Class | Adm No

Candidate Name: _____

H

millennia institute

2017 Promotional Examination II
Pre-University 2

GEOGRAPHY (HIGHER 1) **8813**

12 September 2017

3 hours

Additional Materials: Answer Paper
1 Insert
World outline map

READ THESE INSTRUCTIONS FIRST

Write your name, admission number and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams, graphs, or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **four** questions in total.
Section A
Answer Question 1.
Section B
Answer Question 2.
Section C
Answer **two** questions, each from a different theme.

The Insert contains all the Resources referred to in the questions.
You should make reference to appropriate examples studied in the field or the classroom, even where such examples are not specifically requested by the question.
Diagrams and sketch maps should be drawn whenever they serve to illustrate an answer.
You are reminded of the need for good English and clear presentation in your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Section A

Theme 3: Geographical Investigation

1 A group of Geography students are interested to investigate the effectiveness of recent state-led efforts to improve urban liveability in Singapore. They selected the neighbourhoods of Kallang and Punggol for their investigation. Kallang is an inner city neighbourhood while Punggol is a planned new town.

The group of students were allocated three days for field investigation. They have access to secondary data detailing the range of implemented stage-led efforts to improve liveability in Kallang and Punggol extracted from the URA Master Plan (2013). Resource 1 details the recent state-led efforts to improve urban liveability in Kallang. Resource 2 details the recent state-led efforts to improve urban liveability in Punggol. Resource 3 shows the survey questionnaire results that the students have collected from the neighbourhood of Kallang.

(a) Suggest a suitable research question for the students' investigation with reference to Resources 1 and 2, and state **three** reasons why the research question is at a suitable scale. [4]

(b) Explain possible risks that the students might have to confront when conducting the research investigation and suggest ways to mitigate them. [4]

(c) Recommend and explain other data collection methods to supplement the findings as shown in Resource 3. [6]

(d) Select a suitable data representation method and sketch resident's perception of the environmental impacts of recent state-led efforts to improve urban liveability using information as shown in Resource 3. [3]

(e) Evaluate the usefulness of the investigation in understanding the impacts of recent state-led efforts to improve urban liveability in Singapore. [8]

Section B

Theme 1: Climate and Climate Change

Tropical Cyclone Enawo in Madagascar

2 Resource 4 shows the spatial and temporal distribution of tropical cyclones in the world. Resource 5 shows information on Tropical Cyclone Enawo that hit Madagascar in March 2017. Resource 6 shows the flooding situation in Antananarivo, Madagascar on 10 March 2017 as a result of Tropical Cyclone Enowa.

Note: A tropical depression has wind speed of below 63 kilometres per hour, a tropical storm has wind speed of 63 to 118 kilometres per hour while a tropical cyclone has wind speed above 118 kilometres per hour.

(a) Describe the spatial and temporal distribution of tropical cyclones from 1851 to 2006 as shown in Resource 4. [4]

(b) With reference to Resources 4 and 5, explain the development of Tropical Cyclone Enawo at Madagascar in March 2017. [6]

(c) With reference to Resource 5, describe the distribution of impacts at Madagascar due to Tropical Cyclone Enowa. [5]

(d) Using Resources 5 and 6, explain how hydrological processes could have been affected by Tropical Cyclone Enowa which resulted in river floods in Antananarivo, Madagascar. [6]

(e) Explain **two** impacts caused by the floods due to Tropical Cyclone Enowa in Antananarivo, Madagascar as shown in Resources 5 and 6. [4]

Section C

Answer **two** questions from this section. **Either** Question 3 **or** Question 4 and **Either** Question 5 **or** Question 6

Theme 1: Climate Change and Flooding

3 **(a)** Explain the climate characteristics of regions experiencing Tropical Monsoon (Am) climate. [9]

(b) To what extent does monsoon winds influence the rainfall patterns in the tropics? [16]

4 **(a)** Explain why hydrological processes may differ in the humid and arid tropics. [9]

(b) Evaluate the extent to which natural factors influence the occurrence of floods. [16]

Theme 2: Urban Change

5 **(a)** Explain the reasons for the development of slums in cities with low levels of development. [9]

(b) Evaluate the success of slum improvement strategies in cities. [16]

6 **(a)** Explain the sources of either crowding **or** fear in cities in countries at high levels of development. [9]

(b) Assess the success of strategies used to cater for the different needs of social groups in cities. [16]

- End of Paper -

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INSTRUCTIONS TO CANDIDATES

This insert contains all the Resources referred to in the questions.

This insert consists of 8 printed pages.

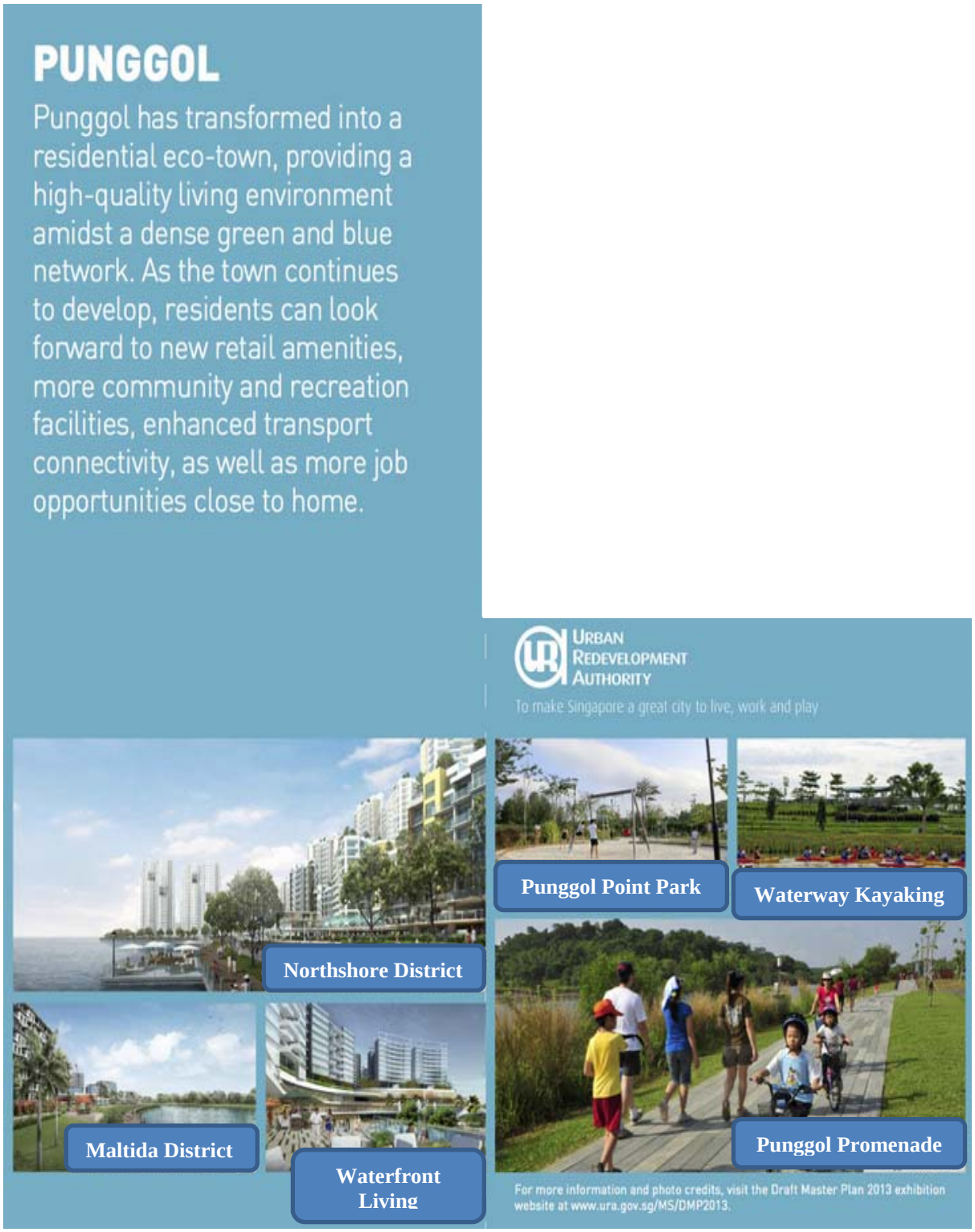
[Turn over

Resource 1 for Question 1

State-led efforts to improve liveability in Kallang, Singapore

Resource 2 for Question 1

State-led efforts to improve liveability in Punggol, Singapore



Resource 3 for Question 1

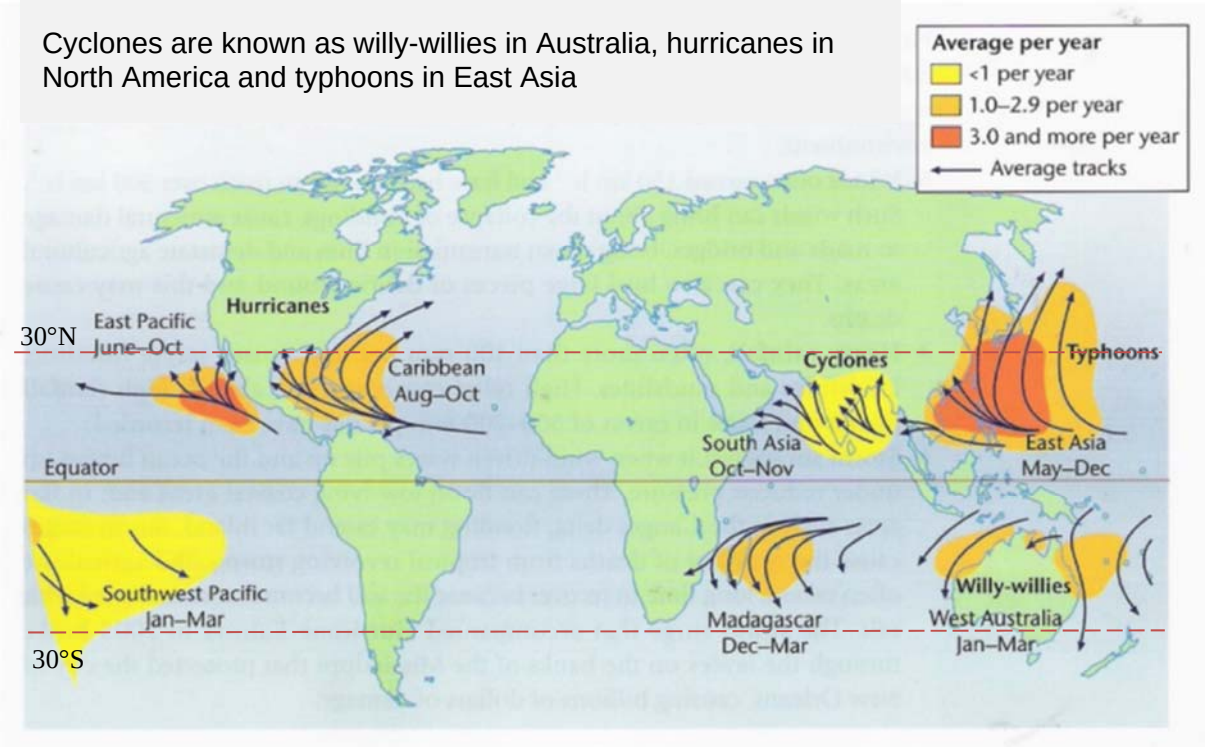
Survey questionnaire results collected from the neighbourhood of Kallang, Singapore

