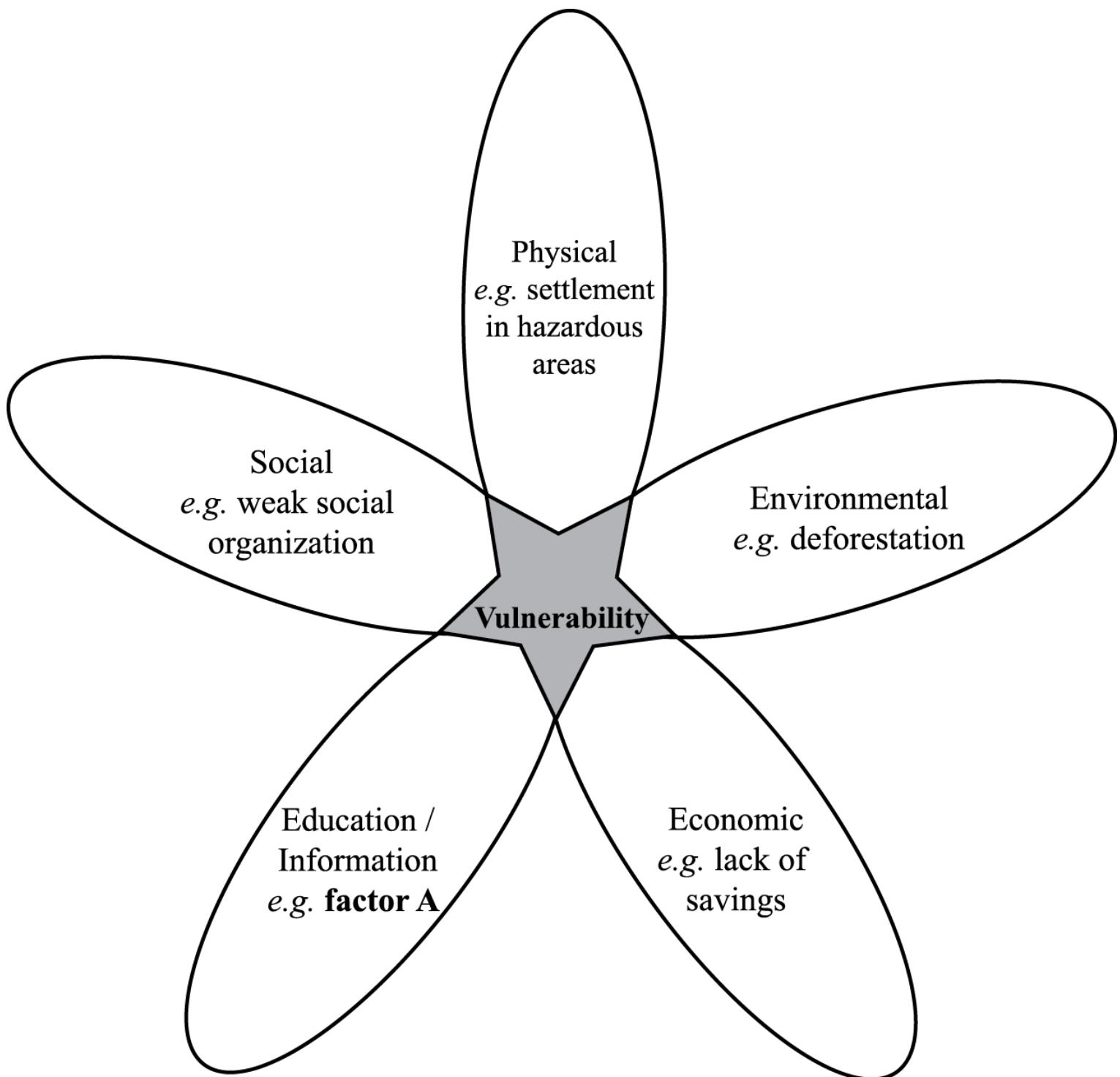


## SL Paper 2

The diagram shows some of the factors affecting vulnerability to hazards.



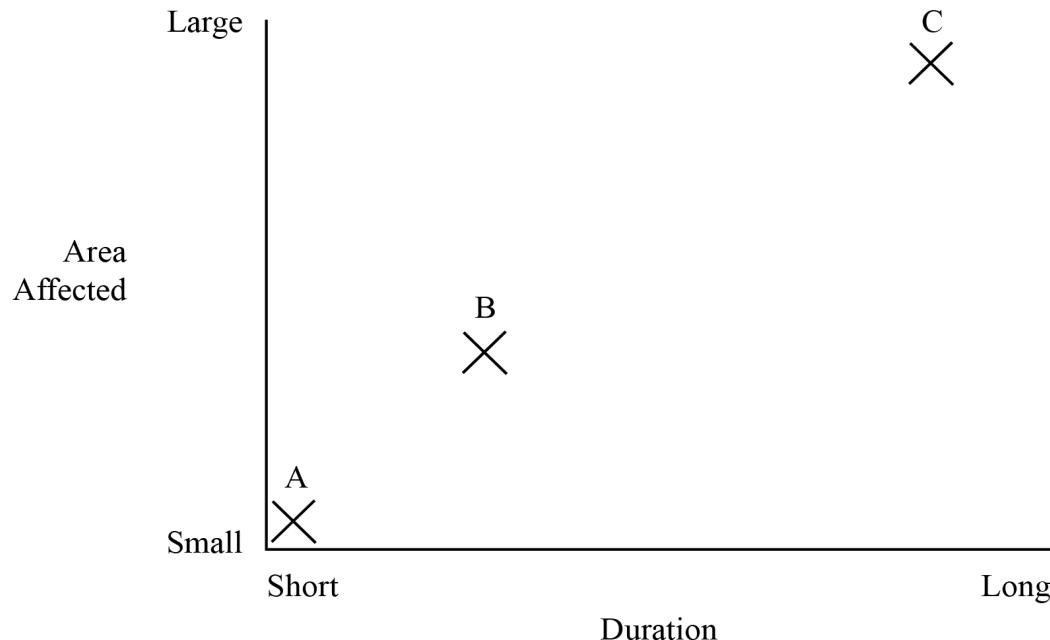
[Source: Richard Rhoda and Tony Burton. *Mexico: A geographic perspective*, Sombrero books (2009)]

- a. Suggest what factor A on the diagram might be.

[1]

- b. Explain how **two** of the other factors (other than factor A) shown on the diagram affect vulnerability to hazards. [2+2]
- c. Analyse why communities may underestimate the probability of a hazard event occurring. [5]
- d. For **one or more** hazards of your choice, examine how estimates are made for the probability and likely impact of a major hazard event. [10]
- 
- a.i. Outline what is meant by the term "drought". [2]
- a.ii. Briefly describe **one** physical cause of a **located** severe drought. [2]
- b. Suggest **two** reasons why individuals and communities may underestimate the probability of a severe drought occurring in the region in which they live. [6]
- c. Discuss the reasons why some low-income countries may be more vulnerable than others to the effects of hazard events. [10]
- 
- a. Describe the global distribution of **either** volcanoes **or** earthquakes. [4]
- b. Suggest **three** factors that might affect an individual's perception of the risk posed by tectonic hazards. [6]
- c. "Hazard prediction is ineffective in reducing the impact of hazard events on people's lives and property." Discuss this statement, with reference to two different hazard types. [10]
- 
- a(i). Identify a scale used to measure the magnitude of **one** hazard type. [1]
- a(ii). Describe the main features of the scale you identified in (a)(i). [3]
- b. Explain the occurrence of hurricanes (tropical cyclones, typhoons) in a **named** area. [6]
- c. "The economic impact of disasters is increasing while related deaths are decreasing." Discuss this statement, with reference to examples of disasters. [10]
- 
- a. Outline the methods used to describe the magnitude (strength) of **two** hazard types. [2+2]
- b. Suggest **three** reasons why some people continue to live in places with a known hazard risk. [3x2]
- c. "Economic factors and not physical factors determine the severity of the impacts of hurricanes (typhoons, cyclones)." Discuss this statement using examples. [10]

The diagram shows three natural hazards (A, B, C), their duration and the size of the area they affect.

