

Cambridge TECHNICALS LEVEL 3

APPLIED SCIENCE

Cambridge
TECHNICALS
2016

Unit 20 – Conservation of biodiversity
DELIVERY GUIDE

Version 2

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INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning outcome so you can see how each activity helps you cover the requirements of this unit.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resources.feedback@ocr.org.uk.

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT AND WORK EXPERIENCE

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. We've also identified any potential work experience opportunities within the activities. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.



English



Maths



Work

Please note

The activities suggested in this Delivery Guide **MUST NOT** be used for assessment purposes. The timings for the suggested activities in this Delivery Guide **DO NOT** relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from <http://www.ocr.org.uk/>. The latest version of this Delivery Guide can be downloaded from the OCR website..

UNIT AIM

This unit will provide you with an understanding of biodiversity on a local and global scale, the threats to biodiversity and the importance of maintaining a sustainable global environment.

You will examine real examples of conservation taking place on a local and global scale and decide whether the measures taken are effective or not.

Unit 20 Conservation of biodiversity

LO1	Understand the importance of conserving and monitoring natural resources
LO2	Understand the value of global biodiversity
LO3	Understand the factors that threaten global biodiversity
LO4	Be able to investigate the efficacy of practical measures to conserve biodiversity

To find out more about this qualification, go to: <http://www.ocr.org.uk/qualifications/vocational-education-and-skills/cambridge-technicals-applied-science-level-3-certificate-extended-certificate-foundation-diploma-diploma-extended-diploma-05847-05849-05879-05874-2016-suite/>

Cambridge
TECHNICALS
2016

2016 Suite

- New suite for first teaching September 2016
- Externally assessed content
- Eligible for Key Stage 5 performance points from 2018
- Designed to meet the DfE technical guidance

RELATED ACTIVITIES

The Suggested Activities in this Delivery Guide listed below have also been related to other Cambridge Technicals in Applied Science units/Learning Outcomes (LOs). This could help with delivery planning and enable learners to cover multiple parts of units.

This unit (Unit 20)	Title of suggested activity	Other units/LOs	
LO1	What does 'sustainable' mean?	Unit 13 Environmental surveying	LO1 Understand environmental impacts of human activity and natural processes
	Protecting biodiversity	Unit 14 Environmental management	LO1 Understand principal characteristics of environments
	Action protecting habitats	Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
	European Environment Agency	Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
LO2	Practical applications of biodiversity	Unit 13 Environmental surveying	LO1 Understand environmental impacts of human activity and natural processes
	Human relationship with the environment	Unit 13 Environmental surveying	LO1 Understand environmental impacts of human activity and natural processes
	Biodiversity and industry	Unit 13 Environmental surveying	LO1 Understand environmental impacts of human activity and natural processes
		Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
	Global contribution of ecology	Unit 3 Scientific analysis and reporting	LO4 Be able to analyse and evaluate the quality of data LO5 Be able to draw justified conclusions from data
		Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
	Benefits of biodiversity	Unit 3 Scientific analysis and reporting	LO4 Be able to analyse and evaluate the quality of data LO5 Be able to draw justified conclusions from data
Challenges of biodiversity	Unit 3 Scientific analysis and reporting	LO2 Be able to use graphical techniques to analyse data	
LO3	Factors affecting global biodiversity	Unit 13 Environmental surveying	LO1 Understand environmental impacts of human activity and natural processes
	Direct factors threatening global diversity	Unit 3 Scientific analysis and reporting	LO4 Be able to analyse and evaluate the quality of data LO5 Be able to draw justified conclusions from data
		Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
	Impact of land use on biodiversity	Unit 13 Environmental surveying	LO1 Understand environmental impacts of human activity and natural processes
	Indirect factors which threaten global diversity	Unit 3 Scientific analysis and reporting	LO2 Be able to use graphical techniques to analyse data
Unit 13 Environmental surveying		LO1 Understand environmental impacts of human activity and natural processes	
LO4	Biodiversity regulations and legislation	Unit 3 Scientific analysis and reporting	LO2 Be able to use graphical techniques to analyse data
		Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
	Biodiversity performance	Unit 3 Scientific analysis and reporting	LO4 Be able to analyse and evaluate the quality of data LO5 Be able to draw justified conclusions from data
	Effectiveness of global efforts	Unit 3 Scientific analysis and reporting	LO5 Be able to draw justified conclusions from data

