2010 Geography

Higher − Paper 2

Environmental Interactions

Finalised Marking Instructions

Instructions to Markers: General Notes

Procedure before Markers' Meeting

You are asked to make yourself familiar with the question paper and the marking instructions. Marking of scripts at this stage should be only tentative and none should be finalised or returned. Please note any point of difficulty for discussion at the meeting.

Marking

1   The maximum mark for Paper 2 is 100. Markers are encouraged to use the whole range of marks and to give a high assessment for an answer of high quality.

2   The total marks assigned by you for each complete question should be entered in the outer right-hand margin of the answer book. When a question consists of more than one part, the marks assigned to each part MUST BE SHOWN SEPARATELY in the column provided on the inner right-hand side of the book.

         It is of great importance that the utmost care should be exercised in adding up the marks. Where appropriate, all summations for totals and grand totals must be carefully checked. Where a candidate has scored zero marks for any question attempted "0" should be shown against the answer.

         The TOTAL mark for the paper should be recorded in the box at the top right-hand corner on the front cover of the script.

3   It is helpful in later procedures if points receiving marks are clearly indicated. In general a mark should be awarded for a correct statement.

4   All mistakes MUST be underlined in red pen. A wavy line (~~~~~~) should be used for something that is not quite right, a single line (-------) for mistakes which, though not very serious, are undoubtedly wrong, and a double line (=======) for gross blunders. These corrections are valuable when borderline cases and appeals are being considered. Where a page shows neither a correction nor a mark, a red tick MUST be placed at the bottom right-hand corner.

5   The marker should take the candidate's answers strictly as they are written; no attempt should be made to read into answers ideas which the candidate may have intended to convey but which have not been successfully conveyed. A caret (λ) should be used to indicate an important omission. A question mark (?) should be used to indicate that the marker cannot understand the meaning intended. The letter "R" should be used to indicate that the candidate is repeating something already stated in the answer.

6   Care should be taken that no credit whatsoever is given to irrelevant parts of answers, however accurate the irrelevant passages may be. Irrelevant passages should be square-bracketed [ ].

         It should be noted, however, that a fact or argument which is irrelevant in one candidate's answer may be made quite relevant by another candidate who has the ability to connect it to the question.

Question 1 (Rural Land Resources)

(a)   **Well annotated diagrams should be awarded full credit. Although unlikely, if an answer does not have any diagram then mark out of 16.**
Credit named examples up to 4 marks; one per feature.
Award a maximum of 12 marks for erosion or deposition features, with a maximum of 2 for unexplained processes or lists.

Candidates should refer to the process of coastal erosion and deposition within their answer, ie hydraulic action, abrasion, solution, attrition and wave movement up/down beaches with longshore drift.

A typical answer for a cave/arch/stack may include:
Caves are most likely to occur where the coastline consists of hard rock and is attacked by prolonged wave attack along a line of weakness such as a joint or fault in the rock. The waves will attack the line of weakness by abrasion, hydraulic action or solution. Over time, horizontal erosion of the cave may cut through the headland to the other side, and form an arch. Very occasionally a blowhole will be created within the cave where compressed air is pushed upwards by the power of the waves and vertical erosion occurs. Continued erosion of the foot of the arch may eventually cause the roof to collapse leaving a stack, isolated from the cliff. This in turn will be eroded yet further to leave a stump.   **20 marks**

(b)   **Candidates must discuss at least three land uses to achieve full marks. Allow up to 2 marks for specific named examples − not already credited.**
Ideally candidates should identify the specific feature of the landscape and then go on to explain the opportunity it provides.

Responses will vary according to the area chosen but opportunities might include:
Social – tourism, recreation, nature conservation.
Economic – farming, forestry, energy generation (wind/waves/tidal), quarrying, industry – ports, oil industry.   **10 marks**

(c)   Candidates should be able to discuss both sides of the argument in this development, to achieve full marks.

