

GEOGRAPHY SYLLABUS

Lower Secondary

Express

Normal (Academic)

Implementation starting with
2014 Secondary One Cohort



Ministry of Education
SINGAPORE

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1. INTRODUCTION

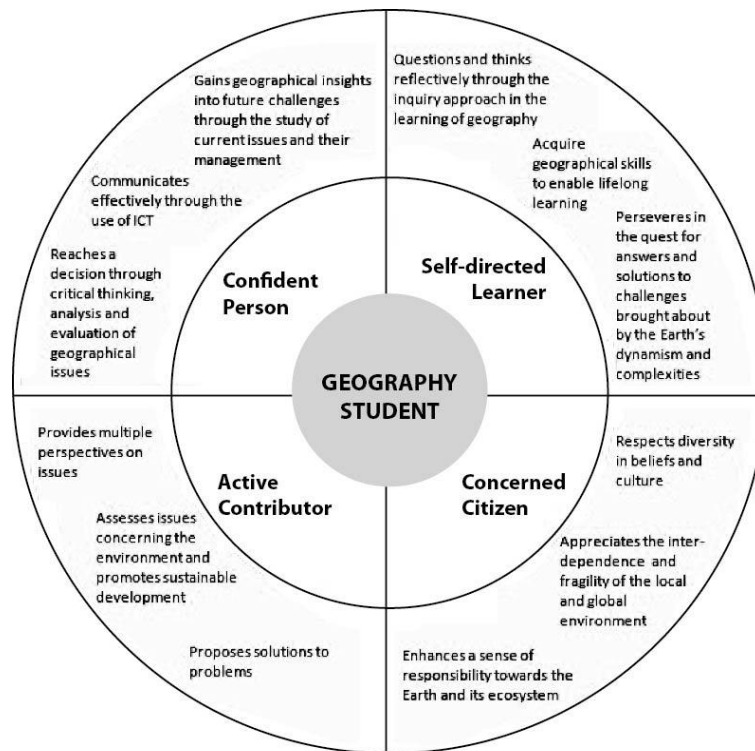
1.1 DESIRED OUTCOMES OF EDUCATION AND THE STUDY OF GEOGRAPHY IN SINGAPORE

The Desired Outcomes of Education (DOE) are attributes that educators aspire for our learners. These outcomes establish a common purpose for geography teachers, and serve as a compass to steer the teaching and learning process. The DOE for our learners are:

- a **confident person** who has a strong sense of right and wrong, is adaptable and resilient, knows himself, is discerning in judgment, thinks independently and critically, and communicates effectively;
- a **self-directed learner** who questions, reflects, perseveres and takes responsibility for his own learning;
- an **active contributor** who is able to work effectively in teams, is innovative, exercises initiative, takes calculated risks and strives for excellence; and
- a **concerned citizen** who is rooted to Singapore, has a strong civic responsibility, is informed about Singapore and the world, and takes an active part in bettering the lives of others around him.

The Lower Secondary Geography syllabuses will enable students to acquire a wide range of knowledge and skills to understand and explain physical and human phenomena; and other contemporary environmental and social issues that occur in different places and cultures. Equipped with the skills of gathering and analysing information, and an inquiring mind to seek answers to issues affecting our lives and the world we live in, geography students will be prepared for their roles as informed citizens in the 21st century. The subject also imbues in students an awareness of appropriate attitudes and values that promotes a positive geographical future; one that ensures the sustainability of our resources, people, country, and planet. An illustration of how Geography contributes towards the DOE in the Singapore education system is shown in Figure 1.

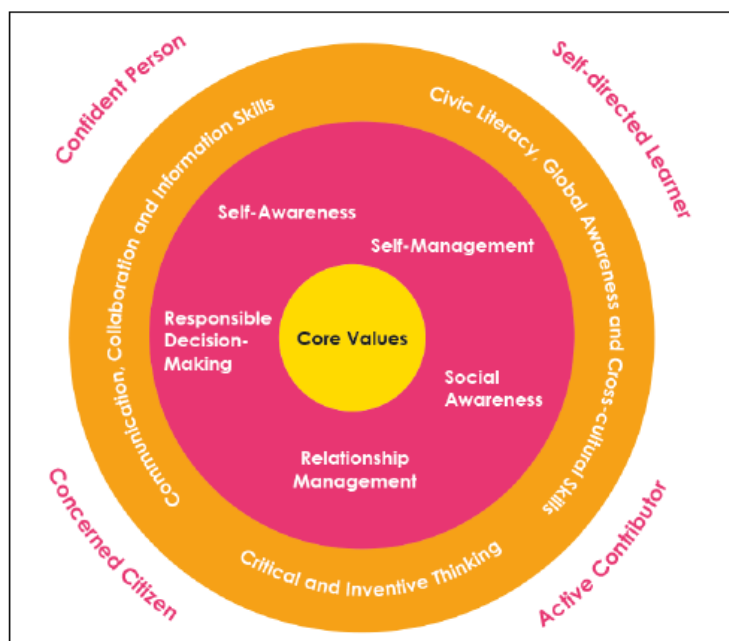
Figure 1: Desired Outcomes of Singapore’s Education through Geography



1.2 21ST CENTURY COMPETENCIES IN GEOGRAPHY

To nurture world ready students, the Lower Secondary Geography syllabuses equip students with the necessary knowledge, skills and values to succeed in the 21st Century (see Figure 2).

Figure 2: 21st Century Competencies in Geography



With its adoption of an issue-based approach focussing on contemporary geographical issues, the syllabuses provide students with an opportunity to explore geographical questions. Moreover, with the recommended use of *inquiry*, students learn to search for geographical data from a variety of sources in a discerning and responsible manner; developing **communication, collaboration and information skills** in the process. In analysing data and drawing connections to theory learnt, students exercise **critical thinking**. The examples and case studies help students understand why people in other places may see and construct the world differently. This promotes **civic literacy, global awareness and cross-cultural skills**.

1.3 AIMS OF LOWER SECONDARY GEOGRAPHY SYLLABUSES

The syllabuses aim to enable students to:

- develop an interest in geography;
- acquire geographical knowledge and develop a basic understanding of geography as a discipline/subject;
- gain global awareness of current geographical issues and future challenges;
- learn the process of geographical inquiry and to use it to make sense of new knowledge;
- develop skills in acquiring, communicating and applying geographical knowledge; and
- develop a concern for the environment and make informed judgments about human action/behaviour.

Learning Outcomes

Knowledge and Understanding

The syllabus intends for students to develop knowledge of:

- geographical concepts, terms and facts;
- components of physical and human environments;
- diverse spatial patterns of physical and human phenomena/features;
- relationships and interactions between and within physical and human phenomena at local, regional and global scales; and
- different approaches through which challenges faced can be managed by local, regional and global communities.

Skills

The syllabuses intend for students to develop the skills to:

- work effectively in teams to observe, collect and record geographical data obtained from both primary and secondary sources;
- derive knowledge and understanding from field experiences of places and natural environments;
- interpret maps, atlases, tables, graphs, photographs and fieldwork data;
- recognise patterns in geographical data and suggest relationships; and
- organise and present geographic information in a coherent way.

Values

Through their geographical training, students should develop:

- an interest in, and valuing of, the ways that the environment supports life;
- a sense of appreciation, care and responsibility for the quality of the environment; and
- sensitivity towards the attitudes, beliefs and values of people of different cultures.

1.4 THINKING GEOGRAPHICALLY

Geography provides students with a particular set of perspectives to make sense of Singapore and the complex and dynamically changing world. Central to understanding geography's way of thinking/perspective are a number of key concepts such as space, place scale, physical and human processes, environmental and cultural diversity, and interdependence.

The key concepts provide valuable insights into the nature of Geography because of their breadth of application to the content studied and the extent to which they are linked to other significant ideas within the subject. The key concepts may be used individually or in combination. For example, the use of place helps students understand why people originally settled along the banks of Singapore River and how Singapore has developed and changed over time. The concept of environment helps students to analyse the changes humans make to natural environments and better appreciate their impact so that the changes can be managed more wisely.

As students grow in familiarity with these key concepts, they will learn to put on the geographical lens, that is to think geographically to understand contemporary issues like deforestation, water shortage, energy crisis, floods, housing shortage and traffic congestion (see Figure 3).

