

Geography

Singapore-Cambridge General Certificate of Education Advanced Level Higher 2 (2018) (Syllabus 9751)

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1 INTRODUCTION

Geography is the science of place and space. Geographers ask where things are located on the surface of the earth... Geography is unique in linking the social sciences and natural sciences... Geographers use many tools and techniques... [including] Geographic Information Systems (GIS), Remote Sensing, Global Positioning Systems (GPS)... and others.

Association of American Geographers

Geography is the study of Earth's landscapes, peoples, places and environments... bridging the social sciences with the natural sciences... and puts [the] understanding of social and physical processes within the context of places and regions... [Geography] helps us all to be more socially and environmentally sensitive, informed and responsible citizens...

Royal Geographical Society (with the Institute of British Geographers)

Geographers in different parts of the world define Geography differently depending on when they are asked to provide a definition of the subject. While the Association of American Geographers describes Geography as a science that deploys geospatial technologies, the Royal Geographical Society (with the Institute of British Geographers) puts greater emphasis on Geography's endeavour to understand our world in its entirety.

Both perspectives hint at the evolving variety of practices and interests among Geographers. More importantly what Geographers do is also influenced by the ever-changing socio-political contexts that they operate in. This dynamism of Geography has been frequently cited as a strength of the subject.

This syllabus underlines six geographical concepts that underline the motivations behind different sets of questions that interest different groups of geographers:

Environment

Geographers are interested in the relationship between humans and the natural environment. The natural environment may be seen as being designed for human purposes, thus legitimising human domination over the non-human world. The natural environment may also be understood as the major influence on human activities, which impose limits on human growth and development. The relationship between humans and the natural environment is recognised to be dynamic and complex, with changes in the former involving changes in the latter and vice-versa.

Place

Geographers investigate real places. Places acquire meaning as a result of an individual's or a group's experiences that include sensory perception and memories. Places can also be produced to represent particular identities and express specific ideas through different ways, for example signage, maps, official documents and popular media. Places evolve constantly and are contestable by different social forces. Places are constituted by what is internal to them while being shaped by external forces simultaneously.

Process

Geographers examine the flow or actions that produce or transform a system or structure. Processes can occur sequentially over time or across space. Processes are also understood as mechanisms by which particular outcomes are achieved. Processes are controlled by variables and knowledge of these variables enables some degree of prediction of future values. However exact prediction of physical and human phenomena is impossible because of our incomplete understanding or inaccurate measurements.

Scale

Geographers take care to match the resolution of data collected in relation to the scale of their research question(s) that they have in mind. Issues and phenomena manifest at different scales from the personal to the global. Processes also operate at different scales, with some operating at multiple scales at the same time. The understanding of how processes at one scale can be amplified or diminished through the interaction with other processes from any other scale is important.

Space and Time

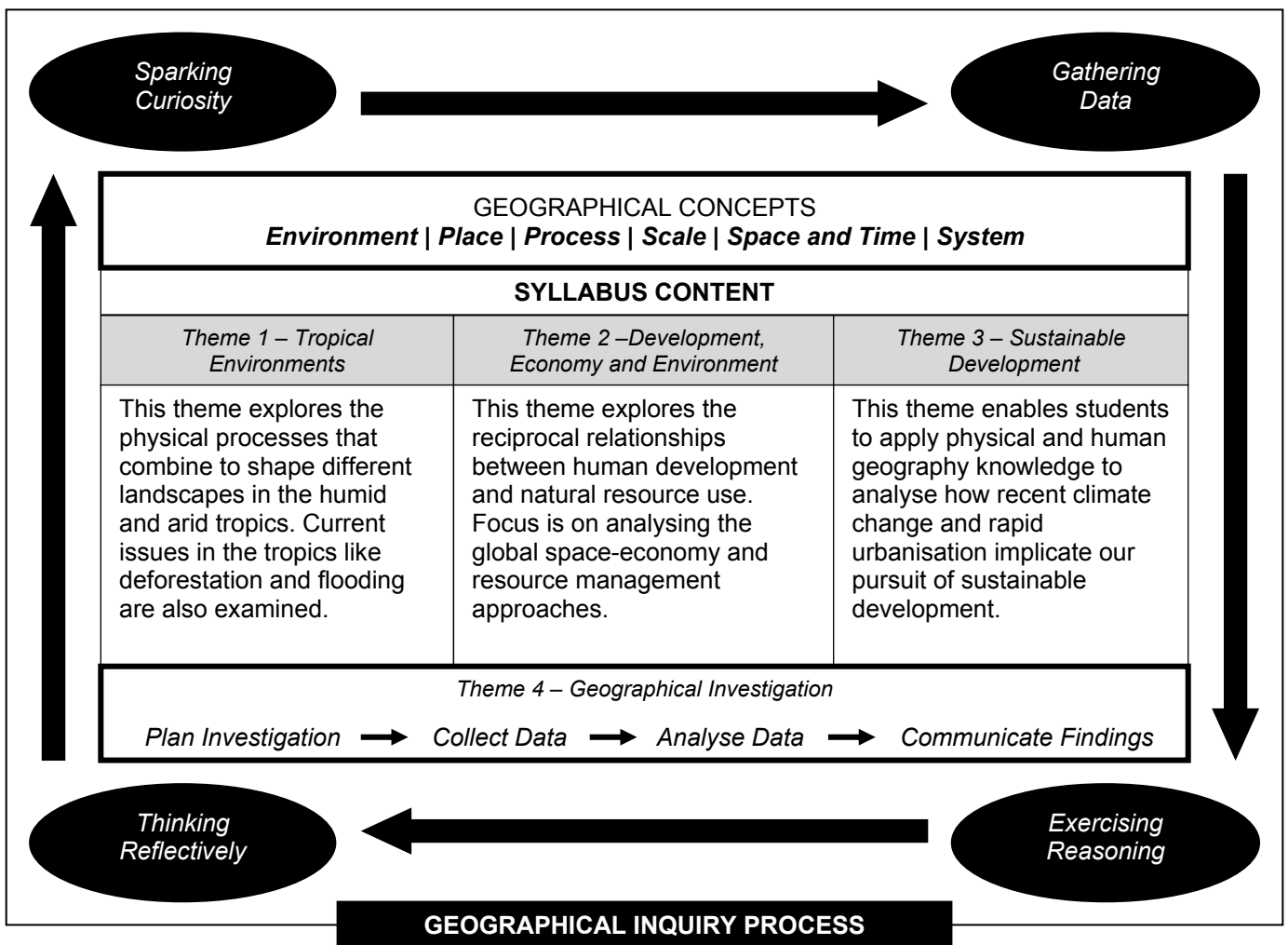
Geographers are particularly concerned about the spatial and temporal aspects of what they study. Much attention is placed on the organisation of physical and human phenomena across space and their evolution over time. Location and distance are often understood in relative rather than absolute terms in this context. An examination of spatial and temporal relations and patterns can yield significant insights and enrich our understanding of the environment and humans.