KEY TERMS

Explanations of the key terms used within this unit, in the context of this unit

Key term	Explanation
Biodiversity	The variety of life within a given defined boundary. Biodiversity can be defined on a global or local level. Biodiversity includes the plants, animals and micro-organisms and the ecosystems in which they interact.
Ecosystem	A community of living organisms that cohabit within an environment (including non-living elements) linked together through food or energy exchanges.
Energy	The capacity or power to do work, such as the capacity to move an object (of a given mass) by the application of force. Energy can exist in a variety of forms, such as electrical, mechanical, chemical, thermal, or nuclear, and can be transformed from one form to another (source: http://www.dictionary.com/). Energy can be neither created nor destroyed but rather changes form.
Food chain	Describes a series of organisms that are related in their feeding habits, often describing predator/prey relationships.
Food web	Describes the flow of energy through an ecosystem.
Low carbon energy	Low carbon energy is energy produced from sources where the net release of carbon into the atmosphere is significantly lower than that released through fossil fuel use. There are no specific figures on the point at which a fuel is classed as low carbon. Low carbon is not the same as renewables. Nuclear power and carbon capture and storage both use finite resources but release low levels of carbon into the atmosphere and so are classed as low carbon. Biomass power stations release similar levels of carbon into the atmosphere as fossil fuel stations, but because the carbon is 'recycled' in the growing of biomass, the net carbon release is very low.
Renewable energy	Renewable energy is energy produced using resources that will not run out or are created at a rate that exceeds the rate of consumption. Wind, solar, wave, tidal, hydro and biomass are all examples. All renewable energy sources are low carbon.
Species	A category or classification of closely related organisms. Individuals within a species can potentially interbreed. The species defines the largest possible gene pool under natural conditions.
Sustainability	<p>Sustainability in terms of ecology and biodiversity is the use of resources at a rate at which natural processes can renew those resources; that is, resources are being used at a rate equal to or lower than the rate at which they are being produced.</p> <p>Sustainability is a key term in this course. Tutors could utilise the OpenLearn material 'Sustainable Scotland' for their own development or as a longer term homework project for learners. The online course takes about five hours. Sustainable Scotland is available at: http://www.open.edu/openlearn/nature-environment/the-environment/environmental-decision-making/sustainable-scotland/content-section-0</p>

MISCONCEPTIONS

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	How can this be overcome?	Resources which could help
In biodiversity, not all species are important and some can be sacrificed	It is not always obvious the impact that a specific species has on an ecosystem. The interactions between species are complex and often not fully known; for example, it is possible that the loss of a single pollinator in an area can have a profound impact on the whole food chain.	UK BAP priority species and habitats JNCC Joint Nature Conservation Committee http://jncc.defra.gov.uk/page-5705 Gives information about UK species and habitats that were identified as being the most threatened and plans for conservation action.
Large numbers of a particular species means the ecosystem is healthy	To be healthy, an ecosystem should have numbers that approach the carrying capacity of the ecosystem. Significant differences in numbers from this capacity, either higher or lower, suggests the ecosystem is not healthy. Disproportionately large numbers of one species may indicate an absence of species higher in the food chain or indicate a coming drop in numbers in the species lower in the food chain. Examples include: <ul style="list-style-type: none"> • Australian flatworm • Killer shrimp • Japanese rose. 	UK Biodiversity Indicators JNCC Joint Nature Conservation Committee http://jncc.defra.gov.uk/page-4229 The latest biodiversity indicators can be downloaded from this website, plus related reports and information. UK Biodiversity Indicators 2014: The good, the bad, and the uncertain British Ecological Society http://www.britishecologicalsociety.org/blog/2014/12/05/uk-biodiversity-indicators-2014-the-good-the-bad-and-the-uncertain/ Article discussing the trends revealed by the biodiversity indicators. NNESS GB non-native species secretariat http://www.nonnativespecies.org/home/index.cfm Developed to meet the challenge posed by invasive non-native species in Great Britain. PDF information sheets can be downloaded from this website.
Large empty spaces are wastelands	Abandoned towns or cities, tundra or deserts may be regarded as having little value in terms of biodiversity, but they are essential in providing habitats for species and preserving biodiversity.	Waste land or 'brownfield' sites are vital for wildlife BBC Nature http://www.bbc.co.uk/nature/18513022 News article on the Butterfly Conservation charity.
Humans do not need to be concerned with biodiversity	It is common for people to forget that humans are a part of the ecosystem and our future existence relies on maintaining biodiversity.	What is biodiversity and why is it important? CSIRO https://www.youtube.com/watch?v=7tgNamjTRkk&feature=youtu.be A short film about the different values that humans obtain from biodiversity and the role we will need to play in shaping its future.
Environmental damage is irreversible	The perception that 'the damage is done' can lead to inactivity. Individuals may feel that the issue is too large and any effort is wasted or not know where to start. Overcoming the initial inertia, reluctance to start, is a key element in the issue. In fact, ecosystems have always been reacting to and coping with changing circumstances. Natural disturbances are actually a key element in many ecosystems.	Major study shows biodiversity losses can be reversed Phys.org http://phys.org/news/2015-04-major-biodiversity-losses-reversed.html Article discussing research published in <i>Nature</i> that suggests some environmental damage can be reversed.