Figure 3: Four Key Geographical Concepts

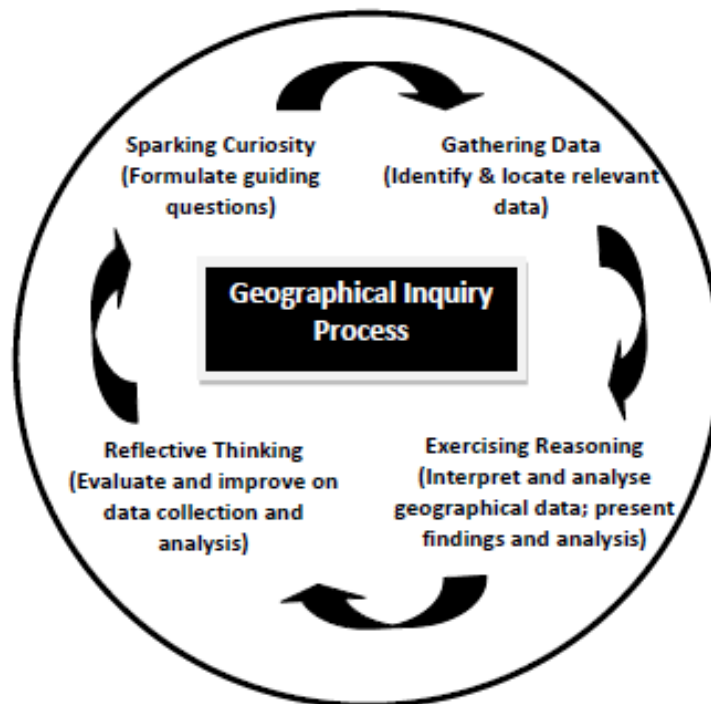
	Place	Space	Environment
Scale As far as possible, issues should be analysed at various scales from the personal and local, to the national, regional and global.	A place is a portion of the earth's surface given meaning by the people who live in it and use it.	A variety of physical and human factors influence the location and interdependence of places and the making of regions and landscapes.	An environment is the result of interaction of physical and human features creating the conditions and resources on which life on earth depends.
	Places result from the interaction of physical and human features in different ways.	The distributions and spatial patterns of physical and human features or phenomena have a significant impact on people's lives.	Interactions within and between human societies and natural environments cause changes in other aspects of the environment which may be beneficial or harmful to life.
	The unique characteristics of places can be interpreted and represented in different ways.	The need to move across space (spatial interaction) is a main driver in economic, social and cultural development.	Students should understand that human action can result in environmental changes. They should be aware of the need to respect and understand environments.
	Students should be aware of how people develop attachment to and form different mental images of different places. They should also appreciate how these images affect human behaviour.	Students should understand that spatial patterns and distributions are influenced by and reflect socio-economic and natural processes in action.	An example in the syllabus is the impact of traffic congestion on people and the environment.
	An example in the syllabus is communal spaces in neighbourhoods.	An example in the syllabus is global pattern of energy consumption.	

2. PEDAGOGY

2.1 GEOGRAPHICAL INQUIRY

The geographical inquiry approach seeks to empower students in their own learning and stimulate an interest in the subject. It provides students with the opportunity to 'ask relevant questions, to pose and define problems, to plan what to do and how to research, to predict outcomes and anticipate consequences, and to test conclusions and improve ideas.'¹

Figure 4: Geographical Inquiry Process



The framework for learning through inquiry (see Figure 4) begins with sparking curiosity through the use of stimulus materials to challenge students' assumptions and habitual responses and invite posing of questions. Thereafter through library research and fieldwork, geographical data is gathered. As students systematically organise the information they have collected, they will need to exercise sound reasoning to analyse and make connections between the pieces of information they have, and thereby construct new knowledge for themselves. They will analyse the information in the light of the question posed so as to arrive at a conclusion to the question before reflecting on their learning based on the inquiry process or conclusion drawn. Through the inquiry process, students will be challenged to examine their own thinking, feeling and doing and become self-reflective thinkers. These four aspects of sparking curiosity, gathering data, exercising reasoning and reflective thinking serve as the basic thinking processes that students will go through in a geographical inquiry.

¹ Roberts, M. (2003). Learning through Enquiry: Making Sense of Geography in the Key Stage 3 Classroom. UK: Geographical Association.

3. CONTENT

3.1 ISSUES-BASED FRAMEWORK

The Lower Secondary Geography syllabuses adopt an issue-based framework whereby students acquire an understanding of Geography through the study of significant environmental and human issues confronting Singapore and the world.

Using such an approach, each issue is unpacked systematically through a set of guiding questions:

- What is the issue? Which part(s) of the world is/are affected by the issue?
- Why is the issue located there?
- How does the issue affect human society and natural environments?
- How should it be managed?

Collectively these questions represent a way geographers unpack and investigate an issue and are underpinned by the four key geographical concepts of place, space, environment and scale.

3.2 SYLLABUS THEMES

3.2.1 Theme on Environment and Resources

At Secondary 1, the theme of **Environment and Resources** introduces students to the biophysical environment that supports life on Earth. Students learn how natural resources (e.g. forests, water and fossil fuels) are produced and sustained by environmental processes. They get to know how people value and use these resources, and how human activities affect their continual supply. Through the use of examples, students learn about the opportunities and constraints that these resources pose for human life and economic activity. They also study how the resources are being managed in selected countries and examine how these resources can be used in a sustainable manner.

3.2.2 Theme on Urban Living

In the second theme on **Urban Living**, students are introduced to the issues such as housing shortage, traffic congestion and floods. Through the use of examples, students learn how cities have adopted different strategies to manage these issues. They will appreciate the importance of planning and understand how changes to the urban landscape can directly affect them, and have an impact on their quality of life.

3.3 Overview of Lower Secondary Geography Express Course Syllabus

The Express Course syllabus comprises two introductory topics and six issues (see Figure 5). In Secondary One, there is an introduction on what students will learn in Geography. This topic inducts them into sub-fields of the subject (i.e. aspects of physical and human geography), methods of inquiry, data collection, analysis and representation. This is followed by an in-depth study of three issues on the first theme of 'Environment and Resources'. The three issues are *Deforestation*, *Water Shortage* and *Energy Crisis*.

For Secondary Two, there is an introduction to how and where people live. This topic explores the development of human society to present-day features of cities is provided to enable students to gain a broad understanding of how and where people live across time and space. This is followed by an in-depth study of three issues on the second theme of 'Urban Living', namely *Housing Shortage*, *Traffic Congestion* and *Floods*.

See Section 3.6 for the amplification of the syllabus.

Figure 5: Issues in the Express Course Syllabus

Theme 1: Environment and Resources	
Introduction: What will we learn in Geography?	
Issue 1: Tropical rainforest – How can we save the rainforest?	
1	What are tropical rainforests and what is deforestation?
2	Where are tropical rainforests found and which areas have been deforested? Why does deforestation occur?
3	How does deforestation impact people and the environment?
4	How should we manage deforestation?
Issue 2: Water Supply – Will our taps run dry?	
1	What is water shortage?
2	Which locations in the world are facing water shortage? Why does water shortage occur?
3	How does water shortage impact people and countries?
4	How can Singapore avoid water shortage?
Issue 3: Energy Crisis – How can we avoid an energy crisis?	
1	What is an energy crisis?
2	Is the level of energy consumption the same everywhere? Why do they differ?
3	How would an energy crisis impact society?
4	How can an energy crisis be avoided?
Theme 2: Urban Living	
Introduction: How and where do people live?	
Issue 4: Housing – How to provide homes for all?	
1	What is housing shortage?
2	Which cities in the world experience housing shortage? Why does housing shortage occur?
3	What are the consequences of housing shortage in cities?

4	What are some strategies used by cities to manage housing shortage and build inclusive homes?
Issue 5: Transport – How do we keep people moving?	
1	What is traffic congestion?
2	Where is traffic congestion found in the city and why does it occur?
3	How does traffic congestion affect people and the environment?
4	How do some cities manage traffic congestion?
Issue 6: Floods – How can cities prepare for floods?	
1	What are floods?
2	Which cities are prone to floods? Why are these cities more prone to floods than others?
3	How do floods affect people living in cities?
4	How should cities prepare for floods?

3.4 Overview of Lower Secondary Geography Normal (Academic) Course Syllabus

The N(A) syllabus comprises two introductory topics and four selected issues (see Figure 6).

In Secondary One, there is an introduction on what students will learn in Geography. This topic inducts them into sub-fields of the subject (i.e. aspects of physical and human geography), methods of inquiry, data collection, analysis and representation. This is followed by an in-depth study of two issues on the first theme of 'Environment and Resources'. The two issues are *Deforestation* and *Water Shortage*.