System

Geographers are sensitive to the interrelationships and interdependence of different elements in the world. Systems are hierarchical; the whole system at one level is a component of a higher-order set and the elements of one system are in effect smaller-scale systems. A positive feedback results in a net change in the system while a negative feedback does the opposite. The concept of systems allows for the study of a portion of reality while being aware that what is being studied is part of a larger whole.

The H2 Geography curriculum concept (Figure 1) shows how the six geographical concepts frame the syllabus content in Themes 1–4. The outer ring identifies the key elements of learning Geography through inquiry. It is important to note that the meanings of the geographical concepts listed have evolved considerably in the past decades and will keep evolving as geographers continue to learn more about the world we live in. The list is also not exhaustive for Geography offers much more learning resources than those included in this syllabus.

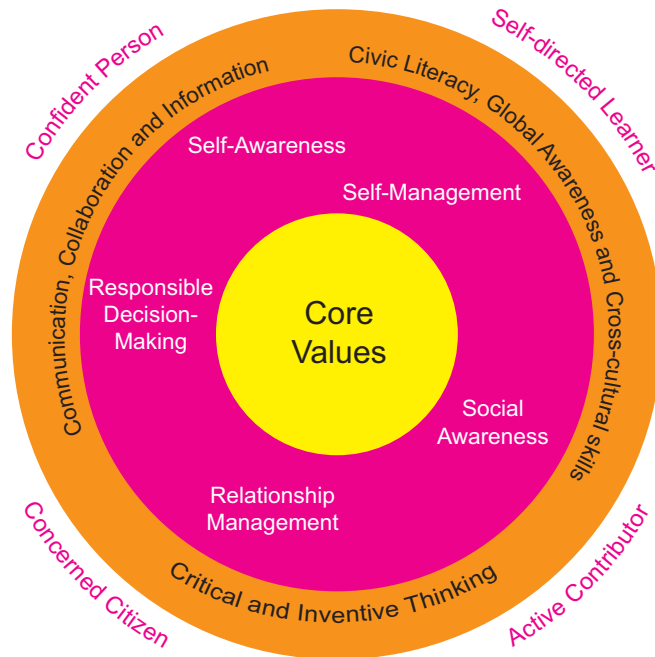
Figure 1: A-Level H2 Geography Curriculum Concept



Geography, Desired Outcomes of Education and 21st Century Competencies

More than simply learning prescribed subject knowledge and skills, Geography must also support students' development of important competencies necessary for them to thrive in the 21st century. In addition, students need to learn a range of life skills and develop key social and emotional competencies that will enable them to achieve personal mastery and relate to others. More importantly, all learning must be anchored in enduring values. Figure 2 outlines the framework for 21st century competencies and student outcomes.

Figure 2: Framework for 21st Century Competencies and Student Outcomes



2 AIMS AND LEARNING OUTCOMES

The aims and learning outcomes below represent the body of geographical knowledge, skills and values that students will acquire through H2 Geography.

Knowledge

The syllabus requires students to develop an understanding of:

1. the uniqueness of different types of natural environments and places
2. the interactions and interdependence between natural environments, societies and cultures at various scales
3. the evolution of landscapes and development of issues over time
4. the processes that shape natural environments, societies and cultures at various scales
5. the connections, trends and patterns in different parts of Asia and the rest of the world
6. a range of contemporary issues in different parts of Asia and the rest of the world through geographical perspectives
7. different approaches to solve real-world problems and achieve sustainable development; and
8. the connections between different sub-fields of geography.

Skills

The syllabus seeks to equip students with the ability to:

1. consider evidence and different viewpoints to develop logical arguments and explanations
2. analyse, evaluate and reflect on information from a geographical perspective to make informed and sound decisions
3. construct understanding through inquiry using different data collection and analysis methods; and
4. use and evaluate maps, other data representation to integrate information and communicate to a specific audience.

Values

The syllabus seeks to encourage students to:

1. be inspired by the splendour of natural environments and human ingenuity
2. care for delicate ecosystems and understand the importance of environmentally sustainable lifestyles
3. develop as global citizens, seek harmony and respect others in a culturally diverse world
4. contribute responsibly towards the building of a robust and inclusive society; and
5. have the integrity to uphold ethical principles and be resilient in their pursuit for a better world.

3 ASSESSMENT OBJECTIVES

AO1 – Knowledge

Candidates should be able to demonstrate knowledge and understanding of:

- geographical terms, facts, concepts, issues, phenomena, trends; and
- geographical investigation skills and methods.

AO2 – Application and Analysis

Candidates should be able to:

- construct explanations to show how geographical knowledge is understood in particular contexts
- apply geographical knowledge and understanding to interpret and analyse different types of geographical data; and
- apply relevant geographical knowledge, understanding, skills and methods to carry out investigations in unseen contexts.

AO3 – Evaluation

Candidates should be able to demonstrate critical thinking by:

- synthesising knowledge from different sub-fields in geography
- drawing conclusions and making judgements based on a reasoned consideration of evidence and/or different viewpoints
- making recommendations and decisions that consider different elements of an issue and/or address interests of different stakeholders; and
- evaluating different types of geographical data, methods of data collection and analysis.

4 EXAMINATION FORMAT

PAPER 1 – STRUCTURED ESSAY QUESTIONS [96 MARKS; 3H; 50%]	PAPER 2 – DATA RESPONSE QUESTIONS [100 MARKS; 3H; 50%]
<p>Candidates answer THREE questions.</p> <p>Theme 1 – Either Question 1 or Question 2 Theme 2 – Either Question 3 or Question 4 Theme 3 – Either Question 5 or Question 6</p> <p>Each question:</p> <ul style="list-style-type: none"> comprises 2 sub-parts carries 32 marks [12m and 20m] <p><u>Note:</u> The structured essay questions will be assessed using generic level descriptors.</p> <p>The following appendices provide details on the generic level descriptors:</p> <ul style="list-style-type: none"> APPENDIX A: H2 Generic Level Descriptors for 12m SEQ sub-part (a) APPENDIX B: H2 Generic Level Descriptors for 20m SEQ sub-part (b) 	<p>Candidates answer FOUR compulsory questions.</p> <p>Theme 4 – Question 1 Theme 1 – Question 2 Theme 2 – Question 3 Theme 3 – Question 4</p> <p>Each question:</p> <ul style="list-style-type: none"> carries 25 marks comprises not more than 5 sub-parts <p><u>Note:</u> A maximum of two open-ended sub-parts of 9 marks each will be set in this paper. These sub-parts will be assessed using generic level descriptors.</p> <p>This paper will contain a maximum of 14 different resources.</p> <p>The following appendices provide details on the generic level descriptors:</p> <ul style="list-style-type: none"> APPENDIX C: H2 Generic Level Descriptors for Open-Ended 9m DRQ on Themes 1, 2 and 3 APPENDIX D: H2 Generic Level Descriptors for Open-Ended 9m DRQ on Theme 4

5 ASSESSMENT SPECIFICATION GRID

		Paper 1 3H (96m)	Paper 2 3H (100m)	Paper 1 + 2 6H (196m)
AO1 + AO2	Marks	36m	82m	118m
	Weighting	37.5%	82%	60%
AO1 + AO3	Marks	60m	18m	78m
	Weighting	62.5%	18%	40%

6 SYLLABUS CONTENT

Overview

Themes 1, 2 and 3 consist of two integrated topics each that examine knowledge relevant to the theme. Theme 4 outlines the skills that students are expected to learn in order to conduct research in areas relevant to what they have learned in Themes 1, 2 and 3.

