

Markscheme

May 2024

Environmental systems and societies

Standard level

Paper 2

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Subject details: Environmental systems and societies SLP2

Markscheme

Mark allocation

Candidates are required to answer:

- **ALL** questions in Section A [25] and **TWO** questions in Section B [40].
- The maximum total = [65].

1. Environmental systems and societies uses marking points and markbands to determine the achievement of candidates

When using marking points (All of this paper except Section B, part (c) questions):

- i. A markscheme often has more marking points than the total allows. This is intentional
- ii. Each marking point has a separate line and the end is shown by means of a semi-colon (;)
- iii. Where a mark is awarded, a tick/check (✓) **must** be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark. **One tick to be shown for each mark awarded**
- iv. The order of marking points does not have to be as in the markscheme, unless stated otherwise.

When using markbands (Only for Section B, part (c) questions):

- i. Read the response and determine which band the response fits into
- ii. Then re-read the response to determine where the response fits within the band
- iii. Annotate the response to indicate your reasoning behind the awarding of the mark
Do not use ticks at this point
- iv. Decide on a mark for the response
- v. At the end of the response place the required number of ticks to enable RM Assessor to input the correct number of marks for the response.

2. An alternative answer or wording is indicated in the markscheme by a slash (/). Either wording can be accepted.
3. Words in brackets () in the markscheme are not necessary to gain the mark.
4. Words that are underlined are essential for the mark.
5. If the candidate's answer has the same "meaning" or can be clearly interpreted as being of equivalent significance, detail and validity as that in the markscheme then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by **OWTTE** (or words to that effect).

6. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
7. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script.
8. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the markscheme.

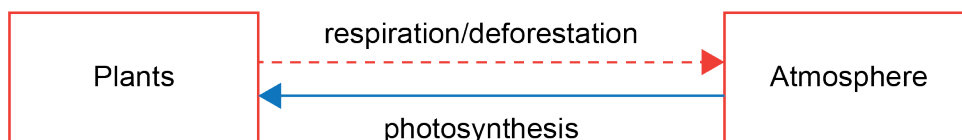
Section A

1. (a) Identify **one** inorganic carbon storage in **Figure 1**. [1]

atmosphere / soils / (surface/intermediate & deep) ocean / fossil fuels / (Earth's) crust / river / rock / volcanoes;

Note: Do not credit plants / animals / vehicles / industry or flows

- (b) Draw a labelled diagram to illustrate the flows of carbon between plants and the atmosphere shown in **Figure 1**. [2]



flows: respiration/deforestation AND photosynthesis;
stores: plants AND atmosphere;

Note: [1] for correctly labelled stores;
[1] for correctly labelled flows in each direction;

- (c) Using the data in **Figure 1**, calculate the net gain in carbon in the oceans in 10^{15} g. [1]

$$(92 + 0.8) - (90 + 0.1) = 2.7 \text{ (Pg)} \quad 10^{15} \text{ g}$$

- (d) Describe **one** advantage and **one** disadvantage of the oceans as a carbon sink. [2]

Advantage:

oceans are large so absorb a lot of CO_2 / increases primary productivity/photosynthesis / reduces global warming/climate change;

Disadvantage:

increasing CO_2 in oceans causes acidification / ocean acidification harms sensitive marine species/ecosystems like coral reefs;

- (e) Outline **one** method to mitigate the effects of atmospheric carbon storage. [1]

- reforestation/afforestation initiatives so that more carbon can be absorbed;
- carbon capture and storage/CCS to bury CO_2 underground;
- land use change/urban renewal leading to revegetation/green roofs to absorb CO_2 ;
- switch to renewable energy to reduce use of fossil fuels;

Note: There are multiple acceptable responses to this question i.e. any process that reduces release of CO_2 or absorbs CO_2 from atmosphere

NB This is an “outline” question, not “identify”, so requires a little more than “reforestation” (i.e. WHY reforestation?) or “reduce use of fossil fuels” (...need to state HOW fossil fuel use might be reduced),

2. (a) Using **Figure 2**, estimate the mass of plastic that was produced in 2017. [1]

a. 430 million tonnes;

Note: accept ± 10 million tonnes. Units must be included for credit.

- (b) Calculate the mean yearly production of plastic between 1950 and 2017. [1]

(9200 million tonnes / 67 or 68) = 137 or 135 million tonnes

Note: Units must be given for credit. Accept range 135-138.

