Oxford Revise | Edexcel A Level Geography | Answers

Chapter 2

All exemplar answers given are likely to be in the top mark band.

Questions are level-marked.

1 AO1 = 3 / AO2 = 3

Level	Marks	Description
	0	• No rewardable material.
1	1–2	• Demonstrates isolated or generic elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding to geographical information inconsistently. Connections/relationships between stimulus material and the question may be irrelevant. (AO2)
2	3–4	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding to geographical information to find some relevant connections/relationships between stimulus material and the question. (AO2)
3	5–6	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding to geographical information logically to find fully relevant connections/relationships between stimulus material and the question. (AO2)

Relevant content may include:

- Patterned ground is formed by repeated freezing and thawing cycles. For example:
  - Ice-wedge polygons: the most common form of patterned ground. In permafrost areas, ice wedges form due to the repeated freezing and expansion of water in the ground. As ice accumulates in vertical cracks, it displaces the surrounding soil, creating a distinctive polygonal pattern on the landscape.
  - Frost action and freeze-thaw cycles: periglacial regions experience repeated freeze-thaw cycles, where diurnal temperature fluctuations cause water in the soil to freeze and thaw. This process induces mechanical stress on the ground surface.
  - Frost heave: frost heave occurs when the freezing of subsurface water causes an uplift of the ground surface. This process is particularly influential in periglacial regions, leading to the formation of raised mounds or hummocks, contributing to the overall patterning.
  - Solifluction lobes: periglacial regions often exhibit solifluction, where the slow downslope movement of saturated soil occurs over the frozen ground during thaw periods. This process contributes to the formation of lobes or terracettes, creating a characteristic pattern on hillslopes.

Example answer: *Figure 1 shows patterned ground in a permafrost area. In very low temperatures, as experienced in the Icelandic highlands, the ground contracts and cracks develop. During the summer, meltwater fills the cracks and then freezes in the winter. The frozen water forms ice wedges, which increase in*

ISBN 9781382052443

size through repeated freezing and thawing cycles. This affects the ground surface, by forming narrow surface ridges due to frost heave. As the ice wedges become more extensive, a polygonal pattern is formed on the ground, with the ice wedges at the sides of the polygons. This causes patterned ground to form, as in the photograph.

2 AO1 = 3 / AO2 = 3

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Relevant content may include:

- Overall, there is an increasing trend of negative mass balance. Since the late 1980s, there has not been a single year of positive gain.
- Over this 70-year period, most individual years show a negative mass balance. Over the last decade, the majority of years have exceeded −0.8 m w.e. (metre water equivalent) and four years exceed −1.0 m w.e., which occurred only once before, in 1950.
- In this period, there has been a net increase in only five years, all between 1955 and 1988, showing a range of 0.29 m w.e.
- Over this period, the outputs of ablation by melting, sublimation, and calving have been greater than the inputs of accumulation from direct snowfall and other precipitation, blown snow, and avalanches.
- This decline in mass balance indicates a warming of these glacial areas over this 70-year period; the glaciers are melting. However, as the data shows the average accumulated mass balance, there is no allowance for any regional variation.

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Relevant content may include:

- Travel can be impacted (the photograph shows boulders on the road). Glacial outburst floods can also cause roads and bridges to be washed away.
- If travel is disrupted, access to work may also be blocked, which will have an impact on people’s ability to support themselves and their families.
- Damaged infrastructure can also cause isolation, with people unable to visit friends and family.
- In some locations, floods can cause deaths and the destruction of homes. Electricity supplies may be damaged.
- Economic multiplier effect: the lack of work and spending in the local area can lead to a decline in living standards. In LICs, this can be dramatic.

4 AO1 = 6

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2	3–4	• Demonstrates geographical knowledge and understanding, which is mostly relevant and may include some inaccuracies. (AO1) • Understanding addresses a range of geographical ideas, which are not fully detailed and/or developed. (AO1)
3	5-6	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Relevant content may include:

- A clear definition of moraines as glacial landforms, with examples of their presence in glaciated landscapes.
- Recognition that moraines are remnants of glacial debris.
- An explanation that the size and distribution of moraines can indicate the extent and movement of glaciers.
- Reference to the role of moraines in reconstructing past glacial dynamics, such as advances, retreats, and periods of stability.