Theme 1 (Tropical Environments) helps students to understand the workings of atmospheric, geomorphic and hydrologic processes and associated landforms in the tropics through a systems approach. Students learn about feedback loops to analyse humans' impact on the environment and how humans are in turn affected by environmental hazards.

Theme 2 (Development, Economy and Environment) introduces students to the underlying political and socio-economic structures that determine what kind of natural resources are transformed into different kinds of useful products in different parts of the world. Through case studies, students gain insights into how political and economic decisions influence the society and our environment.

Theme 3 (Sustainable Development) highlights the importance of exploring how people in different parts of the world are affected when natural environments are exploited. Students confront the contradictions between meeting present needs and achieving intergenerational equity, that is, to pass on the environment in a 'reasonable condition' to future generations.

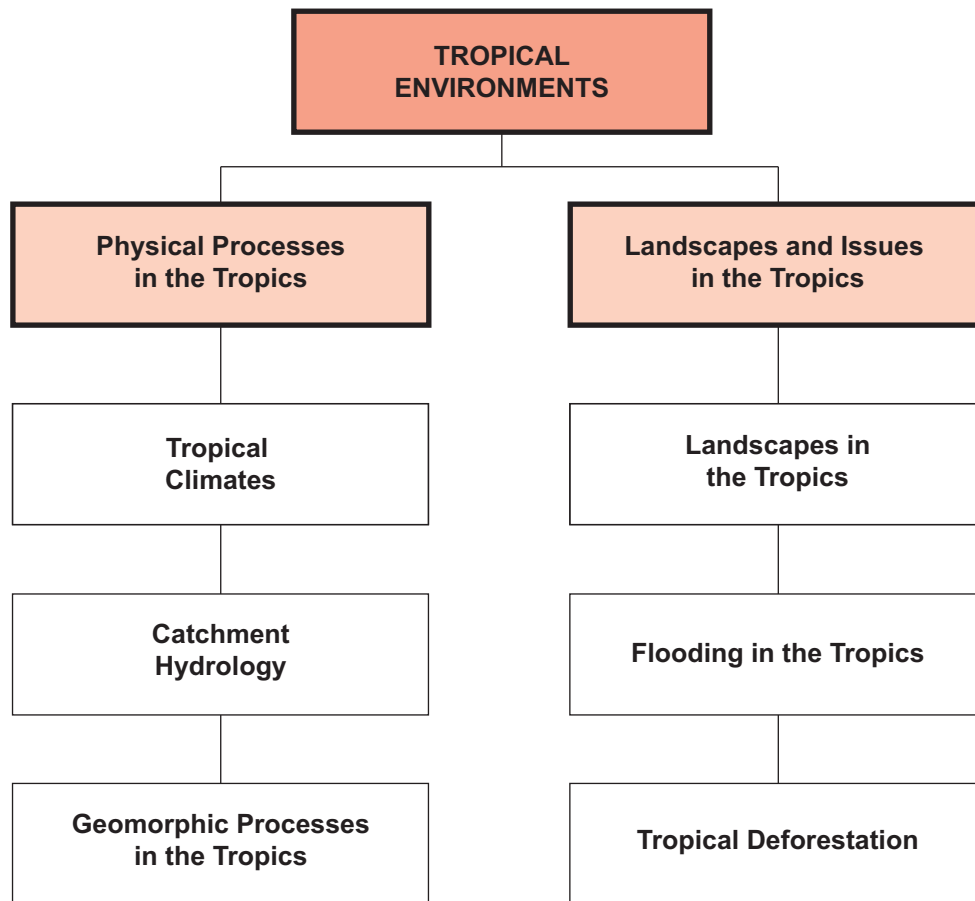
Theme 4 (Geographical Investigation) provides students with opportunities to carry out fieldwork to deepen their understanding of what they have learned from Themes 1–3. They will learn how to craft research questions, plan for their investigations, collect, present and analyse data, evaluate and communicate their findings.

Theme 1 – Tropical Environments

The tropics is a large part of the Earth's surface with a variety of landforms including major mountain ranges and rivers, like the Himalayas and the Amazon. It can be defined as a climatic region of radiation surplus delimited by boundaries fluctuating between 30 and 35 degrees latitude, north and south. Common to all areas in this region (at sea level) is high temperature. Significant variations in the pattern and amount of rainfall differentiate these areas into various tropical climate zones. The tropics are home to some of the wettest (e.g. lower Mekong basin) and driest parts (e.g. Atacama Desert) on Earth. The atmosphere and tropical oceans play an important role in redistributing heat energy while tropical forests, rivers and wetlands regulate the carbon cycle acting as carbon sinks and sources of carbon emissions.

Topic 1.1 examines the dynamism of tropical environments through the study of different processes using a systems approach. The content in this topic focuses on various physical processes and factors that influence them with reference to examples in the tropics. Topic 1.2 surveys the process-form dynamics in open systems through the examination of characteristic landforms in the humid and arid tropics. The exploration of tropical landscapes also includes the investigation of topical issues like flooding and deforestation.

Both topics in this theme help students to understand that similar processes occur differently in different parts of the Earth. Within the tropics, processes operate at different rates and with varying intensities producing a rich array of landscapes. Students will also understand that boundaries separating tropical from the temperate regions are not fixed. Likewise, the transition between the humid and arid areas in the tropics, in most instances, is not as sharp as climate classifications may suggest.



Topic 1.1 Physical Processes in the Tropics

OVERVIEW

Physical geographers today focus on the diverse natural environment. Modern physical geography aims to explain the spatial patterns in the environment and the underlying dynamics and processes underpinning them at different scales. It is characterised by the use of scientific methods and a focus on physical processes. The systems approach, which emphasises the interrelationships between different components in the environment, is also commonly used. This topic explores the interrelated processes in the atmosphere, hydrosphere, biosphere and lithosphere. Students will gain a fundamental understanding of the forces and the resulting processes that shape landscapes in humid and arid tropical environments. The emphasis on the interrelationships between the processes enables students to appreciate the integrated nature of the different spheres and how the natural environment operates as a whole.