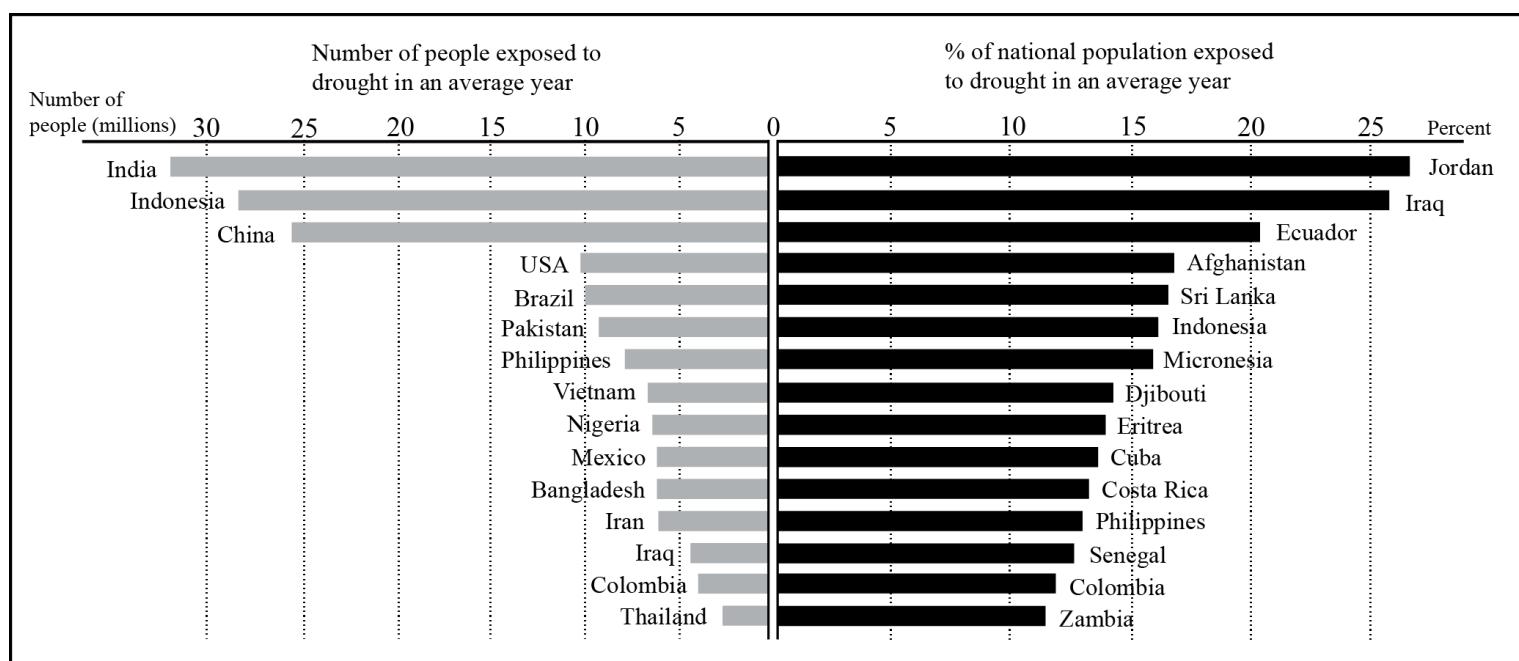


a. Identify **two** of the hazards shown and explain your choice. [2+2]

b. Analyse the global distribution of **one** of the hazards you identified in part (a). [6]

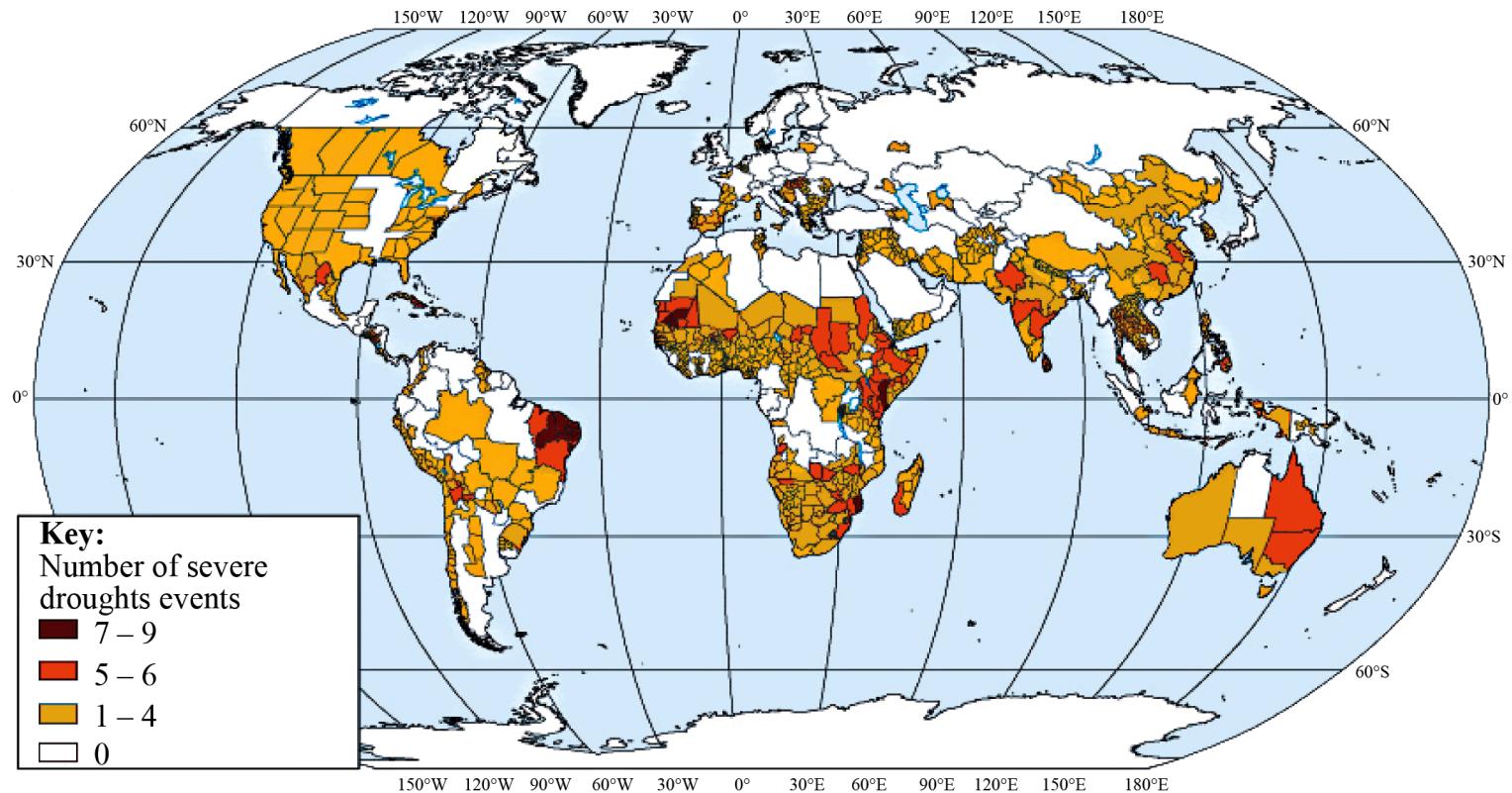
c. Using examples, evaluate the success of adjustment and response strategies for a named hazard type. [10]

The graph shows the number of people, and the percentage of the total population, exposed to drought in different countries in an average year.