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Relevant content may include:

- The mean cumulative mass change shows a decline over the 70-year period. In the 1950s and early 1960s, all regions show a positive mass change, with Western Canada and USA reaching a maximum level of about 7 m w.e. By 2021, the greatest range is 46 m w.e. in the Central Europe and Western Canada and USA regions, with a drop to 39 m w.e. in both.
- From 1976, the mean cumulative mass change declines from 0 to −25 m w.e. Several regions had reached 0 prior to 1976 (e.g. Scandinavia in 1961).
- As with the other regions, the Southern Andes shows an overall rate of decline, but also shows some periods of incline. Overall, the Southern Andes shows more stark fluctuations, perhaps due to the effects of El Niño episodes.
- The data shows that there is a decline in mass balance in every glacial region in the world, but with some areas declining faster than others. For example, there is a very steep decline in Western Canada but a much slower rate of decline in Arctic Canada North.

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Relevant content may include:

- Periglacial environments can demonstrate many distinctive features. Figure 5 shows:
    - Thermokarst lakes: formed due to the thawing of ice-rich permafrost. As permafrost thaws, it can create depressions in the landscape that fill with water, forming thermokarst lakes. These lakes are common in Arctic tundra regions and are indicative of periglacial processes.
    - Uneven ground: freeze-thaw cycles in permafrost leads to the development of hummocks and troughs.
    - Low-lying vegetation: the seasonal freezing of the active layer, and permanent wet and cold conditions, leads to slow vegetation growth of mostly mosses and lichens. High winds ensure these stay close to the ground.

7 AO1 = 8

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Relevant content may include:

- Periglaciation occurs in climates that are subject to repeated freezing and thawing, and are usually found on the margins of glaciated areas.
- Due to melting of snow and refreezing to ice, sparse vegetation and high winds, distinctive landforms are developed.
- Distinctive periglacial landforms include:
    - Ice wedges, formed when water melts into cracks and joints in the rock. As it freezes, it expands and forces sediment towards the surface, often producing patterned ground through frost heave.
    - Patterned ground is caused by repeated freezing and thawing cycles which create patterns of sorted stones on the ground surface. The slope on which they form determines whether they are circles, polygons, or stripes.
    - Pingos are dome-shaped mounds formed by the freezing and expansion of groundwater, reaching up to 600 m in diameter and up to 70 m in height. Open system pingos form as groundwater is forced upwards through a crack in the permafrost doming the ground surface. Closed system pingos are formed when a surface lake drains, and the permafrost is advancing underneath. The permafrost forces the water into the centre which then freezes forming the ice core. If the ice core melts, the pingo can collapse.
    - Loess is fine sediment that is blown by the high winds in the periglacial environment, sometimes great distances, and deposited as the wind drops.
- Distinctive periglacial landscapes include:
    - The Arctic Tundra found in the northern regions of Canada, Alaska, Russia, and Scandinavia. Periglacial landforms here include permafrost, pingos, polygonal ground, thermokarst lakes, and widespread cryosols.
    - The Siberian Yedoma Region in northern Russia has distinctive periglacial landforms including extensive permafrost and gelifluction terraces.

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Example answer: *Periglacial areas, characterised by intense freeze-thaw processes demonstrate distinctive unique landforms.*

Periglacial and glacial landscapes are both cold environments commonly associated with high latitudes, but periglacial areas display distinctive landforms. A periglacial landscape is characterised by ground that is perennially frozen, termed permafrost, but unlike glacial regions, it does not have any present surface ice in the form of glacier ice flows. In contrast, glacial landscapes are directly sculpted by the movement of ice in the form of glaciers or ice sheets. The processes that shape periglacial landscapes, such as solifluction, frost action, and thermal contraction, differ markedly from the glacial processes of plucking and abrasion.

Distinctive periglacial landforms include ice wedges, formed when water melts into cracks and joints in the rock. As it freezes, it expands and forces sediment towards the surface, often producing patterned ground through frost heave. Another distinctive landform is patterned ground, caused by repeated freezing and thawing cycles which create patterns of sorted stones on the ground surface. The slope on which they form determines whether they are circles, polygons, or stripes. Pingos are another distinctive periglacial landform. These are dome-shaped mounds formed by the freezing and expansion of groundwater.