LEARNING OUTCOMES

By the end of this topic, students should be able to discuss:

- the dynamism of natural environments in the tropics
- the factors influencing temperature and rainfall patterns in different climate zones in the tropics
- differences and similarities between the hydrological and fluvial systems in the humid and arid tropics
- differences and similarities of geomorphic processes that occur in the humid and arid tropics

CONTENT	
1.	<p>Tropical Climates</p> <p>(a) Past climates in the tropics</p> <ul style="list-style-type: none"> – Pleistocene – Holocene including the desiccation of pluvial lakes <p>(b) Distinctive characteristics of the tropics based on the Köppen-Geiger climate classification system</p> <ul style="list-style-type: none"> – humid tropics: tropical rainforest (Af), tropical monsoon (Am) and tropical savanna (Aw) – arid tropics: sub-tropical steppe (BSh) and tropical desert (BWh) <p>(c) Effect of atmospheric circulation on tropical climates</p> <ul style="list-style-type: none"> – re-distribution of surplus solar radiation by the Hadley Cell, including the convergence of trade winds at the Intertropical Convergence Zone (ITCZ), and the resultant effects on atmospheric stability and rain formation – seasonal variations in wind direction: Asian and African monsoons – weakening of the Walker Circulation and the El Niño Southern Oscillation (ENSO) phenomenon <p>(d) Other factors influencing rainfall</p> <ul style="list-style-type: none"> – topography: orographic rain – local heating: convective rain – impact of ocean currents on sea-surface evaporation – the effect of continentality
2.	<p>Catchment Hydrology</p> <p>(a) Drainage basin water balance</p> <ul style="list-style-type: none"> – input: precipitation – pathways: overland flow, infiltration, percolation, throughflow and baseflow – water stores: interception and biological water storage, soil water storage, groundwater storage and channel storage – output: evapotranspiration and river discharge <p>(b) Fluvial and runoff processes</p> <ul style="list-style-type: none"> – fluvial processes: erosion, transportation and deposition – storm runoff generation: infiltration excess and saturation overland flow <p>(c) Variations in river channel morphology</p> <ul style="list-style-type: none"> – factors affecting channel morphology: discharge and sediment regime – drainage density and channel patterns – river equilibrium and longitudinal profile
3.	<p>Geomorphic Processes in the Tropics</p> <p>(a) Rocks, weathering and soil forming processes</p> <ul style="list-style-type: none"> – rock cycle and rock types: igneous, sedimentary and metamorphic – physical weathering: pressure release, thermal weathering, freeze-thaw and salt weathering – chemical weathering: hydrolysis, carbonation, solution, oxidation and reduction – soil forming processes: laterisation, salinisation and calcification <p>(b) Erosion processes</p> <ul style="list-style-type: none"> – erosion by water: splash erosion, rainwash, rillwash – erosion by wind: deflation and abrasion <p>(c) Mass movements</p> <ul style="list-style-type: none"> – slope stability: factors that influence shear stress and shear strength – classification of mass movement processes: fall, slide, flow and heave

Topic 1.2 Landscapes and Issues in the Tropics
OVERVIEW
<p>The earth-surface processes that shape the landforms that we observe today have operated over very long timescales. Present day landscapes are the 'key to the past' and physical geographers are also described as 'landscape detectives'. The array of scientific techniques available today enables physical geographers to continually update our understanding of natural environments. Arid landscapes for example were once believed to be places dominated by slow physical weathering. This is in contrast to contemporary understanding that these places contain 'hot spots' with very high weathering rates. This topic explores processes and their role in the evolution of landscapes over time. Students will focus on characteristic landforms in the humid and arid tropics. They will also learn about how humans impact on natural landscapes and environmental processes and, as a result, how we are affected by natural hazards such as floods and landslides. They will appreciate how an understanding of physical geography can be applied to manage the effects of natural hazards.</p>
LEARNING OUTCOMES
<p><i>By the end of this topic, students should be able to discuss:</i></p> <ul style="list-style-type: none"> • the evolution of landscapes and nature of topical issues in the tropics • the formation of landforms in the humid and arid tropics • the causes, effects and management of floods in the humid and arid tropics • the causes, effects and management of tropical deforestation
CONTENT
<p>1. Landscapes in the Tropics</p> <p>(a) Karst landscapes in the humid tropics</p> <ul style="list-style-type: none"> – processes underlying the formation of karst landscapes in the humid tropics – factors that affect the formation of karst landscapes in the humid tropics – characteristic landforms: tower karst, cone karst and isolated karst <p>(b) Fluvial and aeolian landscapes in the arid tropics</p> <ul style="list-style-type: none"> – processes underlying the formation of different landforms in the arid tropics – factors that affect the formation of different landforms in the arid tropics – selected landforms: rills and gullies, yardangs, dunes and loess
<p>2. Flooding in the Tropics</p> <p>(a) Hydrographs</p> <ul style="list-style-type: none"> – characteristics of flash and fluvial flood hydrographs: peak rainfall, baseflow, storm flow, peak discharge and lag time <p>(b) Flooding in the humid and arid tropics</p> <ul style="list-style-type: none"> – patterns of occurrence of tropical cyclones – atmospheric and surface conditions necessary for the development of tropical cyclones – human and physical factors that influence the occurrence of floods including rainfall amount and intensity, land use and surface cover – socio-economic and environmental effects of floods – hard and soft-engineering strategies to manage floods

3. Tropical Deforestation

(a) Causes of tropical deforestation

- logging
- ranching
- agriculture
- firewood collection

(b) Effects of tropical deforestation

- landslides
- soil erosion and sedimentation
- disruption of ecosystems and loss of biodiversity
- disruption of biogeochemical cycles
- release of stored carbon

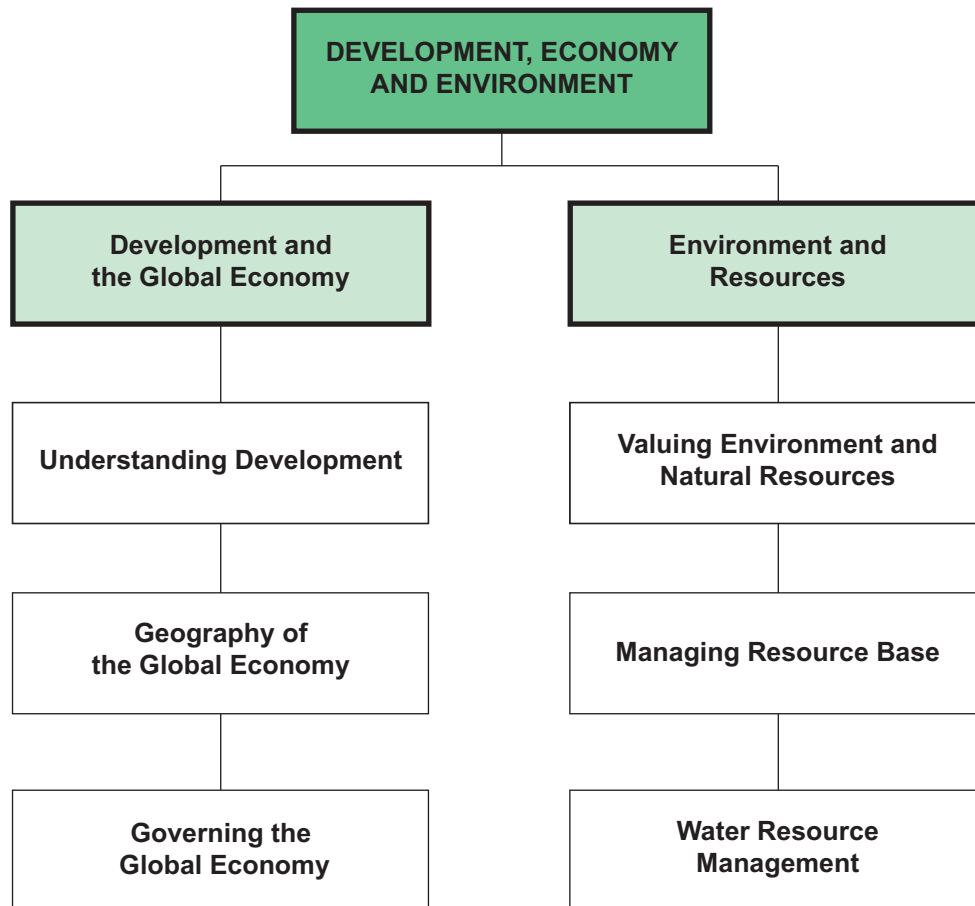
(c) Strategies to manage tropical deforestation