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	How can this be overcome?	Resources which could help
Biodiversity is only important at the species level	The perception that it is only diversity at the species level that matters misses the point that different populations of species adapt to local conditions and represent genetic diversity within a species, which is as important as the diversity between species.	Low genetic variation Understanding Evolution http://evolution.berkeley.edu/evolibrary/article/conservation_04 Discusses the importance of genetic variation within a species.
Plants are dependent on humans	Actually the reverse is true. All animal life is dependent on plants.	The importance of plants Botanical-Online http://www.botanical-online.com/theimportanceofplants.htm# Page setting out the ecological importance of plants.
Plants are defenceless	Many plants have sophisticated defence mechanisms or sophisticated ways of using animals.	Botanical Barbarity: 9 Plant Defense Mechanisms Encyclopaedia Britannica http://www.britannica.com/list/9-plant-defense-mechanisms Illustrates nine plant defence mechanisms.
A 'food web' is the same as a 'food chain'	Food webs describe the flow of energy through an ecosystem. There are complex relationships that cannot be defined as simple chains.	Food Web: Concept and Applications Nature Education http://www.nature.com/scitable/knowledge/library/food-web-concept-and-applications-84077181 Article by Dafeng Hui (Department of Biological Sciences, Tennessee State University) explaining the food web concept.
Ecosystems are just a collection of organisms	The ecosystem does not simply describe the component organisms but also their interactions and the physical environment.	Ecological Relationships National Geographic Society http://nationalgeographic.org/activity/ecological-relationships/ Explains how species interact with one another and shape marine ecosystems.
Ecosystems are static and do not change	Ecosystems are constantly changing in response to changes, natural disasters and man-made disasters.	Ecosystem Change GreenFacts http://www.greenfacts.org/en/ecosystems/millennium-assessment-2/7-ecosystem-change-time.htm Addresses three questions: What is known about ecosystem inertia and time scales of change? When do non-linear or abrupt changes occur in ecosystems? How are humans increasing the risk of non-linear ecosystem changes?

Some common misconceptions and guidance on how they could be overcome

What is the misconception?	How can this be overcome?	Resources which could help
Species have always gone extinct so we do not need to worry	According to the UN Environment Programme, the Earth is in the midst of a mass extinction of life. Scientists estimate that 150–200 species of plant, insect, bird and mammal become extinct every 24 hours. This is nearly 1,000 times the 'natural' or 'background' rate.	<p>How Many Species on Earth? 8.7 Million, Says New Study UNEP News Centre http://www.unep.org/newscentre/default.aspx?DocumentID=2649&ArticleID=8838 UNEP report on how many species are on Earth.</p> <p>What is the point of saving endangered species? BBC http://www.bbc.com/earth/story/20150715-why-save-an-endangered-species Article in the Earth section of the BBC website.</p>
Organisms higher in a food web eat everything that is lower in the food web	Organisms higher in a food chain eat some, but not necessarily all, of the organisms below them in the food web.	<p>African Animal Hierarchy Hierarchy Structure http://www.hierarchystructure.com/african-animal-hierarchy/ Explains the place in the food chain of the main predators in Africa.</p>

SUGGESTED ACTIVITIES

LO No:	1		
LO Title:	Understand the importance of conserving and monitoring natural resources		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
What does 'sustainable' mean? Part 1 	<p>Tutors can begin the course by asking learners to work in pairs or small groups to define the word 'sustainable'.</p> <p>The tutor gets the learners to agree on three or four main definitions of the word.</p>	30 minutes	Unit 13 LO1
What does 'sustainable' mean? Part 2	<p>The tutor could direct the learners to an environmental website and ask them to do a search for the term 'sustainable'. Learners should be given enough time to review several pages.</p> <p>The tutor then shows the three or four definitions to the learners and asks them to modify the definitions in light of their research. Tutors can guide learners to aspects of sustainability covered in the course that they might miss.</p> <p>Greenpeace UK http://www.greenpeace.org This would be a useful resource for learners.</p> <p>Tutors could ask learners to comment on the reliability and objectivity of Greenpeace as a resource.</p>	30 minutes	Unit 13 LO1
What does 'sustainable' mean? Part 3 	<p>Tutors can ask learners to write a short passage that demonstrates how the definitions of the word 'sustainable' can be applied to:</p> <ul style="list-style-type: none"> • Air • Water • Earth deposits • Wildlife. <p>Tutors could use Prezi with the group and ask the students to collaborate on an interactive Prezi. This could be used as a homework exercise.</p> <p>Tutors might allow learners to revisit the definitions once more.</p>	30 minutes	Unit 13 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
How renewable energy adds value to the environment	<p>When looking at the value of renewable energy, learners could begin by discussing the environmental impact of different fuels, other than carbon emissions. The areas that could be discussed include:</p> <ul style="list-style-type: none"> • The impact of mining for fossil fuels • The visual impact of wind turbines • The potential impact of construction of turbines on bird and sea life • The ecological impact of reservoirs used for hydroelectric generation • The ecological impact of transporting biofuels across the Atlantic Ocean • The long-term impact of nuclear waste. <p>Learners could research the different environmental impacts and then take part in a balloon debate:</p> <p>Balloon Debates: Templates and Tips! Tarr's Toolbox http://www.classtools.net/blog/balloon-debates/ Tarr's Toolbox has some examples and suggestions on how a balloon debate may be run.</p>	30 minutes	
The value of renewable energy technologies	<p>Learners can be asked to produce a 'pros' and 'cons' list for renewable energy. They could visit trade association websites for solar, wind, marine and anaerobic digestion; these will present the best picture of the industries. Learners should be asked to consider the downside of renewable energy to produce their lists of both 'pros' and 'cons'.</p> <p>RenewableUK http://www.Renewableuk.com Represents companies active in wind, wave and tidal energy.</p> <p>Anaerobic Digestion and Bioresources Association (ADBA) http://www.adbioresources.org/ ADBA is the trade association for the anaerobic digestion industry.</p> <p>Solar Trade Association http://www.solar-trade.org.uk/ Promotes the benefits of solar energy and works to make its adoption easy and profitable for users.</p> <p>Pros and cons of different energy sources Vattenfall https://corporate.vattenfall.com/about-energy/pros-and-cons-of-different-energy-sources/ Vattenfall is a large European energy producer. This page has a good table of 'Pros' and 'Cons' that learners can compare their list to.</p> <p>Learners can debate whether more or less renewable energy is needed in the future.</p>	30 minutes plus 30 minutes for the debate	