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Relevant content may include:

- Moraine is a remnant of glacial debris. It is mostly evident after glacial retreat, and is formed by deposition.
- Types of moraine include: ground, terminal, recessional, lateral, and medial.
- The size and distribution of moraines can indicate the past extent and movement of glaciers over time, such as advances, retreats, and periods of stability. These can be used to help reconstruct past climate changes.

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Relevant content may include:

- Intense freeze-thaw processes and unique landforms that characterise periglacial areas provide valuable opportunities for studying climate change. However, the effectiveness of these areas as indicators of climate change is subject to certain limitations.
- Features such as patterned ground, solifluction lobes, and pingos are sensitive indicators of temperature variations and changing precipitation patterns.
- Studying the expansion or contraction of permafrost enables researchers to reconstruct past climatic conditions and project future changes, contributing to our understanding of long-term climate trends.
- However, the use of periglacial areas to study climate change is not without challenges. For example, it is difficult to isolate the specific influence of climate change from other factors such as local geomorphological conditions.
- Variations in permafrost response to climate change may differ regionally. For instance, permafrost thaw in Arctic regions may not mirror the patterns observed in subarctic or alpine periglacial areas.
- Absence of long-term historic monitoring makes it challenging to differentiate between natural variability and anthropogenic influences on periglacial landscapes.

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Relevant content may include:

- Mass balance = accumulation +/- ablation. It results from the gains and losses in the ice store (the glacier).
- Inputs include accumulation from direct snowfall and other precipitation, blown snow, and avalanches.
- Outputs are from ablation by melting, sublimation, evaporation, avalanches, and calving.
- Positive feedback: processes within the system amplify the inputs to lead to rapid change.
- Negative feedback: processes balance any changes in the inputs to return the system to equilibrium.
- Changes in mass balance, including variations in glacier volume and thickness, are directly linked to shifts in global and local temperature and precipitation patterns.
- The mass balance is closely tied to sea level rise. Monitoring and comprehending changes in glacier mass help in assessing the contribution of melting glaciers to rising sea levels. This information is vital for predicting future sea level changes and implementing appropriate adaptation strategies.
- Glaciers play a significant role in the global water cycle, acting as natural reservoirs. Understanding the mass balance helps in predicting the availability of water resources from glacial melt. This is particularly important for regions that heavily rely on glacial meltwater for agriculture, drinking water, and hydropower generation.
- The mass balance is crucial for assessing and mitigating glacial hazards such as glacial lake outburst floods (GLOFs).
- Governments and policymakers can use information on glacial mass balance to develop effective climate change mitigation and adaptation strategies.
- Knowledge of the glacial mass balance contributes to advancements in scientific research and modelling.
- It is also crucial for educating the public about the impacts of climate change.

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Relevant content may include:

- Past climate changes: a description of historical climate fluctuations in periglacial regions.
- The influence of past climate variability on geomorphic processes.
- Geomorphic processes: an explanation of processes such as freeze-thaw action, solifluction, and frost heave; the role of these processes in shaping periglacial landscapes and forming characteristic landforms.
- Formation of landforms: patterned ground, pingos, etc.
- The modification of landforms by current climate changes: permafrost degradation and thawing, and accelerated rates of erosion and solifluction due to warming temperatures.
- Future climate change implications: the potential for increased frequency and intensity of periglacial processes as glacial areas become periglacial; forecasted changes in landform distribution and characteristics under future climate scenarios.

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Relevant content may include:

- Erosion, transportation, and deposition of sediment by flowing glacial meltwater (which is common in some glacial environments in seasonal temperature variations), either supraglacial, englacial, or subglacial (all in contact with the glacier).
- A full explanation of the processes to form each of the chosen features. For example:
  - Ice contact features (englacial and subglacial): kames, eskers, and kame terraces.
  - Proglacial features: sandurs (outwash plains), proglacial lakes, meltwater channels (braided streams), and kettle holes.
- Include specific examples from chosen case studies.
- It is not necessary to give each feature in detail. You could list those not covered in your concluding sentence.

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Relevant content may include:

- The definition of fluvioglacial landforms as features formed by the interaction of glacial meltwater and sediment transport.
- An explanation of how fluvioglacial landforms influence hydrological systems in glaciated regions.
- The impact on water resource management: important components of hydrological networks, regulating water flow and storage; analysis of the role of features like outwash plains and alluvial fans in storing and releasing water, affecting downstream water availability.
- Water resource management considerations: sustainable water resource management; the complexity of challenges and opportunities in managing water resources in glaciated regions due to the presence of fluvioglacial features.
- Include named case study examples.
- A consideration of how changes in fluvioglacial landforms due to climate change may impact water resource management in glaciated regions in the future.
- A discussion of the potential challenges and adaptation strategies for managing water resources in the face of changing fluvioglacial dynamics.

