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| 02 | 1 | One mark for the correct answer:<br><br>C. A high proportion of the original forest cover has been removed in Africa and Europe.<br><br>No credit if two or more statements are shaded<br><br>AO4 – 1 mark | 1 |

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| 02 | 2 | One mark for each reason or two marks for single developed explanation.<br><br>Eg Rainfall and temperatures are high all year round (1). This encourages rapid growth of a large number of plants (d) (1)<br>Because rainforests are located in tropical regions, they receive a lot of sunlight (1), which is converted to energy by photosynthesis, so there are many plants. (d) (1)<br>The canopy structure of the rainforest provides many places for plants to grow and animals to live (1). The canopy offers sources of food, shelter, and hiding places (d) (1)<br>The rainforest nutrient cycling is rapid in hot, damp conditions on the forest floor (1), so there is rapid decay of dead plant material and plentiful nutrients easily absorbed by plant roots (d) (1).<br><br>No credit for description of plants or plant adaptations to climate.<br><br>AO1 – 2 marks | 2 |

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| 02 | 3 | One mark for the correct answer:<br><br>B. The highest level of deforestation was in 1995 and the lowest level was in 2012.<br><br>No credit if two or more statements are shaded.<br><br>AO4 – 1 mark | 1 |

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| 02 | 4 | One mark for each separate reason. Accept any plausible reason. This requires application of knowledge to interpret Figure 7<br><br>Eg as the percentage of protected land has increased, so annual deforestation has decreased (1)<br>There has been greater awareness of the need to preserve rainforests for the future (1)<br>There has been greater political pressure to reduce deforestation due to worries about climate change (1)<br>There may have been stricter government controls on logging companies and farmers (1)<br><br>Credit ideas relating to selective logging and replanting, conservation for scientific research, ecotourism and debt for nature swaps.<br><br>AO3 – 2 marks | 2 |

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| 02 | 5 | <table><tr><th>Level</th><th>Marks</th><th>Description</th></tr><tr><td>3 (Detailed)</td><td>5-6</td><td>AO2 Shows thorough geographical understanding of the economic impacts of deforestation<br>AO4 Detailed and relevant reference made to the information about economic impacts of deforestation shown in Figure 8.</td></tr><tr><td>2 (Clear)</td><td>3-4</td><td>AO2 Shows some geographical understanding of the economic impacts of deforestation<br>AO4 Clear and mainly relevant reference made to the information about economic impacts of deforestation shown in Figure 8.</td></tr><tr><td>1 (Basic)</td><td>1-2</td><td>AO2 Shows limited geographical understanding of the economic impacts of deforestation<br>AO4 Limited or partial reference made to the information about economic impacts of deforestation shown in Figure 8.</td></tr><tr><td></td><td>0</td><td>No relevant content</td></tr></table><br>**Indicative content**<br>• Level 3 responses will be detailed and well developed. Some use of Figure 8 (direct or inferred) and specific own knowledge. Impacts can be positive and/or negative.<br>• Level 2 responses will be linked statements with some elaboration. Some use of figure 8 (direct or inferred) and own knowledge. Impacts can be positive and/or negative.<br>• Level 1 responses likely to consist of simple statements, with limited use of subject vocabulary. May only use information in Figure 8 or own knowledge.<br>• The command word “explain” is used, which means to provide a reasoned account of how and why deforestation has economic impacts.<br>• Understanding of positive impacts. Deforestation is associated with some economic development. Development of land for mining, farming and energy will lead to jobs both directly (construction, farming) and indirectly (supply and support industries).<br>• Companies will pay taxes to the government which can be used to improve public services, such as education and water supply.<br>• Forest is cleared to make space for cattle grazing, from which large commercial companies can make profit.<br>• Improved transport infrastructure opens up new areas for industrial development and tourism. Products such as oil palm, soya and rubber provide raw materials for processing industries.<br>• Hydro-electric power provides cheap and plentiful energy, which can be used by all types of industry.<br>• Commercial logging companies and pulp processing/paper making can make sizable profits as a result of deforestation. | 6 |