For Secondary Two, there is an introduction to how and where people live. This topic explores the development of human society to present-day features of cities is provided to enable students to gain a broad understanding of how and where people live across time and space. This is followed by an in-depth study of two issues on the second theme of 'Urban Living', namely *Housing Shortage* and *Floods*.

See Section 3.6 for the amplification of the syllabus.

Figure 6: Issues in the Normal (Academic) Course Syllabus

Theme 1: Environment and Resources	
Introduction: What will we learn in Geography?	
Issue 1: Tropical rainforest – How can we save the rainforest?	
1	What are tropical rainforests and what is deforestation?
2	Where are tropical rainforests found and which areas have been deforested? Why does deforestation occur?
3	How does deforestation impact people and the environment?
4	How should we manage deforestation?
Issue 2: Water Supply – Will our taps run dry?	
1	What is water shortage?
2	Which locations in the world are facing water shortage? Why does water shortage occur?

3	How does water shortage impact people and countries?
4	How can Singapore avoid water shortage?

Theme 2: Urban Living

Introduction: How and where do people live?

Issue 3: Housing – How to provide homes for all?

1	What is housing shortage?
2	Which cities in the world experience housing shortage? Why does housing shortage occur?
3	What are the consequences of housing shortage in cities?
4	What are some strategies used by cities to manage housing shortage and build inclusive homes?

Issue 4: Floods – How can cities prepare for floods?

1	What are floods?
2	Which cities are prone to floods? Why are these cities more prone to floods than others?
3	How do floods affect people living in cities?
4	How should cities prepare for floods?

3.5 Geographical Investigations

Geographical Investigation (GI) is integral to learning Geography and reflects the importance of inquiry. GI provides students with opportunities to:

- carry out a more student-directed geographical inquiry, and participate in fieldwork, as students are required to go beyond the classroom to actively look for and gather data to address the inquiry;
- apply and transfer what they have learnt from their geography lessons to a real world issue;
- be assessed more holistically in terms of a wider range of geographical skills; and
- develop the skills and attitudes to work individually and collaboratively in groups as students are required to complete both individual and group components.

Each issue is designed with an accompanying geographical investigation (GI) (see Figure 7). Students work in groups on one selected GI a year.

See Section 3.6 for the amplification of the syllabus.

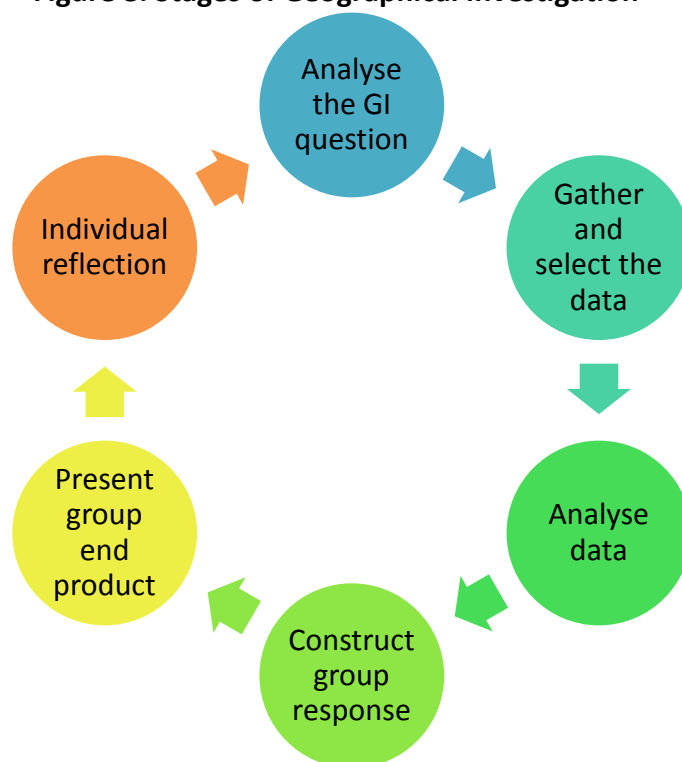
Figure 7: Overview of Geographical Investigations

	Issues	Geographical Investigation Questions
Secondary One	Tropical rainforest: How can we save the rainforest?	How do human activities affect our nature reserve/park? How can we conserve our nature reserve/park?
	Water supply: Will our taps run dry?	What is the quality of water in a waterway or water body? How do human activities affect the quality of water in a waterway or water body?
	Energy resources*: How can we avoid an energy crisis?	How do human activities and attitudes affect the energy consumption of a school? How can we reduce our school's energy consumption?
Secondary Two	Housing: How to provide homes for all?	What makes some places in the neighbourhood special to its residents?
	Transport*: How do we keep people moving?	What features of our public transport help to ensure a safe and comfortable journey?
	Floods: How can cities prepare for floods?	How effective are the measures taken to reduce floods in my neighbourhood? How can we increase residents' awareness and preparedness towards floods?

*For Express course only.

The GI process mirrors the geographical inquiry process in terms of the stages the students go through to answer the GI question and complete the group end product (see Figure 8).

Figure 8: Stages of Geographical Investigation



Stages	Students should:
Analyse the GI question	<ul style="list-style-type: none"> • Ask questions to understand the focus of the GI question • Determine the types of data required to answer the GI question
Gather and select the data	<ul style="list-style-type: none"> • Conduct preliminary research using online and print materials • Acquire fieldwork skills • Conduct fieldwork
Analyse data	<ul style="list-style-type: none"> • Interpret, analyse and represent data gathered
Construct group response	<ul style="list-style-type: none"> • Construct response to the GI question
Present group end product	<ul style="list-style-type: none"> • Present and communicate conclusion using an end-product
Individual reflection	<ul style="list-style-type: none"> • Analyse class data • Identify strengths, limitations and possible ways of improving the investigation

3.6 Amplification of Syllabuses

INTRODUCTION WHAT WILL WE LEARN IN GEOGRAPHY?	
Overview	
<p>Geography is about the real world and geographers help people to understand our complex and ever-changing world in order to make wise decisions about our future. Geographers study the world by exploring spatial patterns and relationships between locations at various scales. Geographers also examine interactions between human society and nature, how places and landscapes are formed (and represented) as well as the interconnections between human society and natural environments. When studying real world issues, geographers ask geographical questions, conduct fieldwork, analyse geographical data and think critically about possible solutions to ensure a sustainable future for all.</p>	
Guiding Question	Content
<p>What will we learn in Geography?</p>	<ul style="list-style-type: none"> • Branches of Geography <ul style="list-style-type: none"> ○ Physical Geography <ul style="list-style-type: none"> ▪ Atmosphere, Biosphere, Hydrosphere, and Lithosphere ○ Human Geography <ul style="list-style-type: none"> ▪ Population, Settlements, Development and Culture • Geographical Concepts <ul style="list-style-type: none"> ○ Place ○ Space ○ Scale ○ Environment • Geographical Inquiry <ul style="list-style-type: none"> ○ Geographical Questions <ul style="list-style-type: none"> ▪ What is the issue? ▪ Which part(s) of the world is/are affected by the issue? Why does this issue occur? ▪ How does the issue affect human society and natural environments? ▪ How should the issue be managed? ○ Geographical Data Collection and Analysis <ul style="list-style-type: none"> ▪ Fieldwork (i.e. primary data collection and analysis) ○ Geographical Data (i.e. graphs, maps, photographs, sketches, tables and text/quotes)

ISSUE 1 | TROPICAL RAINFOREST: HOW CAN WE SAVE THE RAINFOREST?

Overview

A tropical rainforest is one of the world’s natural ecosystems. Rainforests which once covered 14% of the earth’s land surface, now cover a mere 6%. There is a wide variety of plant and animal species in the tropical rainforest. These plants and animals have adapted to the hot and wet environment of the rainforest. Over the past 40 years, about a fifth of the Amazon rainforest has been deforested. In Southeast Asia, many countries have also lost large areas of their rainforests. The study of the tropical rainforests has become crucial as there is a greater threat to the forests now due to increased demand for timber, land for agriculture, cattle ranching, housing, industrial activities, mining and transport infrastructure.

In this issue, students will study the characteristics of the tropical rainforests and their uses to people. Through the study of the causes of deforestation of the Amazon rainforest and the consequent problems, students will understand the importance of tropical rainforests. They will examine the measures for sustainable use of tropical rainforests and the challenges involved in making decisions about such use.

