Edexcel GCE

Geography B (8215)

Unit 1: Changing Landforms and their Management (6471)

Advanced Subsidiary

June 2006

advancing learning, changing lives

Mark Scheme (Results)

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Brief Explanation of Criteria Based Mark Schemes

These are used for the extended writing end parts of all questions, and for selected open-ended responses within questions.

Three criteria bands are used:

Highest criteria band answers:
Will show a good range, depth of detail, relevance, precision, answering the question in a logical structured way.
Medium criteria band answers:
Will show some of these characteristics but have limitations on a number of features, especially at the bottom of the band, whereas at the top of the band, they will have many features of the highest band material.
Lowest criteria band answers:
Will be limited in range, vague, using basic terminology and expression, lacking in detail, often of peripheral relevance with limited reference to rubric.

There is no restriction to the number of candidates achieving each band. It is possible that in some tasks, 40% of candidates may achieve highest band work, but because of a lack of consistency or performance, or particular strengths and weaknesses, the performance will not be sustained across a whole paper.

The **first** stage in marking therefore is to decide on the band, and **secondly** to decide on the position in the band. Note that not all points mentioned in the criteria description need to be met for an answer to be placed in the band.

Quality of Written Communication

Structure, clarity, the use of geographical terminology and the correct use of grammar, spelling and punctuation, will be assessed within the mark scheme for section (c) of each question.

6471 MARK SCHEME JUNE 2006

1. (a) Study Figure 1(a) in the Resource Booklet. It shows the upper course of a river in Snowdonia.

(i) Describe the main features of the river bed and valley sides.
River bed
Valley sides **(5)**

Narrow, shallow channel, with large (calibre) boulders, resisting erosion, some angular, with small falls/rapids, steep gradient. River has turbulent (clear)flow.Valley is deep, rising almost vertically to rugged mountains. Scree slopes, coniferous woodland and coarse grasses.

5 sound, balanced description of both river bed and valley sides. Some detail or use of appropriate terms
3-4 some description or terms, some balance
1-2 one or two points only, unbalanced

(ii) Suggest reasons for the type of load found at this point in the river. **(4)**

Links shape, calibre, etc to process and location. Expect reference to – limited attrition of rocks due to torrent (mountain) stage, recent arrival of load from weathering, screes or rockfall, relatively small discharge. May consider resistant rock, glacial material, rapid run-off, traction in flood conditions/snowmelt…

One mark per reason, second for developed reason or exemplification

(b) Study Figure 1(b). It shows how river channel variables change downstream.

(i) Describe how channel characteristics and water velocity change downstream. **(4)**

Channel depth increases slowly downstream, and less than channel width. Channel gradient however decreases rapidly in upland zone, then less steeply (concave, graded profile). Water velocity increases only very slightly, and is almost constant in the estuarine zone.

One mark per change identified, second for developed point. Reserve 1 mark for velocity. No mark for discharge

(ii) Define the term discharge. **(2)**

The volume of water passing a particular point in a given time. (usually in cumecs, etc).

Two marks for sound definition or good attempt plus correct units. One for some understanding eg volume of water in river..

(iii) Suggest reasons for the downstream changes shown in velocity and discharge. **(5)**

Velocity increases as channel becomes more efficient (hydraulic radius), less friction and turbulence - but countered by decreasing gradient. Discharge increase linked to increases in velocity and volume as mass of water grows (effects of tributaries and increased run-off).

5 sound, balanced explanation of increases in both river velocity and discharge. Some detail or use of appropriate terms
3-4 some reasons or terms, some balance
1-2 basic ideas or unbalanced

(c) With reference to named examples, explain how physical factors influence river discharge.

(10)

May use rivers at any scale – local, Ouse, Rhone, Mississippi, etc. Expect explanation in terms of water cycle or drainage basins. Most will link answer to floods, Inputs from precipitation – prolonged rainfall, intense storms, snow melt… Processes - controlled by vegetation (interception) and reduced runoff. Geology, steep hill sides, may increase overland flow and therefore increase discharge. Impact of catchment shape. In-river controls like lakes, waterfalls, tributaries/confluences. **Not** human - land use, river management (reservoirs), aff/deforestation, etc

9-10 Structured, balanced explanation of how natural factors influence river discharge. using suitable named example(s), showing detail or range

5-8 Some discussion of natural factors affecting discharge. Lower end will be poorly linked to examples.