Theme 2 – Development, Economy and Environment

Human Geography focuses on the study of how humans modify the environment and in turn are affected by changes in the environment. It focuses on people in places and spaces to understand the complex, interconnected and divided world that we live in. Human geographers study the spatial organisation of human society at various scales, from the global to the personal. They recognise that place-based processes operate across and within different spatial scales. The uniqueness of different places and diversity of people are much appreciated and valued. Equally important is the consideration of different dimensions of human life, and how economic, political and environmental factors intersect and influence our behaviour and attitudes.

Theme 2 helps students understand how humans interact with the environment, in particular how we extract value from it in order to fulfil our material needs and achieve progress. Students will understand that the appraisal of natural resources and configuration of production systems vary across space and time. As a result, they will become more sensitive to cultural differences and the implications of their everyday decisions on the environment and communities living in different parts of the world.

Topic 2.1 examines the reciprocal relationship between economic growth and human development. Students will learn about the structure of the economy and analyse how the global economy is governed, with varying degrees of success, by different state and non-state actors. Topic 2.2 explores how humans obtain value from the environment through various activities undertaken by extractive industries. Students will also consider the contrasting experiences of countries endowed with an abundance of natural resources and the challenge of managing scarce water resources.



Topic 2.1 Development and the Global Economy
OVERVIEW
<p>There is rarely consensus on what ‘development’ means. It can mean different things to different people living in different, or even the same, places. Many human geographers argue that development is situated in particular institutional and social contexts, and therefore cannot be defined universally. Despite the challenge of developing a common understanding of development, international organisations such as the United Nations (UN) make use of ‘standard development indicators’ to monitor the improvements in various domains of life. Developmental strategies are often interpreted as well-intended actions to create opportunities and ensure freedom for individuals to fulfil their desires. It is also believed that economic growth can contribute towards development, thus we need to examine how configurations of economic activities across space affect people. This topic explores the connections between development and the global economy with an emphasis on the spatial (re)configuration of commodity chains. Students will learn about different perspectives of development and apply their understanding to analyse the capitalist space-economy.</p>
LEARNING OUTCOMES
<p><i>By the end of this topic, students should be able to discuss:</i></p> <ul style="list-style-type: none"> • the reciprocal relationship between global economic growth and human development • the critique of different perspectives on development and ways to measure and monitor it • the nature of the global economy and the impact of economic activities on society and the environment • the role and influence of different actors in governing the global economy
CONTENT
<p>1. Understanding Development</p> <p>(a) Different ways of thinking about development</p> <ul style="list-style-type: none"> – core-periphery model and dependency theory – bottom-up development <p>(b) Measuring development</p> <ul style="list-style-type: none"> – measuring development using the Human Development Index (HDI) and Multidimensional Poverty Index (MPI) – variations in the levels of development – Millennium Development Goals (MDGs) and post-2015 Development Agenda
<p>2. Geography of the Global Economy</p> <p>(a) Structure of the economy</p> <ul style="list-style-type: none"> – sectors of the economy: primary, secondary, tertiary and quaternary – economic growth and changes in the structure of the economy as development occurs <p>(b) Global production networks (GPNs)</p> <ul style="list-style-type: none"> – factors that led to the emergence of a new international division of labour (NIDL) – production circuit: inputs, transformation, distribution, consumption, additional inputs, control systems – intra-firm networks: control and coordination of different business functions – inter-firm networks: relationship with suppliers, sub-contractors and strategic partners <p>(c) Transnational corporations (TNCs)</p> <ul style="list-style-type: none"> – characteristics: able to coordinate and control cross-border operations, and able to take advantage of economic and socio-cultural differences by re-deploying resources and re-organising operations – socio-economic and environmental impact on home and host economies

3. Governing the Global Economy

- (a) Role of the state
 - regulator of economic activities
 - provider of public services and goods
 - business owner and investor
- (b) Influence of regional and international organisations
 - promoting intra-regional trade in the ASEAN Free Trade Area (AFTA)
 - global financial institutions (GFIs): the International Monetary Fund's (IMF) control of the global financial system and development assistance provided by the World Bank
 - the World Trade Organization's (WTO) regulation of global trade
- (c) Involvement of non-state actors
 - watchdogs, media agencies and standards organisations

Topic 2.2 Environment and Resources

OVERVIEW

The environment was a central concern in Geography. According to the theory of environmental determinism, the origins of which can be traced back to Ancient Greece, the natural environment is the basis of understanding human behaviour. More recently, however, human geographers have argued that human ingenuity can overcome the limits imposed by our environment. It is believed that in addition to its biophysical characteristics, the natural environment is constantly being redefined by our changing perceptions and aspirations. The dominant view, though being challenged increasingly, is that the environment is only useful as a resource to fulfil human needs. The challenge of managing natural resources well is made harder where natural resources extend beyond territorial boundaries. For example, more than 250 rivers and lakes extend into two or more countries. Also, not all resource-rich countries are able to achieve high levels of economic development. In the last decade, oil-rich countries such as Angola have achieved slower growth than non-oil producers like Cambodia for instance.