Advantages/People arguing for the plan	Disadvantages/People arguing against the plan
Jobs will be created during and after the construction.	Labour force – probably not local people, strain on local services.
The golf course will boost visitor numbers and bring money into the economy of the local area.	This will damage the mobile sand dunes and associated wildlife. Loss of habitat/ biodiversity.
The new houses will attract people to move here and boost local services like schools.	Locals/wildlife enthusiasts will no longer have access to the beach/sand dunes on the estate.
Local businesses will benefit by supplying the hotel ie taxi companies, food/farm contracts.	Car parks/roads and buildings associated with the development will cause visual pollution.

10 marks

(d) **Precise points will, obviously, depend on the area chosen. Overgeneralised 'non-authentic' answers ie without place names, should score a maximum of 7 marks. To gain full marks candidates must comment on the effectiveness of their solutions/measures taken to resolve environmental conflicts. Award up to 3 marks for named examples not already credited.**
Award a maximum of 7 if there is no comment on effectiveness.

Measures taken to resolve environmental conflicts might include:
- Traffic restrictions in more favoured areas.
- Reducing congestion on busy roads using a one-way system.
- Encouraging the use of minibuses.
- Seperating local and tourist traffic.
- Attempting to develop wider spread of 'honeypot' areas.
- Providing cheap local housing for inhabitants of area.
- Screening new buildings, car parks etc behind deciduous trees and using only local stone for buildings.
- Better visitor education.   **10 marks**

Question 2 (Rural Land Degredation)

(a)   **Assess out of 8 marks with a maximum of 4 marks for any one process. Do not award credit for the name of the process.**

- **Rainsplash** – usually the first stage in the erosion process, the impact of raindrops on the surface of a soil causing the soil particles to be moved. On steeper slopes they move further downhill. This means that resettled sediment blocks soil pores resulting in surface crusting and lower infiltration.
- **Sheet erosion** – the removal of a thin layer of surface soil which has already been disturbed by rainsplash, accounts for large volumes of soil loss, rarely flows for more than a few metres before concentrating into rills. Typically results in the loss of the finest soil particles which usually contain the nutrients and organic matter.
- **Rill erosion** – small eroded channels, only centimetres (up to about 30cm) deep and not permanent features, often obliterated by the next rainstorm, or develop into gullies.
- **Gully erosion** – steep sided water channels, several metres deep which can cut deeply into the soil after storms and are often permanent. Rain water running into the gully scours the sides or undercuts the head wall which results in the gully migrating. Widening of gully sides can occur by undercutting or slumping.   **8 marks**

(b)   **Assess out of 16 with a maximum of 10 for one area.**
Award up to 2 marks for specific named locations.

Human causes of land degradation will vary according to the location chosen but may include reasons such as:

North America
For the **Dust Bowl**:
- Use of techniques better suited to the moister eastern states.
- Monoculture, especially of wheat or demanding crops (cotton), depleted the soil of moisture and nutrients.
- Deep ploughing of fragile soils (previously these had been held in place by natural grasslands).
- Marginal land ploughed – particularly in wet years – leaving them in a fragile condition in dry years.
- Ploughing downslope creating opportunities for rill erosion.
- Farm sizes being too small so forcing farmers to overcrop – particularly when prices were low and therefore income was low.

For the **Tennessee Valley**:
- Much of the area was cleared of its trees – this opened up the soil surface to erosion.
- Mining and farming also cleared the natural vegetation and led to soil erosion.
- The farmers cultivated steep slopes which were ploughed up and down the slope.
- Overcropping had already weakened the soil.
- The eroded soil was dumped in rivers and this caused them to flood.
- A lack of fertilizer caused the soil to lose its structure and become vulnerable to erosion.

For **Africa, north of the equator**, mention might be made of overgrazing, overcropping, deforestation, monoculture, farming cash crops.
- Allowing more grazing than the pasture can support (eg in West Africa) where herd size is a status symbol.
- Allowing the soil to be stripped bare leaving it vulnerable to erosion.
- Increased population density caused by falling death rates leading to overcultivation.
- Deforestation for firewood/building.
- Bush fires to clear land for farming.
- In some places peasant farmers have had to farm marginal land due to the best land being used for cash crops (eg in parts of Sudan).
- The drought may have caused nomads to move into villages where the land may now be over-cultivated (eg in Burkina Faso).