Guiding Questions	Learning Outcomes	Content	Concepts	Main Terms
	<i>Students should be able to:</i>			
What are tropical rainforests and what is deforestation?	<ul style="list-style-type: none"> Describe the characteristics of tropical rainforests using photographs and sketches. Describe how tropical rainforests adapt to the tropical climate. Describe the uses and importance of tropical rainforests. Respect the different perspectives people have about rainforests. Define deforestation. 	<ul style="list-style-type: none"> Characteristics of tropical rainforest as broad-leafed, mainly evergreen trees <ul style="list-style-type: none"> Structure Adaptation Diversity of plant species Deforestation is the cutting down and removal of all or most of the trees in a forested area. Uses of tropical rainforests: <ul style="list-style-type: none"> Water catchment Green Lungs of the Earth Habitat to flora and fauna, and indigenous people Source of timber Medical application 	<p><u>Geographical Concept</u></p> <ul style="list-style-type: none"> Environment <p><u>Content Concept</u></p> <ul style="list-style-type: none"> Renewable resource Structure Adaptation Biodiversity 	<ul style="list-style-type: none"> Tropical rainforest Canopy Emergent Undergrowth Buttress root Evergreen Drip-tip leaves Water catchment Green Lungs of the Earth Flora Fauna Timber wood Medical application Deforestation
Where are tropical rainforests found and which areas	<ul style="list-style-type: none"> Describe the distribution of tropical rainforests and its deforestation using maps. 	<ul style="list-style-type: none"> Global distribution of tropical rainforest is influenced by climate Distribution of tropical rainforest in Singapore 	<p><u>Geographical Concept</u></p> <ul style="list-style-type: none"> Space 	<ul style="list-style-type: none"> Equatorial climate Agriculture

have been deforested? Why does deforestation occur?	<ul style="list-style-type: none"> Describe the rate of deforestation using graphs and tables. With reference to named examples, explain the causes of deforestation. 	<ul style="list-style-type: none"> Global distribution of deforested areas of tropical rainforest Causes of deforestation: <ul style="list-style-type: none"> Agriculture Cattle ranching Logging Mining 	<ul style="list-style-type: none"> Scale 	<ul style="list-style-type: none"> Cattle ranching Logging Mining
How does deforestation impact people and the environment?	<ul style="list-style-type: none"> Describe the impact of deforestation on people and the environment using text/quotes. Show concern for people and environment as a result of massive deforestation in some parts of the world. 	<ul style="list-style-type: none"> Impact of deforestation on people and the environment: <ul style="list-style-type: none"> Environment <ul style="list-style-type: none"> Loss of biodiversity Loss of water catchment Increase risk of flooding with soil erosion and sedimentation Enhanced greenhouse effect Economic <ul style="list-style-type: none"> Depletion of natural resources Social <ul style="list-style-type: none"> Effect on indigenous people 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Place Environment <u>Content Concept</u> <ul style="list-style-type: none"> Economic development Sedimentation 	<ul style="list-style-type: none"> Loss of biodiversity Extinction Flood risk Water quality Soil erosion Enhanced greenhouse effect
How should we manage deforestation?	<ul style="list-style-type: none"> Describe the measures taken to manage deforestation in the Amazon and conserve the rainforest in Singapore. Explain the measures taken to manage deforestation in the Amazon and conserve the rainforest in Singapore. Describe the benefits and challenges of measures taken to manage deforestation in the Amazon and conserve the rainforest in Singapore. 	<ul style="list-style-type: none"> Conservation of tropical rainforest in Singapore and other countries <ul style="list-style-type: none"> Protection of forested areas Reforestation Controlled logging Public education 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Place Scale <u>Content Concept</u> <ul style="list-style-type: none"> Legislation Sustainable resource management 	<ul style="list-style-type: none"> Conservation Protection Reforestation Controlled logging

**GEOGRAPHICAL INVESTIGATION 1 | HOW DO HUMAN ACTIVITIES AFFECT OUR NATURE RESERVE/PARK?
HOW CAN WE CONSERVE OUR NATURE RESERVE/PARK?**

Rationale and Aims

Nature Reserves/ Parks are important green spaces in our living environment. They are valuable places for recreation, conservation, research and education. In the case of Singapore, the government has created green spaces through the creation of nature reserves and parks, which help to increase the liveability of our living environment. This geographical investigation provides you with an opportunity to explore the human activities taking place in a nature reserve/park and examine the strategies to conserve the nature reserve/park.

The aims of this geographical investigation are to:

1. explain how human activities (e.g. by individuals, non-governmental organisations and government agencies) can affect a nature reserve/ park; and
2. suggest ways we (e.g. individuals, non-governmental organisations and government agencies) can conserve a nature reserve/ park.

Learning Outcomes

Students should be able to:

Knowledge

- Explain how human activities (e.g. by individuals, non-governmental organisations and government agencies) can affect a nature reserve/ park.
- Describe the ways we (e.g. individuals, non-governmental organisations and government agencies) can conserve a nature reserve/ park.

Values/Attitudes

- Appreciate the importance of our nature reserves/ parks and understand the need for conservation.
- Understand that everyone has a role to play in conserving our nature reserves/parks.

Skills

Sparking Curiosity

- Pose questions to guide their investigation.

Gathering Data

- Identify relevant information via library and online searches.
- Apply random and systematic sampling appropriately.
- Observe and sketch the assigned sites and its features.
- Observe and take photographs of the assigned sites and its features.

Exercising Reasoning

Data Presentation

- Organise and present data through maps, tables, graphs, photographs and quotes.

Data Interpretation and Draw Conclusions

- Explain the data meaningfully, draw comparisons and identify relationships in order to arrive at reasoned conclusions.

Reflective Thinking

- Describe the strengths and limitations of the investigation.
- Suggest how the investigation can be improved.

ISSUE 2 | WATER SUPPLY: WILL OUR TAPS RUN DRY?

Overview

Water is a necessity to human life and as an input to agriculture and industries found in many countries. Without this resource, life as we know it would be impossible. As water is so readily available in Singapore, sometimes we take our water supply for granted. We may not be aware that our taps can run dry one day if our usage remains unabated and intervention measures are not taken to boost supply.

This issue introduces students to the issue of water shortage, which is defined here as usage exceeding available supply. Students will learn that Earth's freshwater supply is actually very limited. However due to increasing demand, the pressure on scarce water supplies is mounting. They will examine the causes and problems arising from water shortage as well as how Singapore has taken steps to avoid water shortage. Through this issue, it is envisioned that students would come to value water as a precious resource which has to be protected and used wisely.

Guiding Questions	Learning Outcomes	Content	Concepts	Main Terms
	<i>Students should be able to:</i>			
What is water shortage?	<ul style="list-style-type: none"> • Explain the hydrological cycle. • Identify the uses of water with reference to graphs. • Define water shortage. 	<ul style="list-style-type: none"> • Renewable supply of water through the hydrological cycle • Uses of water <ul style="list-style-type: none"> ○ Domestic (e.g. drinking, washing, cooking) ○ Economic (e.g. irrigation in agriculture and wafer fabrication) • Water shortage • Level of water usage exceeding available water supply 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Place • Environment <u>Content Concept</u> <ul style="list-style-type: none"> • Renewable resource • Water footprint 	<ul style="list-style-type: none"> • Hydrological cycle • Precipitation • Evaporation • Condensation • Transpiration • Surface runoff • Infiltration • Groundwater • Water shortage
Which locations in the world are facing water shortage? Why does water shortage occur?	<ul style="list-style-type: none"> • Describe the global distribution of water using maps. • Identify countries and regions, which are facing water shortage using graphs, maps and tables. • With reference to named examples, explain the causes of water shortage. • Appreciate that although Earth is a water planet, water 	<ul style="list-style-type: none"> • Distribution of water on Earth <ul style="list-style-type: none"> ○ Oceans ○ Freshwater in underground and surface storages • Locations in the world facing water shortage (e.g. northern Africa due to physical factors and central China due to human factors) • Causes of water shortage <ul style="list-style-type: none"> ○ Demand <ul style="list-style-type: none"> ▪ Population growth ▪ Affluence ○ Supply 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Space • Scale <u>Content Concept</u> <ul style="list-style-type: none"> • Water as a global system 	<ul style="list-style-type: none"> • Glaciers • Ice caps • Lakes • Rivers • Climate Change • Pollution