Title of suggested activity	Suggested activities	Suggested timings	Also related to
Managing fossil fuels	<p>Energy is not just about using renewable resources, it is also about the management of non-renewable resources. The tutor could play this YouTube video:</p> <p>300 Years of Fossil Fuels in 300 Seconds Postcarboninstitute https://www.youtube.com/watch?v=cJ-J91SwP8w This is quite a stark, sometimes amusing, view of the human race's dependence on fossil fuels.</p> <p>The tutor could then start a debate by making the statement: 'all fossil fuels will be banned by 2020'. (This is not a true statement, but to be used for debate purposes.) Learners could then be asked to discuss the potential consequences and to come up with a counterproposal. The counterproposal could be created individually, in small groups or as a large group.</p> <p>Matt Ridley: 'Fossil fuels will save the world,' and will continue to provide more than 81% of US energy in 2040 AEI (American Enterprise Institute) https://www.aei.org/publication/matt-ridley-fossil-fuels-will-save-the-world/ To get inspiration, learners could read this blog by Mark Perry.</p> <p>The activity could end with a vote on which proposal is most desirable.</p>	30 minutes	
Protecting biodiversity	<p>What is biodiversity? Learners could watch this European Environment Agency video:</p> <p>What is 'biodiversity', and why do we need it? European Environment Agency https://www.youtube.com/watch?v=ngz5oNuKL5M In this video, Ivone Pereira Martins from the European Environment Agency makes a compelling argument for preserving biodiversity, if only for our own benefit.</p> <p>A transcript from the video could be used to aid retention. Learners can discuss the points made. Were they convinced that action is required?</p>	30 minutes	Unit 14 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Action protecting habitats: Part 1	<p>Learners could be asked to describe what is being done in Europe with regards to protecting habitats. A chart or table of actions could be produced by visiting the EEA website:</p> <p>Biodiversity European Environment Agency http://www.eea.europa.eu/themes/biodiversity Site links to news, articles, publications and multimedia about the EEA's work.</p> <p>Biodiversity policies European Environment Agency http://www.eea.europa.eu/themes/biodiversity/policy-context Learners can use this website to further explore specific EU policies on conservation. EU nature conservation policy is based on two main pieces of legislation: the Birds Directive and the Habitats Directive.</p>	1 hour	Unit 14 LO3
Action protecting habitats: Part 2	<p>Learners can explore the broader impacts of protecting the environment.</p> <p>'Preserve peat bogs' for climate BBC News http://news.bbc.co.uk/1/hi/sci/tech/6502239.stm This article describes how preserving one specific ecosystem can help with climate change.</p> <p>Learners could visit the UK government's website and create a summary of the current UK action plan on protecting biodiversity.</p> <p>Biodiversity and ecosystems Gov.uk https://www.gov.uk/government/policies/biodiversity-and-ecosystems Sets out what the UK government is doing about biodiversity.</p>	30 minutes	Unit 14 LO3
European Environment Agency	<p>To ensure they are using current information, learners could be asked to review the latest reports from the European Environment Agency. The reports illustrate what is being monitored and managed.</p> <p>Briefings from the latest European state and outlook report European Environment Agency http://www.eea.europa.eu/themes/biodiversity/briefings-soer/briefings These reports will enable learners to create a simple timeline of action and comment on the effectiveness of the actions.</p> <p>Learners could write a debate brief on the impact of international politics in preserving biodiversity.</p>	1 hour	Unit 14 LO3