For the **Amazon Basin**, answers will be based on deforestation:
- Deforestation – for eg ranching/mineral extraction/logging/road building/poor peasant farmers.
- Loss of protective cover of trees due to deforestation.
- This allows heavy tropical rainfall to erode the soil.
- Exposure to increased sunlight due to deforestation leads to the soil baking and becoming useless.
- The loss of the root system which previously bound the soil together.
- Deforestation also leads to increased leaching of the soil rendering it useless in addition to erosion.
- The impact of ranching: forest cleared, used for a few years until grass fails – move and clear a new stretch of forest and continue the process. **16 marks**

(c)   **Assess out of 10.**
Award up to 2 marks for specific names.

For **Africa, north of the equator** descriptions may include:
- Crop failures and the resulting malnutrition leading to famine eg Sudan, Ethiopia and much of the Sahel.
- Southward migration on a large scale – usually into shanties on the edge of the major cities.
- The collapse of the nomadic way of life due to the lack of grazing and water.
- Many nomads forced to settle in villages – with a consequent increase in pressure on the surrounding land.
- The breakdown of the settled farmer/nomad relationship in places like Yatenga province in Northern Burkina Faso.
- Disease and illness can become endemic.
- Conflict within countries as people move and re-settle.
- Countries increasingly rely on international aid.

For the **Amazon Basin** answers may include:

- Destruction of the way of life of the indigenous people eg clashes between the Yanomami and incomers.
- Destruction of the formerly sustainable development eg rubber tappers and Brazil Nut collectors.
- Clashes between various competing groups eg the violent death of Chico Mendez allegedly at the behest of ranchers.
- Reduction of fallow period leading to reduced yields with obvious consequences for the dependent population.
- Creation of reservations for indigenous people.
- Increase in 'western' diseases.
- Increase in alcoholism amongst indigenous population.
- People have been displaced and forced into crowded cities ending up living in favelas.

10 marks

(d) **Assess out of 16 marks.**
Award a maximum of 8 marks for any one scheme.
A maximum of 12 marks should be awarded to answers which provide no evaluation of schemes.
Award 4 marks for correctly named examples.
Award a maximum of 15 marks if there is no reference to examples within case study area.
Candidates may provide a composite response of parts (i) and (ii).

Answers should be able to give reasonably detailed information about farming methods, and must include some explanation of these methods, for example:

Shelter belts – on low lying land affected by strong winds shelter belts are rows of trees grown across the direction of the prevailing wind. They act as a barrier to slow down winds and protect the soil. The taller and more complete the barrier of trees the more effective the shelter.

Other farming methods might include:

- Crop rotation.
- Diversification of farming types.
- Keeping land under grass or fallow.
- Trash farming/stubble mulching.
- Replanting shelter belts.
- Strip cultivation and intercropping.
- Increased irrigation.
- Soil banks by keeping soils under grass rather than ploughing.
- Diversification by farmers into recreation.
- Contour ploughing.
- Terracing.
- Use of natural fertilisers.

16 marks

Question 3 (River Basin Management)

(a) **Assess out of 16 marks with a maximum of 10 for either (i) or (ii). Maximum 4 marks for figures lifted from diagrams.**

    (i) Description and explanation of pattern of river flow might include:
- **Description** – very irregular flow from month to month from 2,000 cumecs in Jan/Feb to 13,000 cumecs in Aug/Sept.
- Similar pattern from year to year with peaks and troughs at the same time each year.
- **Explanation** should refer to the fact that troughs relate to dry months from Dec-Mar while peaks occur after heavy rainfall of Jun/Jul/Aug. Rainfall monthly figures indicate monsoon rains.
- Discharge increasing before heavy rainfall suggests discharge is fuelled by snow melt from surrounding mountains shown on reference map Q3A.