	conservation is crucial as freshwater supply is limited.	<ul style="list-style-type: none"> ▪ Seasonal rainfall ▪ Water pollution 		
How does water shortage impact people and the environment?	<ul style="list-style-type: none"> • Describe the impact of water shortage on people and the environment using photographs, sketches and text/quotes. 	<ul style="list-style-type: none"> • Impact of water shortage on people and the environment: <ul style="list-style-type: none"> ○ Domestic <ul style="list-style-type: none"> ▪ Increased difficulty in collecting water (e.g. Mali), water rationing (e.g. Singapore in the 1960s) ○ Economic <ul style="list-style-type: none"> ▪ Reduced agricultural yields (e.g. India) ▪ Increased cost of industrial production ○ Political <ul style="list-style-type: none"> ▪ Conflict over water supply (e.g. Mekong) 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Place • Environment <u>Content Concept</u> <ul style="list-style-type: none"> • Human development 	<ul style="list-style-type: none"> • Yield • Cost of industrial production
How can Singapore avoid water shortage?	<ul style="list-style-type: none"> • Describe the measures taken to avoid water shortage in Singapore. • Explain the measures taken to avoid water shortage in Singapore. • Describe the advantages and disadvantages of various measures to avoid water shortage in Singapore. • Appreciate human ingenuity in developing technology to overcome water shortage. 	<ul style="list-style-type: none"> • Water resource management in Singapore <ul style="list-style-type: none"> ○ Reduce water consumption <ul style="list-style-type: none"> ▪ Pricing (Water consumption tax) ▪ Public education ○ Increase water supply <ul style="list-style-type: none"> ▪ Local catchment water (e.g. Marina Barrage/Reservoir) ▪ Imported water (e.g. Singapore – Malaysia water agreements) ▪ NEWater ▪ Desalinated water ○ Conservation <ul style="list-style-type: none"> ▪ Protection of water resources 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Place • Scale <u>Content Concept</u> <ul style="list-style-type: none"> • Legislation • Public education • Sustainable resource management 	<ul style="list-style-type: none"> • Surface catchment • Reverse osmosis • Desalination

**GEOGRAPHICAL INVESTIGATION 2 | WHAT IS THE QUALITY OF WATER IN A WATERWAY OR WATER BODY?
HOW DO HUMAN ACTIVITIES AFFECT THE QUALITY OF WATER IN A WATERWAY OR WATER BODY?**

Rationale and Aims

In Singapore, various strategies are used to increase our water supply. Currently, our water catchment areas constitute two-thirds of Singapore's total land area. Waterways (e.g. rivers, canals) and water bodies (e.g. lakes, reservoirs and ponds) are interconnected and form part of the catchment area. They are often found close to where people live and work. Human activities can affect the quality of water in the waterways and water bodies. It is important to ensure good water quality to support aquatic life and cater to the needs of people. This geographical investigation provides you with an opportunity to explore a waterway or water body, its water quality and the impact of human activities on water quality.

The aims of this geographical investigation are to:

1. determine if the quality of water in a waterway or a water body is suitable for use by humans and able to support freshwater fishes; and
2. discuss how human activities (e.g. by individuals, industries and government agencies) could affect water quality.

Learning Outcomes

Students should be able to:

Knowledge

- Explain how water quality is measured and the acceptable range for use by humans and to support freshwater fishes.
- Describe how human activities (e.g. by individuals, industries and government agencies) affect the quality of water in Singapore and the assigned waterway or water body.

Values/Attitudes

- Appreciate water as a precious resource and the need for water conservation.
- Understand that everyone has a role to play in water conservation.
- Be aware that varying levels of water quality is required to support aquatic life and cater to the needs of people.

Skills

Sparking Curiosity

- Pose questions to guide their investigation.

Gathering Data

- Identify relevant information via library and online searches.
- Apply random and systematic sampling appropriately.
- Observe and sketch the assigned sites and its features.
- Observe and take photographs of the assigned sites and its features.
- Use equipment to gather data

Exercising Reasoning

Data Presentation

- Organise and present data through maps, tables, graphs, photographs and quotes.

Data Interpretation and Draw Conclusions

- Explain the data meaningfully, draw comparisons and identify relationships in order to arrive at reasoned conclusions.

Reflective Thinking

- Describe the strengths and limitations of the investigation.
- Suggest how the investigation can be improved.

ISSUE 3 | ENERGY RESOURCES: HOW CAN WE AVOID AN ENERGY CRISIS?²

Overview

The bulk of our energy needs today are met by fossil fuels (i.e. coal, oil and gas) that are formed some hundreds of millions of years ago. This finite resource however is being rapidly depleted as a result of population increase, industrial growth and rising affluence worldwide. Compounding this problem is the frequent disruption to energy supplies as a result of unexpected weather conditions and socio-political problems in fossil fuel producing countries. A shortage of fossil fuels will result in various socio-economic problems and may even spark wars. In order to avoid the energy crisis, we need to find ways to use energy more efficiently as well as alternative sources of energy.

In this issue, students will learn about the different types of fossil fuels as well as energy resources that humans had relied on in the past. They would be introduced to the features of an energy crisis and analyse the patterns of energy consumption in Singapore and selected countries. After exploring the socio-economic impact of an energy crisis, they will assess the strategies to avert an energy crisis.

Guiding Questions	Learning Outcomes	Content	Concepts	Main Terms
	<i>Students should be able to:</i>			
What is an energy crisis?	<ul style="list-style-type: none"> • Describe the uses of fossil fuels. • Explain how fossil fuels are formed. • Describe the features of an energy crisis. 	<ul style="list-style-type: none"> • Energy Resources <ul style="list-style-type: none"> ○ Early sources <ul style="list-style-type: none"> ▪ Animals ▪ Firewood ▪ Wind power ○ Fossil fuels • Types of fossil fuels: coal, oil and natural gas <ul style="list-style-type: none"> ○ Formation and distribution of fossil fuels ○ Uses of fossil fuels and its associated environmental problems • Energy Crisis <ul style="list-style-type: none"> ○ Depletion of fossil fuel reserves ○ Increase in energy costs 	<p><u>Geographical Concept</u></p> <ul style="list-style-type: none"> • Space • Environment <p><u>Content Concept</u></p> <ul style="list-style-type: none"> • Utilitarian value • Environmental depletion 	<ul style="list-style-type: none"> • Energy Resources • Renewable resource • Non-renewable resource • Fossil Fuels • Rock Cycle • Sedimentary Rock
Is the level of energy consumption the same everywhere? Why do they differ?	<ul style="list-style-type: none"> • Locate countries and regions that consume high levels of energy with the use of maps. • Describe the pattern of energy consumption in the world with the use of graphs and tables. 	<ul style="list-style-type: none"> • Energy Consumption of Singapore and Selected Countries (e.g. China and USA) <ul style="list-style-type: none"> ○ Current level of consumption ○ Past and future rate of growth • Reasons for High Energy Consumption 	<p><u>Geographical Concept</u></p> <ul style="list-style-type: none"> • Place • Space • Scale 	<ul style="list-style-type: none"> • Energy Consumption • Industrial Growth

² For Express Course only.

	<ul style="list-style-type: none"> • With reference to selected countries, explain why energy consumption has risen in recent decades. • Recognise that one's lifestyle decision impacts others and the natural environment. 	<ul style="list-style-type: none"> ○ Industrial growth (e.g. China, India, Singapore) ○ Affluence (e.g. USA) 	<u>Content Concept</u> <ul style="list-style-type: none"> • Carbon footprint • Human development 	
How would an energy crisis impact society?	<ul style="list-style-type: none"> • Explain how an energy crisis could impact society with the use of photographs, sketches and text/quotes. 	<ul style="list-style-type: none"> • Impact of Increased Energy Costs <ul style="list-style-type: none"> ○ Social <ul style="list-style-type: none"> ▪ Frequent interruption to electricity supply ▪ Increased cost of living ○ Economic <ul style="list-style-type: none"> ▪ Reduced competitiveness 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Place <u>Content Concept</u> <ul style="list-style-type: none"> • Standard of living 	<ul style="list-style-type: none"> • Cost of Living • Competitiveness
How can an energy crisis be avoided?	<ul style="list-style-type: none"> • Describe the measures to reduce energy consumption in Singapore and the world. • Describe the strategies of adapting to declining fossil fuel reserves. • Explain the strategies of adapting to declining fossil fuel reserves. • Describe the advantages and disadvantages of the different strategies of adapting to declining fossil fuel reserves. • Respect the views and opinions of others that may not be in agreement with one's own. 	<ul style="list-style-type: none"> • Reduce Energy Consumption (e.g. Singapore) <ul style="list-style-type: none"> ○ Energy conservation ○ Efficient use of energy • Alternative Energy Sources <ul style="list-style-type: none"> ○ Solar power (e.g. USA) ○ Wind power (e.g. Denmark) ○ Hydropower (e.g. China) ○ Nuclear energy (e.g. France) 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Environment • Scale <u>Content Concept</u> <ul style="list-style-type: none"> • Sustainable use of resources 	<ul style="list-style-type: none"> • Solar Power • Wind Power • Hydropower • Nuclear Energy