LEARNING OUTCOMES

By the end of this topic, students should be able to discuss:

- how different factors interplay to influence society's extraction of value from the environment
- different ways of valuing the environment, perspectives about population-resource relationships and resource appraisal
- the challenge of managing natural resources and extractive industries
- the strategies used to manage water scarcity, transboundary water resources and the implications of privatising water resources

CONTENT

1. Valuing the Environment and Natural Resources

- (a) Human-environment relationships conceived as a continuum bounded by the following:
 - nature-centred: non-human life has intrinsic value that is equal to that of humans
 - human-centred: non-human life has instrumental value in the creation of material goods to improve the quality of life for humans
- (b) Factors influencing resource appraisal
 - cultural: value systems and traditions
 - socio-economic: income levels, education and profitability
 - technological: knowledge and technical capability
 - political: national resource policies and influence of international organisations including the Organization of Petroleum Exporting Countries (OPEC)
- (c) Perspectives on the relationship between population and resources
 - different views including those of Thomas Malthus, Ester Boserup and David Harvey

2. Managing Resource Base

- (a) Nature of resources
 - classification of resources: perpetual, renewable, non-renewable and potential resources
 - resource availability: proven, conditional, hypothetical and speculative reserves
- (b) Extractive industries
 - commodification of resources and the global development of extractive industries
 - characteristics: location specific, capital and technology intensive, mixture of large private and state-owned firms
 - impact on the environment including the effect on the regenerative capacity of nature especially at environmentally sensitive areas
- (c) The 'resource curse' thesis: reasons for underperforming resource-rich countries
 - reliance on expat specialist labour to operate imported technologies
 - limited job creation due to highly mechanised production techniques
 - limited local production linkages
 - economic leakage due to the repatriation of revenue earned
 - exceptions to the 'resource curse': strategies to develop resource-rich countries

3. Water Resource Management

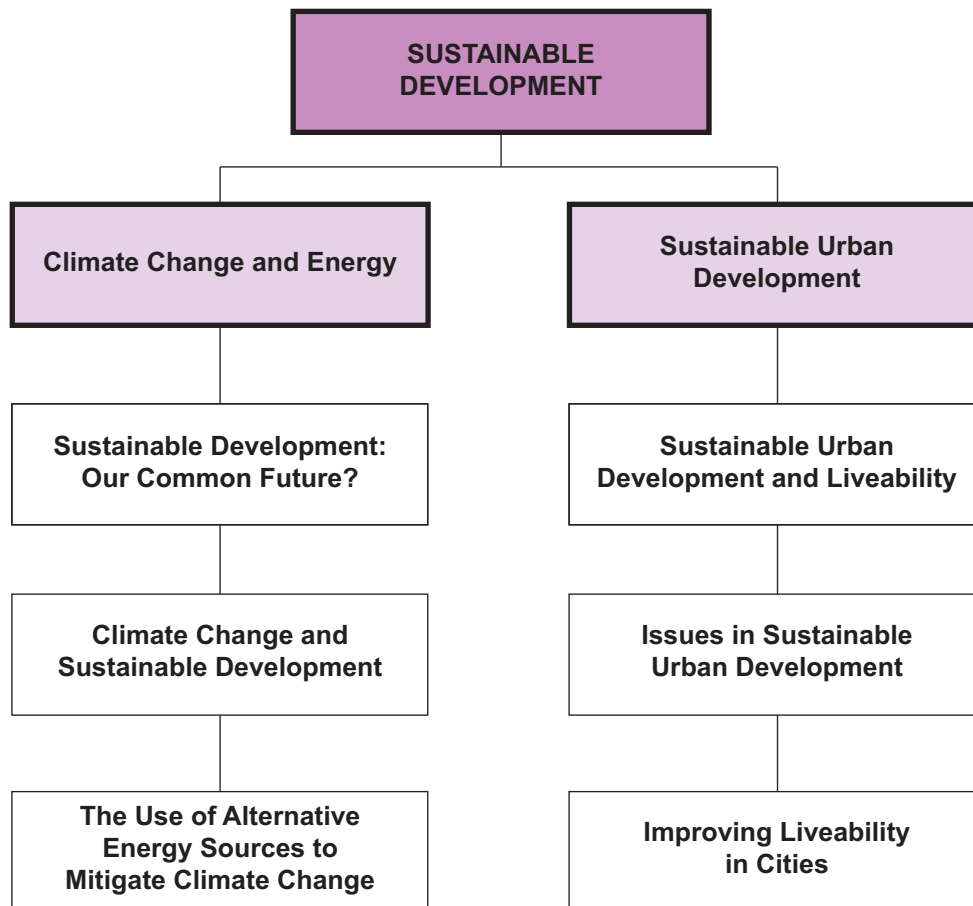
- (a) Water scarcity
 - variability of freshwater supply from lakes, rivers and groundwater
 - global patterns of freshwater usage and sources of water pollution
 - causes of water scarcity
 - strategies to manage water scarcity including conservation and desalination
- (b) Managing transboundary sources of water supply
 - understanding sources of water supply as common property
 - factors contributing to conflict as a result of competition over water supply
 - international water agreements and other strategies to manage transboundary sources of water supply and associated conflicts
- (c) Privatisation of water resources
 - considerations when assigning ownership of water resources to private or public sector
 - impact of privatising water resources on society and the environment

Theme 3 – Sustainable Development

With the release of the report 'Our Common Future'¹ by the World Commission on Environment and Development (WCED) in 1987, 'sustainable development' has become almost universally accepted to mean 'development that meets our current needs but not at the expense of future generations'. The pursuit of sustainable development is now stated as a principal policy goal of major global institutions such as the United Nations as well as many governments around the world. This theme develops students' understanding of sustainable development at various scales and in different contexts. It demonstrates how geographical perspectives can contribute towards our pursuit of sustainable development.

Topic 3.1 introduces the concept of sustainable development and the reasons that may have led some countries to resist efforts towards achieving sustainable development. Following this, the focus is on climate change and how it could impact sustainable development. Topic 3.2 questions the sustainability of urbanisation. As urbanisation continues globally, cities confront pressures to cater to the different needs of city dwellers on economic, environmental, and social fronts. There are also doubts with regard to the compatibility between sustainable development and urban liveability.

By pulling together the twin issues of climate change and urbanisation, Theme 3 helps students to become aware that barriers to our pursuit of sustainable development take various forms. These barriers manifest at the global, local, and even the personal scale. The vision of a common future that consists of a vibrant economy, harmonious society and healthy environment might be achievable. However, to realise this vision, it would take much effort from many parties.



¹ 'Our Common Future' is commonly referred to as the 'Brundtland Report'.

Topic 3.1 Climate Change and Energy
OVERVIEW
<p>Many scientists agree that contemporary climate change is caused mainly by human activities. The Intergovernmental Panel on Climate Change (IPCC) warns that climate change could distract from and compromise our pursuit of sustainable development. Climate change also impacts different aspects of our lives, covering the domains of politics, economics, society and environment. In this topic, candidates will learn about different responses to climate change and how communities continue their pursuit of sustainable development. By framing climate change as a scientific issue, the reduction in greenhouse gas (GHG) emissions is proposed as the main solution. This requires a reduction in our dependence on fossil fuels for energy. Through an evaluation of alternative sources of energy, students will gain an understanding of the range of economic, environmental and social dilemmas associated with the shift to alternative energy.</p>
LEARNING OUTCOMES
<p><i>By the end of this topic, students should be able to discuss:</i></p> <ul style="list-style-type: none"> • the contested nature of sustainable development and alternative energy • the processes underlying contemporary climate change in particular the influence of human activities • the effects of climate change on sustainable development • the responses to climate change in particular the use of alternative energy sources
CONTENT
<p>1. Sustainable Development: Our Common Future?</p> <p>(a) Definition of sustainable development according to 'Our Common Future' and its key tenets:</p> <ul style="list-style-type: none"> – the concept of 'needs', in particular the essential needs of the world's poor – the idea of 'limitations' imposed by the current level of technology and how society is organised on the environment's ability to meet present and future needs – sustainable development involves maximising the goals across three interdependent dimensions (economic, social and environmental), and yet may involve trade-offs <p>(b) The political and economic challenges in attaining sustainable development over space and time as exemplified through the following two international conferences:</p> <ul style="list-style-type: none"> – Rio de Janeiro 1992 – UN Conference on Environment and Development (a.k.a. Rio Earth Summit) – Rio de Janeiro 2012 – UN Conference on Sustainable Development (a.k.a. Rio+20)
<p>2. Climate Change and Sustainable Development</p> <p>(a) The science of climate change</p> <ul style="list-style-type: none"> – evidence of climate change since the last ice age – atmospheric processes that result in the enhanced greenhouse effect – relative significance of anthropogenic activities in climate change <p>(b) Possible effects of climate change on sustainable development</p> <p>(c) Responses to mitigate and adapt to climate change</p>

