



Geogo Crunches!

Issue 1

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1a) Explain the causes of rapid mass movements on slopes. [9]

Introduction

- Shear strength: resistance slope offers against movement
- Shear stress: force trying to enact movement
- If shear stress more than shear strength, mass movement will occur
- Rapid mass movement refers to flow, slide and fall only
- Rapid mass movement is due to human and natural causes

Body (Natural Factors)

- Geology
 - Angle of slope: gravitational force stronger on steeper slopes so able to pull down regolith faster
 - Eg. fall
 - Steep slope where angle of friction greatly exceeded
 - Weathering done sufficient damage to allow block of rock to detach and fall under gravity until it rests where the slope angle is low enough
 - Types of material: loose, consolidated or solid
 - Eg. fall
 - Rock structure: joints and bedding planes
 - Eg. slide
 - Moving mass moves down a slide plane until it reaches bottom of the plane where impact usually breaks it up
 - Slide plane selectively weathered
 - Nature of slope
 - Silt and clay: cohesive forces between particles which is influenced by moisture availability
 - Eg. flow
 - Slopes materials with high proportion of fine particles (more than 35%) most prone
- Climatic and hydrologic factors: role of water
 - Increases shear stress but decreases shear strength
 - Reduce cohesion between particles due to pore pressure
 - Lubricates contact between soil particles → minimise friction and allows them to slip over each other more easily, reducing resistance to gravity
 - Increases weight of sediment, subjecting it to greater gravitational force
 - Eg. slide
 - Slide plane lubricated
 - Eg. flow
 - Soil moisture content high

- Internal deformation under its own weight, dependent on clay becoming saturated with water to a percentage greater than the liquid limit
- Biotic factors
 - Role of animals: burrows reducing the shear strength of slope
 - Role of plants: prying rocks apart, reducing the shear strength of slope
- Triggering mechanisms
 - Earthquakes: vibration reduces internal strength of sediments by shaking material loose from supported position and reduces cohesion
 - Volcanoes
 - Eg. mudflows of Nevada Del Ruiz

Body (Human Factors)

- Undercutting
 - Construction of roadways especially in mountainous terrain
 - Eg. Landslides common in the Himalayas, especially during the monsoon season but increasing number of roads and settlements built along foot of slopes overlooking river valleys (Himachal Pradesh landslide in India in 1995)
- Construction
 - Cliff top buildings: increase gravitational forces applied to slope
 - Eg. Holbeck Hall incident in Scarborough in 1993
 - Hill slope development
 - Eg. Rio in 1966: heavy rainfall and urban slums
 - Dams
 - Eg. Vaiont Dam Italy 1963: landslides into the Vaiont reservoir caused stored water to spill over the dams
- Deforestation
 - Reduces stability of slope due to removal of binding properties of roots, and exposes soil to direct impact of downpours
 - Eg. Hong Kong expansion onto marginal land to accommodate demands of population pressure
- Mining and quarry
 - Eg. Aberfan Wales 1966 coal waste dump: water-saturated debris flowed downhill at high speed

Conclusion

- Rapid mass movement is normally due to the combination of human and natural factors
- Could be natural factors already in place, but human factors aggravate it

1b) To what extent can plate tectonic theory be used to account for the global distribution and formation of earthquakes and volcanoes? [16]

Introduction

- Stand: plate tectonic theory can be used to account for most earthquakes and volcanoes at inter-plate boundaries, but not those within intra-plate boundaries
- Plate tectonic theory is about the motion of crustal plates driven by mantle convections which leads to crustal destruction or formation and the presence of hot spots

Body (Inter-plate Boundaries)

- Convergent zone
 - Continental-continental collision
 - Possible for volcanoes to form, but few
 - Rocks from both plates are too light to sink into the mantle, so the edges just crumble and fold into giant mountain ranges
 - Very little rock is forced to great depths and little melting occurs
 - Eg. Himalayas due to the convergence of the Indian and Asian plate
 - Huge earthquakes
 - Large compressive forces lead to intense folding and faulting
 - Eg. Himalayas (mainly strike-slip earthquakes)
 - Continental-oceanic collision
 - Process of subduction
 - Oceanic plate denser than the continental plate, so it subducts under the continental plate
 - Continental volcanic arcs
 - As descending oceanic plate reaches a depth of about 100km, partial melting of water-rich oceanic crust and some overlying mantle occurs
 - Newly formed andesitic magma is less dense than surrounding mantle rocks and will slowly rise
 - This type of magma will be emplaced in overlying continental crust where it cools and crystallises at depth
 - Magma may eventually migrate to the surface through lines of weaknesses
 - Eg. Andes due to the convergence of the Nazca and South American plate
 - Earthquakes
 - As part of the continental plate is dragged down by the oceanic plate, the plates experience large compressive forces and intense friction
- Divergent zone
 - Zones of tension caused by 2 divergent connective flows in the mantle
 - Viscous drag on overlying plate causes the plate to be torn apart

- Rift valleys
 - As plates move from the area of upwelling magma, broken slabs are displaced downwards, creating down faulted valleys known as rift valleys
 - Volcanoes are present due to crustal weaknesses set up by faulting, allowing magma to rise up
 - Earthquakes are present due to large tensional forces
 - Eg. East African Rift
- Mid-ocean ridges
 - They are rift valleys which have lengthened, deepened and extended into the ocean
 - Volcanoes are present due to crustal weaknesses set up by faulting, allowing magma to rise up
 - Eg. Iceland volcanic islands
 - Many earthquakes as plate has been subjected to tectonic forces for a longer period of time, resulting in more intense faulting
 - Eg. Mid-Atlantic Ridge
- Transform zone
 - Zones of shearing with limited construction and destruction
 - Occurs along a transform fault, marked by zones of intensely shattered rock
 - No volcanoes due to the absence of typical magma sources
 - Usually have earthquakes of the highest magnitude due to the accumulation of elastic strain over time as plates try to move laterally past each other
 - Eg. San Andreas Fault system