Total Population of Kallang: 101, 210 **Sample Size: 100** **Sampling Method: Random Sampling**		
	Yes (%)	**No (%)**
General		
Do you know about recent state-led changes in the neighbourhood?	23	77
Are you satisfied with the current liveability of your neighbourhood?	44	56
Leisure		
Are you happy with the current quality of retail facilities in your neighbourhood?	83	17
Are you happy with the current quality of sports facilities in your neighbourhood?	55	45
Environment		
Are you happy with the current quality of green spaces in your neighbourhood?	37	63

Resource 4 for Question 2

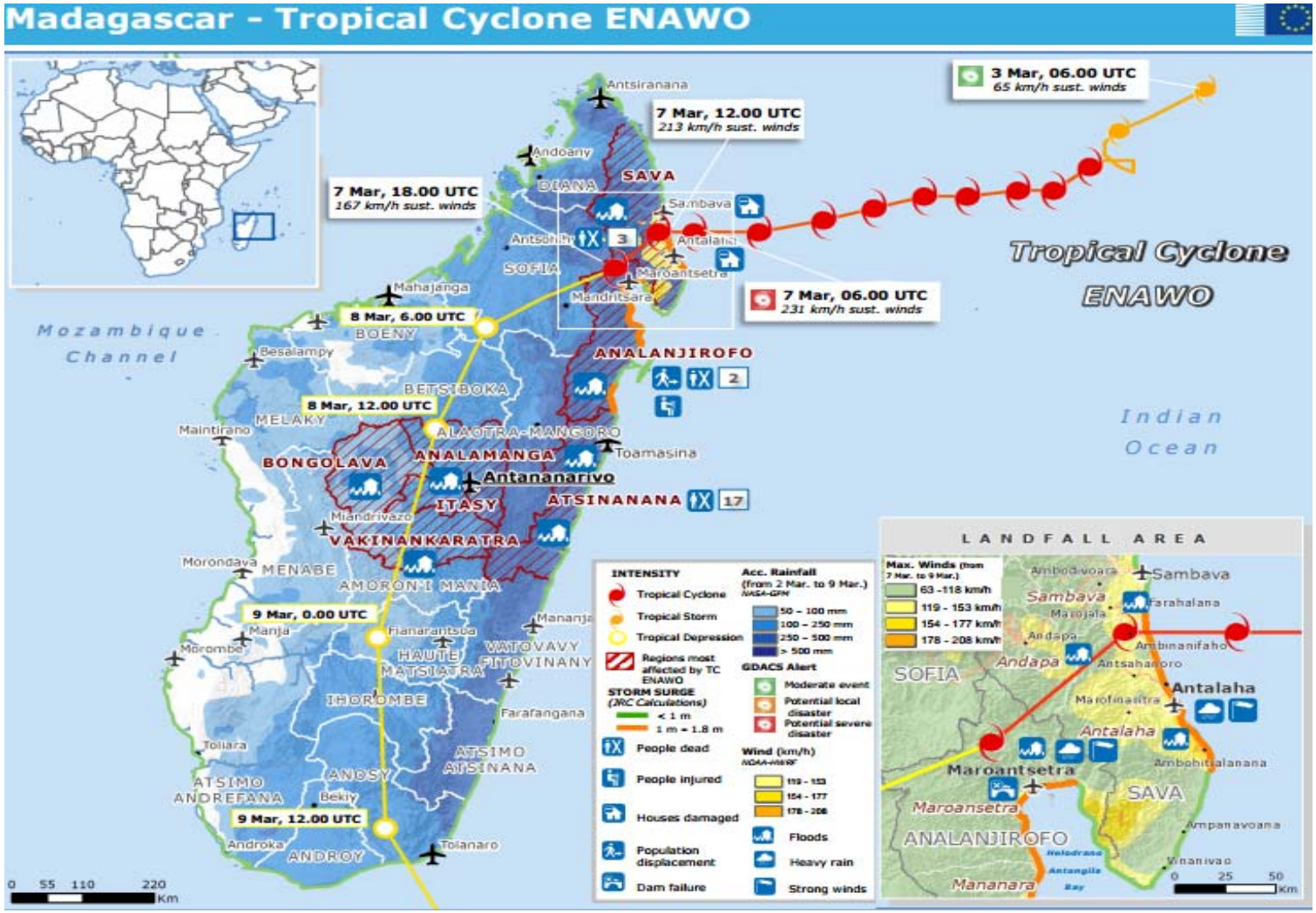
Global distribution of tropical cyclones

Cyclones are known as willy-willies in Australia, hurricanes in North America and typhoons in East Asia



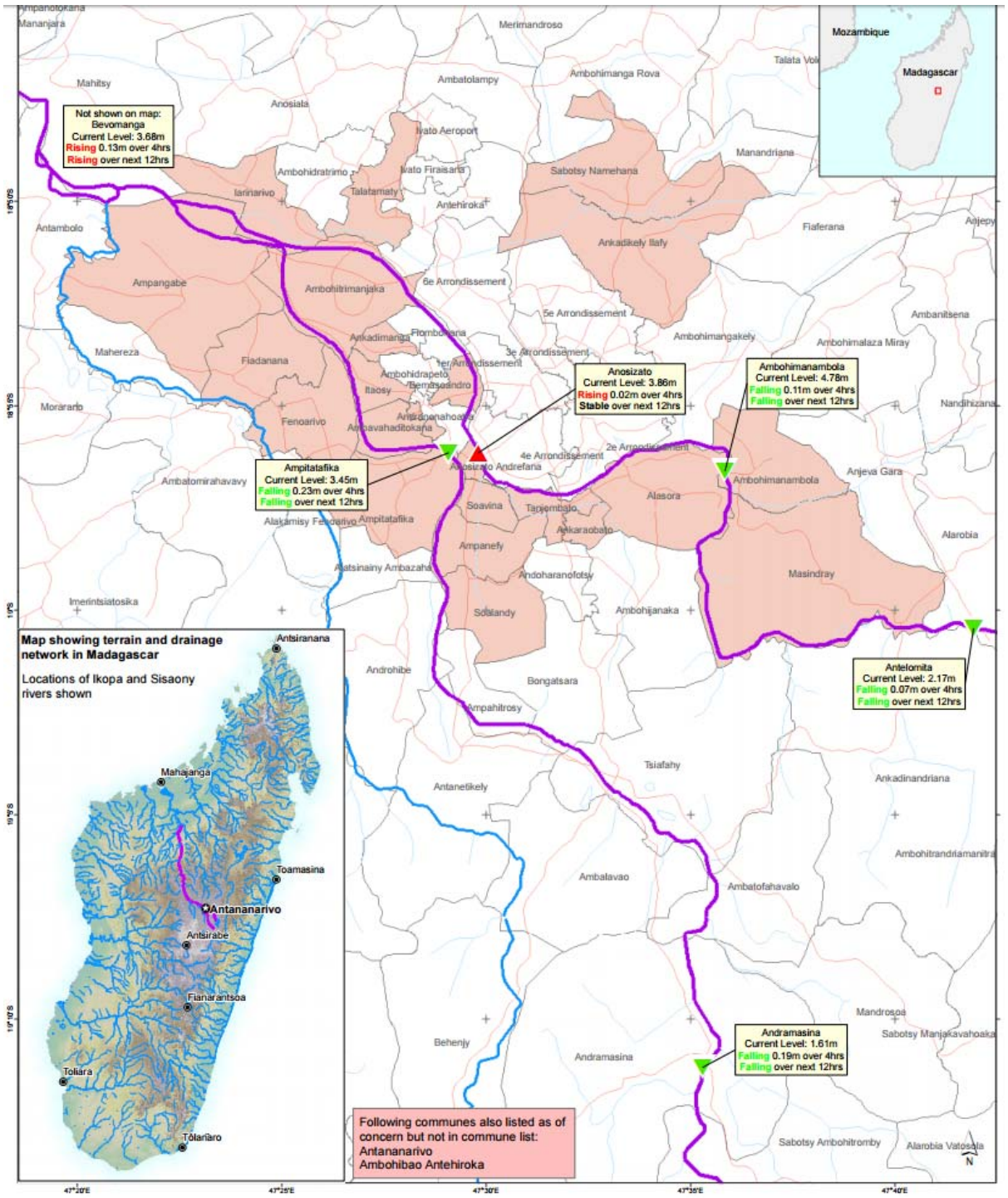
Resource 5 for Question 2

Tropical Cyclone Enawo in Madagascar



Resource 6 for Question 2

Flooding situation in Antananarivo, Madagascar on 10 March 2017 as a result of Tropical Cyclone Enowa



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Section A

Theme 3: Geographical Investigation

1 A group of Geography students are interested to investigate the effectiveness of recent state-led efforts to improve urban liveability in Singapore. They selected the neighbourhoods of Kallang and Punggol for their investigation. Kallang is an inner city neighbourhood while Punggol is a planned new town.

The group of students were allocated three days for field investigation. They have access to secondary data detailing the range of implemented stage-led efforts to improve liveability in Kallang and Punggol extracted from the URA Master Plan (2013). Resource 1 details the recent state-led efforts to improve urban liveability in Kallang. Resource 2 details the recent state-led efforts to improve urban liveability in Punggol. Resource 3 shows the survey questionnaire results that the students have collected from the neighbourhood of Kallang.

(a) Suggest a suitable research question for the students' investigation with reference to Resources 1 and 2, and state **three** reasons why the research question is at a suitable scale. [4]

Award 1 mark for a suitable research question.
Award 1 mark for each reason up to a maximum of 3 marks.

Possible Research Question Include: What is the effect of recent state-led efforts on the liveability of Singapore? (1m)

Possible Reasons why Research Question is at a Suitable Scale: Spatial scale of the research is well defined - Focussed on 2 neighbourhoods in Singapore (1m); Research is not conducted by a one student, but a group/team (1m); There are 3 days allocated for the research (1m)

Point marked

(b) Explain possible risks that the students might have to confront when conducting the research investigation and suggest ways to mitigate them. [4]

Award 1m for each risk and 1m for associated mitigation to a maximum of 4m.