Title of suggested activity	Suggested activities	Suggested timings	Also related to
Biodiversity and public opinion	<p>There are many opinions and views on biodiversity, the drivers and responsibilities. Learners could be asked to review the websites of individuals to judge public opinion.</p> <p>A few misconceptions about endangered species... Green Momster http://www.greenmomster.org/2011/12/few-misconceptions-about-endangered.html 'Green Momster' is the website of a woman in Virginia USA. Learners could read this blog entry on endangered species:.</p> <p>Learners could then discuss the content, validity and reliability of the blog. Learners could discuss whether the suggestions given to lighten the load on the environment in Green Momster, which is directed at Americans, are already an accepted way of life in the UK...such as recycling cardboard.</p> <p>Learners could compare the article on Green Monster with this blog:</p> <p>6 Misconceptions About Biological Diversity and Extinction Michael Leveille http://biodiversityyouth.blogspot.co.uk/2012/07/6-misconceptions-about-biological.html Michael Leveille is a teacher in Canada.</p> <p>Learners could then discuss how they might undertake further research to confirm or counter some of the points in the blogs. Learners could then investigate one of the claims in more depth.</p>	1 hour	

SUGGESTED ACTIVITIES

LO No:	2		
LO Title:	Understand the value of global biodiversity		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
Practical applications of biodiversity	<p>To explore the issues of biodiversity and agriculture, learners could explore the impact of agriculture in the Amazon. Learners could use the information gained to carry out some sort of cost benefit analysis or force field analysis based on the development of agriculture in the Amazon.</p> <p>Amazonian challenges: Cattle ranching and agriculture The Open University http://www.open.edu/openlearn/nature-environment/amazonian-challenges-cattle-ranching-and-agriculture?in_menu=321616 Explains how extensive cattle ranching and agriculture have resulted in deforestation.</p> <p>Tutors could start a debate with the question: Whose responsibility is it to protect the Amazon rainforest? The native population or the broader world population?</p> <p>Sustainable Scotland The Open University http://www.open.edu/openlearn/nature-environment/the-environment/environmental-decision-making/sustainable-scotland/content-section-0 Tutors may wish to ask learners to read more broadly within this free online course.</p>	30 minutes	Unit 13 LO1
Human relationship with the environment	<p>To help embed the concept of a close relationship between humans and the environment, the tutor could ask learners to either predict what would happen if biodiversity was to suddenly vanish or to create a description of the world today if biodiversity had never existed. Learners could create a short newspaper article to share their views of what the world would be like with the broader group. Learners could research the topic using the following two websites:</p> <p>Preserving Health through Biological Diversity Science NetLinks, American Association for the Advancement of Science http://sciencenetlinks.com/lessons/preserving-health-through-biological-diversity/ Seeks to advance understanding of why diversity within and among species is important.</p> <p>Common Misconceptions about Biomes and Ecosystems Ohio State University http://beyondpenguins.ehe.osu.edu/issue/tundra-life-in-the-polar-extremes/common-misconceptions-about-biomes-and-ecosystems Highlights some common misconceptions about plants, food chains and webs, predator/prey relationships, ecosystems and ecological adaptations.</p>	1 hour	Unit 13 LO1