- Briefly describe any **two** distinct patterns shown by the data on the graph. [2+2]
- Explain the reasons for the occurrence and severity of a specific drought event that you have studied. [6]
- Referring to examples, examine why the geographic impacts of disasters vary in space and time. [10]

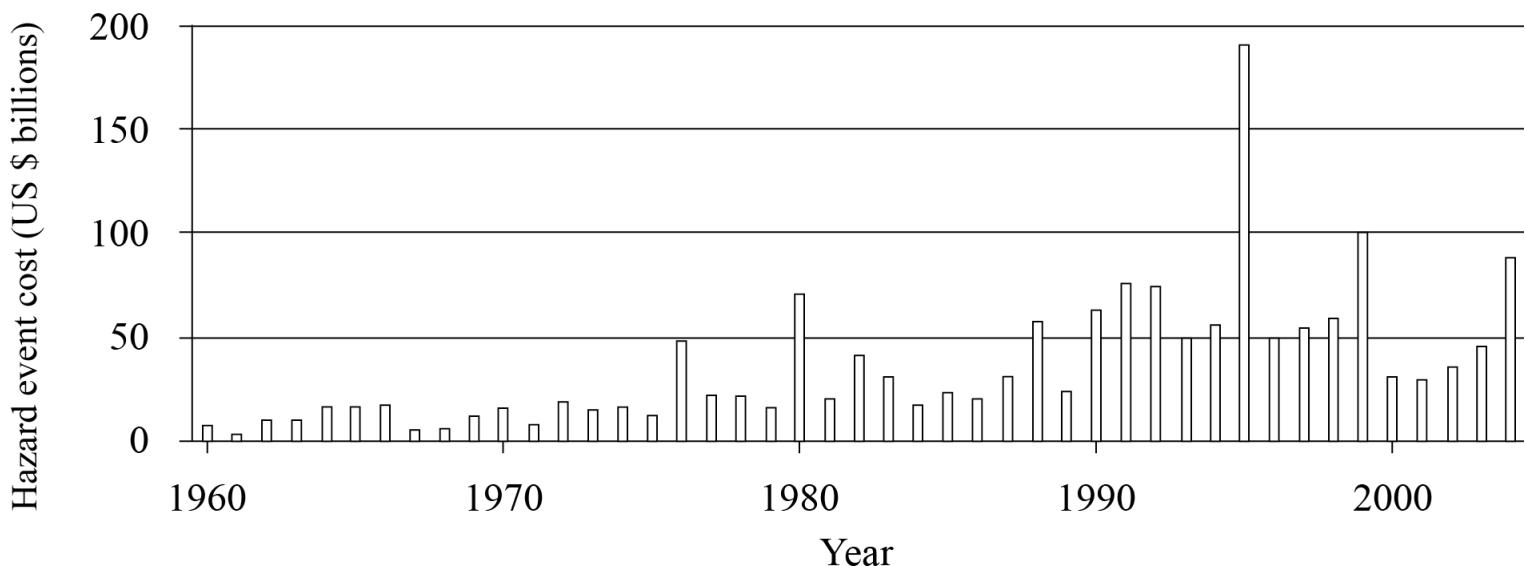
The map shows the world distribution of severe drought events from 1974 to 2004.



[Source: [http://www.preventionweb.net/files/10600\\_Figure226.jpg](http://www.preventionweb.net/files/10600_Figure226.jpg); ©UNEP/GRID]

- Describe the distribution of areas in the northern hemisphere that have been affected by **five or more** severe drought events from 1974 to 2004. [4]
- Analyse **three** ways in which communities can reduce the impact of drought. [2+2]
- “Hazard preparedness is more important than hazard prediction.” Discuss this statement with reference to any **one** hazard other than drought. [10]

The graph shows the cost of hazard events worldwide in US dollars from 1960 to 2004.



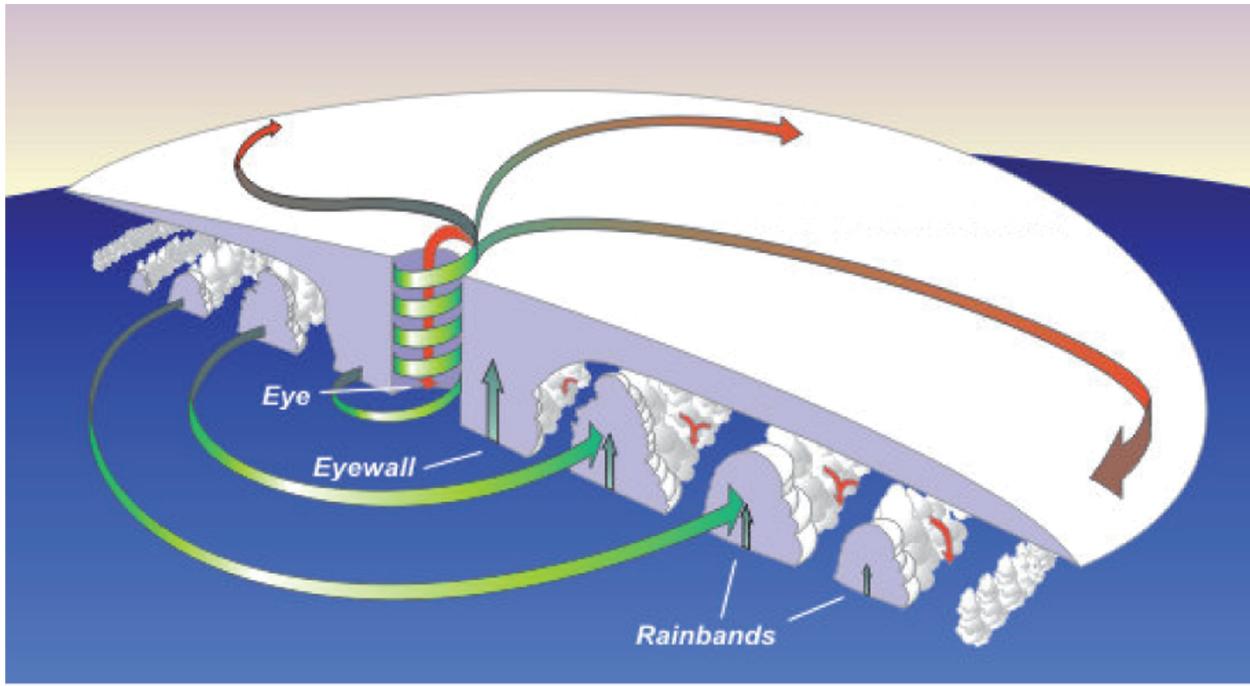
[Source: NASA Earth Observatory, <http://earthobservatory.nasa.gov/Features/RisingCost/>]

- a. Describe the changes shown in the graph. [4]
- b. Explain the reasons for the changes shown in the graph. [6]
- c. Examine the different types of responses that occurred during **and** after a named disaster. (Do **not** refer to technological hazards in your answer.) [10]

- a. (i) Describe what is meant by the term “drought”. [4]
  - (ii) Outline **one climatic** reason for the occurrence of **one named** drought.
- b. Referring to **either** earthquakes **or** volcanoes, explain **three** reasons why fewer deaths are caused by these hazards than in the past. [6]
- c. Using located examples, examine why the intensity of hurricanes varies over time. [10]