- (c) Outline why the total accumulated plastic in 2017 is greater than the yearly production. [1]

because it does not biodegrade/get incinerated as fast as it is produced / because every year adds to the previous year that still exists/is in use / because the accumulated plastic is over a longer time than one year;

- (d) Describe how the environmental impacts of discarded and incinerated plastic waste would differ? [2]

- a. incinerated plastic may release CO₂/toxic gases/ashes/greenhouse gases;
- b. incinerated plastic would be reduced in volume;
- c. incinerated plastic may be used to produce electricity reducing need for fossil fuels;
- d. discarded plastic will take up space in landfill;
- e. discarded plastic may enter oceans/food chains/mistaken for food and ingested/cause physical harm to species;
- f. discarded plastic causes visual pollution/beach litter/affects aesthetic value/property value/tourism;
- g. incineration may reduce urgency to recycle/reduce waste;
- h. discarded plastic may release methane in sunlight;

Note: Allow 1 max if response addresses only discarded or only incinerated plastic.

- (e) Describe **two** possible reasons for the future trends of plastic production, as shown in **Figure 2**. [2]

- a. increasing population, creating greater demand for plastics;
- b. increased amount of petroleum sources available (with newer technology);
- c. cheaper/more environmental-friendly (e.g. from corn)/advanced methods of production, increasing the availability of plastic products around the world;
- d. increased need for plastics in important areas (medicine, reusable containers to avoid single use plastics, etc.);
- e. increased consumerism mentality / increasing living standards / more countries developing economically/industrially;
- f. plastic items continue to be convenient for modern life / easier to acquire / cheaper than their alternatives (despite calls for reduction of plastic);

Note: Accept other valid and reasoned responses explicitly relating to increased plastic production and/or demand.

- (f) Explain **two** potential impacts of the future trends of plastic production on the global ecological footprint.

[2]

ecological footprint will increase because

- a. manufacturers are likely to increase carbon emissions/fossil fuel use;
- b. waste disposal will occupy land area;
- c. resource use will increase;
- d. incineration will increase carbon emissions;

ecological footprint may decrease because

- e. plastic may replace wood/metal as raw materials thus preserving ecosystems;

Note: Do not credit responses that make no explicit reference to change in EF

3. (a) Identify the time of day that ozone is at its lowest concentration on a wet day in **Figure 3(a)**. [1]

07:00

Note: Accept between 06:30 and 07:30

- (b) Outline why the highest concentration of ozone occurs at the time shown in **Figure 3(a)**. [2]
- sunlight/solar radiation promotes ozone production and is highest during/before peak hours;
 - NO_x/hydrocarbons/CO are necessary for ozone production;
 - traffic/industry producing NO_x/hydrocarbons/CO most active during/before peak hours;
 - there is a time lag due to time taken for photochemical reactions;
 - temperature directly correlates with ozone concentration pattern;

- (c) Describe **one** impact on human health of high ozone concentrations in the air. [1]

irritate eyes / (a large array of) respiratory illnesses/symptoms;

Note: Do not credit impacts of stratospheric ozone depletion, e.g. (skin) cancer.

- (d) Outline **one** possible source of the pollutant shown in **Figure 3(b)**. [1]
- burning of fossil fuels in power plants/industry;
 - combustion of fossil fuels in motor vehicles;
 - manufacturing fertilizers / cement kilns / oil refining;
 - lightning oxidizes atmospheric nitrogen / soil microbial activity / volcanic activity;
 - incineration of waste

- (e) Outline why SO₂ levels are lower on wet days than on dry days, as shown in **Figure 3(c)**. [1]

SO₂ dissolves in water / is removed from the atmosphere when it rains/forms acid rain;

- (f) Evaluate a strategy to manage the effects of **one** pollutant named in **Figure 3(b)** or **Figure 3(c)**. [3]

Example NO_x/SO₂: replacing use of fossil fuels with alternative energy sources;

Advantage: it eliminates emission of pollutants altogether;

Disadvantage: it would involve major social changes that may be unpopular;

Appraisal: could be successful in a society that has strong ecocentric principles;

Example NO_x: use of catalytic converters to trap emissions;

Advantage: would enable continued use of fossil fuels appropriate to popular technology;

Disadvantage: allows continued emission of other pollutants e.g. CO₂/hydrocarbons;

Appraisal: would be relatively easy to introduce and enforce in a society;

Example NO_x/SO₂: clean-up of acidified aquatic ecosystems using lime;

Advantage: relatively easy to apply / no requirement for popular cooperation;

Disadvantage: expensive and short term solution;

Appraisal: in the long run it would be better to remove root cause

Note: Allow 1 max for each valid e.g./advantage/disadvantage/appraisal up to 3 max.
Accept other valid strategies.

