they have completed previous geographical case studies, and then be given clear instructions and guidance about creating a detailed case study of one specified region experiencing ecological change. That must focus on: • the nature of the change and the reasons for it • how the economic, social and political character of its community reflects its ecological setting • how the community is responding to change. Students could be encouraged to be creative in the method used to present their findings. However, as a guide it should include the information listed in	Some resources that relate to ecological change: **nature.com/scitable/knowledge/library/species-conservation-rapid-environmental-change-and-ecological-67648942** **greenfacts.org/en/ecosystems/millennium-assessment-2/4-factors-changes.htm** **countrysideinfo.co.uk/successn/summary.htm** **nature.com/scitable/knowledge/global-and-regional-ecology-13228222** **jncc.defra.gov.uk/PDF/Pub10_Bio_&_CC_IACCF_2010_Web.pdf** Resources relating to Serengetti National Park include: **serengeti.org/** **whc.unesco.org/en** **whc.unesco.org/en/soc/3458** **tripsavvy.com/serengeti-national-park-4123575**

Specification content Week number	Subject specific skills development	Learning outcomes	Suggested learning activities (including ref to differentiation and extension activities)	Resources
Case study 2 Case study of a specified ecosystem at a local scale to illustrate and analyse key themes set out above, including the nature and properties of the ecosystem, human impact upon it and the challenges and opportunities presented in its sustainable development. This is likely to be a much smaller area than the previous case study. It might be a local dune system, a piece of local wasteland that is being colonised by a succession of invasive species, a park that is being maintained as a	Collect, analyse and interpret a range of qualitative and quantitative data from a range of secondary sources. Report writing.	Much of what is taught here will depend on the local scale ecosystem chosen. Ensure students understand that if Case study 1 related to a 'region' within a country then Case Sstudy 2 must relate to a smaller local scale place – a named place/location. • Students must be able to identify and analyse: • the nature and properties of the ecosystem • the human impacts upon the ecosystem • the challenges and opportunities presented in its sustainable development.	previous column. (There are opportunities for students to work together or independently). (This could feed into the completion of coursework for the non-examination assessment element of the specification). Opportunity to discuss the broad themes of this unit in respect to one local-scale ecosystem including: • nature and properties of the ecosystem • human impact upon it • the challenges and opportunities presented in its sustainable development. Students should reflect on how they have completed previous geographical case studies, and then be given clear instructions and guidance about	

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plagioclimax community, etc.			creating a detailed case study of one specified local scale ecosystem. To include the themes listed above. Students could be encouraged to be creative in the method used to present their findings. However, as a guide it should include the information listed in the previous column. (There are opportunities for students to work together, or independently).	

Quantitative and qualitative skills

Students must engage with a range of quantitative and relevant qualitative skills, within the theme Ecosystems under stress. Students must specifically understand simple mass balance, unit conversions and the analysis and 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.

GET HELP AND SUPPORT

Visit our website for information, guidance, support and resources at **oxfordaqaexams.org.uk**

You can contact the geography team directly;

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