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| | | • Minerals such as gold and cobalt are very valuable, and earn large amounts of foreign exchange, as well as providing an industrial base.<br><br>• Impacts are more likely to be seen as positive but credit idea that damage to forests, rivers, and marine life through deforestation could significantly reduce the overall wealth of a country as resources are lost and habitats destroyed. Deforestation can rob a country of potential renewable revenues, replacing valuable productive lands with virtually useless scrub and grassland.<br><br>• Short-term economic exploitation through deforestation can be devastating to the long term, destroying valuable forest products and ecosystems. Plants that could bring huge medical benefits and high profits may become extinct. Ecotourism also suffers with deforestation, especially if forests are removed and rivers polluted.<br><br>• Livelihoods of some local people are destroyed. Deforestation can cause loss of animals and plants they rely on to make a living. Illegal logging causes billions of dollars of losses to national economies annually.<br><br>• Often the land is left ruined and many pollutants wash into rivers. Water quality is affected, shortages occur, with knock on effect on industry and wider economy.<br><br>• Use of Figure 8. The photograph indicates the large scale of operations, processing, huge structural works, many buildings, transport of iron ore. Indicates huge investment of money, considerable employment of workers, possibly large commercial returns.<br><br>• Use of factfile information. The Carajas scheme covers a vast area, and has a mix of economic activities. It is dominated by the massive iron ore mine, with some recent expansion nearby. Rail connection to coast ensures access to export markets. HEP generated locally, providing some employment and generating electricity for local industry. Major long-term reserves, likely to last for at least 70 years, ensuring continued economic development. Other minerals are exploited, likely to be exported abroad. Other economic activities may help to provide work and revenue. However the scheme affects the local economy, disrupting lives of Indian population, affecting their ability to work and carry out traditional lifestyles.<br><br>• Responses must refer to Figure 8 (directly or inferred) to access Level 2 marks.<br><br>AO2 – 3 marks<br>AO4 – 3 marks | |

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| 02 | 6 | One mark for an appropriate description of the role.<br><br>Eg Producers are organisms that produce their own food (1).<br>They take energy from the Sun and make it into chemical energy (food) (1)<br>Plants produce chemical energy by the process of photosynthesis (1).<br>They are at the bottom of the food chain and may be eaten by consumers(1)<br><br>AO2 – 1 mark | 1 |

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| 02 | 7 | One mark for an appropriate reason.<br><br>Eg The entire organism is not consumed or digested (1).<br>Parts such as roots, woody stems, bones, scales, feathers etc aren't eaten (1).<br>Energy is used up by organisms in each trophic level for movement and transport inside their bodies (1).<br>Energy is used in respiration and is released from the body of the organism as heat(1). Energy becomes lost in excretion.(1)<br><br>AO1 – 1 mark | 1 |

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| 02 | 8 | One mark for each correct description or inference<br><br>If a disease reduced the number of primary consumers, one effect on the food chain would be that carnivore populations may decrease rapidly/only omnivores would survive/plant life will flourish and grow rapidly (1)<br><br>Decomposers help to return nutrients to the soil by breaking down dead plants and animals/breaking down organic waste or excreted material/releasing energy built up inside a plant or animal so that it can be recycled (1)<br><br>Credit other plausible statements.<br><br>AO2 – 1 mark, AO3 – 1 mark | 2 |