Section B

4. (a) Outline the distinctive features of the anthropocentric environmental value system. [4]

It ascribes to:

- a. a human responsibility to maintain the environment;
- b. concept of stewardship;
- c. sustainable exploitation of the environment;
- d. management/supervision of human activity;
- e. imposing sustainable practices through legislation;
- f. use of incentives/disincentives to regulate exploitation (compensations/taxes/fines etc.);
- g. public debate to reach consensual resolutions/pragmatic approaches;;
- h. population control is of equal importance to management of resource use;

Note: Allow credit for any feature that distinguishes anthropocentrism from one or more alternative value systems.

Do not credit responses implying more cornucopian values e.g. Human supremacy / dominance over environment / only concerned with human benefit.

- (b) Explain how the shape of a population growth curve for a prey species may be influenced by the presence of a predator species. [7]

- a. Predation will lower growth rate...
- b. ...by increasing prey death rate / by reducing prey birth rate (includes egg predation);
- c. Prey curve would flatten out sooner / become S-curve sooner...;
- d. ...as predation is a density-dependent limiting factor / adds to environmental resistance...;
- e. ...reducing prey carrying capacity;
- f. Prey population number would decline...;
- g. ...leading to decline of predator population...;
- h. ...which would allow prey numbers to re-bound / prey growth rate bounce back;
- i. ...prey curve oscillate around carrying capacity / prey population be regulated by negative feedback / Lotka-Volterra/predator-prey system cycling;
- j. Predation may prevent prey population crash (at overcrowded conditions)...;
- k. ...as predation would relax prey intraspecific competition;

Note: accept marking points on an annotated diagram.

Do not credit impact of prey on habitat nor exponential prey growth (J curve) without predators.

- (c) To what extent would an anthropocentric approach to addressing human population growth be the most successful in maintaining a sustainable population?

[9]

The following guide for using the markbands suggests certain features that may be offered in responses. The five headings coincide with the criteria in each of the markbands (although ESS terminology has been conflated with “understanding concepts”). This guide simply provides some possible inclusions and should not be seen as requisite or comprehensive. It outlines the kind of elements to look for when deciding on the appropriate markband and the specific mark within that band.

Answers may demonstrate:

- **understanding concepts & terminology** of anthropocentrism; ecocentrism; technocentrism; soft ecologists; environmental managers; carrying capacity; ecological footprint; population policies; pro-natal/anti-natal; incentives; disincentives; sustainable development; personal and communal improvement; community involvement; legal regulations; etc.
- **breadth in addressing and linking** different value systems and different approaches to population regulation including a range of development policies.
- **examples** of anthropocentric national/international policies, other named value systems; national populations and population policies etc.
- **balanced analysis evaluating** extent to which anthropocentric policies are most conducive to sustainable development of human populations compared with other approaches.
- **a conclusion that is consistent with, and supported by analysis and examples given** e.g. Anthropocentric approaches to maintaining a sustainable population are more realistic than the ideology of ecocentric approaches and the recklessness of extreme technocentric approaches.

NB Although our syllabus takes the view of anthropocentrism indicated in MS for 4a, there is a popular perception that is more toward a cornucopian value system, where humans are rightfully dominant over the environment and nature has a purely instrumental value as it serves humankind. While this represents a misunderstanding of the term defined in our syllabus, please apply the spirit of ECF and be prepared to credit arguments based on this perception.

Please see markbands on page 18

5. (a) Outline how **four** named factors contribute to a steady-state equilibrium in an ecosystem. [4]

- a. species diversity means that other species are more likely to replace lost species / to include keystone/engineer species;
- b. habitat diversity will promote species diversity/greater stability/resilience;
- c. large populations are less likely to become extinct/lost;
- d. constant abiotic conditions will limit deviation in biotic components / lead to stable communities;
- e. large abiotic storages (e.g. high amount of water available) will allow for regular growth/replacement of biotic elements (e.g. species population);
- f. complex food chains/feeding relationships will be more stable / experience less extreme population fluctuations;
- g. limited/regulated human interference/disturbances will help prevent deviations/habitat degradation;
- h. high productivity will limit proportional impact of varying inputs / will allow for faster recovery after a disturbance;
- i. negative feedback mechanisms (e.g. predator/prey relationships) will stabilize ecosystem / dampen changes / prevent tipping point;
- j. genetic diversity provides higher resistance to disease / higher chance to survive/recover from disturbance;

Note: Accept any factor clearly linked to increased ecosystem resilience and/or leading to ecosystem stability despite external disturbances.