Title of suggested activity	Suggested activities	Suggested timings	Also related to
Impacts of biodiversity	<p>The resilience of an ecosystem can be impacted by the breadth of biodiversity. Learners could be asked the question: How can biodiversity reduce the transmission of diseases?</p> <p>Learners could work in small groups or have a broad group discussion to arrive at a range of suggestions. The tutor could then either use material from this website, or direct learners to it:</p> <p>Impacts of Biodiversity on the Emergence and Transmission of Infectious Diseases ConservationTools, Pennsylvania Land Trust Association http://conservationtools.org/library_items/1058 Has examples of how diversity of species disrupts the flow of disease.</p>	30 minutes	
Biodiversity and industry	<p>To round off the discussions on diversity, learners could be asked to what extent they think biodiversity positively impacts on industry.</p> <p>A simple group chart could be produced that demonstrates the positive and negative impacts. Learners could research different aspects, such as biofuels and ecotourism.</p> <p>Are Biofuels Green or Not? EnergySavingSecrets http://www.energysavingsecrets.co.uk/are-biofuels-green-not.html Biofuels are renewable sources of energy, but this page discusses whether they are environmentally sound.</p> <p>Tourism is an industry that can damage biodiversity but also be driven by it. Learners could be asked if they had heard the term 'ecotourism' and what they think it means. They might then research the topic at:</p> <p>What is Ecotourism? The International Ecotourism Society (TIES) www.ecotourism.org/what-is-ecotourism Provides a definition and sets out eight principles of ecotourism.</p>	30 minutes	Unit 13 LO1 Unit 14 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Global contribution of ecology: Part 1 	<p>Who is doing what? The tutor could start by making the statement: governments are doing all they are required to do and this should maintain biodiversity.</p> <p>Learners can then conduct a simple investigation in order to decide if they agree or disagree with the statement.</p> <p>Learners could revisit the European Environment Agency website (http://www.eea.europa.eu) and read through the Pan-European and global biodiversity policies:</p> <p>In 1992, the UN Convention on Biological Diversity (CBD) marked the international community's commitment to addressing biodiversity loss. In response, the Pan-European Biological and Landscape Diversity Strategy was endorsed by the countries covered by the United Nations Economic Commission for Europe.</p> <p>Source: http://www.eea.europa.eu/themes/biodiversity/policy-context</p> <p>The six targets covered by the EU Biodiversity Strategy to 2020:</p> <ol style="list-style-type: none"> 1. Fully implement the Birds and Habitats Directives 2. Maintain and restore ecosystems and their services 3. Increase the contribution of agriculture and forestry to maintaining and enhancing biodiversity 4. Ensure the sustainable use of fisheries resources 5. Combat invasive alien species (IAS) 6. Help avert global biodiversity loss. <p>Source: http://www.eea.europa.eu/soer-2015/europe/biodiversity</p>	1 hour	
Global contribution of ecology: Part 2	<p>Learners could debate if these measures:</p> <ul style="list-style-type: none"> • Go far enough • Go too far • Could be effective. 	30 minutes	Unit 14 LO3
Global contribution of ecology: Part 3	<p>The learners could be asked to create one additional target that could replace an existing one and explain the rationale for the swap.</p>	30 minutes	Unit 3 LO4, LO5 Unit 14 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Benefits of biodiversity: Part 1	<p>When investigating biodiversity, the tutor can emphasise the fact that protecting biodiversity is not just an ethical or emotional decision. There are sound economic reasons for protecting biodiversity.</p> <p>Valuing the Benefits of Biodiversity Economics & Funding SIG http://webarchive.nationalarchives.gov.uk/20110303145213/http://ukbap.org.uk/library/EconomicBenefitsOfBiodiversityJun07.pdf Provides evidence to support the case for protecting biodiversity.</p> <p>Economic reasons for conserving wild nature Andrew Balmford et al http://www.envirosecurity.org/conference/working/ReasonsConservWildNature.pdf Presents evidence that habitat conservation has more economic benefits than habitat conversion.</p> <p>The tutor could use these resources to produce a list of economic benefits. The learners could then be asked to critique the list and comment on the scale of the benefits.</p>	30 minutes	Unit 3 LO4, LO5
Benefits of biodiversity: Part 2	<p>Learners could work in small groups to create a list of priorities that could be used to improve the biodiversity in cities, justifying the actions they intend to take. The website below is a useful resource. Learners could compare the different priorities created.</p> <p>7 benefits to bringing nature back to cities Conservation magazine http://conservationmagazine.org/2014/02/7-benefits-bringing-nature-back-cities/ Report on the benefits of urban greening projects.</p>	30 minutes	
Benefits of biodiversity: Part 3	<p>To help learners appreciate the global impact of biodiversity, tutors could lead a class discussion on the links between poverty and biodiversity. Learners could then review these websites:</p> <p>Linking Biodiversity Conservation and Poverty Alleviation: A State of Knowledge Review ConservationTools, Pennsylvania Land Trust Association http://conservationtools.org/library_items/1056 Focuses on the question: which groups of the poor depend on different elements of biological diversity and in which types of ways?</p> <p>Biodiversity-poverty evidence database Poverty and Conservation Learning Group http://povertyandconservation.info/biodiversity-poverty-evidence Presents recent case studies on biodiversity.</p> <p>The tutor could then have the discussion again, highlighting any differences in viewpoints.</p>	30 minutes	Unit 3 LO5

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Challenges of biodiversity: Part 1	<p>Learners could engage with the MIT Mission 2015 initiative on biodiversity. Students and faculty at MIT have collected resources and data on the challenges and benefits of biodiversity.</p> <p>There are many examples on the website; learners could work in pairs, each choosing a different example and then having a short plenary session where each pair feeds back to the group.</p> <p>Benefits of Biodiversity to Humans Mission 2015: Biodiversity http://web.mit.edu/12.000/www/m2015/2015/benefits_humans.html This is a good starting point from where learners could follow the link to the mission home page and explore the topic as extra material.</p>	1 hour	
Challenges of biodiversity: Part 2 	<p>Learners could be asked to write an essay summarising the work and findings of the MIT group, emphasising the key aspects of biodiversity they had not considered before.</p>	30 minutes	Unit 3 LO2