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| 02 | 9 | | 9 |

| Level | Marks | Description |
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| 3 (Detailed) | 7-9 | AO1 Demonstrates detailed knowledge of threats from human activities in environments on the fringe of hot deserts/cold environments<br>AO2 Shows thorough geographical understanding of the interrelationships between places, environments and processes in the context of environments on the fringe of hot deserts/cold environments.<br>AO3 Demonstrates application of knowledge and understanding in a coherent and reasoned way in evaluating the extent to which human activity poses a risk to environments on the fringe of hot deserts/cold environments. |
| 2 (Clear) | 3-4 | AO1 Demonstrates clear knowledge of threats from human activities in environments on the fringe of hot deserts/cold environments<br>AO2 Shows some geographical understanding of the interrelationships between places, environments and processes in the context of environments on the fringe of hot deserts/cold environments.<br>AO3 Demonstrates reasonable application of knowledge and understanding in evaluating the extent to which human activity poses a risk to environments on the fringe of hot deserts/cold environments. |
| 1 (Basic) | 1-2 | AO1 Demonstrates limited knowledge of threats from human activities in environments on the fringe of hot deserts/cold environments<br>AO2 Shows slight geographical understanding of the interrelationships between places, environments and processes in the context of environments on the fringe of hot deserts/cold environments.<br>AO3 Demonstrates limited application of knowledge and understanding in evaluating the extent to which human activity poses a risk to environments on the fringe of hot deserts/cold environments. |
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- Level 3 will be a well-developed answer. Reasoned examination why human activity poses a risk to the chosen environment, with evaluation of the risks involved.
- Level 2 will have linked or elaborated statements and some accurate use of geographical terms. May outline several risks to the environment, but understanding of the link to environmental effect may be incomplete. May start to make an evaluation of the risks involved.
- Level 1 responses are likely to consist of simple statements, with limited use of subject vocabulary. Might be limited to generic statements, or a list of risks to the environment without development. May be limited to a single risk. May make a limited evaluation.

**Indicative content for Environments on the fringe of hot deserts**

- The command "to what extent" means that responses should reach a conclusion based on supporting evidence. The statement may be completely untrue, true to some extent (partly but not completely true), to a great extent, or completely true. It requires evaluation of the degree of risk posed by human activity to the chosen environment.

- Understanding of the risks resulting from human activity. The principal risk is desertification. It is estimated that 20% of the world's population, in over 60 countries, have to cope with the threat of desertification. For instance, the Sahara has advanced over 250km southwards in the past 100 years.

- Understanding of how desertification occurs- the process of fertile land transforming into desert typically as a result of deforestation, drought, or improper/inappropriate agriculture.

Causes which link to human activity include:

- Population growth – more people need more food which puts pressure on the land.

- Migration brings even greater population pressure. Drought and desertification in one region will displace people to another fragile environment.

- Overgrazing – too many goats, sheep, cattle can destroy the vegetation. Nomadic groups used to wander freely, following the rain wherever it fell. Now they are restricted in movement and this places more pressure on land resources. The soil may turn to dust and become infertile.

- Over cultivation- grow too much without replenishing the soil and it becomes exhausted.

- Deforestation – trees are cut down for fuel and building. The loss of roots to hold the soil down makes the soils more fragile. Trees are stripped of their branches and eventually die. When vegetation has been destroyed the soil is exposed to the wind and the rain making it vulnerable to erosion. Exposed topsoil becomes baked hard by sunlight. When it finally arrives, intense rain washes over the soil rather than soaking into the ground. As it flows, it carries the topsoil away, and gullies and cracks appear. Once the soil has eroded, it becomes impossible for the vegetation to grow back.

- Water management - excessive irrigation in some places has led to waterlogging pf the ground. Where this has happened, salts, poisonous to plants have been deposited on the ground surface (salinisation). Drainage of underground aquifers due to excessive use of groundwater also poses a risk.

- War – many sub-Saharan countries have suffered for years from civil war, where crops and animals have been destroyed, leading to famine. Millions of people have been forced to move into desert fringe areas by armed conflicts. Some become refugees. The environmental resources in and around the cities and camps where these people settle come under severe pressure.

- Further risks to the environment. Degraded land may cause downstream flooding, reduced water quality, sedimentation in rivers and lakes, and siltation of reservoirs and navigation channels. It can also cause dust storms and air pollution, resulting in damaged machinery, reduced visibility, unwanted sediment deposits. Loss of unique species and fragile habitats.

- Enhanced greenhouse effect, partially caused by human activity globally, may contribute to increased risks of drought, higher temperatures etc in areas on fringe of hot deserts.

- Credit examples of desertification. In Darfur region, 250,000 people have been killed and around three million made homeless by conflict since 2003. Drought, crop failure and livestock loss are major problems. Millions have fled their land and homes. They were housed in refugee camps, with help from the UN. But refugee camps create new environmental stress wherever they are located and cause desertification to spread.