3. The Use of Alternative Energy Sources to Mitigate Climate Change

- (a) Energy use and the global carbon cycle
- different methods of energy production
 - variations of energy mix and energy consumption over time and space
 - the effects of the use of fossil fuels on the global carbon cycle
 - alternative energy sources and their potential to mitigate climate change
- (b) The Debate on alternative energy sources
- the promises of hydropower and either nuclear energy or biofuels, including that of energy security
 - the environmental, social and economic issues associated with hydropower, and either nuclear energy or biofuels

Topic 3.2 Sustainable Urban Development

OVERVIEW

More than half of the world's population live in urban areas today. The proportion of people living in urban areas is expected to grow especially in less developed regions. Experience has shown that while activities in cities drive economic growth, there are doubts about whether key decision makers at all levels of government are able to cope with the increasing number and size of cities in their countries. As a result, questions have been raised about the sustainability of urbanisation. For example, how should cities compete in the global economy in order to secure the livelihoods of their inhabitants? Will further urban development cause irreversible damage to the environment? How can cities meet the needs of different social groups and ensure the provision of basic needs to all? This topic explores sustainable development using the city as the unit of analysis. Students will learn about the economic, environmental and social pressures that cities experience, and how they are being managed. They will also discuss the range of political, socio-economic and environmental factors that affect urban liveability.

LEARNING OUTCOMES

By the end of this topic, students should be able to discuss:

- the goals of sustainable development as applied to cities
- the difficulties of measuring sustainable urban development
- the issues that confront cities in achieving sustainable development and liveability
- the range of strategies to achieve sustainable urban development and liveability

CONTENT

1. Sustainable Urban Development and Liveability

- (a) Urbanisation and cities
- defining 'urban' as an entity and a quality
 - urbanisation at the global scale and reasons for variations
 - global trends and projections of urban population change
- (b) Measuring sustainable urban development
- the economic, social and environmental dimensions of sustainable urban development
 - the use of relevant indicators to monitor sustainable urban development
 - the difficulty in deciding on what aspects to be measured and the selection of appropriate indicators
- (c) Urban liveability
- defining and measuring urban liveability
 - liveability and its relationship with sustainable urban development
 - political, socio-economic and environmental factors that affect urban liveability

2. Issues in Sustainable Urban Development

- (a) Management of non-hazardous solid waste
 - ecological footprints of cities
 - urban metabolism: linear nature of production, consumption and disposal in cities
 - strategies to manage non-hazardous solid waste
- (b) Management of slums
 - characteristics of urban slums and the reasons for their development, including the role of migration
 - strategies to improve the lives of slum dwellers
- (c) Management of traffic congestion
 - reasons for traffic congestion
 - impact of traffic congestion on cities and urban dwellers
 - strategies to ease traffic congestion in cities

3. Improving Liveability in Cities

- (a) Raising the quality of urban living space – Urban reimagining
 - reasons for urban reimagining
 - strategies to improve the image of cities
 - impact of urban reimagining on urban dwellers
- (b) Needs of different social groups in the city – Elderly, Youths, Disabled and Migrants¹
 - experiences of different social groups
 - issues affecting different social groups living in the city and their response
 - strategies to cater to the needs of different social groups
- (c) Responding to environmental hazards – Pluvial floods in cities
 - factors contributing to the occurrence of pluvial floods
 - impact of pluvial floods on urban dwellers
 - strategies to mitigate the effects of pluvial floods

¹students are required to learn about the **Elderly** and **one** other social group.

Theme 4 – Geographical Investigation

With guidance from the teacher, students will identify a suitable geographical question or hypothesis to carry out an investigation. This could be completed individually or in small groups. Students should devise research questions or hypotheses and follow through the investigation in the following areas:

A | Living with Rivers

- Factors influencing flood risk and ways to mitigate it
- Impact of wind direction on rainfall
- Influence of land use on infiltration rates

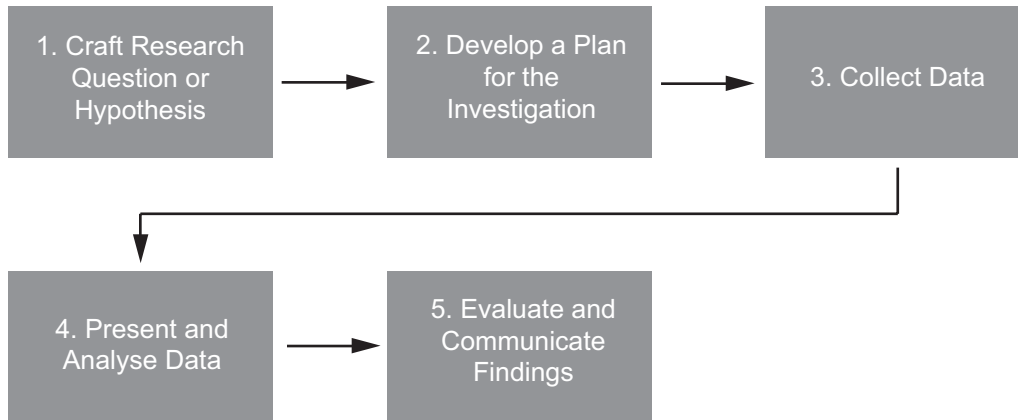
B | People and the Economy

- Impact of industries on local communities
- Impact of industries on the environment
- Linkages between TNCs and local enterprises

C | Urban Living Today

- Liveability of urban neighbourhoods
- Needs analysis of the elderly living in an urban neighbourhood
- Impact of urban imaging on urban dwellers

The investigation should reflect the following stages:



1. Craft Research Question or Hypothesis

Students should be able to craft geographical questions/hypotheses that are:

- at a suitable scale
- capable of research
- clearly defined

2. Develop a Plan for the Investigation

Students should be able to:

- establish the data needed to examine the question/hypothesis posed
- identify appropriate methods for collecting primary and secondary data (including sampling when required)
- consider research ethics and understand limitations imposed by resources
- minimise potential risks in undertaking investigation

3. Collect Data

Students should be able to:

- make use of primary and secondary data as appropriate to the question/hypothesis posed
- consider issues of accuracy and reliability in relation to the data being collected

4. Present and Analyse Data

Students should be able to:

- organise and represent data using appropriate methods (see Additional Notes on Data)
- analyse and interpret the data using appropriate qualitative and quantitative methods
- interpret the results in relation to the question/hypothesis posed

5. Evaluate and Communicate Findings

Students should be able to:

- present a summary of the findings, relating back specifically to the question/hypothesis posed
- present an evaluation of the investigation, including the methods used, data collected and possible limitations and improvements that could be made

Additional Notes on Data

Students are required to be familiar with the following types of data. Making sense of data and representing ideas using different graphical/tabular methods should be an integral part of learning Geography, including geographical investigations.