    (ii) Description and explanation of need for water management might include:
- Reference map Q3A indicates that the Irrawaddy River has many tributaries and the river basin has a very high drainage density leading to unpredictability of river flow which is dependent on when and how quickly snow melts in surrounding mountains areas.
- Rapidly increasing population in Myanmar gives increasing demand for water for domestic, power, industrial needs.
- Increasing demands from farmers for irrigation water to try and feed increasing population.
- Rainfall graph for Myitsore indicates seasonal nature of rainfall – extremely dry from November to April but huge monthly figures for June/July/August – leading to flooding and also run-off of water that could be stored and used in dry months.
- Temperature graph for Myitsore indicates hot temperatures throughout the year leading to very high evaporation rates. Monthly temperatures peak at 35°C.
- Reference diagram Q3A indicates that there is a need to regulate flow of river to prevent flooding during peak discharge and to keep water level high enough for navigation in dry months.

16 marks

(b) **Assess out of 10 marks.**

Physical factors might include:
- Geologically stable area away from earthquake zones/fault lines.
- Solid rock foundations for weight of dam.
- Narrow valley cross-section to reduce dam length.
- Large, deep valley to flood behind dam to maximise amount of water storage.
- Lack of permeability in rock below and around reservoir to prevent seepage.
- Low evaporation rates.
- Large catchment area above dam to provide reliable water supply.

10 marks

(c) **Assess out of 24. Answers should be authentic for the chosen river basin. Up to 6 marks may be awarded for appropriate named examples illustrating the benefits and adverse consequences of the chosen scheme. Candidates must refer to all 6 sections for full marks. Maximum of 20 if only benefits or adverse consequences mentioned.**

Answers will depend on the river basin chosen. However, for the Colorado River they might include:

Social benefits:
- Fresh water supply for growing desert cities eg Phoenix.
- Better standard of living in hot, dry climate with air conditioning, swimming pools, landscaping etc.
- Areas at reservoirs, eg Lake Mead, give opportunities for tourism, water sports, fishing etc.
- Regulation of river greatly improves flood control on river.

Social adverse consequences:
- People had to be moved off their land as valley areas were flooded.
- Loss of burial sites and other Native American sacred areas.
- Disagreements between states and countries with regard to allocation of water from river.

Economic benefits:
- Cheap HEP attracted industries eg electronics to take advantage of the area's cheap land and low taxes.
- Benefited tourist industry with reliable water supply – attractions like the Grand Canyon, gambling in Las Vegas, Hoover Dam etc.
- Expansion of irrigated land led to agribusiness-style farming.

Economic adverse consequences:
- Huge cost of building the dams eg Central Arizona Project cost $6 billion.
- High cost of maintaining dams, power plants and irrigation channels.
- Subsidised water for farmers has led to water wastage and the growing of crops that could be produced cheaper elsewhere.

Environmental benefits:
- Reservoirs provide sanctuaries for waterfowl and wading birds like the blue heron.
- The National Recreation Area around Lake Mead has more than 250 species of birds.
- Reliable seasonal water flow for plant and animal life.

Environmental adverse consequences:
- Water in river and on farmland becomes saline with high evaporation rates – farmers downstream have to switch to more salt-tolerant crops.
- Change in river regime has caused the loss of many animal habitats eg the drying up of Colorado delta area where there used to be a great variety of birdlife.
- Huge amounts of water loss by seepage through the sandstone rocks around Lake Powell. Scenic attractions like the Rainbow Bridge are being affected by the high water levels in Lake Powell. **24 marks**

Question 4 (Urban Change and its Management)

(a)   **Assess out of 8 awarding up to 3 marks for taking data directly from the diagram.**

Candidates should be able to identify the overall increase in number of megacities from 1975 to 2015.

They should recognise that the greatest area of growth is in developing countries rather than developed countries.

Within this they should identify patterns of increased growth in particular areas of the world eg India and China in Asia and USA and Brazil in the Americas.   **8 marks**

(b)   **(i)**   **Assess out of 10, avoiding double crediting for overly similar push/ pull factors and reversals.**
Award a maximum of 17 for parts (i) and (ii) combined if there is no reference to a named city.
Award up to 2 marks for specific named examples.