Possible responses include:

- One possible risk of undertaking the fieldwork are physical attacks, particularly if the geography students are going to access areas high crime activity or perform their fieldwork outside the daylight hours. (1m) To mitigate this, fieldwork activities can be undertaken during daylight hours. Lone working by individuals should also be avoided wherever possible. Fieldwork activity should also be thoroughly planned to ensure the personal safety of the students. This can include consultation with local police force. (1m)

- Another possible risk of undertaking the fieldwork is being lost in the neighbourhoods. (1m) To mitigate this, the geography students can study maps of the area before setting out. They can also plan their routes carefully to ensure that they know of a second route

should the first be impassable. They should ensure that they have means of raising alarm if they are lost (eg. access to data connection on their handphones etc.). (1m)

Point marked

(c) Recommend and explain other data collection methods to supplement the findings as shown in Resource 3. [6]

Indicative Content

Resource 3 contains relevant and pertinent quantitative data addressing the research question on the effects of recent state-led efforts on the liveability of Singapore. With reference to Resource 3, it is found out that less than half of Kallang residents are aware or are satisfied with the current liveability of Kallang. While at least 4 in 5 of residents are satisfied with the retail life conferred in Kallang, a large fraction (63%) continues to feel that the environmental aspect of liveability in Kallang is unsatisfactory. These data reflects that recent state-led efforts to improve liveability in Singapore have not been (holistically) effective. While quantitative methods utilised allowed for greater objectivity in the research, they are also limiting in many ways. As a concept, liveability is highly subjective and often takes different definition to different people/stakeholders. For example, different people may place different levels of emphasis on the aspects/components that constitute liveability (social, economic, environmental etc.). This open ended nature of liveability can only be more fully captured through qualitative methodologies. Unlike quantitative methods, qualitative methods are typically more flexible - that is, they allow greater spontaneity and adaptation of the interaction between the researcher and the study participant. To collect richer information to answer the research question, qualitative data collection methods such as in-depth interviews can be used. Widely used in qualitative research, in-depth interviews provide an opportunity for detailed investigation of people's personal perspectives. In-depth interviews are particularly effective in providing greater understanding of the research question as it provides the opportunity for the neighbourhood residents to articulate their subjective understanding of how state-led efforts to improve liveability have impacted their lives. In addressing the research question, focus group conversation can be utilised as well. In focus group conversations, respondents are brought together to discuss the research topic as a group. In the context of the research investigation, focus groups are effective in generating “broad overviews” of the impacts of state-led effort on the neighbourhood of Kallang. In addition, focus group conversation - in allowing the opportunity for the neighbourhood residents to explore their ideas through conversation with each other - can also provide a good opportunity for reflection and refinement which can deepen respondents' insights into their own circumstances, attitudes and behaviour. This makes possible for richer information addressing the research question to be collected.

Levels marked

Level	Marks	Descriptors
3	5-6	Response demonstrates strong and accurate knowledge of the strengths and limitations of different data collection methods that can be utilised to answer to the research question. Explanation is detailed, thorough and relevant.
2	3-4	Response demonstrates adequate knowledge of the strengths and limitations of different data collection methods that can be utilised to answer to the research question. Explanation is valid but may be somewhat limited in relevance and detail.
1	1-2	Response demonstrates limited or no knowledge of the strengths and limitations of different data collection methods that can be utilised to answer to the research question. Explanation lacks detail. Overall the response does not address the context of the question.
0	0	No creditworthy response

(d) Select a suitable data representation method and sketch resident's perception of the environmental impacts of recent state-led efforts to improve urban liveability using information as shown in Resource 3. [3]

Award up to 3 marks for pie chart or any other suitable data representation method

For pie chart, 1m awarded for each of the following:

- Title
- Accuracy of proportion of sector
- Clear and relevant labels

Point marked

(e) Evaluate the usefulness of the investigation in understanding the impacts of recent state-led efforts to improve urban liveability in Singapore. [8]

Indicative Content

The investigation is useful to a small extent in understanding the impacts of state-led efforts on liveability of Singapore.

The investigation allows for a general understanding of how residents of Kallang and Punggol perceive levels of liveability in their neighbourhood. This can help deepen understanding on whether the range of state efforts introduced in Punggol and Kallang as observed in Resource 1 and 2 respectively have been effective. Specifically, and making reference to Resource 3, it is found that less than half of Kallang residents are aware or are satisfied with the current liveability of Kallang. While at least 4 in 5 of residents are satisfied with the retail life conferred in Kallang, a large fraction (63%) continues to feel that the environmental aspect of liveability in Kallang is unsatisfactory. These data point to the idea that recent state-led efforts to improve liveability in Singapore have not been (holistically) effective.

However, the investigation is not useful as the adoption of random sampling as a data collection method is problematic in a few days. While the utilisation of random sampling is relatively simple as it only requires minimum knowledge of the study of group (Residents of Kallang and Punggol) in advance, the method fails to consider the fact that the residents of Kallang and Punggol are heterogeneous – different gender, age, race, ethnicity and coming from different socio-economic class/background. These differences in identity is likely to colour and influence their subjective idea/understanding of what constitutes liveability. The fact that social groups/identities might not be equally represented would render the information collected ineffective in addressing the demands of the research question.

In addition, the investigation is not useful as the design of the research question is not clearly defined. It is difficult to ascertain what qualifies as "recent" state efforts to improve liveability in Singapore. Moreover, residents' perception of liveability may be influenced by vectors and sources other the efforts observed in Resources 1 and 2. It may also be noteworthy to highlight that the scope of the research question is overly ambitious and broad. A more manageable investigation would be to focus to one aspect of liveability – social, economic, environmental etc.

Levels marked

Level	Marks	Descriptors

3	7-8	Response demonstrates strong and accurate knowledge of geographical investigation skills and methods. Provides a logical and well developed evaluation that 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. 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. Provides little or no evaluation. May include material that is irrelevant to the question.
0	0	No creditworthy response

Section B

Theme 1: Climate and Climate Change

Tropical Cyclone Enawo in Madagascar

2 Resource 4 shows the spatial and temporal distribution of tropical cyclones in the world. Resource 5 shows information on Tropical Cyclone Enawo that hit Madagascar in March 2017. Resource 6 shows the flooding situation in Antananarivo, Madagascar on 10 March 2017 as a result of Tropical Cyclone Enowa.

Note: A tropical depression has wind speed of below 63 kilometres per hour, a tropical storm has wind speed of 63 to 118 kilometres per hour while a tropical cyclone has wind speed above 118 kilometres per hour.

(a) Describe the spatial and temporal distribution of tropical cyclones from 1851 to 2006 as shown in Resource 4. [4]

Award 1 mark for each description on the spatial/temporal distribution. Reserve 1 mark for spatial distribution and 1 mark for temporal distribution.

Possible responses

Spatial distribution:

- Generally located within 5 to 40° N and 5 to 30° S of the equator
- Anomaly: absent in southern Atlantic ocean within the tropics
- Highest frequency found in east pacific and east Asia with 3 and more cyclone per year
- Lowest frequency found in south Asia and southwest pacific, of less than 1 per year

Temporal distribution:

- In the N Hemisphere, cyclones are usually formed at the second half of the year, from around June to Dec, e.g. East Pacific is June – Oct while East Asia is May – Dec
- In the S Hemisphere, cyclones are formed at the first half of the year. For e.g. Southwest Pacific and West Australia from Jan – March

Data from Resource 4 should be used when appropriate to support responses
Point marked

Marker's Report:

- Many students failed to provide specific description
  - E.g. '30°N/S from the equator' but cyclones do not exist between 0° to 5°N/S of the equator! (see resource!!)
- For 'describe' questions, students should not be listing everything as seen in the resource. Instead, students should be describing the spatial/temporal distribution such that a reader without looking at the resource is able to visualise the distribution
- Some students managed to mention the general temporal distribution of cyclone but failed to provide data from the resource to support the observation
- Cyclone tracks do not serve as spatial distribution of cyclones

(b) With reference to Resources 4 and 5, explain the development of Tropical Cyclone Enawo at Madagascar in March 2017. [6]

Indicative Content

Conditions:

- Due to the position of the overhead sun in the southern hemisphere in the early part of the year (December – March), the Indian Ocean is warmed up
- The warm ocean of at least 28°C to a depth of 60m and atmospheric humidity of up to 6km provides the necessary condition to initiate the formation of a cyclone where the warm sea heats the air above it
- Tropical cyclone started its formation in the warm ocean on 7 March

Track:

- Once formed, the cyclone is steered primarily westwards by the trade winds from 7 to 8 March
- Due to coriolis effect, the cyclone starts to move polewards once it fully develops (8 – 9 March)
- It then starts to move eastwards as they move into areas dominated by westerlies
- The cyclone takes on an anti clockwise direction (moving westwards, polewards and eastwards)

Intensity:

- Cyclone started off as a lower intensity tropical storm. As it crosses the ocean and picks up more moisture from the sea, the storm continues to grow in intensity. As the cycle continues, the surface pressure at the centre drops lower and lower causing the circulation of air to strengthen and the winds to grow increasingly stronger, thus creates a self-sustaining heat energy
- However, after it makes its landfall on the eastern coast of Madagascar, it starts to lose its source of energy which is the ocean, and starts to fall in its intensity (tropical cyclone at Sava vs tropical depression at Analamanga)

Levels marked

Level	Marks	Descriptors
3	5 – 6	Response demonstrates accurate knowledge of development of tropical cyclone, including at least 2 explanation relating to the conditions for its formation, the track of the tropical cyclone or its intensity. Good and accurate use of resources to explain for the development of Tropical Cyclone Enawo at Madagascar in March 2017. Response is clear, detailed and shows focus on the question.
2	3 – 4	Response demonstrates knowledge on the development of tropical cyclone, including at least 1 explanation relating to the conditions for its formation, the track of the tropical cyclone or its intensity. Some reference is made to the resource to explain for the development of Tropical Cyclone Enawo at Madagascar in March 2017. Explanation however may lack accuracy or details in parts. Response is mostly clear but may lack focus on the question at times
1	1 – 2	Response demonstrates some knowledge on the development of tropical cyclone, including at least 1 explanation relating to the conditions for its formation, the track of the tropical cyclone or its intensity. Limited or no reference is made to the resource to explain for the development of Tropical Cyclone Enawo at Madagascar in March 2017. Little or no explanation made. Response lacks detail, clarity and focus on the question.
0	0	No creditworthy response

Marker's Report:

- Some students misunderstood 'development' in the question as cyclone formation → Need to see the resource and understand what the question is asking. In this case, the question is asking for the explanation as to the development of the cyclone across days (from storm to cyclone), the conditions necessary for its formation and to explain its track
- Some students misinterpreted the movement of the cyclone from South to North when it's moving the other way round
- Many students were able to bring out the necessary conditions for the formation of cyclone but failed to use the resource(s) to support their answer
- Few students made use of the resource(s) purposefully to answer the question

(c) With reference to Resource 5, describe the distribution of impacts at Madagascar due to Tropical Cyclone Enowa. [5]

Award 1 mark for each description that is supported by evidence from Resource 5 where appropriate.