Body (Intra-plate Boundaries)

- Hot spots
 - Location at which the flow of geothermal heat through the crust from the mantle is considerably higher
 - Causes up warping of crust to form domes
 - Magma wells up through fractures to form volcanoes
 - Only volcanoes above the hot spot are active
 - Eg. Hawaiian chain of islands
- Other reasons not related to plate tectonics
 - Intra-plate earthquakes might be caused by the release of stresses within the rock structure
 - Small-scale earthquakes can be the result of human factors like deep drilling, mining and underground blasting
 - Human activities like deep drilling can trigger mud volcanoes like in Sidoarjo, East Java where thousands of villagers had to vacate their homes

Conclusion

- There is a limit as to how much people can impact the distribution or formation of volcanoes and earthquakes
- At best, people can only trigger eruptions or earthquakes while plate tectonics provides the basis for which such natural disasters can happen in the first place

2a) With reference to examples, describe and explain the growth of the service sector in developed countries. [9]

Introduction

- Service: tertiary industry comprising of education, tourism, banking and finance etc.

Body

- Economic factors
 - New international division of labour
 - Able to focus higher functions within DCs and outsource manufacturing operations overseas, hence greater room for growth of service
 - Deindustrialisation, reindustrialisation and tertiarisation
 - Lose comparative advantage to NIEs or LDCs in terms of low wages, lax environmental policies and weaker trade unions hence not able to secure manufacturing plants within DCs → deindustrialisation
 - Need to find ways to bring back firms to invest in DCs → reindustrialisation
 - But realise that really cannot compete with NIEs or LDCs, hence DCs choose to groom the service sector because they are able to offer the expertise (due to the highly skilled pool of labour they have), the technology and infrastructure to sustain the service sector → tertiarisation
 - Eg. US, Singapore
- Social factors
 - Growing global affluence so DCs want to grow the service sector to earn more revenue
 - Capitalise on the fact that people in DCs experience greater growth of income → have newer wants and worn-out goals
 - Eg. people in Europe compared with people in Africa
 - Change in lifestyle to focus on recreation and tourism
 - People in DCs usually lead a hectic and modern life, so they need avenues to relieve stress
 - Eg. tourism spots like New York City, Los Angeles
 - More highly-educated
 - DCs have better educational institutions so they are able to develop a more qualified and highly-skilled pool of labour which is more suited for the service industry
- Political factors
 - Role of government to attract FDI in services
 - Eg. Singapore attracting foreign banks here to increasingly liberalise the industry / telecommunications industry
 - Signing of free-trade agreements between governments
- Enabling factors
 - Presence of technology enables IT-enabled services like research and development

- An efficient transport network to customise the landscape for tourism
- Standardisation of service products like banking products and medical procedures can be consumed by people of different countries, so DCs can actually capitalise on services to sell to the global market

Conclusion

- In future, when NIEs catch up with the growth of the service sector, then DCs might have to explore methods to grow their quaternary or quinary sectors as well
- There is no one sector that a country can continually grow because other countries will lose its comparative advantage in that sector over time

2b) Discuss to what extent the role of government has contributed to the development of the service sector. [16]

Introduction

- Service: tertiary industry comprising of education, tourism, banking and finance etc.
- Role of government: employer, regulator, collaborator and competitor

Body

- Role of government can help develop the service sector
 - Employer
 - How the government employs the skills of its people
 - Government needs to know how to achieve maximum growth with a highly-skilled and educated pool of labour and hence use this as a leverage to attract FDIs in service to develop the service sector
 - Eg. Singapore
 - Regulator
 - Crafting and implementing socio-economic policies to benefit the country
 - Creating niche areas or economic zones to attract investors
 - Eg. Singapore's Biopolis to promote Singapore as a biomedical hub
 - Grants or tax subsidies
 - Scholarships so that students are better equipped with skills and can transfer the knowledge to their home country
 - Collaborator
 - Signing free-trade agreements to increase the volume of trade and to maintain strong relationships with the country to facilitate transfer of skills and knowledge between both countries
 - Eg. Singapore has personnel working in Hewlett-Packard in the US while the US capitalises on the technological skills that the personnel can provide
 - Competitor
 - Think of ways for the service sector to compete with other countries
 - Eg. Malaysia's Multimedia Science Corridor compared with the Singapore Science Park
- Role of government may not help develop the service sector
 - Competitor
 - The government may think of ways, but whether it works remains to be seen
 - Eg. Malaysia's Multimedia Science Corridor has not produced much impact on its service sector perhaps due to the lack of a highly-educated pool of labour
 - Regulator
 - Not all governments are able to effectively control their country and enforce stability
 - Political instability often results in reduced investor confidence

- Eg. Thailand strikes, US fight against terrorism
- Other factors that may help develop the service sector
 - Role of the private sector purely
 - Eg. Hollywood's movie industry
 - Location
 - Eg. Johor Bahru's retail and dining due to its proximity to Singapore
 - Language
 - Eg. widespread use of English in India which attracts firms to set up call centres there

Conclusion

- It is undeniable that the role of government is the determining factor of whether its country's service sector makes or break
- In DCs where governments have the resources and greater ability to control their countries, the role of government has helped developed their service sectors
- In LDCs where governments are more likely to be corrupted, the development of the service sector may be at stake
- That is probably why supranational bodies like the United Nations and European Union can take charge to contribute to the development of the service sector when governments fail to do so