Allow [2max] if factors are only named without outline.

- (b) Explain why pyramids of numbers, biomass and productivity may vary in shape for different food chains. [7]

- a. pyramids of productivity tend to get smaller at higher levels;
- b. this is because energy is lost between trophic levels;
- c. seasonal productivity at lower levels could temporarily be smaller;
- d. ...but annual productivity should always decrease at higher levels;
- e. pyramids of numbers tend to get smaller at higher levels due to losses;
- f. ...but may get larger if individuals at lower trophic levels are larger (e.g. trees);
- g. pyramids of biomass tend to get smaller at higher levels due to losses;
- h. ...but as they reflect standing stock (and not rate of flow) they can be inverted;
- i. pyramids may become larger at higher levels if they represent a single food chain in a larger food web;
- j. ...because more biomass may be fed in from other food chains;
- k. food chain with more trophic levels will have longer shape;
- l. pyramids of productivity tend to be pyramid shaped because they show flow of energy over time;
- m. ...and because the second law of thermodynamics means energy is lost in the flow;

Note: Alternative valid points describing/explaining why pyramid shape may vary can be credited.

Do not credit vague statements claiming shape will be “different” without explaining in what way it will differ.

- (c) To what extent can the practical strategies for obtaining data for a pyramid of numbers be made reliable?

[9]

The following guide for using the markbands suggests certain features that may be offered in responses. The five headings coincide with the criteria in each of the markbands (although ESS terminology has been conflated with “understanding concepts”). This guide simply provides some possible inclusions and should not be seen as requisite or comprehensive. It outlines the kind of elements to look for when deciding on the appropriate markband and the specific mark within that band.

Answers may demonstrate:

- **understanding concepts & terminology** of reliability in sampling; quadrats (including number, size, positioning, species distribution); transects; aerial photographs; traps; nets; Lincoln index; mark/release/recapture (including issues of marking technique, trap-happy and trap shy phenomena, time interval); aquatic sampling use of dragnets, kick samples); camera traps (difficulty of extrapolation); general sampling issues (including repetition; extrapolation; seasonal variation; randomisation); total census; abundance; bias; scientific expertise; etc.
- **breadth in addressing and linking** different sampling methodologies with varying degree of reliability for a range of different sessile and motile populations in a range of different habitats;
- **examples** of named sampling methods appropriate for different named species etc.
- **balanced analysis evaluating** extent to which sampling method can be executed to produce reliable data; practical issues hindering application of methodologies in the field.
- **a conclusion that is consistent with, and supported by analysis and examples given** e.g. All methods of sampling inevitably involve a degree of inaccuracy compared with a total census, but they can always be made more reliable by repeated executions.

Please see markbands on page 18

6. (a) Outline the mechanisms by which a terrestrial species may have evolved from an aquatic ancestor.

[4]

- a. there was genetic variety in aquatic species / mutations accumulated over years;
- b. certain features may have adaptation/advantage for terrestrial existence;
- c. individuals with these features could colonize terrestrial habitat;
- d. they would be more likely to survive/survival of the fittest/experience less competition (natural selection);
- e. they produce offspring like themselves/feature will become more abundant;
- f. individuals with feature may be unable to breed with others without feature /speciation occurs / reproductive/geographical barrier will give rise to new terrestrial species:

- (b) Explain how the hydrological cycle influences climate around the Earth.

[7]