**GEOGRAPHICAL INVESTIGATION 3 | HOW DO HUMAN ACTIVITIES AND ATTITUDES AFFECT THE ENERGY CONSUMPTION OF A SCHOOL?
HOW CAN WE REDUCE OUR SCHOOL'S ENERGY CONSUMPTION?³**

Rationale and Aims

Our dependence on fossil fuels to meet increasing energy needs has contributed to a rise in the level of carbon emissions. This results in climate change which is said to be one of the greatest challenges facing human society in this century. There has been considerable evidence that links climate change to human activities. Thus, it is important for us to understand how our everyday activities and decisions can significantly affect global carbon emissions. Conducting an energy audit is one way to evaluate the individuals', households' and organisations' impact on the environment as it can show us how efficiently we use energy. The geographical investigation provides you with an opportunity to identify areas in the school with high/low energy consumption; discover human activities and attitudes that contributed to the school's amount of energy consumed and examine ways in which energy consumption may be reduced.

The aims of this geographical investigation are to:

1. determine the areas of high/low energy consumption in a school; and
2. discuss how human activities and attitudes affect a school's energy consumption and suggest ideas to reduce it.

Learning Outcomes

Students should be able to:

Knowledge

- Describe how human activities and attitudes (e.g. values/ awareness of students, teaching staff and non-teaching staff) affect the energy consumption of a school.
- Describe the ways in which we (i.e. students, teaching staff and non-teaching staff) can reduce our school's energy consumption.

Values/Attitudes

- Appreciate energy as a precious resource and the need for energy conservation.
- Understand that everyone has a role to play in energy conservation.

Skills

Sparkling Curiosity

- Pose questions to guide their investigation.

Gathering Data

- Identify relevant information via library and online searches.
- Apply random and systematic sampling appropriately.
- Construct a questionnaire and conduct interviews.
- Observe and take photographs of the assigned sites and its features.
- Conduct an energy audit

Exercising Reasoning

Data Presentation

- Organise and present data through maps, tables, graphs, photographs and quotes.

Data Interpretation and Draw Conclusions

- Explain the data meaningfully, draw comparisons and identify relationships in order to arrive at reasoned conclusions.

Reflective Thinking

³ For Express Course only.

	<ul style="list-style-type: none">• Describe the strengths and limitations of the investigation.• Suggest how the investigation can be improved.
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INTRODUCTION | HOW AND WHERE DO PEOPLE LIVE?

Overview

How and where people live is closely connected to the nature of human society. Although a large proportion of the world population lives in cities today, urban living was in fact uncommon in human history. For much of human existence, people lived among nomadic bands that hunted wild animals and gathered food. Subsequently, people became more rooted when agriculture appeared. People invested in farms to cultivate crops and practice animal husbandry. Since the late 18th century, people started to live in close proximity as more housing was built in existing built-up areas to meet the needs of the expanding working class. To facilitate the mass production and transportation of goods, cities were often established near waterways (e.g. rivers), sources of energy supply (e.g. coalfields) or raw materials (e.g. forests). Today, cities continue to grow in population size as a result of natural increase and rural-urban migration.

Guiding Question

Content

How and where do people live?

- Development of Human Society
 - Hunter-gatherer society
 - Hunt wild animals
 - Gather food from flora
 - Nomadic
 - Agrarian society
 - Cultivate plants
 - Domesticate animals
 - Sedentary
 - Industrial society
 - Commercial farming
 - Mass production of goods
 - Industrial cities
 - Location of industrial cities
 - Waterways (e.g. Shanghai)
 - Source of energy supply (e.g. Newcastle)
 - Source of raw materials (e.g. Seattle)
- Features of cities
 - Large population size due to natural increase and rural-urban migration
 - High population density
 - Cosmopolitan population
 - Built-up

ISSUE 4 | HOUSING: HOW TO PROVIDE HOMES FOR ALL?

Overview

With the turn of the 21st century, increasing numbers of people are moving to cities in search of better opportunities. This trend and the large number of young people, in their reproductive years, living in cities have resulted in rapid population growth in many cities around the world, including Singapore. Since 2007 more than half of the world's population live in cities.

This issue introduces students to the issue of housing shortage faced by many cities. Through examples, students will learn that rapid population growth often lead to housing shortage in cities. This results in poor living conditions, environmental pollution and social tension. Students will study the various approaches used by cities to manage housing shortages and meet the diverse needs of its residents, including the elderly. They will appreciate that housing shortage is a complex issue and requires multi-pronged solutions.

Guiding Questions	Learning Outcomes	Content	Concepts	Main Terms
	<i>Students should be able to:</i>			
What is housing shortage?	<ul style="list-style-type: none"> Define housing shortage. Describe the nature of housing shortage using photographs and sketches. 	<ul style="list-style-type: none"> Housing shortage <ul style="list-style-type: none"> Lack safe shelter Insufficient basic services 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Place <u>Content Concept</u> <ul style="list-style-type: none"> Carrying capacity 	<ul style="list-style-type: none"> Housing shortage Slums and squatter settlements
Which cities in the world experience housing shortage? Why does housing shortage occur?	<ul style="list-style-type: none"> Identify the location of cities experiencing housing shortage using maps. Describe the extent of housing shortages in cities using graphs and tables. Using named examples of cities, explain the reasons for housing shortage. 	<ul style="list-style-type: none"> Location of cities that experience housing shortage Reasons for housing shortage <ul style="list-style-type: none"> Rapid population growth <ul style="list-style-type: none"> Rural-urban migration High birth rates Competing landuse Limited supply of land 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Place Space <u>Content Concept</u> <ul style="list-style-type: none"> Urbanisation 	<ul style="list-style-type: none"> Migration Rural-urban migration Birth rates
What are the consequences of housing shortage in cities?	<ul style="list-style-type: none"> Describe the consequences of housing shortage using photographs, sketches and text/quotes. Show concern for people who live in poor quality housing. 	<ul style="list-style-type: none"> Consequences of housing shortage <ul style="list-style-type: none"> Homelessness Slums and squatter settlements <ul style="list-style-type: none"> Environmental pollution Low level of health due to poor living conditions Vulnerability 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Place Environment <u>Content Concept</u>	<ul style="list-style-type: none"> Homelessness Social tension Pollution

			<ul style="list-style-type: none"> • Environmental degradation 	
<p>What are some strategies used by cities to manage housing shortage and build inclusive homes?</p>	<ul style="list-style-type: none"> • Describe and explain the strategies used by Singapore and other cities to manage housing shortage. • Describe the strategies used by Singapore to build inclusive homes. • Explain the challenges faced by Singapore and other cities to manage housing shortage. • Respect the resilience shown by people to improve their living conditions. 	<ul style="list-style-type: none"> • Strategies to manage housing shortage <ul style="list-style-type: none"> ○ Slum upgrading ○ Provision of public housing • Inclusive housing <ul style="list-style-type: none"> ○ Affordable housing ○ Facilities and amenities for all ages ○ Strong sense of place and belonging 	<p><u>Geographical Concept</u></p> <ul style="list-style-type: none"> • Place • Scale <p><u>Content Concept</u></p> <ul style="list-style-type: none"> • Legislation • Government policy 	<ul style="list-style-type: none"> • Self-help scheme • Public housing • New towns • Private sector

GEOGRAPHICAL INVESTIGATION 4 | WHAT MAKES SOME PLACES IN THE NEIGHBOURHOOD SPECIAL TO ITS RESIDENTS?

Rationale and Aims

Housing is a challenging and complex issue faced by many cities today. Though Singapore does not face the problem of widespread housing shortages, it is critical that Singapore provides inclusive housing for its people. The neighbourhood contains many gathering places of everyday life. It is a place where interactions among residents often happen and over time, residents gradually develop a strong sense of place and belonging (i.e. sense of familiarity and attachment) to the neighbourhood. However, as people identify and relate to the neighbourhood in different ways, the relationships and memories formed, and meanings that residents attach to these places would also be different. This geographical investigation provides you with an opportunity to explore the neighbourhood, discover places that are special to its residents and understand their reasons why these places are special to them as well as how the characteristics of these places may contribute to the residents' sense of familiarity and attachment.