- a. Outline **two** factors that can influence the vulnerability of a community to the impacts of a tectonic hazard event. [4]
  - b.i Briefly explain the occurrence of **either** volcanoes **or** earthquakes at constructive plate margins. [3]
  - b.ii Briefly explain the occurrence of **either** volcanoes **or** earthquakes at destructive plate margins. [3]
- c. Examine the effectiveness of short- and long-term responses to **one** recent disaster caused by a hurricane (tropical cyclone/typhoon). [10]

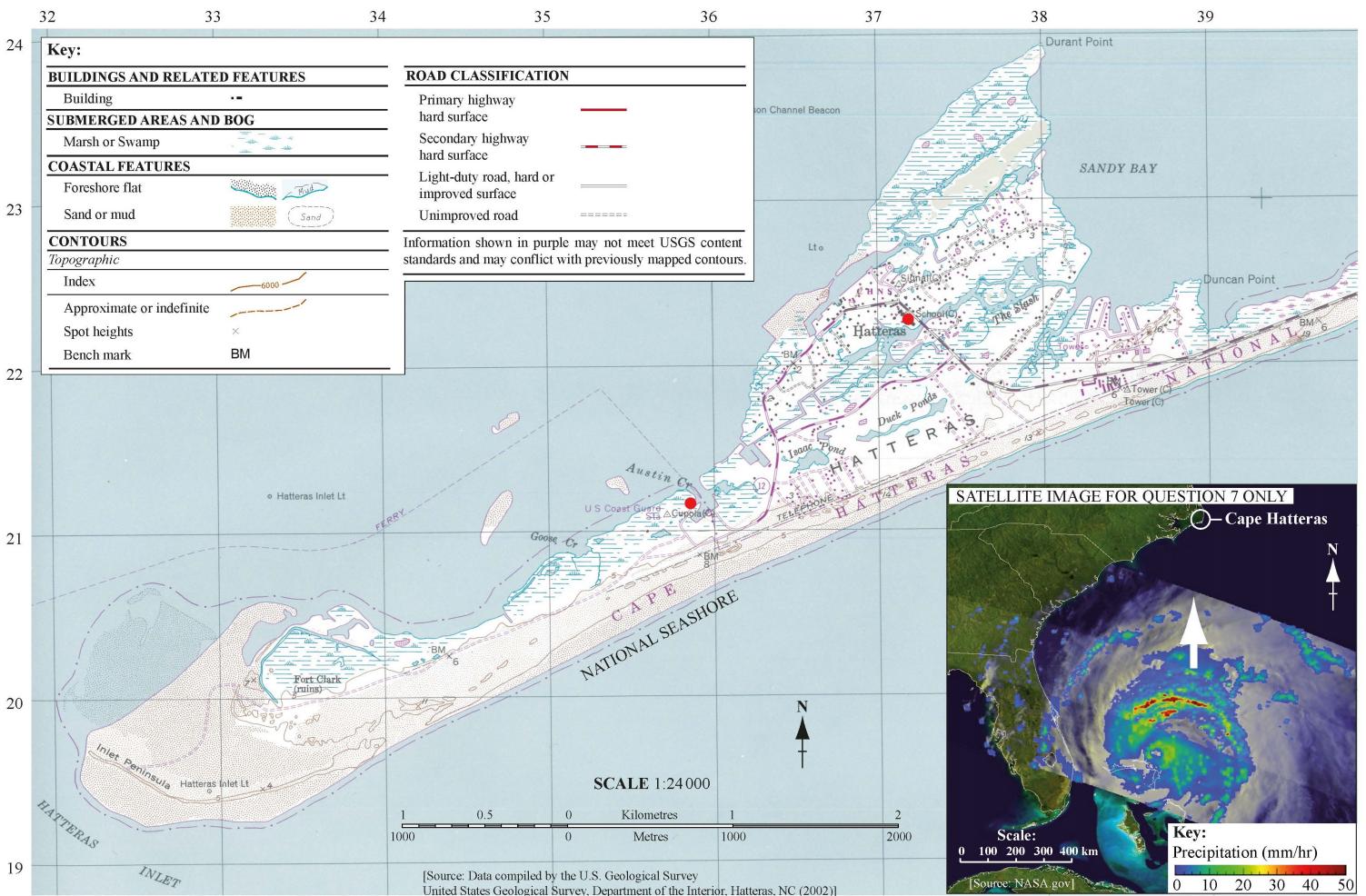
The diagram shows the structure of a typical hurricane (typhoon, tropical cyclone) in the northern hemisphere.



[Source: <http://library.thinkquest.org/03oct/00758/en/disaster/hurricane/structure.jpg>]

- a. Describe the atmospheric conditions in the eye and the eyewall of a typical hurricane. [2+2]
- b. Explain the conditions needed for the occurrence of a hurricane hazard event. [6]
- c. "Rich countries experience hazard events while poor countries experience disasters." Discuss this statement with reference to **one** named hazard type. [10]

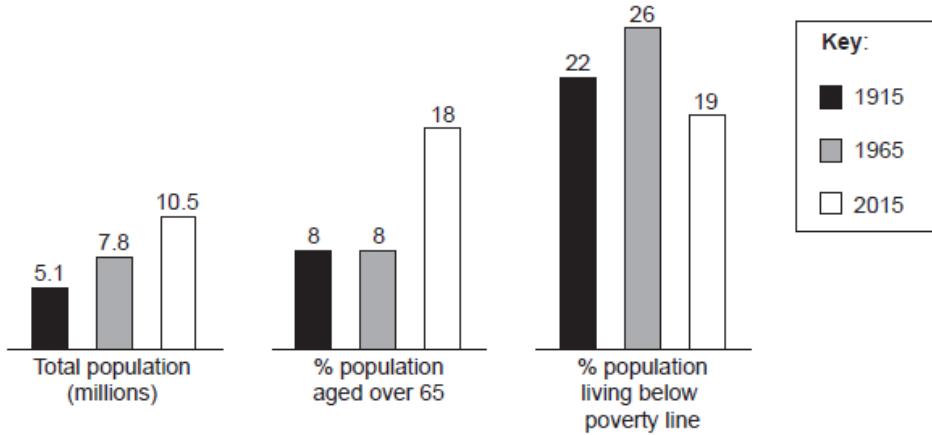
The map shows the Cape Hatteras area of the east coast of the USA. The satellite image shows Hurricane Irene (2011), a few days before it reached Cape Hatteras.