1-4 One or two causes identified, lacking exemplification.

(Total 30 marks)

2. (a) Study Figure 2(a) in the Resource Booklet. The photograph looks across a river valley in the Pennines, after a period of heavy rainfall.

(i) Describe the landforms shown. (4)

Meandering channel/sinuous course. Channel bounded by levees. Beyond river is relatively flat floodplain, appears to be below bankful level with floodwater/surface water. Accept added knowledge if appears relevant (eg. Thalweg or silt) May feel that there is an oxbow (actually off camera). Valley margins show steeper ground (actually former proglacial lake basin, see map)

4 sound description of landforms (channel, floodplain or beyond). Some detail or use of appropriate terms
2-3 some description of landforms/terms; basic list = 2
1 one item identified

(ii) Choose one river landform shown in the photograph and explain how it has been formed. You may draw a diagram as part of your answer.
..... (4)

Expect meander, ox-bow or floodplain, but may be others, eg levee. *Reward full marks for good annotated diagram.*

4 sound explanation of landform processes. Some detail and use of appropriate terms.
2-3 some explanation and terms.
1 a basic idea

(iii) Suggest how land use in this valley may be influenced by repeated flooding. (3)

Agricultural land use, pastoral not crops. Input of soil nutrients. No apparent settlement or development. Risk factor. Effects of waterlogged land, risk to investment, etc
One mark per point, second for developed point or exemplification.

(b) Study Figure 2(b) in the Resource Booklet. The map shows the proposed site of a small dam and reservoir in the same valley as Figure 2(a).

(i) Using both resources suggest why this site was chosen. (4)

Narrow point in valley so cheaper dam, long and narrow to house reservoir. Helped by lack of development/settlement, low population (little/no displacement) and land floods any way so low value. Rainfall high in hilly areas like Pennines. Use for water storage and leisure. NOT HEP
One mark per reason, second for developed point or exemplification.

(ii) Using evidence and your own ideas, suggest why the scheme was abandoned. (5)

Cost and engineering problem of re-routing railway and A class road. Loss of minor roads which cross the lake floor will isolate villages and increase local journey times. Loss of farmland. Accept added knowledge if appears relevant and exemplified. (eg. conservation argument – loss of wetland (Tees): environmental argument – too shallow (drawdown), loss of landscape, further tourist development perhaps not welcome (Lakes) or downstream changes to habitats: economic argument – water demand from industry falls or better sites preferred (real reason). Capacity too small (shallow). May refer to similar schemes to exemplify.

Note this is small scale so not really a sediment trap, climate change, etc.

5 sound explanation of reasons for not adopting scheme. Includes both map evidence and own ideas. Some detail or range.
3-4 some reasons, some balance (evidence and ideas).
1-2 one or two points only.

(c) Referring to named examples examine how river floods can be managed without the use of dams and storage reservoirs.

(10)

May look at other forms of hard engineering, eg channelisation/diversion, or at softer/holistic solutions. Integrated catchment management, river corridors, use of wetlands also expected. May consider in-channel measures (eg wing dykes)or wider catchment (eg afforestation). Plenty of examples to choose from at any scale.

9-10 Structured examination of river management schemes, using suitable named example(s), showing detail or range. Uses appropriate terms. May evaluate.

5-8 Some discussion of named flood management schemes using some terms. Lower end will be descriptive and generalised.

1-4 One or two methods identified, lacking exemplification, may confuse with reservoirs.

(Total 30 marks)

3. (a) Study Figure 3(a) in the Resource Booklet. It shows a cartoon about taking water from the Colorado River.

(i) Complete the table below to show winners and losers. (2)

Winners: US Farmer, Californian (homeowner). Losers: Native Indian, Mexican (farmer).
Accept similar responses, but not just 'farmer'
All correct - 2 marks: two or three correct – 1 mark.

(ii) Suggest reasons why there are conflicts over water use in this example. (5)

Winners have most water eg, large demand from California, some uses perhaps trivial, water going ex-catchment. Farming use may have costs eg evaporation losses. Losers have limited supply eg. are native people (rights issue) Mexicans are in-catchment but limited supply for even basic agriculture. Conflict is political and even international, subsistence versus commercial. Has environmental links.