- a. evaporation/evapotranspiration is higher at regions with higher insolation;
- b. evaporation absorbs heat from the atmosphere (negative latent heat flux)...;
- c. ...water vapour carries (via convection currents/tropical cyclones) heat to higher latitudes/altitudes...;
- d. ...condensation of vapour releases heat (positive latent heat flux) to colder latitudes/altitudes...;
- e. ...stabilizing the heat deficit between Tropics and Poles;
- f. condensation of vapour (as rising air cools) forms clouds...;
- g. ...leading to higher precipitation (e.g. in the Equatorial Belt) / snowfall (higher altitudes/latitudes);
- h. oceans/inland waters effectively store heat (positive sensible heat flux) during periods of high insolation (day/summer)...;
- i. ...and release it back (negative sensible heat flux) during night/winter;
- j. ...thus ameliorating regional temperature differences (seasonal/diurnal);
- k. overall, oceans warm the planet (by absorbing solar radiation)...;
- l. ...due to water's high thermal capacity...;
- m. water masses increase humidity of adjacent region (due to higher evaporation);
- n. warm ocean currents transfer heat from equator to poles / cold ocean current absorb heat from atmosphere as they move from Poles toward Equator...;
- o. ...(warm currents) increasing temperatures in certain regions/e.g. Gulf Stream / (cold currents) decreasing temperatures in certain regions/e.g. Labrador current;
- p. warm ocean currents also increase precipitation in coastal regions/e.g. Southwest Monsoon Current / cold ocean currents decrease precipitation in coastal regions/e.g. Peru Current...;
- q. ...(warm) due to increased evaporation during the summer (period of higher insolation)/e.g. monsoons in Bay of Bengal, which is helped by...;
- r. ...advection of vapor by prevailing onshore winds;
- s. ...(cold currents) due to cold air holding less moisture;
- t. formation of ice / increased cloud cover increases albedo, thus may stabilize global warming (negative feedback) / reduce regional temperature;
- u. melting of ice / reduced cloud formation decreases albedo, thus may contribute to global warming (positive feedback) / increase regional temperature;
- v. increased evaporation may contribute to global warming, as water vapour is a greenhouse gas;
- w. ocean acts as a carbon sink sequestering CO₂, thus reducing global warming;

Note: Description of the tri-cellular model of air circulation should gain marks as above; i.e. no separate mark for stating e.g. "Hadley cell". No credit for wind effects not linked to water (as, for example, in MPr).

Allow up to [2max] for reference to global warming.

- (c) Evaluate management strategies for reducing the impact of agricultural pollution on an aquatic ecosystem.

[9]

The following guide for using the markbands suggests certain features that may be offered in responses. The five headings coincide with the criteria in each of the markbands (although ESS terminology has been conflated with “understanding concepts”). This guide simply provides some possible inclusions and should not be seen as requisite or comprehensive. It outlines the kind of elements to look for when deciding on the appropriate markband and the specific mark within that band.

Answers may demonstrate:

- **understanding concepts & terminology** of agricultural pollution; inorganic fertilizers; organic run-off/slurry; persistent pesticides; biomagnification; erosion; spraying; biological control; buffer zones; organic fertilizers; eutrophication; mud-pumping; re-introduction of aquatic species; levels of pollution management etc.
- **breadth in addressing and linking** different forms of agricultural pollutants with effective management strategies to protect or clean-up different aquatic ecosystems.
- **examples** of different pollutants; agricultural practices; management strategies; aquatic systems etc.
- **balanced analysis evaluating** advantages and disadvantages of management strategies employed to reduce impacts of agricultural pollution.
- **a conclusion that is consistent with, and supported by analysis and examples given** e.g. The most effective management strategies are those that prevent pollutants being released in the first place e.g. replacing inorganic with organic fertilizers, but this is not always the most economically feasible for farmers.

Please see markbands on page 18

7. (a) Outline **two** transfer processes and **two** transformation processes that occur within the soil.

[4]

Transfers: [2max]

- a. leaching of dissolved nutrients;
- b. percolation/infiltration of water;
- c. water/mineral uptake by plants;
- d. erosion of material by wind/water/landslides;
- e. mixing of soil by animals (includes any translocation by humans);

Transformations: [2max]

- f. rock weathering;
- g. decomposition of dead organic matter;
- h. nitrification/denitrification by microorganisms / nitrogen fixation by free-living soil bacteria;
- i. respiration by soil organisms/roots;
- j. evaporation of soil water...;
- k. ...leading to salinization of soil (solid ionic salt instead of dissolved);
- l. soil water/permafrost freezing/thawing;
- m. soil compaction (transforms air pores/physical change);

Note: Do not credit falling organic matter, littering, surface organisms dying, flooding, dust, rainfall, transpiration, photosynthesis, nitrogen fixation by lightning as these do not occur “within” the soil.

Do not credit as single terms: evaporation, respiration, freezing, thawing, leaching, if not clearly linked to soil.

Flows should be clearly identified as transfers or as transformations for credit.

- (b) Explain how negative and positive feedback mechanisms play a role in the process of global warming.

[7]

Allow [1 max] for general description of negative and positive feedback either as a separate knowledge statement or explicitly in e.g.:

negative feedback occurs when increase in global warming promotes reduction/stabilization of global warming and positive feedback occurs when it promotes further increase in global warming;

Allow [2max] per loop given below.