- a. (i) State the height in metres of the highest point west of gridline 35. [4]
- (ii) State the four-figure grid reference for the square in which this point is located.
- (iii) State the shortest distance by road, in kilometres, between the school and the ferry at Cupola.
- b. **Using map evidence only**, explain why the inhabitants of this area were particularly vulnerable to the impacts of Hurricane Irene. [6]
- c. "The level of economic development is **not** the main factor affecting the impact of a tectonic hazard event on a community." Discuss this statement, with reference to **either** earthquakes **or** volcanoes. [10]
- ai. Define *hazard risk*. [2]
- aii. Define *hazard probability*. [2]
- b. Explain **three** factors that affect the way that people perceive hazards. [2+2+]
- c. Examine the impact of a recent human-induced (technological) hazard event. [10]

- a. (i) Describe what is meant by hazard risk. [4]
- (ii) Describe what is meant by vulnerability to hazards.
- b. Explain how building design and land-use planning can limit the potential damage from one **named** hazard type. [6]
- c. "The faster the speed of onset, the greater the impact of the hazard event." Discuss this statement, with reference to examples. [10]
- 
- a. Describe **two** ways in which land-use planning (zoning) can reduce hazard risk for a **named** hazard type. [4]
- b. Explain **three** reasons why people continue to reside in areas that are known to be affected by hazards. [6]
- c. "Hazard events are predictable, disasters are not." Discuss this statement. [10]
- 
- c. Explain **three** conditions necessary for the formation of tropical hurricanes. [6]
- d. "Poorer communities are more vulnerable to the impacts of hazard events than richer communities." Discuss this statement. [10]
- 
- a. (i) Define the term *disaster*. [5]
- (ii) Outline **two** long-term actions a community can take to reduce the economic impact of hurricanes.
- b. Explain the causes of **one named** human-induced hazard event. [5]
- c. Examine the reasons why people continue to live in areas that have been affected by severe drought hazard events. [10]
- 
- a. Describe the difference between a hazard and a disaster. [2+2]
- b. Explain why some sections of a community are more vulnerable to hazards than others. [6]
- c. Compare the effectiveness of the methods used to predict the occurrence of **two** different natural hazard types. [10]
- 

The diagram shows changes in population and vulnerability for a city at risk of multiple natural hazards, between 1915 and 2015.

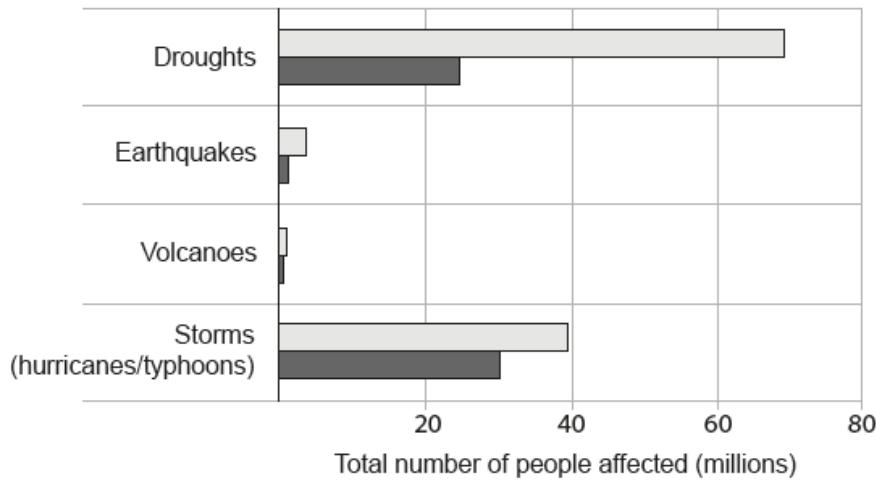


[Source: International Baccalaureate Organization, 2015]

- Using data from the diagram, describe **three** trends shown. [4]
- Suggest how a community's vulnerability to hazards is affected by: [6]
  - the demographic characteristics of its population;
  - the socio-economic characteristics of its population.
- Using examples, contrast the strategies adopted to minimize the risk from future droughts and hurricanes. [10]

- Referring to **either** earthquakes **or** volcanoes, briefly outline: [4]
  - one** scale used to measure the magnitude of the hazard event;
  - why some hazard events are categorized as disasters.
- Referring to **either** earthquakes **or** volcanoes, briefly explain their occurrence: [6]
  - at a destructive (convergent) plate margin;
  - in areas **other than** along a plate margin.
- Discuss why some hazard events are easier to predict than others. [10]

The diagram shows the total number of people affected by different types of hazard event between 2002 and 2012.



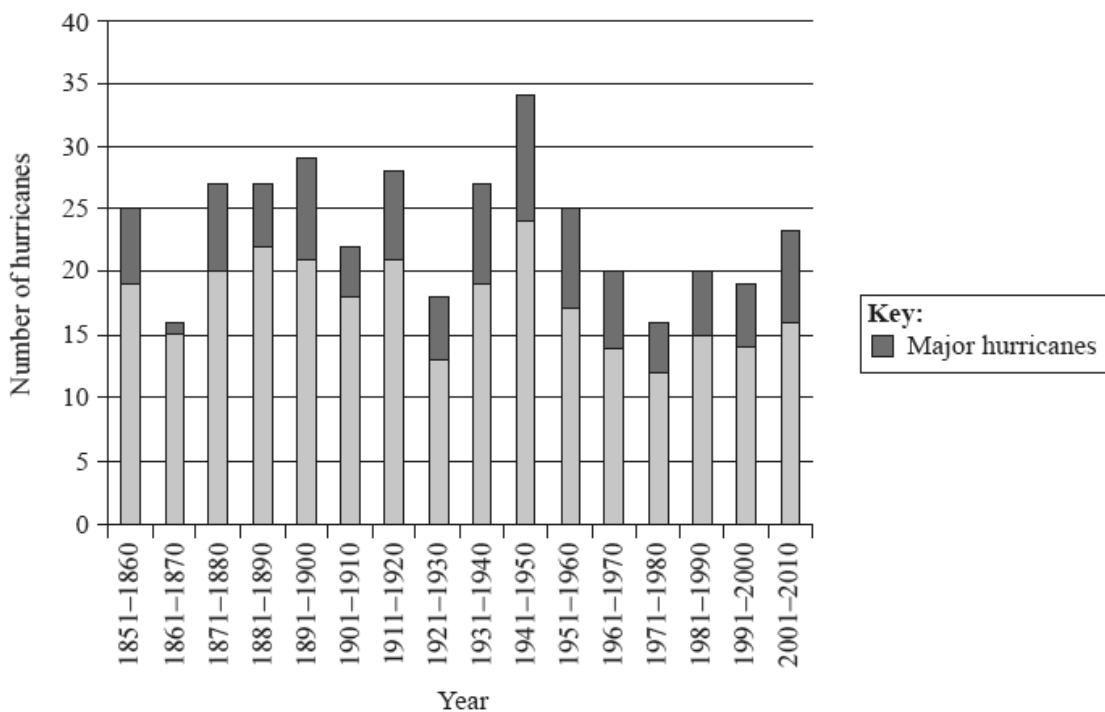
**Key:**

Annual average 2002–2011     2012

[Source: © International Baccalaureate Organization 2015]

- a. Identify which hazard: [2]
  - (i) affected the least number of people in 2012;
  - (ii) affected the greatest number of people between 2002 and 2012.
- b. Suggest **two** reasons why the number of people affected by storms in 2012 is lower than in previous years. [4]
- c. Explain what is meant by the: [4]
  - (i) rehabilitation response to a hazard event;
  - (ii) reconstruction response to a hazard event.
- d. Examine why some areas of the world have a high hazard risk for **either** earthquakes **or** volcanoes [10]

