

PAPER 2: UNIT 1 TROPICAL ENVIRONMENTS

Recommended Prior Knowledge As is the case for all of the Advanced Geography Options completion of the core modules is expected. The tropical Environments option builds on the knowledge and understanding gained in the compulsory core units of *Atmosphere and Weather* and *Rocks and Weathering*.

Context The focus in this option is on the **humid tropics**. i.e. those regions that have high temperatures and high annual rainfall or a seasonal distribution of rainfall.

Outline Study of the physical environment is the starting point with consideration of the climatic characteristics across the humid tropics which can then lead into discussion of the vegetation, soils and landforms of these areas. Case study material and examples should be included wherever appropriate and **one** case study illustrating some of the problems of sustainable management of **either** a tropical rain forest **or** a savanna is an essential part of the option.

Resources: Geofile online at Nelson Thornes and Geofactsheets at www.curriculumpress.co.uk are two excellent subscription online resources.

Textbooks referenced below: Digby, B ed. (2000) *Global Challenges* Heinemann; Heelas, R (2001) *Tropical Environments: Contrasting Regimes and Challenges* Nelson Thornes; Meg and Jack Gillett (2003) *Physical Environment: A Case Study Approach* Hodder and Stoughton; Guinness P and Nagle, G (1999) *Advanced Geography: Concepts and Cases* Hodder and Stoughton; Money, DC (2000) *Weather and Climate* Nelson; Nagle, G (2000) *Advanced Geography* Oxford University Press; O'Hare, G (1990) *Soils Vegetation and Ecosystems* Oliver and Boyd; Warburton, P (2001) *Atmospheric Processes and Human Influences* Collins; Waugh, D (2000) *Geography: An Integrated Approach* Nelson Thornes 3rd edition; Woodfield, J (2000) *Ecosystems and Human Activity* Collins 2nd edition. *Geography in Focus* (2000) Cook, I, Hordern, B, McGahan, H, Ritson, P Causeway Press Ltd.

1.	<p>TROPICAL ENVIRONMENTS</p>	<p>Introduction The intention should be to convey an overview of the option at the outset. Study a world map of the major biomes Consider latitudinal distribution Relate to the global climate map and global population distribution Emphasise the humid tropics/low latitudes and links between the sub-sections of climate, vegetation and soils in the syllabus through these maps. EXERCISE: Give climate data for selected stations eg equatorial climate, savanna climate monsoon climate. Plot figures, describe in detail climatic</p>	<p>General: amazonia.com is a comprehensive web site. www.gis.psu.edu/geog121/re mote/rondonia_75html www.dpi.inpe.br/Amazoniapg13.html www.worldclimate.com Has a good range of climate data for a selection</p>	<p>Any Atlas Nagle p.210 excellent map of the world vegetation zones/biomes Woodfield p.15 Heelas p. 8 as a starting point</p>
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		<p>characteristics of each as a lead in to explanation June 2003 Q2 (a) Good climate data –could be a useful teaching aid.</p> <p>WHY IS THE TROPICS AN ISSUE? Brief, general discussion of wilderness areas, outstanding physical environments, biodiversity, resources, endangered species and the threats posed by indiscriminate exploitation, need for conservation. <i>Development of tourism – links to human geography SoW units 2 & 3</i></p>	of stations round the world	<p>Digby p.38</p> <p>p.12-13 Heelas</p>
1.1	Tropical Climates	<p>The foundations will have been laid at AS through <i>Atmosphere</i> and <i>Weather</i> See SoW 2.2 Earth-Atmosphere energy budget and general circulation etc.</p> <p>Good starting point- general circulation of the atmosphere. Focus on the Hadley cell. Formation of ITCZ, low pressure at the Equator, descending air at 30° N and S, producing high pressure. Associated wind belts-trade winds. Migration of thermal equator according to the seasons. Relate to the resultant changing position of pressure and wind belts, on-shore/offshore winds and resultant rainfall. Relationship of earth to sun as it moves to produce seasonal variations in temperature.</p> <p>November 2002 Q2(a) was specifically about the ITCZ and its influence upon precipitation.</p> <p>EXAMPLES</p> <p>1. West Africa. Aptly demonstrates the change from Equatorial to Savanna climate with seasonal variation in rainfall.</p> <p>It may be appropriate to introduce the West African ecocline (vegetation transect) to demonstrate links between climate, vegetation and human activities</p> <p>June 2003 Q2 (b) The ecocline would be an ideal example for such a question which asks about the</p>		<p>Garrett and Nagle p.411 Waugh p.226 Nagle p.157 Digby p.39</p> <p>Waugh p.228</p> <p>Gillett p.110-111 Fig.1</p> <p>Digby p.41 Money p.87</p>