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3	6–8	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Understanding addresses a broad range of geographical ideas, which are detailed and fully developed. (AO1)

Relevant content may include:

- Fluvioglacial landforms result from the interaction of glacial meltwater and sediment transport.
- Erosion, transportation, and deposition of sediment by flowing glacial meltwater (which is common in some glacial environments in seasonal temperature variations), either supraglacial, englacial, or subglacial (all in contact with the glacier).
- A description of fluvioglacial landforms, including:
  - ice contact features (englacial and subglacial): kames, eskers, and kame terraces
  - proglacial features: sandurs (outwash plains), proglacial lakes, meltwater channels (braided streams), and kettle holes.
- The differences between fluvioglacial and glacial landforms in terms of their morphology and sediment composition. For example, fluvioglacial processes sort sediment by size, whereas glacial processes do not.
- A description of glacial landforms such as cirques, arêtes, pyramidal peaks, glacial troughs, hanging valleys, ribbon lakes, etc.
- Specific named examples of glacial and/or fluvioglacial landscapes.

15 AO1 = 8

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Relevant content may include:

- The importance of fluvioglacial landforms in reconstructing past glacier extents, ice dynamics, and climate conditions.
- An analysis of how features like outwash plains, eskers, and kame terraces provide evidence of glacial meltwater discharge and sediment deposition.
- An examination of how changes in fluvioglacial landforms over time reflect environmental shifts such as climate fluctuations and deglaciation.
- Variations in sediment composition and stratigraphy within fluvioglacial deposits provide insights into past environmental conditions.
- A description of how the study of fluvioglacial landforms contributes to reconstructing past landscapes and understanding landscape evolution.
- How mapping and analysis of fluvioglacial features aid our interpretation of paleoenvironments and paleoclimate conditions.

16 AO1 = 5 / AO2 = 15

Level	Marks	Description
	0	• No rewardable material.
1	1–5	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical ideas, making limited and rarely logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited coherence and support from evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2)
2	6–10	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2)
3	11–15	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical ideas in order to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2)
4	16–20	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2)

Relevant content may include:

- There is an increase in meltwater discharge and sediment transport as a glacier retreats.
- There is a release of stored meltwater, intensifying fluvioglacial erosion and deposition.

- Changes in glacier morphology and ice dynamics affect the pattern and magnitude of fluvioglacial processes.
- Glacial retreat exposes new areas for fluvioglacial erosion and deposition, leading to the formation of new landforms.
- A description of the role of meltwater streams in sculpting valleys, transporting sediment, and forming features such as eskers and outwash plains.
- Recognition of positive feedback mechanisms, where increased meltwater discharge accelerates glacier retreat, and the implications for landscape evolution and geomorphic change in glaciated regions.
- Named chosen case study examples.
- Ongoing and future glacial retreat due to climate change may further impact fluvioglacial processes and landform development.
- The potential consequences for landscape stability, water resources, and environmental management in glaciated regions.
- The release of meltwater can lead to the formation of proglacial lakes, which affect the stability of surrounding slopes and influence landforms (e.g. the retreat of glaciers in the Himalayas).

Example answer:

Glacial meltwater plays a crucial role in shaping glaciated landscapes, contributing to their distinctiveness through various geomorphological processes. The significance of meltwater in creating these landscapes can be evaluated through its impact on erosion, transportation, and deposition of sediments, as well as its role in forming specific landforms.

Glacial meltwater significantly enhances erosion in glaciated regions. As glaciers melt, the resulting water flows beneath and around the ice, often under high pressure. This subglacial meltwater can erode bedrock through plucking, where water infiltrates cracks in the rock, freezes, and then expands, causing pieces of rock to break off. Meltwater also facilitates abrasion, where the water carries sediment and rocks that grind against the bedrock, smoothing and polishing it. Meltwater channels can also transport sediment. These sediments range from fine silt to large boulders.

Meltwater can carve deep valleys and gorges, creating distinctive landforms. An example of this is the fjords found in regions like Norway and New Zealand, which were formed by glacial erosion and subsequently deepened by meltwater flow.