- In Kenya, nomadic Masai farmers have been forced onto marginal land. Traditional pastoral migration patterns have been disrupted and they have been compelled to use smaller areas of land for their cattle. Overgrazing has resulted from this, leading to land degradation and soil erosion by wind and water.

- Other threats to the environment linked to human activity include exploitation for mineral resources and fossil fuels and high impact tourism in vulnerable areas such as the edge of the Thar desert and in East Africa.

- Evaluation of extent to which human activities pose a risk. Although natural climate change, as part of a natural cycle, may contribute to desertification, there is little doubt that human misuse and mismanagement of the land poses a significant threat. Desertification is a major global ecological and environmental problem affecting many countries on the edge of hot deserts, which to a great extent is driven by human factors.

**Indicative content for cold environments**

- The command “to what extent” means that responses should reach a conclusion based on supporting evidence. The statement may be completely untrue, true to some extent (partly but not completely true), to a great extent, or completely true.

- Cold environments are extremely fragile and they can be easily damaged by human activities. Tundra vegetation takes a very long time to become established. It is a very delicate ecosystem that can be easily disturbed. Relatively minor developments – such as constructing a footpath can have serious long-term effects. Tyre tracks can be seen for many years after they were made. When the Sun hits the ruts it causes the permafrost to melt; this causes erosion and the ruts get bigger, and eventually the ruts turn into gullies.

- Mining - mines have opened up resources, such as gold and diamonds, under the land in tundra regions, eg Arctic Canada. To extract them, roads have to be constructed through forests and across the tundra and supply bases built. This increases the number of vehicles in the tundra creating

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| | | noise and air pollution. Housing for hundreds of workers also needs to be constructed.<br><br>• Pollution from mining and oil drilling has contaminated the air, lakes and rivers. The land around some nickel mines in Russia is so polluted that the plants in the area have died. The short growing season means that bulldozer tracks from the oil and natural gas industries could take centuries to restore. Burst pipes have spilt hundreds of thousands of gallons of crude oil in Alaska and Siberia, with major impacts on a fragile environment. Oil spills have caused serious water pollution in the Arctic Ocean.<br><br>• Oil rigs have enabled oil to be drilled in the sea. In Alaska, the oil is exported from the Prudhoe Bay oil fields in raised pipes above the ground to the ice-free port of Valdez. Some animals' movements to traditional feeding and nesting grounds have been disrupted by these pipelines.<br><br>• Pesticides have been used to control the masses of insects. Migrating birds feed on the insects and are subsequently poisoned or die due to their food source being removed. Oil spills have caused serious water pollution in the Arctic Ocean.<br><br>• Natural gas (methane hydrate) is extracted from gas fields eg in western Siberia. Natural gas is pumped from beneath the permafrost and piped east across the tundra to the Norilsk metal smelter. Risk of rupture to pipelines and pollution.<br><br>• New industries have led to the creation of towns such as Anchorage in Alaska which have been built to accommodate workers. These developments spoil the appearance of the natural landscape. Some problems with melting of permafrost where buildings and roads not constructed properly.<br><br>• Illegal hunting and fishing is threatening the numbers of certain species, eg whales. Species of animals such as polar bears are highly specialised so find it difficult to adapt to change.<br><br>• Tourism impacts are increasing-the rise in visitor numbers has potential to threaten animal breeding patterns and passenger boats could impact on the marine environment.<br><br>• Threats to environment resulting from human induced climate change. Polar ice caps are melting because of an increase in global warming. As the tundra melts, the plant matter decomposes and returns carbon dioxide to the atmosphere, causing further warming. Rising sea levels, increased risks of flooding in some low-lying coastal areas.<br><br>• Credit examples human activity causing risk to environment such as Exxon Valdez oil spill, 1989.<br><br>• Evaluation of risk to environment from human activity. The tundra environment is among the least disturbed ecosystems in the world. However, that is changing with the discovery of large reserves of raw materials. Any damage to the tundra landscape is slow to recover. Environmental damage occurs at different scales, with causes that range | |

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| | | from local to global. Of greatest threat may be the impact of human-induced climate change.<br><br>AO1 – 3 marks<br>AO2 – 3 marks<br>AO3 – 3 marks | |