One mark per reason, second and third mark for developed point

(iii) Using the cartoon and your own ideas explain why abstraction of water on such a large scale is not sustainable. (4)

Demand in California growing, perhaps trivial uses, political pressure of state. Farming lobby strong, irrigation expensive and problems with salinisation, seepage, etc. Future problems of desert cities (like Phoenix) for urban growth. Mexico losing out in political battle with reduced supplies. Impacts downstream on river and environments (ecology). Political/moral issues.
Reward clear reference to sustainability.

One mark per idea, second for developed point or exemplification.

(b) Study Figure 3(b) in the Resource Booklet. The maps show changes along the Australian coast near Adelaide.

(i) Describe the physical and human changes that have taken place (5)

Physical – Initially longshore drift supplied sand to beaches and these helped build sand dunes inland, with swamps behind (slacks). Brackish, shallow water allowed mangroves to colonise the estuary. Increased erosion has eroded southern beach, drastically reduced dunes and formed a spit growing north into the Port river estuary. Mangroves have migrated.

Human – Increase in coastal urban growth has increase rate of loss of dunes and drainage of slacks (coastalisation and urbanisation) to become built up area. River Torrens diverted. Mangroves will lose out as new areas develop. Industrial growth has seen harbour grow with need to deepen channel and protect shoreline with groynes and breakwaters. Flood risks have increased.

5 Sound description of physical and human changes. Some detail or suggestion of process.
3-4 some description, some balance.
1-2 one or two points only.

(ii) Explain two environmental issues that may have arisen as a result of the changes.(4)

Issues include…need for coastal management – groynes/nourishment: need to keep harbour channel open will impact on natural processes- dredging channel: loss of dunes and slacks to urban growth behind shoreline: estuary and mangroves threatened by planned development of city northwards: towards estuary: recent sea and river flooding needs addressing: sewage outfall damaging ecosystems (actually seagrass) and polluting beaches, air pollution, reclamation.

One mark per issue identified. Second mark for clear explanation.

(c) With reference to either a river, ecosystem or coastal ecosystem, examine how human pressures can change natural environments.

(10)

May well go for dune, wetland, saltmarsh or coral, but accept others. Looking for human impacts including management on ecosystems. Most will probably discuss 'damaging' development as in Indian Ocean islands or Studland, Kissimmee etc. May be positive development.

9-10 Structured, account of how human impacts change a river or coastal ecosystem, using suitable named example(s), showing detail or range. Uses appropriate terms.

5-8 Some discussion of human impacts on a named ecosystem using some terms. Lower end may be generalised.

1-4 One or two changes identified, lacking exemplification. Ecosystem only implied

(Total 30 marks)

4. (a) Study Figure 4(a). It shows coastal cliffs undergoing erosion.

(i) Name the processes A, B and C. (3)

A - Wave attack (allow marine, swash, waves or hydraulic action): B - Longshore drift (allow current): C -Subaerial (allow detail eg landslide, gulleying, mass movement, run-off or terrestrial)

One mark each

(ii) Describe how physical processes combine to erode cliffs like those shown. (5)

Waves erode beach and quarry foot of cliffs (high tides and storm conditions): Backwash and drift move material alongshore (in suspension): On land, rain saturates cliffs and land slides occur on to beach below or surface runoff may create gullies. These operate *together* to cause cliff recession and movement of sediment through the system.

5 sound, balanced description of marine and subaerial processes. Some recognition of interaction and use of appropriate terms

3-4 some description and terms, some balance

1-2 one or two points only, unbalanced

(iii) Suggest how the human activities shown may have accelerated coastal erosion (3)

Cliff top development increases structural load, interferes with drainage, etc. Management by groynes etc changes natural system (downdrift implications).Both sorts of changes have impacts on cost/benefits.

One mark per effect, second for developed point or exemplification.

(b) Study Figure 4(b). It shows a scheme to protect a small village from coastal erosion.