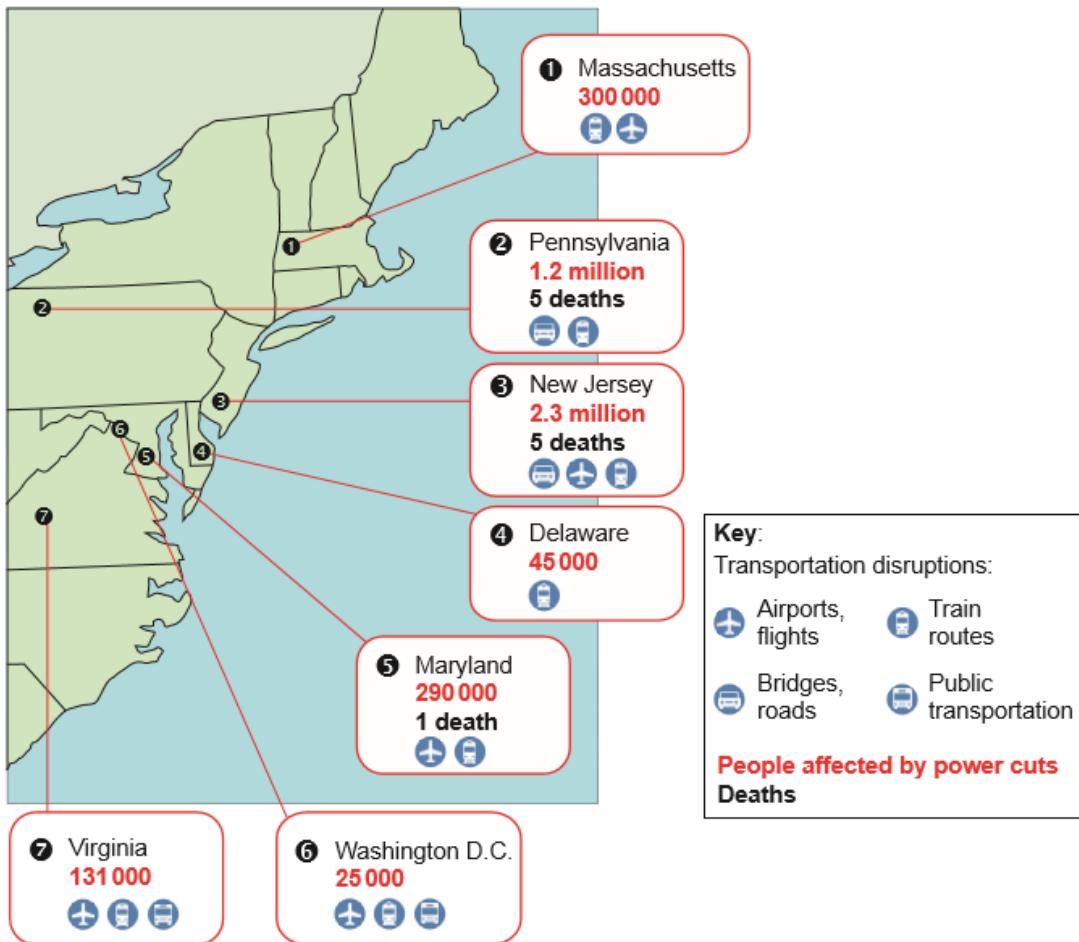
The chart shows the total number of hurricanes that struck a country per decade from 1851 to 2010.



[Source: adapted from NOAA, [www.nhc.noaa.gov](http://www.nhc.noaa.gov)]

- a. Describe the trends shown on the graph. [4]
- b. (i) Outline the essential characteristics of drought. [6]
  - (ii) Explain the cause(s) of **one named** drought event.
- c. "The level of economic development is the most important factor that influences the vulnerability of a population to environmental hazard risks." [10]  
Discuss this statement.

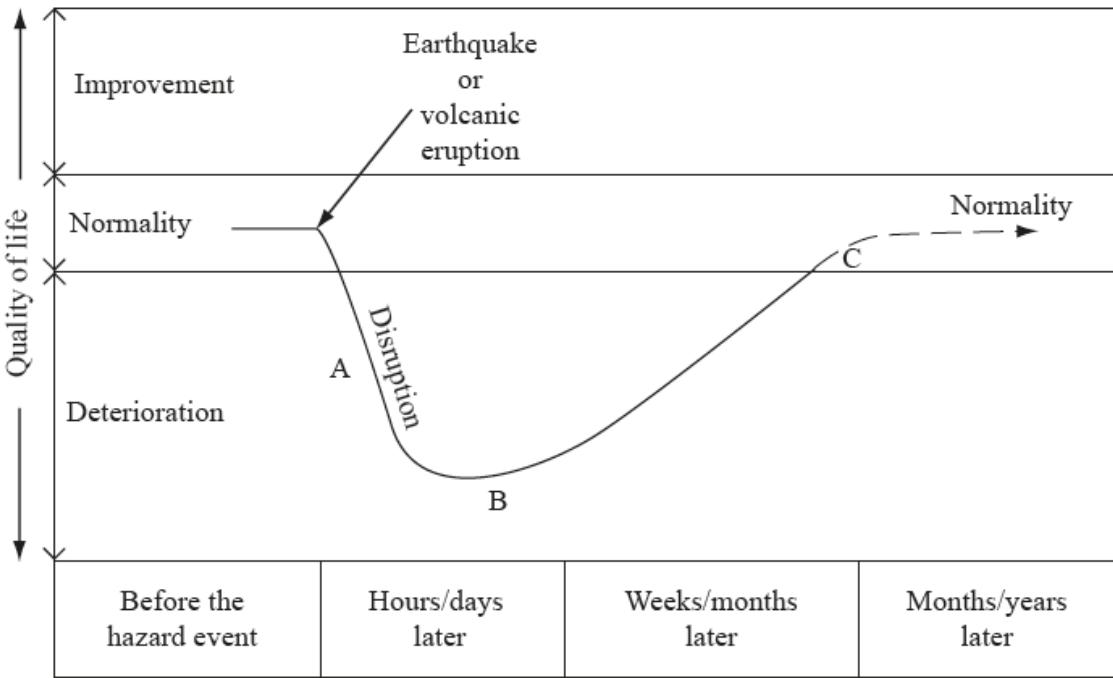
The map shows the impacts of Hurricane Sandy on selected states in the Eastern United States in 2012.



[Source: © International Baccalaureate Organization 2016]

- (i) Using map evidence, determine which state was worst affected and outline why. [6]
  - Using map evidence, determine which state was least affected and outline why.
  - Suggest how land-use planning (zoning) could help reduce vulnerability to hurricanes in this area.
- Suggest why the distinction between a hazard event and a disaster is not always completely clear. [4]
- Referring to **two or more** types of hazard, examine why the highest magnitude hazard events are not necessarily the most harmful. [10]

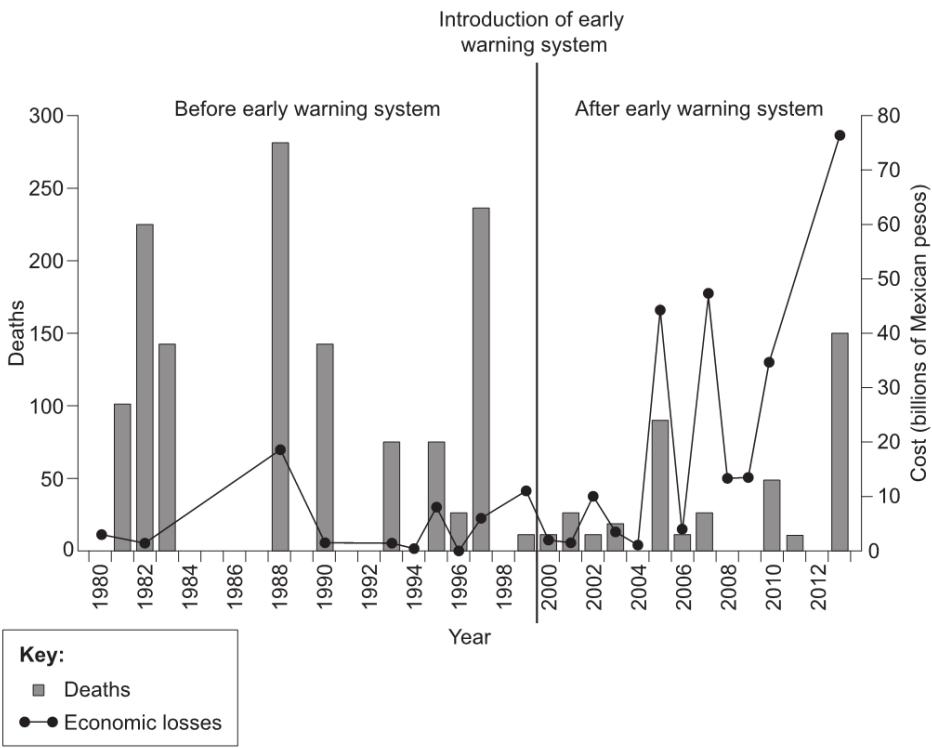
The diagram shows how an earthquake or volcanic eruption impacts on a population's quality of life.