The aims of this geographical investigation are to:

1. discover places in the neighbourhood that are special to the residents and understand the reasons why; and
2. understand that different residents may feel differently about the different places in the neighbourhood.

Learning Outcomes

Students should be able to:

Knowledge

- Describe the characteristics (e.g. natural, cultural, aesthetical design) of places and explain the reasons that may make some places in neighbourhoods special to different groups of residents.
- Describe the profile of the residents, the history, development and characteristics of the assigned neighbourhood.

Values/Attitudes

- Appreciate the uniqueness of a neighbourhood.
- Appreciate that people hold different meanings about their neighbourhood.

Skills

Sparking Curiosity

- Pose questions to guide their investigation.

Gathering Data

- Identify relevant information via library and online searches.
- Apply random and systematic sampling appropriately.
- Construct a questionnaire and conduct interviews.
- Observe and take photographs of the assigned sites and its features.

Exercising Reasoning

Data Presentation

- Organise and present data through maps, tables, graphs, photographs and quotes.

Data Interpretation and Draw Conclusions

- Explain the data meaningfully, draw comparisons and identify relationships in order to arrive at reasoned conclusions.

Reflective Thinking

- Describe the strengths and limitations of the investigation.
- Suggest how the investigation can be improved.

ISSUE 5 | TRANSPORT: HOW DO WE KEEP PEOPLE MOVING?⁴

Overview

Rapidly increasing populations are a problem in all large cities throughout the world. With increasing population, comes the issue of mobility in cities. People in cities have to commute daily between their homes and work places. They have to commute as they work in one place and live in another place. In this issue, students will learn about the challenges associated with mobility and how different cities have used a range of measures to move masses of people in an affordable manner. Some cities build more roads and highways, yet others have an efficient public transport system. Students will learn how some cities integrated transport and land use strategy to reduce traffic problems and improve the urban environment. In such cities, development is shifted to areas outside the city centre that are served by mass rapid transit and expressways. From the study, students will also appreciate the need to reduce car usage and accept alternative modes of urban transport.

Guiding Questions	Learning Outcomes	Content	Concepts	Main Terms
	<i>Students should be able to:</i>			
What is traffic congestion?	<ul style="list-style-type: none"> Describe the characteristics of urban transport using photographs and sketches. Define traffic congestion. 	<ul style="list-style-type: none"> Characteristics of urban transport: <ul style="list-style-type: none"> Variety of transport modes Density of transport network Quality of transport infrastructure Traffic congestion <ul style="list-style-type: none"> A situation where there are more vehicles than the road can handle Characterised by slower speeds, longer trip times, and increased vehicular queue 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Place <u>Content Concept</u> <ul style="list-style-type: none"> Carrying capacity 	<ul style="list-style-type: none"> Mobility Modes of transportation Traffic congestion Public transport Private transport Infrastructure
Where is traffic congestion found in the city and why does it occur?	<ul style="list-style-type: none"> Describe the distribution of traffic congestion in the city using maps. With reference to Singapore and named examples, explain the causes of traffic congestion in the city. 	<ul style="list-style-type: none"> Concentration of traffic congestion in the city Causes of traffic congestion in Singapore and other cities <ul style="list-style-type: none"> Separation of work and residential areas Movement from one part of the city to another to obtain or provide goods and services Inadequate transport infrastructure and poor provision of transport services 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Place Scale <u>Content Concept</u> <ul style="list-style-type: none"> Urbanisation Landuse planning 	<ul style="list-style-type: none"> Peak hour Transport services Commute

⁴ For Express Course only.

			<ul style="list-style-type: none"> • Connectivity • Accessibility 	
How does traffic congestion affect people and the environment?	<ul style="list-style-type: none"> • Describe the impact of traffic congestion on people and the environment using graphs, tables and text/quotes. • Show concern for people who live in cities with severe traffic congestion. 	<ul style="list-style-type: none"> • Impact of traffic congestion in Singapore and other cities <ul style="list-style-type: none"> ○ People <ul style="list-style-type: none"> ▪ Reduced productivity ▪ Stress on physical and mental health ○ Environment <ul style="list-style-type: none"> ▪ Air pollution (e.g. smog) ▪ Noise pollution 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Place • Environment <u>Content Concept</u> <ul style="list-style-type: none"> • Environmental degradation • Quality of life 	<ul style="list-style-type: none"> • Productivity • Physical health • Mental health • Smog
How do some cities manage traffic congestion?	<ul style="list-style-type: none"> • Describe and explain the strategies used by Singapore and other cities to manage traffic congestion. • Describe the benefits and challenges of various strategies used by Singapore and other cities to manage traffic congestion. • Appreciate the challenges faced by planners in managing transport issues. 	<ul style="list-style-type: none"> • Measures taken to manage traffic congestion in Singapore <ul style="list-style-type: none"> ○ Making public transport a choice mode <ul style="list-style-type: none"> ▪ Integrated public transport system ▪ Bus lanes schemes ▪ Increasing capacity and frequency of buses and rails ○ Managing road usage <ul style="list-style-type: none"> ▪ Road pricing ▪ Increase parking fees ▪ Enhanced traffic monitoring ▪ Measures taken by other cities to manage traffic congestion ○ Improving public transport (e.g. Curitiba) <ul style="list-style-type: none"> ▪ Building an integrated public transport system ▪ Increasing capacity and frequency ○ Other measures <ul style="list-style-type: none"> ▪ Telecommuting ▪ Encourage cycling (e.g. Copenhagen) 	<u>Geographical Concept</u> <ul style="list-style-type: none"> • Place • Scale <u>Content Concept</u> <ul style="list-style-type: none"> • Legislation • Government policy 	<ul style="list-style-type: none"> • Road pricing • Car pooling • Integrated public transport system

GEOGRAPHICAL INVESTIGATION 5 | WHAT FEATURES OF OUR PUBLIC TRANSPORT HELP TO ENSURE A SAFE AND COMFORTABLE JOURNEY?⁵

Rationale and Aims

Mobility influences the quality of life in cities to a large extent. A majority of the people in the city commute via different modes of public transport, such as buses, Mass Rapid Transit and Light Rail Transit. Certain features of the public transport such as the presence of barrier gates in train stations and hand rails for standing passengers, help to ensure a safe and comfortable journey for commuters. This geographical investigation provides you with an opportunity to explore these features of public transport and understand the different views of commuters on the features of public transport that help to ensure a safe and comfortable journey.

The aims of this geographical investigation are to:

1. describe and explain the features of public transport that help to ensure a safe and comfortable journey; and
2. understand the different views of commuters on the features of public transport that help to ensure a safe and comfortable journey.

Learning Outcomes

Students should be able to:

Knowledge

- Describe and explain the features of public transport (bus or rail) in Singapore that help to ensure a safe (e.g., top speed limiter in buses) and comfortable (e.g., air conditioning) journey for commuters.
- Describe the different needs and concerns about safety and comfort of commuters (e.g., adults, elderly, families with young children) using public transport.

Values/Attitudes

- Appreciate the features of public transport that help to ensure a safe and comfortable journey for different groups of commuters.
- Appreciate that commuters have different views about the features of public transport that help to ensure a safe and comfortable journey.

Skills

Sparking Curiosity

- Pose questions to guide their investigation.

Gathering Data

- Identify relevant information via library and online searches.
- Apply random and systematic sampling appropriately.
- Construct a questionnaire and conduct interviews.
- Observe and take photographs of the assigned sites and its features.

Exercising Reasoning

Data Presentation

- Organise and present data through maps, tables, graphs, photographs and quotes.

Data Interpretation and Draw Conclusions

- Explain the data meaningfully, draw comparisons and identify relationships in order to arrive at reasoned conclusions.

Reflective Thinking

- Describe the strengths and limitations of the investigation.
- Suggest how the investigation can be improved.

⁵ For Express Course only.

ISSUE 6 | FLOODS: HOW CAN CITIES PREPARE FOR FLOODS?

Overview

The destructive power of floods is amplified in cities as a result of its built-up environment and its high population density. Also, the social and economic loss could potentially be huge when public infrastructure and private property are inundated by flood waters. Although it is not able to halt the occurrence of floods completely, cities can mitigate its impacts effectively through investments in infrastructure and enhancing the disaster preparedness of its residents. Unfortunately, given the many problems cities face today, the risk of flooding is not always the priority of governments and dealt with sufficiently.