Candidates should be able to demonstrate authentic knowledge of a city they have studied. Answers could include the following points:

Rural push:
- Low income from farming and related work.
- Lack of employment in manufacturing and service industry.
- Lack of education and low literacy levels.
- Poor health facilities and higher levels of disease, malnutrition etc.
- Low quality of life, poor sanitation, lack of electricity.
- Poor quality of infrastructure.
- Resettlement, civil unrest, environmental degradation.

Urban pull:
- Industrial employment, both manufacturing and service.
- Informal opportunities for employment.
- Increased income.
- Better housing, education, health facilities.
- Improved infrastructure.
- 'Bright lights' ambitions.   **10 marks**

(ii) **Assess out of 12 giving a maximum of 3 marks for specific authentic examples. Allow up to 8 marks for either socio-economic or environmental problems.**

Candidates should relate socio-economic and environmental problems to their chosen city.

- Impoverished and overcrowded areas of the city which lack many public utilities and amenities of water supply, electricity and sewerage.
- Semi-urban peripheral districts with poor housing quality and poor economic opportunities. Squatter settlements are located on steep upland areas. Areas lack basic services eg schools, piped water and hospitals.
- High incidence of disease.
- High rates of unemployment and growth of 'grey' economy and black market.
- Crime, drugs and prostitution.
- Problems of waste disposal include open sewers, toxic industrial waste contaminating water supply, lack of refuse collection and landfill sites for solid waste.
- Air pollution caused by chronic traffic congestion and industrial emissions.   **12 marks**

(c) **Assess out of 16 if candidates fail to use a named city. Maximum of 10 for any one part, and maximum of 16 if one part is omitted. Maximum of 4 for specific named examples.**

(i) Reasons for urban sprawl might include:

- Growth of population.
- Growth of suburban housing both high quality private and low cost, council estates.
- Cheaper land prices on outskirts.
- Development of shopping malls, industrial estates and retail parks.
- Growth of leisure facilities eg golf courses, new football stadia.
- Need for motorway and by-pass developments.
- Increased level of commuting to suburban areas and villages with more attractive environments.
- Negative aspects of the city eg pollution, congestion, land prices, house prices, levels of social problems like crime.
- Increased number of single person households.

(ii) Candidates could look at problems at the edge of the city as well as within the inner urban areas. Problems might include:

- Urban sprawl using up recreational and farm land.
- Urban sprawl threatening wildlife habitats and removing clean air lungs and open land.
- Increased commuting leading to traffic congestion and increasing levels of air pollution.
- Buildings and services in inner urban areas not being used or becoming run down or derelict eg housing, schools, factories and shopping areas.

(iii) Candidates require to select one problem and identify how their chosen city has dealt with the problem. For example if the candidate had chosen traffic congestion the following solutions could be developed.

- Policies to reduce cars eg car sharing, high occupancy vehicle lanes, new car tax charges, congestion charges, cycle routes.
- Promotion of improved public transport, including lower pricing, integrated transit systems.
- Park and Ride schemes.
- Mass transit systems using fixed routes eg metro lines and tramways.
- Changing road systems eg flexi-time travel, tidal flows, coordinating traffic lights, bus lanes. **20 marks**

Question 5 (European Regional Inequalities)

(a) **(i)** **Assess out of 8 with up to 5 marks for accurate named locations.**

- Credit should be awarded for candidates noting that Convergence Regions are found in Europe's peripheral areas, notably in eastern periphery countries with former centrally planned economies eg Bulgaria, Hungary, Baltic states etc.
- Also southern European peripheral areas such as southern Italy and much of Greece, Spain and Portugal.
- In the UK, Cornwall and western Wales have this status.
- No Convergence Regions found in most of northern, central and western areas of the EU.