SUGGESTED ACTIVITIES

LO No:	3		
LO Title:	Understand the factors that threaten global biodiversity		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
Factors affecting global biodiversity: Part 1	<p>The OpenLearn course 'Health and environment' could be utilised as an introduction to this topic. This free course looks at interactions between plants, animals and the physical and chemical environment, as well as considering ways in which humans have altered, and are altering, this environment.</p> <p>Health and environment The Open University http://www.open.edu/openlearn/health-sports-psychology/health/health-sciences/health-and-environment/content-section-0</p> <p>The full material could take up to 12 hours to study and could be set as optional homework or selected resources could be used in sessions or for tutor CPD.</p>	1 hour	Unit 13 LO1
Factors affecting global biodiversity: Part 2	<p>Tutors can lead learners in a broad discussion on what the current large threats to biodiversity are.</p> <p>Learners could draw up a list of potential threats and then prioritise them. The research could be presented as a collaborative Prezi using research into the following three activities:</p> <ul style="list-style-type: none"> • Pollution • Change of land use • Effect of changes in land use. <p>The time allocation here can be split between the three activities or added at the end for the Prezi collaboration to take place.</p>	1 hour	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Direct factors threatening global diversity: Part 1 	<p>Pollution: learners can research the three forms of pollution (atmospheric, land and water).</p> <p>Water Framework Directive European Environment Agency http://www.eea.europa.eu/themes/water/interactive/by-category/wfd Provides links to material on water pollution.</p> <p>WFD: Ground Water Viewer European Environment Agency http://www.eea.europa.eu/themes/water/interactive/soe-wfd/wfd-ground-water-viewer Interactive map showing chemical status and trend assessment of groundwater bodies.</p> <p>European water resources – overview European Environment Agency http://www.eea.europa.eu/themes/water/water-resources Links to a set of resources on water availability and water use.</p> <p>Pollution World Wildlife Fund http://www.worldwildlife.org/threats/pollution The World Wildlife Fund website explores a range of impacts caused by pollution</p> <p>UK-AIR Defra https://uk-air.defra.gov.uk/ This Defra website details air pollution levels and has a broad range of information.</p>	1 hour	Unit 14 LO3
Direct factors threatening global diversity: Part 2 	<p>As the human population grows there is an increasing demand to use the limited land there is in different ways. The tutor can ask learners to identify the different reasons why land might be used for a different purpose as populations grow.</p> <p>Learners could then try to estimate the extent to which this might impact on biodiversity. Learners could rank the causes in terms of impact and report on the top five identified by the group.</p>	30 minutes	Unit 3 LO5

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Direct factors threatening global diversity: Part 3	<p>Learners could then be directed to a range of resources and asked to review their priority list in light of the information they find. Learners could work in small groups to create an annotated list to feed back to the broader group. Learners could then review the annotated lists of the other groups.</p> <p>PREDICTS Project: Land-Use Change Doesn't Impact All Biodiversity Equally UCL http://blogs.ucl.ac.uk/gee-research/2014/10/13/tropical-forests-anthropogenic-pressures-predicts/ Investigates species' responses to changing land use in tropical and sub-tropical forests worldwide.</p> <p>Biodiversity and Land Use PEER (Partnership for European Environmental Research) http://www.peer.eu/research/biodiversity-and-land-use/ Links to relevant EU-funded projects.</p>	30 minutes	Unit 3 LO4
Impact of land use on biodiversity	<p>As the use of land changes, this has an impact on the ecosystem. These impacts can differ according to the change in use. Learners could take the priority list and use the resources below to create a sub-list of knock-on effects that could result from the change of use.</p> <p>Deforestation National Geographic http://environment.nationalgeographic.com/environment/global-warming/deforestation-overview/</p> <p>Desertification United Nations http://www.un.org/en/events/desertificationday/background.shtml</p> <p>Human uses of the savannah BBC Bitesize http://www.bbc.co.uk/schools/gcsebitesize/geography/ecosystems/human_uses_savannah_rev1.shtml</p> <p>Habitat Loss and Degradation The Earth Times http://www.earthtimes.org/encyclopaedia/environmental-issues/habitat-loss-degradation/</p> <p>Impact of habitat loss on species World Wildlife Fund http://wwf.panda.org/about_our_earth/species/problems/habitat_loss_degradation/</p>	1 hour	Unit 13 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Indirect factors which threaten global diversity: Part 1	<p>The direct factors affecting global biodiversity have been explored, but these are driven by other indirect factors. Learners can research the different indirect factors. One focus could be on human population growth. Working in groups, learners could be given the opportunity to create a 'cause and effect' diagram showing how the growth of human population leads to reduction in biodiversity.</p> <p>Health and environment The Open University http://www.open.edu/openlearn/health-sports-psychology/health/health-sciences/health-and-environment/content-section-0 Learners could be given this link to this OpenLearn resource as a starting point.</p>	1 hour	Unit 13 LO1
Indirect factors which threaten global diversity: Part 2	<p>Learners could discuss population growth trends. Learners could come up with two or three scenarios based on action or inaction with regards to the impact of population growth on biodiversity.</p> <p>World Population Worldometers http://www.worldometers.info/world-population/ This is a live chart of world population.</p> <p>World population trends UNFPA: United Nations Population Fund http://www.unfpa.org/world-population-trends A UN-funded initiative looking at global population trends.</p> <p>World Population Trends Signal Dangers Ahead YaleGlobal Online http://yaleglobal.yale.edu/content/world-population-trends-signal-dangers-ahead This Yale publication gives a worrying view of the trends.</p>	30 minutes	Unit 13 LO1
Indirect factors which threaten global diversity: Part 3	<p>Another driver of the loss of global diversity is climate change. This is having a slow, but increasingly significant impact on ecosystems. Learners could produce an infographic with the 'Top ten things you need to know about climate change'. Information to produce this can be found at these resources:</p> <p>Climate Scoreboard : UN Climate Pledge Analysis Climate Interactive https://www.climateinteractive.org/tools/scoreboard/</p> <p>Key Questions & Answers on Climate Change Liliana Hisas, Executive Director, Universal Ecological Fund (U.S.) http://climatenetwork.net/wp-content/uploads/2015/11/OA-Climate-Change-COP21.pdf</p>	1 hour	Unit 3 LO2 Unit 13 LO1



