Edexcel Subject Content

Topic 2: Landscape Systems, Processes and Change

2A

Glaciated Landscapes and Change

Enquiry Question 2: What processes operate within glacier systems?

2A.6 The glacier landform system.

a. Glaciers alter landscapes through a number of processes: details of erosion, entrainment, transport and deposition.

b. Glacial landforms develop at macro-, meso- and micro-scales with distinctive morphologies in process environments, such as subglacial, marginal, proglacial and periglacial.

c. These landforms create a number of distinctive landscapes in upland and lowland areas that can be used to study the extent of ice cover.

Enquiry Question 3: How do glacial processes contribute to the formation of glacial landforms and landscapes?

2A.7 Glacial erosion creates distinctive landforms and contributes to glaciated landscapes.

a. Glacial, erosional processes (abrasion, quarrying, plucking, crushing and basal melting, combined with subaerial freeze thaw and mass movement).

b. The processes leading to the formation of landforms associated with cirque and valley glaciers (cirques/corries (5), arêtes, pyramidal peaks, glacial troughs, truncated spurs and hanging valleys and ribbon lakes).

c. The formation of landforms due to ice sheet scouring (roches moutonnées, knock and lochan, crag and tail) and the influence of differential geology.

2A.8 Glacial deposition creates distinctive landforms and contributes to glaciated landscapes.

a. The formation of ice contact depositional features (medial, lateral, recessional and terminal moraines and drumlins).

b. The formation of lowland depositional features (till plains, lodgement and ablation till). (6)

c. The assemblage of landforms can be used to reconstruct former ice extent and movement and for provenance (erratics, moraines, crag and tail, drumlin orientation). (7)

2A.9 Glacial meltwater plays a significant role in creating distinctive landforms and contributes to glaciated landscapes.

a. The processes of water movement within the glacial system (supraglacial, englacial and sub-glacial flows).

b. Glacial and fluvioglacial deposits have different characteristics (stratification, sorting, imbrication and grading). (8)

c. The formation of fluvioglacial landforms; ice contact features (kames and eskers and kame terraces) and proglacial features (sandurs, proglacial lakes, meltwater channels, and kettleholes).

Enquiry Question 4: How are glaciated landscapes used and managed today?

2A.11 There are threats facing fragile active and relict glaciated upland landscapes.

a. Glaciated landscapes face varying degrees of threat from both natural hazards (avalanches and glacial outburst floods) and human activities (leisure and tourism, reservoir construction, urbanisation) (A: direct actions by players reduce resilience).

b. Human activity can degrade the landscape and fragile ecology of glaciated landscapes (soil erosion, trampling, landslides, deforestation) (A: indirect actions by players alter natural systems).

c. Global warming is having a major impact on glacial mass balances, which in turn risks disruption of the hydrological cycle (meltwater and river discharge, sediment yield, water quality). (9)
Guidance for integrating geographical skills

(5) Cirque orientation analysis using large-scale maps (OS maps); calculating Spearman's rank correlations of height of basin, size of basin and orientation and commenting on the significance of the correlation.

(6) Till fabric analysis using rose diagrams.

(7) Use of British Geological Society (BGS) glacial drift maps, Ordnance Survey (OS) maps, GIS and fieldwork results to reconstruct past ice extent and ice flow direction.

(8) Use of student t-test to analyse changes in sediment size and shape in outwash plains; central tendency analysis of both glacial and fluvioglacial deposits (comparison of size, shape and degree of sorting of clasts).

(9) Numerical analysis of mean rates of glacial recession in different global regions.

Appendix 1: Geographical Skills

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<tr>
<th>2</th>
<th>Quantitative data</th>
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<tbody>
<tr>
<td>a)</td>
<td>Understand what makes data geographical and the geospatial technologies (e.g. GIS) that are used to collect, analyse and present geographical data.</td>
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<td>b)</td>
<td>Demonstrate an ability to collect and to use digital, geo-located data, and to understand a range of approaches to the use and analysis of such data.</td>
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| d) | Understand the purposes and difference between the following and be able to use them in appropriate contexts:  
  i. descriptive statistics of central tendency and dispersion, including Gini Coefficient and Lorenz curve  
  ii. descriptive measures of difference and association from the following statistical tests: t-tests, Spearman's rank, Chi-squared; inferential statistics and the foundations of relational statistics, including measures of correlation and lines of best fit on a scatter plot  
  iii. measurement, measurement errors, and sampling. |
Fieldwork

Topic 2: Landscape Systems, Processes and Change

<table>
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<tr>
<th>2A</th>
<th>Glaciated Landscapes and Change (relict or active, upland or lowland*)</th>
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<tbody>
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<td>Students could investigate questions relating to the following themes, and then use those questions to devise an appropriate methodology:</td>
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<td>• changing glacial and/or fluvio-glacial sediments</td>
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<td></td>
<td>• glacial and/or fluvio-glacial landform morphology and orientation</td>
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<td>• the impact of human activity on fragile glaciated landscapes</td>
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*It is key that students have access to appropriate opportunities for meaningful research. Teachers must also ensure that the fieldwork activities and environments experienced by students allow them to develop and demonstrate the full range, variety and diversity of fieldwork skills required.

Appendix 2: Fieldwork Skills

<table>
<thead>
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<th>Identify appropriate field research questions, based on their knowledge and understanding of relevant aspects of physical and human geography.</th>
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<tbody>
<tr>
<td>1</td>
<td>Undertake informed and critical questioning of data sources, analytical methodologies, data reporting and presentation, including the ability to identify sources of error in data and to identify the misuse of data.</td>
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<tr>
<td>2</td>
<td>Understand how to observe and record phenomena in the field and be able to devise and justify practical approaches taken in the field, (including frequency/timing of observation, sampling, and data collection approaches).</td>
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<td>3</td>
<td>Demonstrate knowledge and understanding of how to select practical field methodologies (primary) appropriate to their investigation.</td>
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<td>4</td>
<td>Demonstrate knowledge and understanding of implementing chosen methodologies to collect data/information of good quality that is relevant to the topic of investigation.</td>
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<td>5</td>
<td>Demonstrate knowledge and understanding of the techniques appropriate for analysing field data and information and for representing results, including GIS, and show ability to select suitable quantitative or qualitative approaches and to apply them.</td>
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<tr>
<td>6</td>
<td>Show the ability to present and write a coherent analysis of fieldwork findings and results in order to justify conclusions as well as to interpret meaning from the investigation, including the significance of any measurement or other errors.</td>
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Please visit [http://www.field-studies-council.org/outdoorclassroom/](http://www.field-studies-council.org/outdoorclassroom/) for alternative courses.