Possible responses:

- Regions that are most affected are along the track of tropical cyclone Enowa
- The eastern side of Madagascar receives greater impact as compared to west Madagascar; e.g. rainfall accumulations follow a gradient whereby highest rainfall of 250 – 500mm are received in the east like in Analanjirofo while places in the west like Morandava received no rainfall from the cyclone/similar for social impacts
- However, Atsimo Andrefana in the west and about 200km away from the cyclone track is one the areas that is most affected despite receiving low amount of rainfall from the cyclone
- Atsinanana is one of the worst affected region; with highest death toll of 23 people and suffering from 5 out of 8 of the impacts listed
- Least affected regions include Morombe, Morondava in the West where they received minima rainfall from the Tropical Cyclone and has no record of flood incidents or the loss of lives and properties

Data from Resource 5 should be used when appropriate to support responses
Point marked

Marker's Report:

- Many students failed to address the part on 'distribution' in the question → they merely address impacts across Madagascar
- Students did not apply the skills taught for questions that require skills to 'describe' a resource
    - I.e. general, specifics and anomaly
- Students are just randomly picking places out and describing the impacts there but not addressing how the impacts were distributed
- Some misread the legend of 'floods' as houses damaged – please read the legend properly, don't assume.
- Impact of accumulated rainfall was not mentioned by all students except one

(d) Using Resources 5 and 6, explain how hydrological processes could have been affected by Tropical Cyclone Enowa which resulted in river floods in Antananarivo, Madagascar. [6]

Indicative Content:

- Antananarivo, Madagascar received 100 – 250mm rain accumulations from 5 to 12 March as shown in Resource 5
- Initially, rainfall brought about by tropical cyclone Enowa will infiltrate into the soil as long as the intensity is below infiltration capacity of the soil and when the soil has yet to reach saturation
- As the rain continues, soil moisture and groundwater storage starts to increase
- High intensity and long duration rainfall results in soil saturation to be reached
- As the soil reaches maximum saturation, rainwater can no longer infiltrate into the sub-surface
- It then flows over as saturation overland flow downslope into the river (increase in OLF), contributing to river discharge
- Ikopa and Sisaony rivers flood as their discharge exceeds bankfull discharge

Level	Marks	Descriptors
3	5 – 6	Response shows accurate knowledge of as well as clearly accounting for possible changes in the hydrological processes brought about by Tropical Cyclone Enowa that resulted in river floods in Antananarivo, Madagascar. Response uses resources accurately to account for the river flood is resulted. Response is clearly focused on the question throughout with a detailed account of how hydrological processes could have been affected by Tropical Cyclone Enowa and resulted in river floods in Antananarivo, Madagascar.
2	3 – 4	Response shows adequate knowledge of and attempts to account for possible changes in the hydrological processes brought about by Tropical Cyclone Enowa that resulted in river floods in Antananarivo, Madagascar. Response uses resources to account for how the river flood is resulted but the use of resources may be limited or lack accuracy at times. Response may lack detail and depth or lack a clear focus on the question of how hydrological processes could have been affected by Tropical Cyclone Enowa and resulted in river floods in Antananarivo, Madagascar.
1	1 – 2	Response shows limited knowledge of and makes limited attempt to account for possible changes in the hydrological processes brought about by Tropical Cyclone Enowa that resulted in river floods in Antananarivo, Madagascar. Little or no use of the resource to account for how the river flood is resulted. Use of resource where present will lack accuracy. Response lacks detail and focus on the question.
0	0	No creditworthy response

Levels marked

Marker's Report:

- A handful of students are not clear of what hydrological processes are – please revise on your content
- Many students focused on transfers only. Besides transfers, students can mention about storages and output (river discharge)
- Many failed to get high marks for this question because they did not use the resource(s) purposefully to support the answer
    - E.g students mentioned that the cyclone brought heavy rainfall to the area. → How much of rainfall? (Can be seen in R5)

- Many did not explain clearly how the changes to the hydrological processes resulted in flood in the reigon.

(e) Explain **<u>two</u>** impacts caused by the floods due to Tropical Cyclone Enowa in Antananarivo, Madagascar as shown in Resources 5 and 6. [4]

Award 2 marks for each full explanation on an impact to a maximum of 4 marks for 2 impacts given.

<u>Possible responses:</u>

- Disruption of daily activities
  From Resource 5, it indicated that Antananarivo is one of the most affected region by the heavy rainfall of 100-250mm brought about by the cyclone that caused floods. People's homes could be flooded and livelihood disrupted as people may have difficulties going to work
- Economic loss
  From Resource 5 and 6, it is observed that some parts of Antananarivo are affected by the river floods. Economic activities may come to a standstill as communication links and infrastructure may be damaged and disrupted. This leads to the dysfunction of normal life for a period much beyond the duration of the flooding

Data from Resources 5 and 6 should be used when appropriate to support responses
Point Marked

Marker's Report:

- Again, many students failed to read the resource(s) properly. There are many students who talked about loss of lives and damaged houses when in R5, they clearly did not show these impacts in Antananarivo
- Take note that the question only asked for TWO impacts. Students should not be providing more than two impacts as only the first 2 will be taken into account for assessment

Section C

Answer **two** questions from this section. **Either** Question 3 **or** Question 4 and **Either** Question 5 **or** Question 6

Theme 1: Climate Change and Flooding

3 **(a)** Explain the climate characteristics of regions experiencing Tropical Monsoon (Am) climate. [9]

Tropical Monsoon (Am) climate is a humid tropical climate that lie within 15°N/S of the equator/the tropics. Like the other tropical climate, regions experiencing Am climate has high mean annual temperature. They are also characterised by high total annual precipitation but the influence of monsoon winds result in distinct wet and dry seasons experienced by regions with the Am climate.

Regions experiencing Am climate has high mean annual temperature because they lie within the tropics where the sun is overhead for most period of the year. The tropics is a region where the average temperature of the coldest month is above 18°C. As the earth revolves around the sun, the position of the overhead sun shifts north and south of the equator but mainly within the tropics. When the sun is directly overhead, the high angle of

incidence of the sun causes insolation to be concentrated on a small area which heats up the earth's surface and causes temperature to be higher. Though regions experiencing Am climate has a high mean annual temperature due to its location (latitude) within the tropics, there is a slight variation whereby the warmest months occur just prior to the onset of the wet season. This is because of high air temperature that is able to hold more moisture and the lack of cloud cover allows greater amount of insolation to reach the surface. This temperature characteristic of Am climate is evident in Akyab, Myanmmar that experiences monthly average temperature of more than 20°C and its highest temperature of 27°C occurring in April to May before its wet season from June to August. Hence, regions experiencing Am climate has high mean annual temperature due to its location on earth where the sun is overhead for most period of the year.

Besides high mean annual temperature, regions experiencing Am climate have distinct wet and dry seasons due to the influence of monsoon winds. Monsoon winds are seasonal reversals of winds caused by unequal heating of the earth surface by the Sun. During July in the Asia-Pacific region, when the sun is overhead at the northern hemisphere, a region of low pressure is formed at Central Asia. However, at the southern hemisphere, as Australia is experiencing winter and cold air sinks, a region of higher pressure is formed. Due to pressure gradient force, the difference in air pressure causes air to move from Australia to Central Asia. Southeast winds blow from Australia and is deflected to the right when they cross the equator to form the Southwest monsoon winds. This southwest monsoon winds crosses the Indian Ocean and picks up moisture, bringing heavy rain to the Indian sub-continent. This explains why the Indian sub-continent, for example places like Dhaka, Bangladesh, receives high amount of rainfall from May to July due to the onset on moist southwest monsoon winds. However, the reverse happens when the sun is overhead at the southern hemisphere during January. Instead of receiving moist monsoon winds, the Indian sub-continent now receives cold, dry Northeast monsoon wind that originates from inland central Asia that brings little to no rain. Due to the characteristics of the monsoon winds, regions experiencing Am climate tend to have distinct wet and dry seasons.

Despite the distinct wet and dry season, regions experiencing Am climate have high total annual precipitation due to the influence of the inter-tropical convergence zone (ITCZ). The ITCZ is a zone of convergence of trade winds where air is forced to rise to form clouds and hence is associated with high rainfall. It is also associated with the rising limb of Hadley cell, where the overhead sun creates a zone of low pressure at the earth surface, causing air to move from regions of higher pressure to this zone of lower pressure where winds converge and air rises. As the sun is overhead the tropics for most time of the year, the ITCZ brings rainfall to regions experiencing Am climate from 6 to 12 months of the year, hence explaining its high total annual precipitation. For example, Yangon in Mynammar receives 2690mm of rain a year. The dry season Am climate has is a result of the ITCZ not overhead the region during the particular time of the year, for example, the ITCZ is not overhead the Indian sub-continent during the start of the year, hence bringing little to no rainfall to the region. The high total annual precipitation that Am climate has could be attributed to the influence of the ITCZ that brings heavy rainfall to these regions for most part of the year.

Marker's Report:

- Many students were not able to clearly explain for the climatic characteristics of Am climate
- Many were able to describe but that can only get a maximum of L1
- Students were not specific in their explanation/description
- Students should provide e.g. as and when possible to further support the explanation

(b) To what extent does monsoon winds influence the rainfall patterns in the tropics? [16]

Introduction

Monsoon winds are winds which direction is completely reversed from one season to the next. The tropics lie within 30°N/S of the equator. Rainfall patterns in the tropics are influenced by many factors that include the Hadley cell and trade winds, monsoon winds, El Nino and topography. Thus, monsoon winds influence on rainfall patterns in the tropics is to a small extent only. In this essay, the various factors will be discussed by taking a global to a regional and then local scale perspective.

Body Paragraphs

In the tropics, the operation of the Hadley cell and trade winds have a major influence on the rainfall patterns. The rising limb of the Hadley cell is associated with the position of the overhead sun. In this region, due to insolation heating the earth's surface, air expands and rises to the upper troposphere where it condenses to form clouds when dew point temperature is reached. An area of low pressure is formed at the earth's surface associated with this rising limb of Hadley cell. Air diverges to the north and south at the upper troposphere to about 30°N/S of the equator where this air has been cooled and starts to sink. At the subsiding limb of the Hadley cell, air that is sinking undergoes adiabatic warming and this prevents clouds from forming at this region. A region of high pressure is formed on the earth's surface associated with the subsiding limb of the Hadley cell. Due to a difference in pressure between the rising and subsiding limb of Hadley cells, trade winds are formed that travel from the subsiding limb to the rising limb of the Hadley cells. The convergence of Northeast and Southeast trade winds results in the formation of the Inter-Tropical Convergence Zone (ITCZ) at the rising limb of the Hadley cell and it is characterised by bands of clouds and high rainfall. The trade winds often bring heavy convectional rainfall to eastern parts of continents in the tropics, such as in Eastern Peninsula of Malaysia. As the Hadley cell is not 'fixed' in position but follows the position of the overhead sun, it affects the rainfall that the tropics receive. Nearer to the equator, the presence of the ITCZ and its association with the rising limb of the Hadley cell for most time of the year results in high total annual precipitation for humid tropics like in Singapore and Brazil. Whereas over at nearer to 30°N/S of the equator, such as in places experiencing arid tropics like Egypt, as this region is usually associated with the subsiding limb of the Hadley cell, total annual precipitation is very low and scant. Thus, it can be seen how the operation of the Hadley cell and its resultant trade winds affect the rainfall patterns in the tropics.