Negative feedback loops;

(Increased temperatures...)

- a....leads to increased evaporation...;
- b. ...which leads to increased cloud cover...;
- c....which leads to greater albedo...;
- (...which decreases global temperature)

(Increase in global temperatures/CO₂ concentrations...)

- d....leads to increased rates of photosynthesis...;
- e....which is assimilating more CO₂...;
- f....which is a greenhouse gas/ thus less outgoing heat/emitted long-wave radiation is absorbed...;
- (...leading to lower global temperatures/CO₂ concentrations)

Positive feedback loops:

(Increased global temperatures...)

- g.... lead to increased evaporation...;
- h....which leads to more water vapour...;
- i....which is a greenhouse gas/absorbs outgoing heat/emitted long-wave radiation...;
- (which increases global temperature);

(Increased global temperatures...)

- j....leads to melting of permafrost/glaciers...;
- k....leading to increased methane release...;
- l....which is a greenhouse gas / absorbs outgoing heat/emitted long-wave radiation...;
- (...which increases global temperature)

(Increased global temperatures...)

- m....leads to melting of polar ice caps...;
- n.... leading to reduced ice/albedo;
- o....which leads to less reflection of incoming solar radiation...;
- (which increases global temperature);

Note: Allow [4max] if only positive or only negative feedback is addressed.

Allow credit for any other valid feedback loops relating to ocean expansion/forest fires/desertification etc.

Credit appropriately annotated drawings.

- (c) To what extent are the concepts of natural capital and natural income helpful in managing the sustainable use of natural resources?

[9]

The following guide for using the markbands suggests certain features that may be offered in responses. The five headings coincide with the criteria in each of the markbands (although ESS terminology has been conflated with “understanding concepts”). This guide simply provides some possible inclusions and should not be seen as requisite or comprehensive. It outlines the kind of elements to look for when deciding on the appropriate markband and the specific mark within that band.

Answers may demonstrate:

- **understanding concepts & terminology** of natural capital; natural income; resources; goods; services; sustainability; maximum sustainable yield; optimal sustainable yield; overexploitation; quotas; ecological footprint; Millenium ecosystem assessment; renewability; various values of natural capital/income (aesthetic, cultural, biological, ecosystem services); etc.
- **breadth in addressing and linking** different forms of natural capital and the income they generate with different appropriate management strategies to regulate harvesting, extraction, transport, processing; etc.
- **examples** of named natural capital, of how the goods and services they provide are valued, natural income and named sustainable management strategies etc.
- **balanced analysis evaluating** extent to which these concepts of natural capital and income provide a useful model around which management can be conceived and executed.
- **a conclusion that is consistent with, and supported by analysis and examples given** e.g. These concepts are particularly useful because they emphasize the value of preserving the ability to produce future income from the resources although it is not always easy to translate these concepts into actual data that would represent sustainable quotas.

Please see markbands on page 18

Section B, part (c) markbands

| Marks | Level descriptor |
|--------------|--|
| 0 | The response does not reach a standard described by the descriptors below and is not relevant to the question. |
| 1–3 | <p>The response contains:</p> <ul style="list-style-type: none"> • minimal evidence of knowledge and understanding of ESS issues or concepts • fragmented knowledge statements poorly linked to the context of the question • some appropriate use of ESS terminology • no examples where required, or examples with insufficient explanation/relevance • superficial analysis that amounts to no more than a list of facts/ideas • judgments/conclusions that are vague or not supported by evidence/argument. |
| 4–6 | <p>The response contains:</p> <ul style="list-style-type: none"> • some evidence of sound knowledge and understanding of ESS issues and concepts • knowledge statements effectively linked to the context of the question • largely appropriate use of ESS terminology • some use of relevant examples where required, but with limited explanation • clear analysis that shows a degree of balance • some clear judgments/conclusions, supported by limited evidence/arguments. |
| 7–9 | <p>The response contains:</p> <ul style="list-style-type: none"> • substantial evidence of sound knowledge and understanding of ESS issues and concepts • a wide breadth of knowledge statements effectively linked with each other, and to the context of the question • consistently appropriate and precise use of ESS terminology • effective use of pertinent, well-explained examples, where required, showing some originality • thorough, well-balanced, insightful analysis • explicit judgments/conclusions that are well-supported by evidence/arguments and that include some critical reflection. |