The deposition of sediments by glacial meltwater also contributes to the creation of distinctive glaciated landscapes. As the speed of meltwater decreases, it can no longer carry sediments, leading to deposition. This process forms distinctive glacial landforms, such as outwash plains, eskers, and kames. Outwash plains are expansive, flat areas formed by sediments deposited by meltwater flowing from the glacier. Eskers are sinuous ridges of sand and gravel deposited by streams that flowed within or beneath the glacier. These ridges trace the path of the sub-glacial meltwater channels. Kames are irregularly shaped hills or mounds of sand and gravel deposited by meltwater in depressions or holes in the glacier. When the glacier retreats, these deposits are left behind. Meltwater is instrumental is the creation of these distinctive landforms.

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Relevant content may include:

- Glaciated environments (those with glaciers and associated landforms) offer a unique set of opportunities and challenges for development.

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- This is primarily due to the abundance of natural resources there. For example, hydropower potential (Norway), oil and mineral deposits (Canada), and tourism (New Zealand).
- However, alongside these opportunities, there are substantial environmental concerns associated with development in glaciated environments.
- Development can impact directly on the environment. For example, the alteration of natural drainage patterns due to infrastructure development can lead to increased sedimentation in rivers and lakes, negatively impacting aquatic ecosystems. The construction of dams for hydropower projects may disrupt the natural flow of glacial rivers, affecting fish habitats and biodiversity (e.g. Patagonia).
- Conclusion: while significant economic benefits can be reaped from glaciated environments, it is crucial to adopt sustainable practices that minimise negative environmental impacts. Striking a balance between development and conservation is imperative to ensure the long-term wellbeing of these unique and fragile ecosystems, acknowledging that environmental concerns must be carefully addressed to truly harness the opportunities presented by glaciated environments.

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Relevant content may include:

- Fluvioglacial landscapes are shaped by the interaction of meltwater from glaciers with river systems, and exhibit a complex interplay of erosional and depositional processes.
- Erosional:

  - Meltwater streams originating from glaciers possess significant erosive power due to the entrainment of rock debris, which acts as abrasive agents.
  - Abrasion, plucking, and hydraulic action are key erosional processes that contribute to the deepening and widening of valleys in fluvioglacial landscapes. For example, in the Alps, the U-shaped valleys, such as the Lauterbrunnen Valley, showcase the pronounced erosional impact of fluvioglacial activity over time.
  - Scouring action of meltwater on bedrock results in the formation of distinctive landforms like glacial troughs and hanging valleys. The erosional capacity of fluvioglacial processes is especially pronounced during periods of glacier retreat, as the sudden release of meltwater intensifies erosional activity along valley floors.
- Depositional:
  - Sediment deposition occurs when the flow velocity decreases.
  - Outwash plains are extensive areas of sediment deposition in front of glaciers, created as meltwater streams lose energy and deposit gravel, sand, and silt.
  - Moraines, both lateral and medial, are prominent depositional features in fluvioglacial landscapes. Lateral moraines are formed at the sides of glaciers through the accumulation of debris, while medial moraines result from the merging of lateral moraines as tributary glaciers join together. The moraines act as key indicators of past glacier positions, and provide evidence of the transportation and deposition of material by fluvioglacial processes.
  - The importance varies depending on factors such as glacier size, climate, and the underlying geology. In regions with large glaciers and high erosive potential, such as Patagonia, erosional processes may dominate, carving deep valleys and fjords. Conversely, in areas with smaller glaciers and more sediment-laden meltwater, depositional features like outwash plains and moraines become more pronounced.
  - The temporal aspect also plays a crucial role in assessing relative importance. During periods of glacier advance, erosional processes tend to prevail as the glacier actively scours and shapes the landscape. In contrast, during periods of retreat, the focus shifts to depositional processes, resulting in the formation of distinctive landforms associated with sediment deposition.
- Conclusion:
  - Both erosional and depositional processes are integral to the formation of fluvioglacial landscapes.
  - The relative importance of these processes is context-dependent, influenced by factors such as glacier size, climate, and temporal considerations.
  - The dynamic interaction between erosional and depositional forces results in the creation of diverse and distinctive landforms that characterise fluvioglacial environments, highlighting the complex and interconnected nature of these geomorphic processes.

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Relevant content may include:

- A clear understanding of the definition of a stakeholder – anyone with an interest in the area and recognition of diverse interests and perspectives.