However, despite the Hadley cell determining the rainfall patterns associated with latitude, there is seasonal variation in rainfall patterns in the tropics brought about by the effect of monsoon winds. Monsoon winds is by far the most significant disturbance of the pattern of the general circulation, particularly in Asia and in Africa. For the Asian monsoon, due to differential rates of heating and cooling over land and water over the Asian region, it produces large scale regional seasonal changes in wind patterns. During July, when the sun is overhead at the northern hemisphere, a low pressure region is formed over at central Asia. However, Australia experiences winter and the cold air exerts high pressure over the region. Pressure gradient force causes air to move from region of high pressure to a region of low pressure, and in this case, from Australia to central Asia. Southeast winds blowing from Australia gets deflected to the right in the northern hemisphere to form Southwest monsoon winds. This Southwest monsoon winds crosses the Indian Ocean, picks up moisture and brings heavy rain to the Indian sub-continent. However, during January, the opposite holds true for the Indian sub-continent. Northeast monsoon winds that blow from central Asia towards Australia crosses vast lands prior to reaching the Indian sub-continent, resulting in low amount of precipitation during that period of the year. Similarly, West African monsoon brings rainfall to west Africa during northern hemisphere summer but East African monsoon brings little rainfall to this same region during northern hemisphere winter. This is why regions experiencing tropical monsoon climate, such as Dhaka, Bangladesh or Yangon, Myanmmar have distinct wet and dry seasons brought

about by the effects of monsoon winds. Hence, monsoon winds do influence the rainfall patterns in the tropics by varying the effect of the Hadley cell at the regional scale.

Besides the effect of monsoon winds, another regional phenomenon that can influence rainfall pattern in the tropics is the El Nino Southern Oscillation (ENSO). ENSO is a result of the weakening of the Walker Circulation. Under normal conditions, trade winds blow from eastern to western pacific, dragging warm ocean surface currents towards the western pacific. Air rises in the western pacific to create a region of low pressure and together with the warm ocean surface currents, it causes local convective thunderstorms to develop in this region, bringing high rainfall to places like Australia and Indonesia. However, on the other end, the upwelling of cold ocean currents and high pressure result in relatively dry conditions along the western part of South America, such as in Peru. The Walker Circulations brings about heavy rainfall conditions to the western Pacific and dry conditions to the eastern Pacific. But, this Walker Circulation is weakened every 3 to 7 years, resulting in a 'seesaw' of pressure where high pressure now develops over at western Pacific and low pressure over at eastern Pacific, in a phenomenon known as ENSO. Due to this 'seesaw' of pressure, the warm ocean surface currents now amass in the eastern Pacific, and together with the low pressure region, brings heavy rainfall to the usually dry eastern Pacific. While at the western Pacific region, high pressure leads to the inhibition of formation of clouds which brings little to no rainfall and may even cause drought. During El Nino period, uncommon abundance of rain may cause floods in normally dry parts of Ecuador and Peru while lack of rainfall brings huge crop losses in the Philippines and Indonesia. Therefore, ENSO is an atmospheric phenomenon that can influence rainfall patterns in the tropics too.

Lastly, at the local scale, topography can also influence the rainfall patterns in the tropics. Topography refers to the surface configuration of a region. In the presence of topographic barriers such as mountains, orographic rainfall is resulted. This is because winds carrying moist air towards the windward slope of mountains are forced to rise over the topographic barrier, and as air rises, adiabatic cooling occurs and reaches saturation when dew point temperature is reached. This then results in condensation and the formation of clouds that leads to rainfall to occur at the windward slope. However, on the other side of the mountain, the leeward slope, air descends and undergoes adiabatic warming. With warming, relative humidity of the air parcel decreases, and neither cloud nor rain will be formed, causing the leeward slope to be usually dry. An example of a topographic barrier is the Himalayas which results in heavy rainfall in Terai region located in the windward slope but dry conditions to the leeward slope, such as places like the Tibetan plateau and Mongolia's Gobi Desert. This shows how topography at the local scale can also influence rainfall patterns in the tropics.

Conclusion

In conclusion, unarguably monsoon winds do have an effect on the rainfall patterns in the tropics. However, its influence is to a small extent as there are many other factors operating at the global, regional and local scale that influence rainfall patterns in the tropics too. To understand rainfall patterns in the tropics, there is a need to understand the different wind systems, phenomenon and environmental conditions operating at different scales that can influence the occurrence of rainfall.

Marker's Report:

- Students were able to provide the various factors in influencing climatic characteristics of the tropics
- However, many did not provide clear explanation to:
    - The process itself
    - How it affects RAINFALL patterns
- Many students obtained a level 2 due to lack of evaluation
    - Need to justify the stand taken!

4 (a) Explain why hydrological processes may differ in the humid and arid tropics. [9]

Hydrological processes in a drainage basin can be categorised into input, transfers, storages and outputs. Due to differing climatic (temperature and precipitation characteristics) and soil conditions, hydrological processes in the humid and arid tropics are different.

The differing climatic conditions of the humid and arid tropics, in particular precipitation characteristics, cause the amount of water to be circulated through the various hydrological processes under these 2 climatic conditions to differ. In the humid tropics, the high total annual precipitation and occurrence throughout the year leads to rivers with discharge throughout the year, like the Amazon River in Brazil. Whereas for the arid tropics, low total annual precipitation compounded with scant precipitation throughout the year result in rivers to have no flow in certain time of the year. For example, more than 95% of streams in Arizona, USA are ephemeral in nature, where there is flow only after precipitation. However, the precipitation that arid tropics receive tend to be of high intensity that often result in flashy discharge in its river. The sudden, high intensity rainfall often leads to high amount of hortonian overland flow due to infiltration being limited, and hence the flashy discharge in the river. Whereas for humid tropics, intensity and duration of rainfall can vary. As long as rainfall intensity is below the infiltration capacity of the soil, infiltration will take place and less overland flow will be resulted. Thus, due to differing precipitation characteristics in the humid and arid tropics, hydrological processes in these 2 regions may differ.

Besides precipitation characteristics, temperature characteristics of the 2 climatic types can also influence hydrological processes. Although both humid and arid tropics are characterised by high mean annual temperature, it is the relationship between evapotranspiration and precipitation that can affect hydrological processes. In arid tropics, such as in places like Cairo, Egypt, they are characterised by evapotranspiration exceeding precipitation. Due to its association with the subsiding limb of the Hadley cell, cloud formation is limited which causes insolation to reach the ground surface most of the time, thus having high temperatures and low rainfall. This promotes high rates of evapotranspiration to take place in the arid tropics which also leads to low amount of soil moisture, groundwater and channel storages. On the other hand, humid tropics is characterised by precipitation exceeding evapotranspiration for most period of the year (unless is the dry season). The higher amount of input than output encourages more amount of water to be stored in various storages, such as soil moisture, groundwater and channel storages. Hence, differing climatic characteristics of the humid and arid tropics lead to hydrological processes in regions experiencing these 2 climatic types to differ.

Besides looking at climate, it is also crucial to look at how the environment affects hydrological processes. Due to the climatic conditions, the nature of soil in the humid and arid tropics differ and this has an influence on the type and amount of transfers that take place in the respective drainage basins. In arid tropics like the Sahara Desert, due to high temperature and low precipitation, the soil surface is often sun-baked and clay-like. This lowers the porosity of the soil surface which lowers the infiltration capacity of the soil. When precipitation occurs in arid tropics, which is often of high intensity, rainfall intensity often exceeds the infiltration capacity of the soil, resulting in high generation of hortonian overland flow. While for the humid tropics, such as in Singapore, infiltration capacity of soil is often not a limiting factor, unless during a thunderstorm. Instead, prolonged rainfall causes soil to reach saturation and since additional rainfall is unable to infiltrate into the saturated soil, excess water flow overland as saturation overland flow. Though both arid and humid tropics may generate overland flow, the conditions under which these flows occur differ and they are mainly associated with different types of overland flow. Therefore, the conditions of the soil may influence the hydrological processes in the humid and arid tropics.

Additional (Vegetation)

The nature of vegetation, in terms of type and density, can also be used to explain why hydrological processes may differ in the humid and arid tropics. Due to differing climatic characteristics, the type and density of vegetation in humid and arid tropics differ and this has an influence on hydrological processes, such as interception, infiltration, overland flow and biological water storage. As the climatic conditions in humid tropics are more favourable for vegetation growth, vegetation is of higher density as compared to arid tropics. Furthermore, in the humid tropics, vegetation are of tall evergreen trees as opposed to in the arid tropics where vegetation is made up of grasslands and succulents. With higher density of vegetation such as tropical rainforests in Borneo, Malaysia, these trees tend to intercept higher amount of rainfall and lowers the intensity of rainfall reaching the ground which encourages more infiltration to take place and reduces the amount of overland flow. This also helps to increase sub surface storages (soil moisture and groundwater storage) and the high density of vegetation leads to higher biological water storage too since water is taken up by vegetation for growth. Whereas for arid tropics like the Outback in Australia, scant vegetation (savannas) do not intercept as much rainfall and biological water storage is much lesser as compared to those in the humid tropics. The vegetation, soil and climate characteristics in the arid tropics do not encourage as much infiltration to take place, resulting in higher generation of overland flow after a rainfall event. This shows how environmental conditions (climate, vegetation, soil) can all influence hydrological processes in the humid and arid tropics.

Marker's Report:

- Some students misinterpreted hydrological processes as fluvial processes
- Many did not do well for this question as they fail to answer the question on why hydrological processes differ in the humid and arid tropics
    - Question is asking for the reasons as to why hydrological processes differ in these 2 regions

(b) Evaluate the extent to which natural factors influence the occurrence of floods. [16]

Introduction

Floods occur when the discharge in a river exceeds its bankfull discharge. There are various factors, both natural and human, that can cause a river to flood, either by causing unusually high river discharge or lowering the river capacity. However, the occurrence of floods can also be managed by humans' intervention. The extent to which natural factors influence the occurrence of floods is small. Although the amount of precipitation determines the river discharge and natural hazards like mass movement can increase the occurrence of floods, human activities can either increase or prevent the occurrence of floods and the changes done to land use can have a lasting and knock-on impact in the occurrence of floods.