[Source: adapted from V Bishop, (2001), *Hazards and Responses*, page 11]

- With reference to either earthquakes or volcanic eruptions, describe two ways in which people's quality of life deteriorates at point A on the diagram. [4]
- With reference to either an earthquake or a volcanic eruption, distinguish between the types of response to the hazard event that occur at point B and point C on the diagram. [6]
- "Improved building design is the most effective way for people to reduce their vulnerability to hazards." Discuss this statement. [10]

The diagram shows the deaths and economic losses resulting from tropical storms in Mexico, before and after the introduction of an early warning system.



[Source: adapted from Víctor Orlando Magaña Rueda et al. (2014). El sistema de alerta temprana ante ciclones tropicales desde una perspectiva de riesgo. *H<sub>2</sub>O Gestión del agua* 1, January–March 2014. Revista auxiliar de difusión del Sistema de Aguas de la Ciudad de México. Published by Helios Comunicación]

a.i. With reference to the diagram, describe the changes in number of deaths

[2]

a.ii. With reference to the diagram, describe the changes in economic losses.

[2]

b.i. Suggest reasons for the changes you identified in (a) for number of deaths.

[3]

b.ii. Suggest reasons for the changes you identified in (a) for economic losses.

[3]

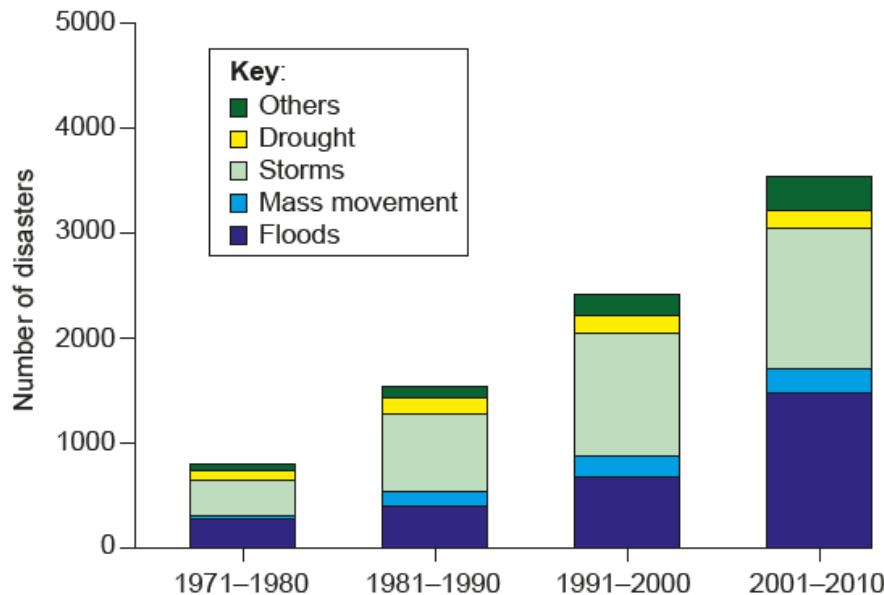
c. Examine the factors that affect the choice of adjustments before, and responses after, **tectonic** (earthquake/volcanic) hazard events.

[10]

Diagram A shows the number of reported disasters by decade by hazard type, globally. Diagram B shows economic losses by hazard type, globally.

**Diagram A**

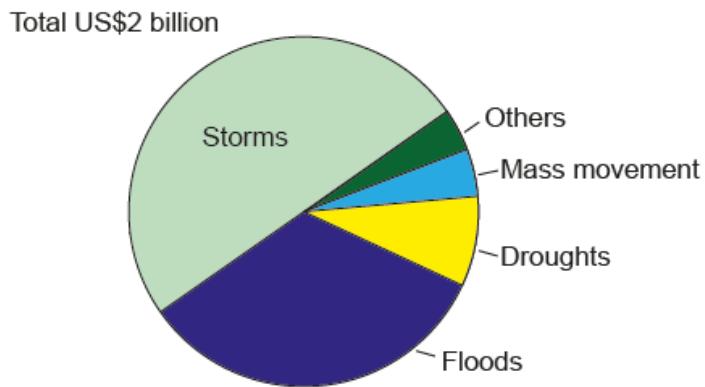
**Number of reported disasters by decade by hazard type globally (1971–2010)**



[Source: From Atlas of Mortality and Economic Losses from Weather Climate and Water Extremes ([http://library.wmo.int/pmb\\_ged/wmo\\_1123\\_en.pdf](http://library.wmo.int/pmb_ged/wmo_1123_en.pdf)), ©2014 World Meteorological Organization.]

**Diagram B**

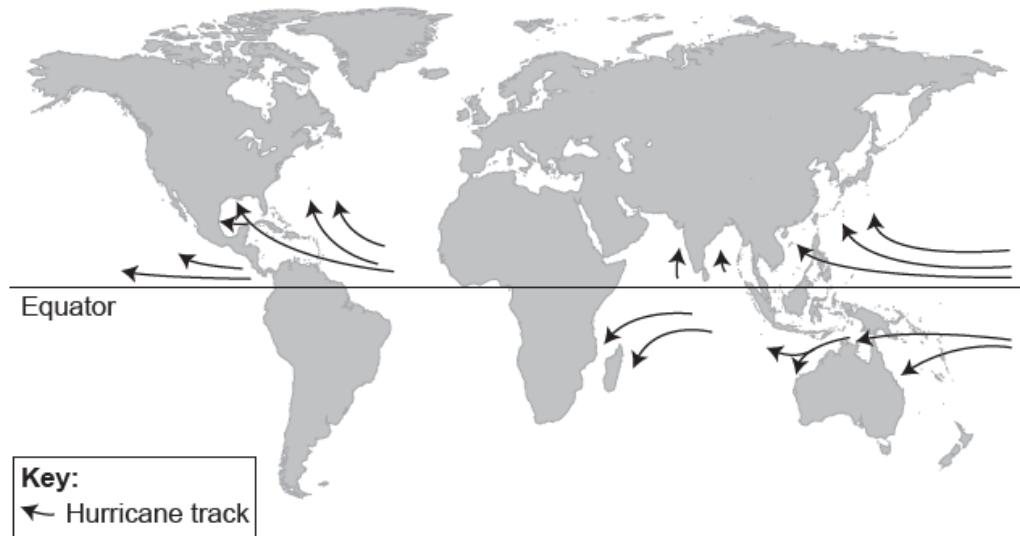
**Economic losses by hazard type, globally (1971–2010)**



[Source: From Atlas of Mortality and Economic Losses from Weather Climate and Water Extremes ([http://library.wmo.int/pmb\\_ged/wmo\\_1123\\_en.pdf](http://library.wmo.int/pmb_ged/wmo_1123_en.pdf)), ©2014 World Meteorological Organization.]