8 marks

(ii) **Assess out of 10, giving credit for specific named projects.**

EU measures could include:
- Cohesion Fund – aimed at member states whose Gross National Product (GNP) per inhabitant is less than 90% of the EU average. It serves to reduce their economic and social shortfall, as well as to stabilise their economy. The Cohesion Fund finances activities such as trans-European transport networks and also projects related to energy or transport as long as they clearly present a benefit to the environment.
- The European Regional Development Fund (ERDF) aims to strengthen economic and social cohesion in the EU by correcting imbalances between its regions by financing technical assistance measures, improvements to local infrastructure etc.
- The task of the European Investment Bank (EIB), the EU's financing institution, is to contribute towards the integration, balance, development and economic and social cohesion of all the member states.
- The European Social Fund (ESF) set out to improve employment and job opportunities in the EU through lifelong learning schemes and providing access and employment for job seekers, the unemployed, women and migrants. It supports actions to socially integrate disadvantaged people, combating discrimination in the job market.

For full marks, candidates will require to illustrate points made with some well-chosen examples and statistics.

10 marks

(b) **(i)** **Assess out of 10.**

Candidates should use some form of comparative statements covering all four indicators to get full marks.

The four indicators given all identify a similar pattern identifying regional inequalities within the UK –East England, SE and SW England and London generally fare better than Wales, the West Midlands and areas further north.

- Population change – apart from Northern Ireland, regions with the highest increase in population are in the south of England. No growth or decrease in Scotland, NE and NW England.
- Average house prices – highest in London and SE England, while Scotland, northern regions of England and Wales have figures well below the UK average.
- Gross Disposable Household Income – very similar to house prices although Yorks and Humberside, East Midlands and Scotland fare slightly better.
- Working Age Population with no qualifications (%) – very low in southern England, again high in Wales, northern England and especially Northern Ireland. Scotland same as UK average. **10 marks**

(ii) **Assess out of 14 with maximum of 8 for either physical or human factors.**

The UK's regional inequalities stem from a combination of the physical differences between the higher and steeper land to the north and west of the UK compared with the lower and more gently sloping land to the south and east coupled with the remoteness of the north-west compared to the proximity of the south-east to the 'core' of the EU. Candidates may justifiably stress the positive and negative aspects of different regions.
- Physical factors might mention advantages/problems such as relief, rock types, climate and water supply, soil fertility and erosion.
- Human factors might mention decline of traditional heavy industries, growth areas of new lighter industries and hi-tech industries, out-migration from north and differences in accessibility related to communications and remoteness. **14 marks**

(iii) **Assess out of 8 giving credit up to 2 marks for specific named projects**

UK national government help could include:
- UK government identifies 'Assisted Areas' eligible for regional selective assistance in line with EU moves to redistribute most of aid budget to poorer areas. Assisted areas include the whole of Northern Ireland, Cornwall and the Scilly Isles, West Wales and the Valleys and the Scottish Highlands and Islands.
- There are also economic development agencies in the four countries of the UK which aim to attract investment and help new and existing businesses compete nationally and internationally.
- The Welsh Assembly Government's department of Economy and Transport in Wales.
- Scottish Enterprise and Highlands and Islands Enterprise in Scotland.
- Invest Northern Ireland in NI and The Regional Development Agencies (RDAs) in England. **8 marks**

Question 6 (Development and Health)

(a) **Assess out of 12, with maximum of 4 for names of relevant countries.**
Maximum of 6 for generalised responses which fail to make specific/authentic points.

Candidates should be able to refer to:
- Oil rich countries such as Saudi Arabia, Brunei; well-off countries like Malaysia which can export primary products such as hardwoods, rubber, palm oil and tin.
- Poor Sahelian countries like Mali, Chad and Burkina Faso which are landlocked, lack resources, have poor quality farmland, high levels of disease.
- Newly Industrialised Countries eg South Korea, Taiwan have high GNPs due to steel-making, shipbuilding, car manufacturing, clothing etc. Countries with entrepreneurial skills and low labour costs.
- Large countries eg Brazil with a variety of opportunities ranging from resources in Amazonia to tourism in the South East around Rio.
- Tourist destinations eg Sri Lanka, Thailand, Caribbean islands like Barbados, earn foreign currency and improve living standards and create new job opportunities.
- Countries which suffer natural disasters which restrict development and cause massive damage to infrastructure. Examples include drought in Ethiopia, floods/cyclones in Bangladesh, hurricanes in Caribbean and tsunamis in Indonesia, earthquakes in China.
- Mountainous countries eg Tibet, Afghanistan which restrict communications and farming.
- Areas of political instability which divert aid and resources away from areas of need. Examples include civil war in Sudan, large scale conflicts in Afghanistan and Iraq, corruption, mismanagement and need for regime change in Zimbabwe. **12 marks**