Body Paragraphs

One important natural factor that can influence the occurrence of floods is the amount of precipitation. Precipitation is the only input into the drainage basin water balance and river discharge is mainly attributed by precipitation, after accounting for evapotranspiration output and changes in water storages. When there is excessive or intense precipitation that exceeds the infiltration capacity of the ground or causes soil saturation to be reached, infiltration is limited and overland flow is generated instead. This overland flow, that is the faster lateral transfer, will flow downslope and contribute to river discharge. Because of this higher amount of overland flow that contributes to the river discharge quickly, the river discharge may easily exceed bankfull discharge of the river and result in floods. For example, Hurricane Paine brought intense rainfall in Southwest USA, causing floods to occur in the region in September 2016. Also, monsoon winds laden

with moisture have also brought heavy rainfall to Bangladesh in July 2004, causing the capital city, Dhaka, to be 40% under water. This shows how the amount of precipitation in a region can influence the occurrence of floods.

Besides the amount of precipitation, natural hazards can also influence the occurrence of floods by reducing the river capacity. Natural hazards include earthquakes and mass movements and the occurrence of these hazards can cause sediment, soil and regolith to be deposited in the rivers which will reduce the river capacity. A river capacity determines the amount of discharge it can hold and when the capacity is reduced, the river is at a higher risk of flooding. In April 2017, heavy rainfalls in Colombia caused a landslide to take place, in which the debris, mud and boulders get deposited in rivers and caused 3 rivers to flood that killed 300 people. Thus, it is possible that natural factors such as natural hazards can influence the occurrence of floods by reducing river capacity.

However, besides natural factors, human activities can also influence the occurrence of floods. One major human activity is urbanisation that result in the change in land use that has a lasting and knock-on impact on hydrological processes and subsequently floods. Due to urbanisation and urban growth, there is an increasing proportion of earth surface being covered by impermeable concrete ground. Compared to natural ground surface, concrete being more impermeable allows little to no infiltration to take place. This causes higher generation of overland flow that contributes directly and quickly to the river discharge. It is thus more likely for flood to occur when more proportion of land is covered by concrete due to the process of urbanisation. This is evident between an urban stream in Mercer Creek Washington, USA and a nearby rural stream in Newaukum Creek. Following a one-day storm, river discharge in Mercer Creek increases more quickly and reaches a higher peak discharge as compared to Newaukum Creek. Urban development has its impact on increasing peak discharge and reducing lag time between peak rainfall and peak discharge. Also, in Salt Creek, Illinois, USA, urban development has resulted in floods to increase by magnitude, from 1000 to 2000 cubic feet per second for large floods. Furthermore, such change in land use is often permanent and this has an impact on the occurrence of floods in the region in the long run. Therefore, human activity such as urbanisation can influence the occurrence of floods.

In addition, human activities can also reduce the chance of flood from occurring. Humans have put in place various flood management strategies to reduce the occurrence of floods. Different strategies have been adopted by different places to manage floods by reducing the frequency of occurrence of magnitude of flood. There are both hard and soft engineering strategies that could be adopted to manage floods. Hard engineering measures involve the construction of structures along the river to control discharge while soft engineering measures tend to be more ecologically sensitive and are done to reduce the impact of flood. For example, the construction of the Three Gorges Dam at the Yangtze River has been effective in reducing the occurrence of flooding along the Yangtze River by controlling the amount of discharge downstream. It has helped to reduce the amount of damage suffered by the people living along the river, especially in Hunan province. On the other hand, plantation forestry, which is a soft engineering measure, is built upon the basis that the change in land use cover to plantation forestry can help to improve catchment conditions and help in the management of flood by increasing infiltration ability of the soil which will reduce overland flow and lower the flood peak. This has been adopted in White Hollow of Tennessee, USA and it has reduced the peak discharge following a rainfall event by 85% and the lag time has increased from 1 to 8 hours. Hence, flood management strategies put in place by human can help to lower the occurrence of floods.

Yet, human intervention of flood management strategies to reduce the occurrence of flood could also possibly result in the increase of occurrence of floods elsewhere. Although flood management strategies are implemented to manage the occurrence of flood in one region, if the larger river system is not taken into consideration, the implemented strategy may end up changing the river dynamics downstream and cause flood there instead. For example, channel re-alignment involves the process to reduce the sinuousity of the river so as to increase the gradient of the long profile in that stretch of the river. This will then lead to an increase in flow velocity which will move river discharge out

of the area more quickly and reduce the chance of flooding upstream. This was done in the Mississippi River, USA, where the length of the river has been reduced by 240km to reduce the occurrence of flood. However, as flow velocity is faster, the river has more energy to erode the river banks and bed. This leads to the deposition of extra sediment that is derived from upstream erosion in the downstream reaches and aggradation of the river bed is resulted. This has an impact on the river dynamics as aggradation of river bed downstream would lower the river capacity to hold its discharge and in turn increase the occurrence of flood downstream. Thus, without careful consideration of how human intervention to reduce flood occurrence may have on the river system, flood management strategies implemented by humans may end up increasing the occurrence of flood elsewhere.

Conclusion

In conclusion, both natural factors and human activities can influence the occurrence of floods. However, the influence of natural factors on the occurrence of floods is to a small extent as they only lead to the increase in occurrence of floods. Whereas human activities such as changes in land use and flood management strategies have greater influence on the occurrence of floods as the intervention can either increase or reduce flood occurrence. Furthermore, such human modifications often have lasting impact. Yet, it is to note that it is not possible to pinpoint the occurrence of floods to either natural factors or human activities alone. Rather, there is a need to study the interaction between humans (activities) and its natural environment to understand how they come together in affecting the occurrence of floods.

Marker's Report:

- Many students are merely listing the factors in influencing the occurrence of floods rather than evaluating them
    - Why do natural factors influence flood occurrence to a larger/smaller extent compared to human activities?
- Note that influencing the occurrence can also mean the reduction of occurrence of floods → not necessarily just increasing

Theme 2: Urban Change

5 (a) Explain the reasons for the development of slums in cities with low levels of development. [9]

I: Explain
R: Explain how and why slums develop in cities with low levels of development.

Introduction
Slums include the traditional meaning – that is, housing areas that were once respectable or even desirable, but which have since deteriorated as the original dwellers have moved to new and better areas of the cities. The condition of the old houses has then declined, and the units have been progressively subdivided and rented out to lower-income groups. But slums have also come to include the vast informal settlements that are quickly becoming the most visible expression of urban poverty in developing world cities. Although slum on the surface be may considered an easily understandable "catch-all", the term in actuality is hugely complex. What is considered as a slum in one city may be regarded as adequate in another city – even in the same country. Moreover, slums change too fast to render any criterion valid for a reasonably long period of time. Slums come about because of, and are perpetuated by, a number of forces. These forces can be arranged under four domains: Economic, Social, Political and Environmental factors.

Body Paragraph 1:
Rural-urban economic migration is one the major causes for the formation of slums. Rural-urban economic migration is contributed by a combination of push and pull factors. Push factors are those that force the individual to move voluntarily, and in many cases, they are forced because the individual risk something if they stay. Pull factors are those factors that attract the individual or group to leave their home. The actual (and perceived) economic opportunities that urban area provide attract rural population to move to the city. However, most of the time rural migrants are unable to get immediate job, which leads to their financial shortage. On the other hand, many cities do not provide low-cost-housing to the large number of rural migrants and these ultimately result in them settling down in affordable slums.

Body Paragraph 2:
An expanding informal economy can contribute to the formation of slums. Informal economy can be defined as economy which is neither registered as a business nor licensed; that they do not pay any tax and are not monitored by local/state/federal government. Informal economy can grow faster than formal economy when government laws and regulations are opaque and excessive, government bureaucracy is corrupt and abusive of entrepreneurs, labour laws are strict, or when law execution is poor. The economic opportunities that an expanding informal economy provides can promote rural population can promote rural population to move to the city for a better living. An example would be Mumbai, India. Real estate in Mumbai is among the most expensive in the world. The contrast between rich and poor is stark, and about 60 percent of the

city's population of more than 18 million lives in slums. This makes Dharavi Slum a magnet for migrants from across India. The primary reason as to why migrants from across India choose to reside in Dharavi as compared to other locations is the size of its **informal economy**. Thousands of small businesses thrive in Dharavi today, creating an informal economy with annual turnover of $1 billion by some estimates. Leatherwork is a major industry in Dharavi. Small garment factories have proliferated throughout the slum, making children's clothes or women's dresses for the Indian market or export abroad. According to a 2007 study sponsored by the United States Agency for International Development, Dharavi has at least 500 large garment workshops (defined as having 50 or more sewing machines) and about 3,000 smaller ones. Then there are the 5,000 leather shops. Then there are the food processors that make snacks for the rest of India. And then still more: printmakers, embroiderers and, most of all, the vast recycling operations that sort, clean and reprocess much of India's discarded plastic. Thus, with the lure of job opportunities via the informal sector and the prospect of improving standards of living, development of slums becomes an imminent process in the cities.

Body Paragraph 3:

Poverty is a major factor for the development of slums. With the migration of the rural poor, poverty is also migrating to urban area. For a large proportion of these rural migrants - slums are the only options to settle themselves as they struggle to afford decent housing in their new host city. Residing in slum neighbourhoods can entrap these rural migrants in a cycle of poverty – defined as a set of factors or events by which poverty, once started, is likely to continue unless there is external intervention. Socio-economic levels of residential neighbourhoods affect quality of life and life chances. Concentrated disadvantage in neighbourhoods is one of the most durable predictors of high rates of violent crime, and differences in neighbourhood disadvantage explains much of the class gap in exposure to violence. The spatial separation of the affluent and poor also produces a spatial mismatch between the demand for job and job seekers, contributing to high unemployment in poorer neighbourhoods. Likewise, high-poverty schools in poor neighbourhood tend to be ineffective educationally due to a lack of resources and have disproportionately high dropout rate as children/youths (or their family) lack the economic means to put themselves through education. A case study of this could be seen in Kibera, Nairobi. There are approximately 2.5 million slum dwellers in about 200 settlements in Nairobi representing 60% of the Nairobi population and occupying just 6% of the land. Kibera houses about 250,000 of these people. Kibera is the biggest slum in Africa and one of the biggest in the world. Residents in Kibera live on less than 1-2 USD per day. The poverty level creates a harsh environment with pressing problems like lack of sanitation, clean water, waste management etc. While it is key for children to go to school to be able to break the cycle of poverty, to find a job is hard without a proper education. Lack of financial resources continue to deter children from pursuing an education. But even if they do, schools located in Kibera are less than satisfactory. They are often ill equipped, dense and with few, low paid and often have uneducated teachers. With little opportunities for socio-economic mobility for rural migrants residing in slum neighbourhoods, slums can/will persist.