1.2	<p>Tropical Ecosystems</p> <p>VEGETATION</p>	<p>relationship between rainfall and vegetation.</p> <p>2. Indian sub-continent- Monsoon climate. Sub-tropical jet stream and relation to surface conditions November 2003 Q1 (a) June 2002 Q1 (a)</p> <p>Well annotated maps can be very useful for both examples and can be used in an exam answer for explanatory purposes.</p> <p>This section needs an introduction to the ecosystem as a concept, and its structure, functioning and development over time. Soil characteristics and formation is also included. Focus on TRF and Savanna ecosystems</p> <p>Productivity- rate of energy production usually on an annual basis. Gross Primary Productivity(GPP) Total energy production including respiration. Net Primary Productivity-(NPP)-is the total amount of energy transferred from sunlight into organic matter (photosynthesis) minus the energy lost via respiration. It is expressed as a rate g/m²/yr. Biomass- total mass of living organisms present in an area. Expressed as mass per unit area measured as dry weight. Food chain/webs Trophic levels – a feeding level within a food chain from which energy is lost. Biodiversity a term used to describe the variety of species, both floral and faunal within an ecosystem.</p>		<p>Money p.37-9 Warburton p.145-154- excellent section Nagle p.173 Has excellent diagrams Waugh p.239-40</p> <p>Waugh Ch.11 p.286-306 Nagle Chapter 10 O’Hare Ch.4 p.94-106 Woodfield p.4-11</p>
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	<p>SOILS</p>	<p>processes: Precipitation:Evaporation ratios, leaching and upward capillary action; gleying; ferrallitisation; calcification, laterisation, duricrusting</p> <p>Soil profiles for tropical soils. Oxisol/latosols/ferrallitic soils. Familiarity with at least one tropical soil. Well annotated diagram will fulfil requirements. November 2002 Q1. requires at least one tropical soil profile.</p> <p>Catena- is a downslope sequence of soils which reflects differences in drainage conditions. The influential factors are slope angle, water table, aspect, vegetation and climate. Rock type is constant.</p> <p>NB See CIE Standards booklet for an excellent candidate response/possible model answer to a question on catenas. There is plenty of information here.</p> <p>The theme of this section of work should emphasise the link between process and form. It will be familiar from AS work. See the SoW for AS. 3.2 <i>Weathering and Rocks</i> 3.3 Slopes, processes and <i>development</i></p> <p>Weathering processes: Physical: Exfoliation, Dilatation, crystal growth, frost action, Chemical: Hydrolysis and hydration. Reminder of the Peltier diagram. Also latitudinal variation of weathering depths-link to basal surface of weathering November 2003 Q2(a) Good teaching aid in this question.</p> <p>Factors influencing weathering rates. Van't Hoffs Law, importance of water, rock structure-joints patterns- increasing surface area.</p>		<p>Heelas p.65-6 good Nagle p.193-4 Very good on zonal and equatorial soils. Good profile diagrams</p> <p>O'Hare p.50, p.119-120 Catena in Belize Waugh p.276 Nagle p.189 All refs have theoretical models of the catena.</p> <p>Fig. 3 An annotated diagram to show the characteristics of a soil catena.(tropical)</p> <p>Waugh p.40 Nagle p.40 has a diagram showing relationship between depth of weathering and climate</p> <p>See also Cook, Hordern et al (CHE) chapter 8</p>
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1.3	TROPICAL LANDFORMS	<p>Granite- characteristics of granite composition and structure. Weathering of granite-Hydrolysis. Weathering front-basal surface, joint pattern corestones, saprolite. Evolution of landforms:</p> <p>Etchplanation theory: deep weathering; exhumation by stripping-reasons for stripping, ie climate change, fluvial activity, vegetation removal, cyclical nature of the stripping. Pediplanation-uplift of a pediplain; vertical fluvial incision; pediment formation and role of water in lateral planation of these surfaces and relation to parallel retreat of slopes. (Link to option 4.2 desert landforms)</p> <p>November 2002 Q2 (b) June 2003 Q1 (a)</p> <p>Landforms: Inselbergs, ruwares, bornhardts, koppes. Tors</p> <p>Useful teaching aids: June 2003 Q1 (a) diagrams November 2003</p> <p>Mark schemes for these papers gives a good guide to content.</p> <p>Limestone: Weathering process: Carbonation-solution. Joint pattern bedding planes and vertical joints. Permeability.</p> <p>Tropical limestone forms: emphasise vertical nature of the weathering to produce scale of these landforms</p> <p>Landforms: Cockpit karst, tower karst, mogotes. Good examples: China and Caribbean</p> <p>June 2002 Q2 (b)</p>		<p>Cook, Hordern et al 376-385</p> <p>Nagle p.38-9. This is a key source</p> <p>Heelas p.58 passing reference</p> <p>Waugh p.198 short ref</p>
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1.4	<p>Case Study of TRF OR SAVANNA ECOSYSTEM</p>	<p>Big idea in this section is sustainability in relation to the functioning of the physical environment and human use of that environment in order to maintain its resources. Carrying capacity, soil erosion, leaching, infertility. Link to human activities. Management strategies. Discussion should include evaluation of the success of the management.</p> <p>TRF Deforestation, problems associated within the physical environment soil erosion, leaching, consequent infertility break down of nutrient cycles loss of productivity NPP. Changing albedos, implications for global climate change. Therefore extend local effects to global impact. Also forests as carbon sinks link to atmospheric pollution and climate change. Loss of agricultural potential. Carrying capacity, sustainable population levels, indigenous populations. Human activities: Sustainable-bush fallowing, commercial large scale agriculture-plantations ranching. Other activities: mining, tourism-ecotourism.</p> <p>(Food for thought-Mature TRF produces as much CO2 as it absorbs. It is only when it is growing that it acts as a sink. Apparently it would be best to chop down all the TRF, use the wood for building and replant so that the TRF re-grows absorbing more CO2!!)</p> <p>Savanna- Rainfall reliability, drought, desert margins-Sahel –use the West African example again. Overpopulation, nomadic pastoralism indigenous populations changes to sedentary agriculture, way of life, pressure on the natural environment. Desertification eg. Sahara margins- Sahel. Possible</p>	<p>Garrett and Nagle p.530 Heelas p.86-90 theme of sustainability</p> <p>Digby (GC) p.89-105 Very good accessible section</p> <p>Heelas p.74-85 Case Study of Brazil Woodfield p.30-7 Gola Forest Sierra Leone Woodfield p.30 Excellent flow digram to show effects of deforestation on albedo</p> <p>Money p.87 Warburton p100-101 Waugh p.335-338 Case Study 12 Garrett and Nagle p.524-529 Excellent section on desertification The Challenge of Seasonality in the Tropics-</p>
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