In this issue, students will learn about the nature and causes of floods. They will analyse the vulnerability of cities in different parts of the world and understand how and when floods occur in these locations. They will explore how floods impact people before assessing the range of strategies that cities could adopt.

Guiding Questions	Learning Outcomes	Content	Concepts	Main Terms
	<i>Students should be able to:</i>			
What are floods?	<ul style="list-style-type: none"> Describe the types of floods. Explain the causes of floods. 	<ul style="list-style-type: none"> Types of floods <ul style="list-style-type: none"> Coastal flood River flood Flash flood Causes of floods <ul style="list-style-type: none"> Intensity, frequency and duration of rainfall Snowmelt Storm surge 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Scale <u>Content Concept</u> <ul style="list-style-type: none"> Excess overland flow 	<ul style="list-style-type: none"> Floods Rainfall Snowmelt Storm surge
Which cities are prone to floods? Why are these cities more prone to floods than others?	<ul style="list-style-type: none"> Describe the location of cities prone to floods using maps. Explain why some cities are prone to floods with the use of photographs, sketches and text/quotes. 	<ul style="list-style-type: none"> Cities prone to floods (e.g. New Orleans, USA and Manila, Philippines) Factors contributing to floods <ul style="list-style-type: none"> Height above sea level Permeability of surface cover Channel capacity Proximity to water bodies 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Space Place Environment <u>Content Concept</u> <ul style="list-style-type: none"> Location 	<ul style="list-style-type: none"> Permeability Drainage capacity
How do floods affect people living in cities?	<ul style="list-style-type: none"> Describe the socio-economic impact of floods with the use of graphs, tables and text/quotes. 	<ul style="list-style-type: none"> Impacts of floods <ul style="list-style-type: none"> Social Impacts <ul style="list-style-type: none"> Injuries, spread of diseases and loss of lives Homelessness Disruption to clean water supply 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Environment <u>Content Concept</u> <ul style="list-style-type: none"> Natural hazard 	<ul style="list-style-type: none"> Social impacts Economic impacts

	<ul style="list-style-type: none"> Show concern for communities that are affected by natural hazards. 	<ul style="list-style-type: none"> Economic Impacts <ul style="list-style-type: none"> Damage to machinery and equipment Damage to transport infrastructure Disruption to energy supply 		
How should cities prepare for floods?	<ul style="list-style-type: none"> Describe the strategies used in Singapore and other cities to mitigate the impact of floods. Explain the strategies used to mitigate the impact of floods. Describe the benefits and challenges of various strategies used to mitigate the impact of floods. Respect the views and opinions of others that may not be in agreement with theirs. 	<ul style="list-style-type: none"> Mitigation Strategies Used in Singapore and Other Cities <ul style="list-style-type: none"> Regulation <ul style="list-style-type: none"> Zoning Elevated properties Investment in Infrastructure <ul style="list-style-type: none"> Levees and floodwalls Channel improvement Disaster preparedness <ul style="list-style-type: none"> Forecasting and warning system Evacuation drills 	<u>Geographical Concept</u> <ul style="list-style-type: none"> Environment Scale <u>Content Concept</u> <ul style="list-style-type: none"> Legislation Human intervention Public education 	<ul style="list-style-type: none"> Regulation Zoning Platform level Levees Flood walls Channel improvement

**GEOGRAPHICAL INVESTIGATION 6 | HOW EFFECTIVE ARE THE MEASURES TAKEN TO REDUCE FLOODS IN MY NEIGHBOURHOOD?
HOW CAN WE INCREASE RESIDENTS' AWARENESS AND PREPAREDNESS TOWARDS FLOODS?**

Rationale and Aims

Singapore has a tropical climate with high rainfall and warm temperatures. Monthly average rainfall ranges from an average of 130mm in June to more than 300mm in December. Despite high rainfall throughout the year, flood risk in Singapore is low due to effective drainage management and flood control by our national water agency, Public Utilities Board (PUB). Nevertheless some low-lying areas in Singapore are still prone to flooding especially when rainfall intensity is high. Floods disrupt public life and result in economic loss. To effectively mitigate the impacts of floods, measures should be adopted at various levels from the personal to the national. This geographical investigation provides you with the opportunity to examine the effectiveness of measures to reduce floods in a neighbourhood as well as to discover residents' awareness and preparedness towards floods.

The aims of this geographical investigation are to:

1. examine the effectiveness of measures taken to reduce floods in a neighbourhood; and
2. discover residents' awareness and preparedness towards floods.

Learning Outcomes

Students should be able to:

Knowledge

- Describe flood events in a neighbourhood.
- Describe and explain the measures taken to reduce floods in a neighbourhood.
- Describe the steps taken to increase awareness and preparedness towards floods among Singaporeans.

Values/Attitudes

- Appreciate that it takes time to increase people's awareness and preparedness towards floods.
- Understand that planners and residents have a role to play in mitigating floods.

Skills

Sparkling Curiosity

- Pose questions to guide their investigation.

Gathering Data

- Identify relevant information via library and online searches.
- Apply random and systematic sampling appropriately.
- Construct a questionnaire and conduct interviews.
- Observe and take photographs of the measures to reduce floods in the assigned sites.

Exercising Reasoning

Data Presentation

- Organise and present data through maps, tables, graphs, photographs and quotes.

Data Interpretation and Draw Conclusions

- Explain the data meaningfully, draw comparisons and identify relationships in order to arrive at reasoned conclusions.

Reflective Thinking

- Describe the strengths and limitations of the investigation.
- Suggest how the investigation can be improved.

4. ASSESSMENT

4.1 PURPOSE OF ASSESSMENT

Assessment in the syllabuses is aligned to the MOE Assessment Philosophy which comprises three key messages:

- Assessment is integral to the learning process.
- Assessment begins with clarity of purpose.
- Assessment should gather information to inform future practices.

As such, assessment will comprise both Assessment for Learning and Assessment of Learning. In the former, assessment activities are designed to provide information to be used as feedback to modify practices by teachers and input to help students improve on their learning. In the latter, assessment activities are designed to provide judgement about students' attainment of the intended learning outcomes in the syllabuses.

4.2 ASSESSMENT OBJECTIVES (AO)

In the syllabuses, the geographical knowledge and skills to be assessed are defined in the Assessment Objectives (AOs). These AOs are as shown below.

AO1: Knowledge

Students should be able to:

- demonstrate relevant factual knowledge – geographical facts, concepts, processes, interactions and trends; and
- demonstrate knowledge of geographical inquiry process (formulating questions, gathering data, exercising reasoning and reflective thinking).

AO2: Critical Understanding and Constructing Explanation

Students should be able to:

- select, organise and apply concepts, terms and facts learnt;
- construct explanation and undertake analysis; and
- describe the strengths and limitations of geographical investigation undertaken and of the conclusions reached (*applicable to geographical investigation only*).

AO3: Interpreting and Evaluating Geographical Data

Students should be able to:

- comprehend and extract relevant information from geographical data (numerical, diagrammatic, pictorial and graphical forms);
- use and apply geographical knowledge and understanding to interpret geographical data in graphs, maps, photographs, sketches, tables and texts/quotes; and
- recognise patterns in geographical data and deduce relationships.

4.3 RECOMMENDED MODES OF ASSESSMENT

To promote independent learning, foster the spirit of inquiry and develop collaborative and communication skills as well as lay a strong foundation of knowledge in our students, a variety of assessment modes is encouraged (see Figure 9).

Figure 9: Recommended Assessment Modes

Assessment Modes	Purposes	Examples / Forms
a. Response to a geographical issue	Require students to apply knowledge and understanding in response to a selected geographical issue reported in the news.	<ul style="list-style-type: none"> • Written exercise • Wiki / blog
b. Short Answer Questions	Require students to apply knowledge and understanding to interpret and analyse geographical data presented in graphs, maps, photographs, sketches, tables and text/quotes.	<ul style="list-style-type: none"> • Map work questions • Photo interpretation questions • Basic technique questions
c. Structured Questions	Require students to select, organise and apply knowledge and provide descriptions, explanations and analysis to questions on geographical issues.	<ul style="list-style-type: none"> • Describe questions • Explain questions • Analysis questions
d. Geographical Investigation	Require students to participate collaboratively in an investigation into an authentic geographical issue. It will involve the geographical inquiry process of asking questions, gathering data, exercising reasoning and reflective thinking.	<ul style="list-style-type: none"> • Individual contribution • Group contribution • Group end product