

UNIT 10: Human influences on the environment.

Recommended Prior Knowledge: Students should have covered Unit 9 before beginning this Unit.

Context: This Unit builds on ideas studies in Unit 9, and brings together knowledge from many other areas of the syllabus.

Outline: General features of population growth are first considered, before looking in particular at problems associated with human population growth. A number of different effects of the growing human population on the environment are then considered. Some of these are complex issues, with no straightforward answers, and students should be encouraged to discuss and debate them.

	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
IV 4	<p>State the factors affecting the rate of population growth, and describe their importance (e.g. food, supply, predation and disease)</p> <p>Identify the phases of a sigmoid curve of population growth resulting from the action of a limiting factor.</p> <p>Explain the factors that lead to the lag phase, exponential phase and stationary phase in the sigmoid curve of population growth.</p>	<p>The term 'population' will need to be defined before thinking about how populations grow.</p> <p>Ideas about how populations grow can be built up by discussion, concentrating on examples that are likely to be familiar to students – for example they could imagine what might happen if a few rabbits were introduced onto an island where none have previously existed. Simple sketch graphs should be drawn to illustrate population growth, and possible factors that might cause a levelling off in population growth can be considered.</p>		
IV 4	<p>Describe the increase in population size in the absence of limiting factors (human population growth) and the social implications of current human survival rate interpret graphs and diagrams of human population growth.</p>	<p>The ideas developed in the previous section are now applied to human population growth. Graphs showing how the human population has changed in the past, and predictions for the future should be drawn. Students could also be introduced to population pyramids and their interpretation. They should discuss the possible implications of continued growth of the world human population, if possible with reference to particular examples, collected from newspapers and other sources of up-to-date information and data.</p>		

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IV 5.1	Discuss, using suitable examples, ways in which the use of modern technology has resulted in increased food production.	Where possible, this should be related both to the students' own country, and also to other countries in the world. Ideas to consider are the introduction of machinery (tractors to replace draught animals, for example), and the increasing use of pesticides and fertilisers, as well as the breeding of new high-yielding crop varieties. At least one specific example should be looked at in some detail.		
IV 5.1	Describe the undesirable effects of deforestation.	Deforestation may already have been considered in relation to the carbon cycle, and now more wide-ranging effects can be considered, such as loss of habitat and increased soil erosion and flooding. Again, it is a good idea to try to introduce at least one specific example, as well as discussing the problems in general.		
IV 5.1	Describe the over-use of fertilisers on the land.	The use of fertilisers containing nitrate can be concentrated on here, and related back to the nitrogen cycle (dealt with in Unit 9). Ensure that students realise that both organic (for example manure) and inorganic fertilisers can cause problems, but do avoid creating a completely negative attitude towards farmers. Leaching into waterways, and subsequent eutrophication, should be described and explained.	Two sites explaining what is being done in the UK to reduce pollution from fertilisers: Nitrate Vulnerable Zones http://www.environmentagency.gov.uk/yourenv/eff/water/210440/ Nitrate Sensitive Areas http://www.defra.gov.uk/news/newsrel/1998/980122a.htm	
IV 5.2	Describe the undesirable effects of water pollution by sewage and chemical waste, air pollution by sulphur dioxide and pollution due to pesticides and herbicides and nuclear fall-out.	Pollution of waterways by raw (untreated) sewage can be considered to cause the same problems as fertilisers, plus the risks to health from water-borne pathogens (e.g. cholera). Problems caused by pesticides could be dealt with by considering a particular example, e.g. DDT, and the	DDT a banned insecticide http://www.chem.ox.ac.uk/it_lectures/chemistry/mom/ddt/ddt.html DDT - a replacement is necessary before a ban	

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		debate for and against its continued use in countries where malaria is a major problem. This example demonstrates that these issues are not simply matters of right and wrong, but involve complex evaluation and careful decision making. Make sure that students realise that not all pesticides are long-lasting and accumulate up food chains.	http://www.malaria.org/teachingmodules/ddt.html	
IV 5.2	Assess the significance of non-biodegradable plastics and other materials used in the manufacturing industry.	Non-biodegradable materials will be detrimental to the environment if they are put in land fill sites. They will produce air pollution if they are burnt in an incinerator. The environmentally friendly option is to recycle materials such as paper, glass, metal etc. This reduces environmental pollution and saves energy in production costs.	http://www.alupro.org.uk/ Facts and information about recycling and environmental projects or schools.	
IV 5.2	Discuss the causes and apparent effects on the environment of acid rain and the measures which might be taken to reduce its incidence.	Students should understand that acid rain is caused by sulphur dioxide (released from the burning of oil and coal, for example in power stations) and nitrogen oxides (present, for example, in car exhausts. They should know something of the biological effects of acid rain.	FAQ's on acid rain http://www.ns.ec.gc.ca/aeb/ssd/acid/acidfaq.html	
IV 5.3	Describe the need for conservation of species and their habitats and of natural resources.	It is best to look at some specific examples here, either relating to the students' home country, or of international importance (such as tigers in India, elephants in Africa or orang-utans in Borneo).	Tigers in the wild http://www.panda.org/about_wwf/what_we_do/species/show_species.cfm?SID=25&LID=1&FH=E	
IV 5.3	Describe the principle of recycling of materials including sewage (water) and paper.	Students should learn how sewage is dealt with in their own local area, and there may be an opportunity to visit a sewage treatment plant, or at the very least to obtain information from the water company responsible for this.	Plastics recycling http://www.plasticsresource.com/	

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