(i) Describe how the scheme would work. (4)

New and extended groynes (using geotubes) will collect sand and widen beach. This will protect cliff foot from erosion and save houses (beach may help business). Rip rap will protect from storms and infill will stabilise cliffs (increase promenade area). Ramp will improve access. Rock groyne (riprap) will prevent undercutting and terminal scour in the embayment beyond the village.

One mark for basic explanation, second for developed point or exemplification.

(ii) Currently the scheme is not going ahead. Suggest reasons for this. (5)

Must consider and take account of all objections (especially if local or expert). Are land value and population density high enough? Need to reduce costs associated with hard engineering and consider wider (down coast) strategy. Issue of short term (and maintenance) versus long term solution. Move to more sustainable strategies. Government policy has changed (and assessment).

5 sound, well argued critique of proposal and its shortcomings. Uses of appropriate terms or may exemplify.

3-4 some reasoning and use of terms.

1-2 one or two basic points only.

(c) Referring to one named example of coastal management, evaluate its success in dealing with either coastal erosion or coastal flooding.

(10)

Accept either erosion or flooding, - ought to be able to separate. Expect clear accounts of management. Evaluation implies good and bad points, cost and benefits, or impact analyses (environment or socio-economic aspects). Probably OK at any scale, but ought to be one location or at least one stretch of coastline. Expect Barton, Mappleton, etc.

9-10 Structured, evaluation of success of named location and coastal defence strategy. Shows detail perhaps rather than range. Uses appropriate terms.

5-8 Some discussion of success of defence measures at named location, using some terms. Lower end - one or two successes identified.

1-4 Management scheme described, lacks exemplification.

(Total 30 marks)

5. (a) Study Figure 5. It shows a surveyor's checklist. It is used to help house buyers assess the risks from erosion when buying shoreline property in the Caribbean.

(i) What evidence does the photograph provide about the risk of erosion at this location? (2)

Tree roots exposed, fallen trees, undercut shoreline, low terrace, narrow beach, building proximity, no defences, breakwater, etc. - all suggest rapid/easy erosion.

One mark each

(ii) Circle the three missing scores in the checklist using the photograph. (3)

In order……..3, 3, 2

One mark each

(iii) Explain why the following are included in this risk assessment of coastal erosion:(6)

the beach and coral reef – beach is a natural defence against erosion, shelving effect absorbs wave power: reef intercepts waves offshore, especially in storm/hurricane conditions. (accept idea of advantage for house purchase/sale?)

wave fetch – may define(accept for 1 mark), longer fetch means bigger waves, so linked to amount or speed of erosion,

local information – removal of natural dunes may increase erosion risk, loss of sand store in beach system, could lead to blowouts, (accept locals know more, for 1 mark).

One mark for basic explanation, second for developed point or exemplification.(items out of 3, 2 and 2, but maximum 6)

(iv) Outline two sources of information that you could use as part of a coastal risk investigation.

(4)

primary data eg Beach survey (transect), winter/storm changes, vegetation diversity/succession, questionnaire or

secondary research into tide tables, NOAA and weather-hurricane records, FEMA emergency plans, newspaper reports?

One mark for basic information source, second for developed explanation or detail (may include primary and/or secondary)

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(b) How effective is beach nourishment as a means of coastal defence.

(5)

Looking for evaluation of beach nourishment technique.

Strengths include: cheaper option if small scale (local supplies?), has natural look (holiday location context).

Possible weaknesses are: further damage to dunes, ecosystems, long term uncertainties, may pollute coral/fish with sediment, may not be sustainable, knock on effects.

5 sound, assessment of effectiveness of strategy, detailed or exemplified.
3-4 some assessment of beach nourishment, may be generalised.
1-2 one or two basic points only

(c) Referring to named examples examine the effects of rapid coastal erosion on people's lives.

(10)

Expecting case study of rapid change, for example Holderness, Norfolk or Christchurch Bay. Not about flooding unless directly linked. Could include delta erosion (Nile). Looking for socio-economic impacts rather than physical changes.

9-10 Structured examination of impacts of rapid erosion on people's lives in named locations. Shows detail or range and uses appropriate terms.

5-8 Some discussion of effects on people at named locations. Uses some terms. Lower end will be descriptive and generalised.

1-4 One or two effects identified, lacking exemplification.

(Total 30 marks)