- a. (i) Describe the change in the total number of reported disasters between 1971 and 2010. [4]
- (ii) State the type of natural hazard that has **not** increased in frequency since 1981.
- (iii) Estimate the total economic losses due to storms and floods between 1971 and 2010.
- b. Explain **three** reasons why communities may underestimate the probability of a major hazard event occurring in the area in which they live. [6]
- c. Discuss the view that human vulnerability to natural hazards (excluding river flooding) is greater in urban areas than in rural areas. [10]

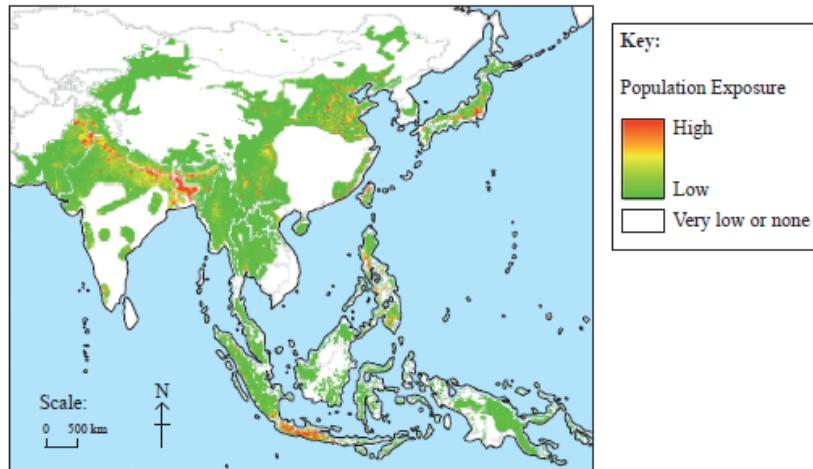
The map shows the global pattern of hurricane (tropical cyclone, typhoon) tracks.



[Source: National Hurricane Centre / NOAA]

- Describe the distribution **and** tracks of hurricanes (tropical cyclones, typhoons) affecting **mainland Asia**. [4]
- Briefly explain **two** geographical consequences of a recent human-induced (technological) hazard. [6]
- Using **one or more** recent examples, discuss the relative importance of short-term and long-term responses to hazard events and/or disasters. [10]

The map shows the population exposed to tectonic hazards in south and east Asia.



[Source: OCHA Regional Office for Asia-Pacific, NGI Report 2007, 1600-1]

- Describe the pattern of high population exposure to tectonic hazards shown on the map. [4]

[4]

b. Suggest **three** reasons why communities often underestimate the probability of a tectonic hazard event occurring in their locality. [6]

c. Examine the ways in which vulnerability to **either** earthquake **or** volcanic hazards can be reduced. [10]

#### Optional Theme D – Hazards and disasters – risk assessment and response

7. The map shows the track of Hurricane Charley in August 2004 and changes in the intensity of the storm. Dates are also shown.



[Source: adapted from CIMSS image at <http://tropic.ssec.wisc.edu>]

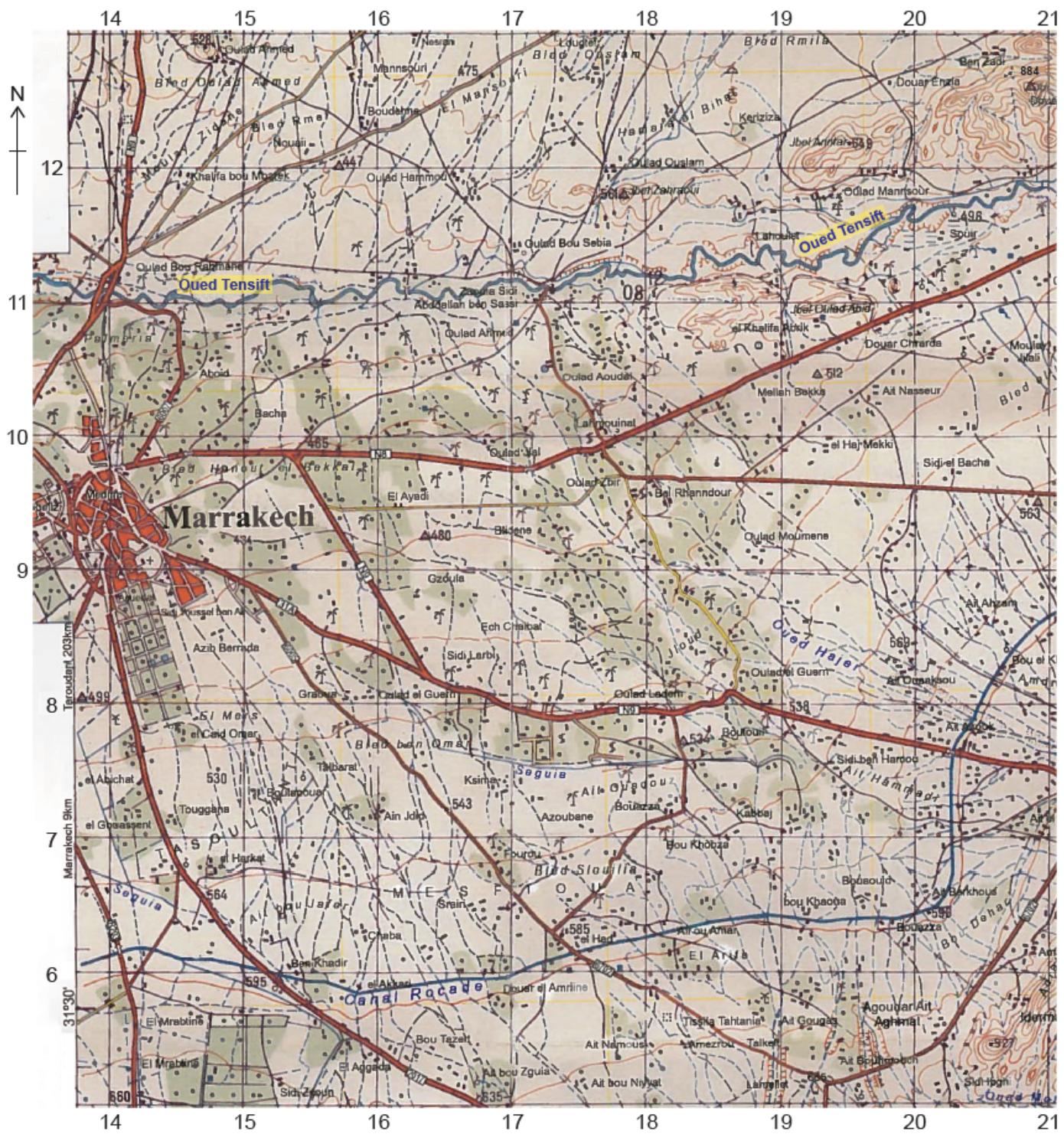
a. Describe the changes shown from 12 August to 14 August in: [4]

- (i) storm intensity;
- (ii) storm direction.

b. Explain **two** factors that affect the formation and development of hurricanes. [6]

c. Using examples, examine the demographic **and** socio-economic factors that affect the vulnerability of a community to hazard events. [10]

The map shows Marrakech and the surrounding area. The scale of the map is 1:160 000 and the contour interval is 40 metres.





a.ii.State the four-figure grid reference for this point.

[1]

a.iiiBriefly describe the distribution of fruit farming areas shown on the map.

[2]

b.i.Explain **two** possible human impacts that could occur as a result of a long-term drought in the area shown on the map.

[4]

b.iiSuggest **one** short-term strategy that the local community could use to help overcome the problem of drought in the area shown on the map.

[2]

c. Examine the reasons why people continue to live in areas affected by frequent earthquake or volcanic activity.

[10]

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