Maps | contour maps, choropleth maps, isoline maps, dot maps, flow-line maps, proportional symbols maps and cartograms

Graphs | pie charts, bars, histograms, scatter graphs, dispersion diagrams, triangular graphs, line graphs

Photographs | landscape photographs, aerial photographs and satellite images

Others | tables, diagrams, illustrations and cartoons

APPENDICES

A H2 Generic Level Descriptors for 12m SEQ sub-part (a)

Level	Marks	Descriptors
4	10–12	Response is consistently analytical and comprises purposeful explanations. Response addresses the question fully using accurate and detailed knowledge. Depth of relevant knowledge and understanding is evident throughout. Response is coherent and use of terminology is accurate throughout.
3	7–9	Response is analytical and explanatory rather than descriptive. There is a clear focus on the question. Response demonstrates relevant knowledge and understanding. The response is coherent and the use of terminology is mostly accurate.
2	4–6	Response includes analysis and explanation but is generally dominated by description. Response reflects understanding of the question and is generally relevant. Some parts of the response may be unclear. Use of terminology is limited.
1	1–3	Response lacks focus on the question. Response is generally fragmentary and lacks a clear structure and organisation. There may be many unsupported, brief or incomplete assertions and/or arguments with some inaccurate use of terminology.
0	0	No creditworthy response.

Note: The assessment involves qualitative rather than quantitative evaluation. Judgements on the level to be awarded to an answer will be based on the principle of 'best fit' determined by the descriptors within each level.

B H2 Generic Level Descriptors for 20m SEQ sub-part (b)

Level	Marks	Descriptors
5	17–20	Response is perceptive, logical and has strong evaluative elements. Evaluation is relevant and comprehensive. Strong evidence of synoptic thinking where knowledge from different topics is synthesised purposefully. Response fully addresses the demands of the question and features detailed and accurate knowledge reflecting depth of understanding of the subject content. The argument or discussion is coherent and well supported by relevant material. Use of terminology is accurate.
4	13–16	Response displays a sound evaluative element. There is some evidence of synoptic thinking through synthesising knowledge from different topics. Response is generally focussed on the demands of the question and features accurate knowledge, reflecting depth of understanding of the subject content. The argument or discussion is coherent and supported by relevant material. Use of terminology is accurate and appropriate.
3	9–12	Response is broadly evaluative rather than descriptive. Response addresses the question and features accurate knowledge, reflecting some understanding of the subject content. Argument or discussion is mainly coherent and supported by material which is largely relevant. Use of terminology is relevant and mostly accurate.
2	5–8	Response is largely descriptive. Response attempts to provide an argument to address the question. The weakest responses in this level may lack balance and/or depth. Response structure is broadly coherent but may lack clarity. Some lapses in use of terminology though generally accurate.
1	1–4	Response lacks focus on the question and may be largely irrelevant to it. Response is fragmentary and lacks clarity. There may also be unsupported assertions and/or arguments with limited or no use of relevant terminology.
0	0	No creditworthy response.

Note: The assessment involves qualitative rather than quantitative evaluation. Judgements on the level to be awarded to an answer will be based on the principle of ‘best fit’ determined by the descriptors within each level.

C H2 Generic Level Descriptors for Open-Ended 9m DRQ on Themes 1, 2 and 3

Level	Marks	Descriptors
3	7–9	<p>Response demonstrates a clear knowledge and understanding of the context in the question. Uses relevant, detailed and accurate factual information and conceptual understanding. Reflects strong critical thinking skills and may include perceptive insights for the strongest responses. Source(s) is well used to support the response.</p> <ul style="list-style-type: none"> Provides a logical and well-developed evaluation well founded on evidence and/or different viewpoints. <p>OR</p> <ul style="list-style-type: none"> Makes a decision which clearly addresses different elements of the issue and/or interest of different stakeholders
2	4–6	<p>A satisfactory response which is generally sound and contains relevant points, but may not always focus on the context in the question. Uses factual information and conceptual understanding that is generally appropriate to the given context but lacks detail and may contain some inaccuracies. Displays general critical thinking skills. Source(s) is used to support parts of the response.</p> <ul style="list-style-type: none"> Provides an evaluation, which may be limited in depth and sufficient elaboration in some parts. <p>OR</p> <ul style="list-style-type: none"> Shows some attempt to address different elements of the issue and/or views of different stakeholders when making a decision but is not well-developed
1	1–3	<p>Response shows a poor understanding of the context in the question. Uses basic factual information and conceptual understanding which has some, but limited relevance to the question. Source(s) is not used or not accurately used to support the response.</p> <ul style="list-style-type: none"> Provides little or no evaluation <p>OR</p> <ul style="list-style-type: none"> Evidence of decision-making, if present, is simple and may be flawed
0	0	No creditworthy response.

Note:

- The assessment involves qualitative rather than quantitative evaluation. Judgements on the level to be awarded to an answer will be based on the principle of 'best fit' determined by the descriptors within each level.
- The descriptors in each level may be worded differently in actual assessment to link them more to the questions set. However, regardless of the wordings used, the quality of responses expected of candidates in each level would not deviate from that stated in the generic level descriptors.

D H2 Generic Level Descriptors for Open-Ended 9m DRQ on Theme 4

Level	Marks	Descriptors
3	7–9	Response demonstrates accurate knowledge and understanding of geographical investigation skills and methods relevant to the given context. Provides a logical and well-developed evaluation, which may include perceptive insights for the strongest responses. Reflects strong critical thinking skills and a good understanding of the requirements of the question.
2	4–6	Response demonstrates good knowledge and understanding of geographical investigation skills and methods relevant to the given context. Provides an evaluation, which may be limited in depth and detail. Response reflects critical thinking skills in general but may not always be relevant to the question.
1	1–3	Response shows inadequate knowledge and understanding of geographical investigation skills and methods. Response has some, though limited, relevance to the given context. Provides little or no evaluation. May include material that is irrelevant to the question.
0	0	No creditworthy response.

Note:

1. The assessment involves qualitative rather than quantitative evaluation. Judgements on the level to be awarded to an answer will be based on the principle of 'best fit' determined by the descriptors within each level.
2. The descriptors in each level may be worded differently in actual assessment to link them more to the questions set. However, regardless of the wordings used, the quality of responses expected of candidates in each level would not deviate from that stated in the generic level descriptors.