- A consideration of stakeholders as key actors in decision-making processes and the implementation of management strategies.
- Local community engagement:
  - The involvement of residents in planning and decision-making processes.
  - Utilisation of local knowledge and expertise in identifying management approaches.
- Economic stakeholders:
  - Engagement of businesses and industries dependent on glacial resources or tourism.
  - Consideration of economic interests in promoting sustainable practices.
- Environmental organisations:
  - Collaboration with NGOs to promote conservation and sustainable use.
  - Incorporation of scientific research into management strategies.
- Government agencies:
  - Coordination with governmental bodies responsible for regulation and planning.
  - Alignment with national and regional policies and priorities.
- Intergovernmental organisations, especially in relation to climate change. For example, the UN, Madrid Protocol, Arctic Council, etc.
- Include case studies.
- Analysis (an examination of the challenges and lessons learned):
  - Challenges of stakeholder involvement: potential conflicts of interest and power dynamics; difficulty in achieving consensus and balancing priorities.
  - Benefits of stakeholder involvement: enhanced legitimacy and acceptance of decisions; improved effectiveness and sustainability of strategies.
- An evaluation of stakeholder involvement in case study: an assessment of their contribution to effectiveness and sustainability; a consideration of limitations and drawbacks.

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Relevant content may include:

- Glacial erosion is the process by which glaciers shape the landscape through abrasion, plucking, and glacial transport.
- Distinctive landforms created by glacial erosion:

- Corries (cirques) – bowl-shaped depressions carved into mountainsides by glacier erosion. For example, Corrie Fee in the Cairngorms, Scotland.
    - Arêtes and pyramidal peaks – sharp ridges formed by glacial erosion where two corries have formed.
    - Pyramidal peaks – pointed mountain summits sculpted by multiple glaciers eroding from different sides. For example, the Matterhorn in the Swiss Alps.
    - U-shaped valleys – wide, steep-sided valleys carved by glaciers moving through pre-existing V-shaped valleys. For example, Yosemite Valley in California, USA.
    - Hanging valleys – smaller valleys formed above the main valley floor due to differential erosion by tributary glaciers. For example, Lauterbrunnen Valley in the Bernese Alps, Switzerland.
- Significance of glacial erosion:
    - The formation of distinctive and visually striking landscapes.
    - Its influence on hydrology and drainage patterns.
    - The preservation of geological records of past glacial activity.
    - The importance of understanding glacial processes for interpreting landscape evolution and environmental management.

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Relevant content may include:

- Emphasise the importance of comprehensive risk assessments, infrastructure development, and community engagement in mitigating the impacts of avalanches and GLOFs.
- The importance of managing glacial hazards:

  - The recognition of the significant risks posed by glacial hazards such as avalanches and GLOFs in upland environments.
  - An explanation of the need for effective management strategies to mitigate potential impacts on human lives, infrastructure, and ecosystems.
- Assessment of current strategies:
  - An examination of existing strategies implemented to manage glacial hazards.
  - An evaluation of their effectiveness in reducing the frequency and magnitude of glacial hazard events.
  - The identification of challenges and limitations faced in managing glacial hazards, such as the unpredictable nature of avalanches.
  - An analysis of the role of stakeholder engagement in the effectiveness of management strategies, for example the importance of local community participation, governmental support, and collaboration with scientific experts and NGOs.
  - Case studies highlighting both successful and unsuccessful attempts to manage glacial hazards in upland environments could be examined.
  - A comparison of different approaches and their outcomes in various geographic contexts.
- Assessment of effectiveness:
  - An evaluation of the overall effectiveness of strategies in reducing the risk and impact of glacial hazards, depending on any chosen case study.
  - Factors such as risk reduction, community resilience, and sustainability of management efforts could be considered.
- Answers could also consider alternative approaches:
  - An exploration of alternative or complementary approaches to traditional hazard management, such as nature-based solutions, early warning systems, and land-use planning.
  - A discussion of their potential benefits and challenges compared to conventional strategies.
  - A consideration of future challenges and opportunities in managing glacial hazards in the context of climate change and evolving socio-economic conditions.
  - An emphasis on the importance of adaptive management approaches and continuous improvement in hazard mitigation efforts.
  - Reflection on the complexities and uncertainties involved in hazard management and the need for ongoing evaluation and adaptation of approaches.

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