Body Paragraph 4:

Finally, presence of extended families can contribute to greater migratory flows – expanding the formation of slums. Chain migration refers to the social process by which immigrants from a particular town follow others from that town to a particular city or neighbourhood, whether in an immigrant-receiving country or in a new, usually urban, location in the home country. Peru's capital Lima has expanded rapidly. In the 1950s, the city had around 1 million residents. Today, nearly 10 million people call the city home. The city has continued to grow outwards through the expansion of slum settlements – where most of the residents are migrants from the rural countrysides of Peru. An important reason promoting rural population to relocate to Lima is the presence of extended families and familial networks. A study on migrants from the Peruvian Highlands to Lima, Peru revealed that 90% of migrants rely on relatives for short term accommodation and 50% rely on relatives for employment arrangements. Thus, it is found that the more established a migrant community becomes in a city, the easier it appears for others in the same community to take the decision to migrate as there are support that they can fall on (pull factor).

Generic level Descriptors for 9m

Level	Marks	Descriptors
3	7-9	Response is analytical and explanatory rather than descriptive. There is a clear focus on the question. Response demonstrates exemplary display of 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 for weaker response. Response reflects relevant knowledge and understanding of the question. Response is structured and organised satisfactorily but may be unclear in parts. Use of terminology is generally accurate.
	1-3	Response does not address the requirements of the question fully. Depth of knowledge and understanding shown is limited. 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.

(b) Evaluate the success of slum improvement strategies in cities. [16]

I: Evaluate
R: To what extent are slum improvement strategies successful?
A:

Introduction:
Although slum on the surface be may considered an easily understandable "catch-all", the term in actuality is hugely complex. What is considered as a slum in one city may be regarded as adequate in another city – even in the same country. Moreover, slums change too fast to render any criterion valid for a reasonably long period of time. Whilst the term may be subjective, there are a few common characteristics which can help to identify and quantify the slums, such as informal structure and settlement, lack of security of tenure, overcrowding and lack of basic communal and public service and economic base. Whilst urban authorities have recognised the problems that slums may bring about and tried to improve slum dwellers' standard of living with various slums improvement strategies, the strategies are often found wanting and have been successful to a small extent. This is mainly due to the strategies' inability to solve the root cause of slum formation and low standard of living and the 'top-down' implementation and planning processes.

Counter Paragraph 1:
Slum improvement strategies can be effective and successful if they are able to help improve the overall standard of living of slum dwellers. Authorities would aim to eradicate the problem of poor sanitation and provide clean water, electricity and basic services and amenities. In this case, the strategy of New Town planning have largely been able to help raise the standard of living of the people. New towns deals with large-scale, holistic planning of a mixed use, self-sufficient community – one that include its physical design of streets and infrastructure, its provision of residential, commercial, education, recreational, shopping and service facilities, its blend of employment and leisure activities. A city that has managed to use new towns as a strategy to cope with housing problems is Singapore. Following self-governance in 1959, the government assumed a dominant role in the provision of housing, much of which has been relocating population from slum neighbourhoods in the city core to new town developments in the periphery. To date, there have been no more slums in the city and these new towns are homes to public housing highly subsidised by the Housing Development Board of Singapore, of which more than 89% of the population own these houses and the system has been touted as one of the most successful housing development project in the world to eradicate slums in cities in the past 30 years. Therefore, large scale housing development projects like New Towns have been successful in elevating the standards of living.

Support Paragraph 1:
However, very few slum development projects could be successful as they do not tackle the root cause of why there are slums in the first place – namely, poverty and rapid rural-urban migration. The poverty in slums is a vicious cycle, where the lack of education opportunity and job opportunities in the slums or in the cities themselves entrap urban dwellers in poverty for generations to come. In this case, most of the strategies are touch-and-go strategies which do not address these problems. For example, whilst site and service schemes include provision of plots of lands by state authorities, either on ownership or land lease tenures along with a bare minimum of essential infrastructure needed for habitation, these projects do not alleviate people out of poverty. For example, the Dandora Community Development Project is a site and service scheme in

Dandora, Nairobi, Kenya implemented by the Nairobi City Council with loan or credit support from the World Bank. The target group of people was slum dwellers earning between the minimum and median income and they were given technical support and a soft loan to build additional rooms. However, there is a still a need for these residents to be able to afford these loans. Although overall, there is an improvement in the slums as plots were serviced with access roads, security, lighting, water and sewage, with provisions for primary schools and markets, residents will still be living in poverty and unable to get out of the poverty cycle to will entrap them in the slum neighbourhoods. In the case study of Singapore's New Town projects, it was highly successful as it was coupled with high speed economic growth and socio-economic policies such as the CPF system, which is a mandatory savings plan in which wages contributed by both citizens and their employer are saved in a government board. Thus, whilst there was adequate jobs for people, this mandatory savings account allowed residents to pay for the public housing. At the same time, the state put aside large amount of budget to develop high quality education system to improve the education level of its residents. As such, the New Town projects in Singapore was a success not only in improving standard of living in the housing environment, but also provided an impetus for its people to work hard themselves in order to be able to afford these public housing. Thus, given the fact that slum development stems from poverty and that it requires nation-wide multi-pronged approach to improve slums and its standard of living, it is generally very difficult for urban authorities to be successful in improving the slums.

Support Paragraph 2:

In times where various communities would like to have a say in how they can be helped to improve their housing environment, particularly in the slums, the top-down approach employed by many state agencies proved to impeded the success of the strategies commonly used by the state. Strategies of slum improvement should be based on the needs and demands of its residents. However, slum improvement strategies are mostly based on the governments' agendas and needs, mostly to revamp the city as part of its branding and marketing strategies rather than to really cater to the needs of the residents. A case in point would be the demolition and eviction strategies. Demolition and eviction relates to the forceful and purposeful destruction of substandard housing including slums. It results in the displacement or relocation of population to other areas. Demolition and eviction usually involves armed police allowing workers to move in to bulldoze the shacks when the land is needed for other uses. Demolition and eviction may be accompanied with other strategies such as the relocation of slum residents to new towns. Urban authorities' may cite different reason for such strategies, such as for 'city beautification', or that the slums pose as a crime and health hazard, or they could simply be reclaiming the land for redevelopment to use the land for more profitable activities. For example, slum neighbourhoods (or Favelas) in Rio De Janeiro, Brazil have been demolished and 22,059 families since 2009 to make way for transport and other infrastructure projects related to the Rio 2016 Olympic Games. In particular, Vila Autódromo - a favela on the fringes of the main Olympic Park in has seen half of its population been forcibly moved to new town/public housing sites as far away as 60km from the centre of Rio. This not only effectively eradicate homes that these urban dwellers may have painstakingly built up over the years but also forcing the residents to quit their jobs if they may be working in the city centre of Rio. This may result in either the residents refusing to move to the new town or public housing, and set up informal settlements elsewhere nearer to their sources of employment, which brings about another set of problems, or force these slum dwellers to be out of job as they will have to seek other sources of employment nearer to their new places. Thus, such top-down

approaches without seeking the opinions and getting active participation from the stakeholders, especially the slums residents would only lead to more problems.

Support Paragraph 3:

Finally, slum improvement strategies are usually not effective as they only take effect in a longer term, or that such improvements could only be taking place to tackle one issue at a time. Often times, there are too many issues and problems plaguing slums that it is impossible to try to eradicate the problems or at least improve the situation. Many slums face multiple issues of chronic absence of basic services such as potable water, sanitary services and electricity. Thus, to be able to provide all these services at the same time is almost impossible. For example, Orangi Township in Karachi is a massive slum neighbourhood with a population of 1.2 million. Until 1980s, most households had no access to sanitation facilities and used bucket latrines and soakpits for the disposal of human waste and open sewers for the disposal of waste - resulting in a high rate of water-borne diseases. This however has changed with the onset of Orangi Pilot Project – a project that has enabled low income families to finance, manage and maintain sanitary latrines in their homes, underground sewerage lines in the lanes and secondary sewers in the neighbourhood in a better and sustainable manner. Whilst such slum improvement projects provide improvements in-situ and harness on the community's efforts and labour to improve the environment, it can be haphazard without supervision and can only tackle one issue at a time, with slow improvements being made. Thus, the massive amount of problems plaguing slums may be difficult to resolve in the short run.

Conclusion:

To conclude, slum improvement strategies can be successful if the standard of living is largely improved. But for most of the time, this may prove to be a tall order as the range of issues plaguing slums may be too big and deep-rooted. Unless a range of complementary policies to eradicate poverty and improve level of education in the cities, the strategies would be at best some stop-gap measures which will see the problems recurring in a few years' time. Also, as long as the strategies continue to be top-down approach with no consultation with the slum residents and/or community leaders, the effectiveness and success would be largely impeded. In the near future, as urbanisation rates continue to climb and cities continue to swell, slums are projected to grow in numbers and size. This may make way for more effective and holistic strategies to be deployed to better address the issues from a multi-pronged approach.

Generic level Descriptors for 16m

Level	Marks	Descriptors
4	13-16	Response shows strong evaluative elements. Evaluation is relevant and comprehensive. Response fully addresses the question and features accurate knowledge, reflecting depth of understanding. The argument or discussion is coherent and well-supported by relevant material. Use of terminology is accurate.
3	9-12	Response displays a sound evaluative element. Response addresses the question and features accurate knowledge, reflecting depth of understanding. The argument or discussion is coherent and supported by relevant material. Use of terminology is relevant and mostly accurate.

2	5-8	Response has some elements of evaluation but is broadly descriptive. Response exemplifies knowledge and understanding of the question and is generally relevant. The weakest responses may lack balance and/or depth. Response structure is broadly coherent but may lack clarity. Use of terminology is inconsistent though generally accurate.
1	1-4	Response shows little or no evaluation. 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 terminology.
0	0	No creditworthy response.

6 (a) Explain the sources of either crowding **or** fear in cities in countries at high levels of development. [9]

I: Explain
R: Sources of fear in cities in countries at high levels of development.
A:

Introduction:
Fear is an emotional reaction to a perceived threat. Urban dwellers are often fearful that individuals, places, actions and events can inflict physical or psychological harm on themselves or on the people and thing they hold dear. Sources of fear in the city stems from crime and terrorism and it must be noted that geographies of fear brought about by crime is highly uneven.

Body Paragraph 1:
One source of fear in the city is crime. Crime refers to an illegal act for which someone can be punished by the state. While cities are spaces of hope and aspirations, cities can also be sites of vulnerability and danger. It is found that in a majority of countries, most crime occur in urban areas. In Turkey, one fourth of all crimes in 2014 were committed in Istanbul, while almost half of all crimes in the country in general were committed in Istanbul in 2015. Low quality urban spaces prepare the basis for crime. Deserted, empty structures, irregular and uncontrolled green areas that are not well maintained or illuminated, and regions with complex road networks can easily be transformed into areas where gangs operate and become crime nests where they can organize. Research also suggests that crime is greater in poorer neighbourhoods, and in places occupied by disadvantaged populations. The occurrence of urban poverty and the rapid increase in the ratio of such poverty plays the most important role in the increase of urban crime. Fear of crime in the city can be produced by direct involvement with violence, the impact of the media or even shared knowledge of family, friends, peers, acquaintances, and co-workers.