(b) **Assess out of 12 marks with a maximum of 8 for either physical or human factors.**

Candidates can make use of resources to suggest the following factors which may lead to low life expectancy.
- Chad is landlocked restricting trade, income from imports/exports and reducing money available to improve quality of life.
- Low GDP means Chad will struggle to provide services such as hospitals/clean water/sanitation which will increase ill health.
- High infant mortality will reduce average life expectancy.
- Low quantities of farmland and irrigated land mean crop production will be less than required to feed population leading to malnutrition and ill health.
- Low literacy levels imply poor education in areas of hygiene/birth control/disease control.
- Inhospitable areas eg desert, uplands means living conditions are very harsh
- High fertility rates mean large families with not enough food and resources to go round.
- High levels of water borne diseases reduce life expectancy. **12 marks**

(c) **(i)** **Assess out of 8 ensuring that both physical and human factors included for full marks. Maximum of 6 if physical or human factors not covered.**
Avoid crediting reversals in parts (i) and (ii).

Answers will depend on the disease chosen but for Malaria might include:

Physical factors:
- Hot wet climates such as those experienced in the tropical rainforests or monsoon areas of the world.
- Temperatures of between 15°C and 40°C.
- Areas of shade in which the mosquito can digest human blood.

Human factors:
- Suitable breeding habitat for the female anopheles mosquito – areas of stagnant water such as reservoirs, ponds, irrigation channels.
- Nearby settlements to provide a 'blood reservoir'.
- Areas of bad sanitation, poor irrigation or drainage.
- Exposure of bare skin.
- Migration.
- Not completing courses of medication.

8 marks

(ii) **Assess out of 14 marks.**

Measures taken to combat malaria may include:

Trying to eradicate the mosquitoes:
- Insecticides eg DDT.
- Newer insecticides such as Malathion
- Mustard seed 'bombing' – become wet and sticky and drag mosquito larvae under the water drowning them.
- Egg-white sprayed on water – suffocates larvae by clogging up their breathing tubes.
- BTI bacteria grown in coconuts. Fermented coconuts are, after a few days, broken open and thrown into mosquito-infested ponds. The larvae eat the bacteria and have their stomach linings destroyed!
- Larvae eating fish.
- Drainage of swamps.

Treating those suffering from malaria:
- Drugs like chloroquin, larium and malarone.
- Quinghaosu extract from the artemesian plant – a traditional Chinese cure.
- Continued search for a vaccine – not available as yet.
- Education programmes in –
    - the use of insect repellents eg Autan
    - covering the skin at dusk when the mosquitoes are most active
    - sleeping under an insecticide treated mosquito net
    - mesh coverings over windows/door openings.
- WHO 'Roll back malaria' campaign.
- The Bill and Melinda Gates Foundation.

NB A maximum of 1 mark each should be allocated for examples of insecticides, drugs and herbal medicines.

14 marks

(iii) **Assess out of 4 marks.**

The benefits of controlling the disease on a developing country might include:
- Saving money on health, medicines, doctors, drugs etc.
- Reduction in the national debt.
- Healthier workforce and increased productivity.
- Longer life expectancy and decreased infant mortality rates.
- Scarce financial resources could be spent on other areas such as education or housing.
- More tourists/foreign investment may be attracted if there was less risk of disease – leading to more job opportunities, foreign currency earnings, increased prosperity.

4 marks

[END OF MARKING INSTRUCTIONS]