SUGGESTED ACTIVITIES

LO No:	4		
LO Title:	Be able to investigate the efficacy of practical measures to conserve biodiversity		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
Conserving biodiversity: Part 1	<p>Working individually or in small groups, learners could create a list of ways in which biodiversity could be conserved; the list should differentiate between local, national and international ideas.</p> <p>Learners should group the items in the list under the headings:</p> <ul style="list-style-type: none"> • Conservation schemes • Captive breeding programmes • Seed banks. 	30 minutes	
Conserving biodiversity: Part 2	<p>Having created the lists, learners should then carry out research to identify current or recent examples of the items on the list.</p> <p>Working in small groups, the learners could create a simple presentation that can be reviewed by the whole group.</p>	1 hour	
Conserving biodiversity: Part 3	<p>Learners could develop a single class framework to be used to compare the effectiveness of the different schemes and programmes. Each subgroup could then use the framework to analyse the effectiveness of their suggestions.</p> <p>The class could then create a preferred list for the group based on the analysis. This could then be presented in poster format.</p>	1 hour	
The Red Data list	<p>Tutors could ask learners to describe the typical content of Red Data lists.</p> <p>The IUCN Red List of Threatened Species International Union for Conservation of Nature and Natural Resources http://www.iucnredlist.org/ This is the home page of the international Red Data lists.</p> <p>Learners should highlight any entries in the lists that they find surprising or unusual.</p> <p>Working in pairs and using the filter options, learners can create a simple ranking quiz based on the different species and the level of concern. Learners could compete with other pairs to see if the other pairs can answer their quiz correctly.</p>	30 minutes	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Biodiversity regulations and legislation: Part 1	<p>Learners could research national legislation and regulations that are related to biodiversity and conservation. Learners could draw a diagram demonstrating the areas covered by the legislation and highlighting any overlaps or gaps.</p> <p>Starting points for the research could be:</p> <p>All Defra services and information Gov.uk https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs Information on responsibilities and activities of the Department for Environment, Food & Rural Affairs.</p> <p>All EA services and information Gov.uk https://www.gov.uk/government/organisations/environment-agency Information on responsibilities and activities of the Environment Agency.</p> <p>Wildlife and Countryside Act 1981 Gov.uk http://www.legislation.gov.uk/ukpga/1981/69 Full text of the primary legislation in this area.</p>	1 hour	Unit 3 LO2 Unit 14 LO3
Biodiversity regulations and legislation: Part 2	Learners could write a short bullet-point list covering the main points of the legislation they had found.	1 hour	Unit 14 LO3
Biodiversity performance: Part 1	<p>Learners should review statistics on global performance on biodiversity.</p> <p>Global data trends Global Biodiversity Information Facility (GBIF) http://www.gbif.org/analytics/global Contains data about all types of life on Earth, including species counts and geographic range.</p> <p> Using the information gained, learners could work in small groups to create an infographic based on the figures they find. The infographic could use a range of statistical and mathematical formats.</p>	30 minutes	Unit 3 LO4, LO5
Biodiversity performance: Part 2	Learners could then create a short summary that gives an overview of the current global position and likely trends in biodiversity.	30 minutes	Unit 3 LO4, LO5

Title of suggested activity	Suggested activities	Suggested timings	Also related to
International collaboration on global biodiversity	<p>To conclude, the learners should research the range of international action groups focused on biodiversity.</p> <p>Learners can then research the international conferences and debates on biodiversity.</p> <p>United Nations Conference on Sustainable Development, Rio+20 Sustainable Development Knowledge Platform https://sustainabledevelopment.un.org/rio20</p> <p>This is one example of an international conference that learners could research. It details outcomes of the United Nations Conference on Sustainable Development in Rio de Janeiro, Brazil, which was held on 20-22 June 2012.</p> <p>The Convention on Biological Diversity CPB: UNEP https://www.cbd.int/convention/default.shtml</p> <p>Signed by 150 government leaders at the 1992 Rio Earth Summit, the Convention on Biological Diversity is dedicated to promoting sustainable development.</p>	30 minutes	
Effectiveness of global efforts	<p>Linking with the previous suggested activity learners could review the outcomes and performance of the summits and initiatives, drawing conclusions on the effectiveness and impact of the events.</p> <p>Their findings could be recorded in the style of a short news broadcast. The recordings could be shared on the centre's internal network.</p>	1 hour	Unit 3 LO5





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