Body Paragraph 2:

One other source of fear in the city is terrorism. Terrorism refers to the calculated use of unlawful violence or threat of unlawful violence to inculcate fear; intended to coerce or to intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological. In a world of intensifying globalization and urbanization, the ''urban'' and the ''international'' are fast blurring into one another. The division between ''domestic urban'' and ''international'' politics has now melted away. Terrorist acts are simultaneously global and local (urban) events. Facilitated by the advancement of transport and communication technologies, fear spurred by localised terrorist acts is no longer contained within urban/national boundaries, but is now "globalised" as it "travels". There is a strong relationship between space and terrorism. Experiences of fear spurred by terrorism is spatially uneven - stronger in some cities, some locations within cities (usually high profile landmarks) and higher among certain social group than others. It has been found that residents in cities previously targeted and affected by terrorist acts tend to experience higher levels of fear. It has also been found out that those who are socially and economically marginalised and racialised and religious minorities experience greater levels of fear. For example, after the 2005 London bombings, Muslims felt more fearful than other groups. In New York City, it was women, those on lower incomes and those from non-white ethnic groups. In Providence, an urban settlement 3 hours away from New York, older people and those with low levels of educational attainment were more afraid of future attacks.

Body Paragraph 3:

Fear of terrorism and crime can be considered to create and reinforce exclusion from urban life and from particular urban spaces in a number of ways. When exclusion is created and reinforced, this creates and reinforce fear, forming a vicious cycle. Exclusion of urban dwellers due to fear can take place in 4 different ways: Exclusion through sub-criminal acts, exclusion through being constructed as a threat, exclusion through precautionary behaviour and exclusion through community safety policies. Policies which aim to improve the safety of cities can excite greater fear, isolation and social exclusion - limiting citizens from urban public space. For example, More recently, in 2017, Islamophobia has taken the form of increased travel restrictions imposed on the Muslim community. Starting from June, people from six mainly Muslim countries (Iran, Libya, Syria, Somalia, Sudan and Yemen) and all refugees now face tougher US entry due to President Donald Trump's controversial travel ban. The US president insisted his ban was necessary for national security and pointed to terrorist attacks in Paris, London, Brussels and Berlin as evidence. This may further reinforce people's fear of certain groups in the city and on top of that, result in fear within the Islam community as well, as there would be fear of the rise in uncivil behaviour towards Muslims and Arabs in the cities.

Conclusion:

As such, sources of fear of crime and terrorism in cities really stem from perceptions which may be shaped by media and state policies which tend to play up certain events or nuggets of information following crime and terror attacks. This has got implications on the way cities are perceived and how certain groups who are perceived to be perpetrators of such threats to actually become the victims of these perception of fear in the cities.

Generic level Descriptors for 9m

Level	Marks	Descriptors
3	7-9	Response is analytical and explanatory rather than descriptive. There is a clear focus on the question. Response demonstrates exemplary display of 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 for weaker response. Response reflects relevant knowledge and understanding of the question. Response is structured and organised satisfactorily but may be unclear in parts. Use of terminology is generally accurate.
	1-3	Response does not address the requirements of the question fully. Depth of knowledge and understanding shown is limited. 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.

(b) Assess the success of strategies used to cater for the different needs of social groups in cities. [16]

I: Assess
R: To what extent have the strategies used to cater to different needs of social groups in cities been successful?
A:

Introduction:
In each city, there would be different proportions of social groups with a variety of needs which city planners and authorities would try to satisfy. For this essay, the social groups which will be discussed would be the elderly and the migrants residing in the cities. Although there are subjective interpretations as to what constitute as elderly and the idea of it as a social construct and subjected to many interpretations, for the purpose of this essay, elderly is defined as those living beyond the age of 60. The other group in question would be the migrants, who can be broadly categorised into economic migrants who are skilled and unskilled, political and environmental refugees. Strategies catering to the needs of different social groups in cities have been **effective to a small extent**. This can be due to a variety of reasons ranging from insufficient economic capacity to sustain these strategies for the long run, inability to meet the diverse needs of the different social groups, or having to face difficulty in bringing about a change of perceptions which are often ingrained in people's minds or that strategies themselves bring about other sets of unintended social consequences. However, strategies to cater to the needs of different social groups in cities may be effective if they cater to the essential needs of these social groups.

Counter paragraph 1

Some strategies do cater to the essential needs of these social groups, improving their quality of life. Migrants and refugees should be assisted in overcoming difficulties in accessing basic essential needs such as water, shelter and food, to empower and improve their quality of life. For elderly, their needs may include the freedom to access places in the city and for them to have a permanent housing or shelter close to areas with healthcare services and for active ageing to take place. For instance, in Britain, economic aid was given to asylum seekers in the form of weekly allowance and more for women who are pregnant or with children. For active ageing, there should be optimised opportunities for healthcare services, participation in social networks, sense of security with community support with respect and inclusion. Therefore, strategies catering to the needs of the elderly should enhance the enablement for elderly. In this aspect, Singapore has developed 39 new Senior Care centres by 2016 to meet increasing demand for aged care in the heartland communities. These senior care centres provide day care, dementia day care, day rehabilitation services and basic nursing services and over time, may even begin the delivery of home care services. These services have been well received by the elderly and are also very much welcomed by the families of the elderly. Hence, the strategies that cater to the needs of the different social groups may be effective if they are able to provide the essential needs.

Support Paragraph 1:

However, in retrospect, due to the fact that these social groups are within themselves too diverse for states and planners to adequately cater to the large diversity of needs that these groups may require, it may not be possible to satisfy all their needs. Every social group is often generalised and seen as one where they might face the same generic problems and therefore face the same needs. As a result, it creates a lack of understanding by the government and urban authorities when in fact they could have offered more assistance if they further narrow own the scope of assisting a social group. In other words, a social group's needs can be further assessed when it is associated with religion, gender status and culture. For example, a research performed by Ontorio Human Rights Commission of old Age experiences in Canada has found that while older men do experience particular concerns, the unique and often compounded disadvantage experienced by older women needs to be recognised. Owing to a number of factors including longer life expectancy, labour force participation patterns, wage inequality, social programmes and systems designed primarily from a male-centred or gender-neutral perspective, older women are more likely to experience poverty. This reflects how old age can be compounded with other identity markers to create different levels of marginalisation and urban experiences. Going back to the example mentioned above on Senior Care Centres, there still exist the problem of elderly who are living in poverty or who are disabled and may not be able to make it to the senior care centres or afford to go for these senior care centres. The problem is the same for the strategy on improving bus transport system to enable elderly to get out and about on their own by providing bus information and disabled friendly facilities on the roads. This still do not cater to the needs of the elderly living in poverty who might not even have the monetary means to pay for public transport on their own. Therefore, whilst generic issues may be addressed by strategies, the many facets of issues faced by the diversity within each social groups will impede the authorities' effectiveness to cater to each and every single need.

Support Paragraph 2:

Moreover, for some countries, even strategies to meet the basic needs of socials may not be feasible or successful as such strategies demand for a strong political

commitment, economic capacities and planning capabilities from the government to successfully plan and implement it at the community level for the different social groups. Developed countries and their cities have the fundamental infrastructure and capital and are striving towards green issues as opposed to developing countries that have yet to meet their basic needs and are struggling with a range of other brown issues. Therefore, in many of these developing countries, or even in poorer cities within developed nations such as Texas will have problems providing even basic needs for migrants and/or elderly. In Turkey, more than 1.8 million refugees are living along its borders and is said to put a strain on Turkey as it has already spent more than 6 million dollars on refugee camps and providing them with food. This highlights how the city's budget allocation is insufficient to alleviate their economic strain, exceeding their financial capacity and even planning capabilities to cater to the enlarging group of refugees and migrants in the cities. Going back the previous example of providing information on transport options to influence elderly's use of public transport, it is a costly system which Singapore and Himeji, Japan are currently using and this will not be possible to be emulated in cities struggling with brown issues. Therefore, strategies to cater to the needs of the social groups may be met with financial constraints and planning blight which further reduce the strategies' success.

Support Paragraph 3:

Strategies to cater to different social groups have been effective to a small extent as they often do not change the negative perceptions of social groups and hence do not solve the root cause behind their marginalisation. These perceptions are often ingrained social constructs which may take generations of educating the young to finally be eradicated to a certain extent. Over the past years, both elderly and migrants have been associated with negative connotations in the society. These stigma and labellings may directly or indirectly affect the effectiveness of strategies such as the ones which attempt to provide opportunities for integration into the mainstream society and for these groups to feel included in the city. For example, promoting a culture of respect and social inclusion is taken by the Tripartite Alliance for Fair and Progressive Employment Practices (TAFPE) in Singapore to promote the adoption of fair, responsible and progressive employment practices. Today, TAFEP has been producing advertisements and running campaigns aimed at convincing employers and employees to look beyond their age biases, and see the elderly's abilities and the value they bring to the organisation. However, such campaigns and advertisements may not guarantee the change in perceptions of the society. It is still hard to convince employers to retain these older worker in the companies especially in the face of economic recession and cost-cutting measures need to be undertaken. Therefore, whilst strategies targeting a change in mindset and attitude towards certain social groups are essential, it may take long time for them to take effect and still does not alleviate unfair work practices and uneven power relations in the workplace in the short run.

Support Paragraph 4:

Finally, strategies to cater to different social groups may bring about other sets of unintended social or economic consequences. It is sometimes hard, or even too demanding for strategies to be able to cover all economic, social and cultural grounds for a 'holistic' approach. For example, to cater to the needs of migrant workers in Singapore, the government has commissioned for Workers' dormitories to be built in areas like Tuas and Tampines. These self-contained workers' dormitories include services such as

remittance services, mini food court, barbers and facilities such as basketball courts and kitchens. This provides a basic level of services and facilities to cater the essential needs of the migrant workers. However, in doing so, some are arguing that this adds to the further socio-spatial segregation of these workers as these self-contained dormitories would mean they do not need to travel out of the dormitories. This impedes chances for mutual understanding between the locals and the migrants, and misunderstandings and misconceptions about them may not be easily eradicated or be reduced. As such, for the state or authorities to be able to cater the needs of the social groups for all their needs without some consequences would therefore be impossible, unless certain complementary policies are put in place, which brings about the question of inter-agency cooperation and its effectiveness.

Conclusion

In the final analysis, it is almost impossible to cater to the needs of each and every single individual in these social groups as their needs differ according to their identities, level of income and differing backgrounds. It is also important to bring in the fact that the idea of catering to the needs of different social groups in the context of liveable cities is fluid and means different things to different individuals. Therefore, whilst the cities gear towards liveability for all, one must acknowledge the difficulty in trying to satisfy all the different needs of these individuals at the government or planning authorities' level. Sometimes, it is up to us individuals to make the changes from bottom-up approach to try and make the city a comfortable and liveable place for everyone.

Generic level Descriptors for 16m

Level	Marks	Descriptors
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0	0	No creditworthy response.

- End of Paper -
