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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Environmental Science 6441

ESC4 Biotic Resource Management

Mark Scheme

2006 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Environmental Science

June 2006 **ESC4**

Instructions: ; = 1 mark / = alternative response A = accept R = reject

Question 1

Statement	True	False
The main aim of the Stewardship Schemes has been to reduce over-production by farmers		✓
Vegetative propagation is a useful way of maintaining genetic uniformity	✓	
Increasing the organic matter content of soils can increase fertility and reduce soil erosion	✓	
The deep ocean is usually more productive than shallow areas		✓
Afforesting catchments may reduce flooding but also reduce the volume of available water	✓	

Total marks = 5

Question 2

(a) Selection/ manipulation of species for human use/taming; 1

(b) High yield + high disease resistance; 1

(c) Maintains genetic diversity;
source of genetic material;
could offer resistance to future disease/environmental change;
customer choice;
habitat value; MAX 3

(d) (i) Female stimulated to produce eggs;
FSH;
female is artificially inseminated;
sperm from desired male;
embryos removed;
screening;
frozen or inserted into recipient female;
ref. to surrogacy/implanting in similar species; MAX 3

(ii) Protects chosen female;
Control of genes/genetic makeup;
farmer has control of when birth takes place;
can choose cow and bull;
bull can be thousands of miles away or dead;
precise number of offspring can be determined; MAX 2

Total marks = 10

Question 3

(a) (i) High inputs/ electricity/fuel/lighting/heating/milking/antibiotics; 1

(ii) Few inputs/ little mechanical energy/in form of human labour; 1

(b) Closed areas;
net sizes: restrict size ;
large mesh size;
explanation of mesh size;
closed seasons;
quotas:
MSY/maximum catch that can be taken without harming ability to maintain in perpetuity;
reduce bycatsh;
ban trawling/drift netting;
reduce effort;
economic/financial strategies; MAX 4

(c) (i) Less energy lost (between trophic levels);
respiration/faeces/movement/indigestible elements/not all of preceding organism eaten; 2

(ii) Less fossil fuels used/more labour intensive;
in pesticides/fertilisers/machinery/shelters/artificial environment creation; 2

Total marks = 10

Question 4

(a) Closer planting distance/effect of competition/pesticides/fertilisers; 1

(b) (i) Less disturbance/destruction of habitat;
less damage to non-target species;
less hydrological/microclimate effect;
faster production of timber/markets/demand can be satisfied easier; MAX 2

(ii) Plantations grown on cleared rainforest;
may lead to soil erosion/exhaustion;
only one tree species;
much simpler ecosystems/unstable/fewer niches;
may need more pesticide/fungicide;
may stimulate demand so encourage felling wild trees;
GM contamination;
reservoir of disease; MAX 3

(c) (i) Some factors controlled by genes;
eg colour/grain/density/pest resistance/fibre length;
ref. to tissue culture/cloning; MAX 2

(ii) Reduced demand/deforestation;
many species not discovered/scientifically assessed;
many drugs/pharmaceuticals originate from tropical species; MAX 2

Total marks = 10

Question 5

(a) (i) Intensification/overgrazing/vegetation removal/compaction/deforestation;
reduced OM;
weakened structure/reduced binding;
reduced interception/infiltration/increased impact;
increased wind/wash/runoff/overland flow;
gullies;
soil erosion; MAX 3

(ii) Increased water use for agriculture/industry/irrigation;;
water tablechanges;
evaporation;
salts left behind;
salt water incursion MAX 3

(b) Deep/long/tap;
roots absorb nutrients;
biomass;
fall/litter;
decay;
ref fluctuating water table;
biota tunnelling; MAX 3

(c) (i) Fossil fuels;
finite;
pollution caused by fertilisers/fossil fuels;
weakened soil structure; MAX 2

(ii) Animals need more land;
food chain longer;
loss at each stage/less efficient/respiration/faeces/movement/inedible parts;
cereals fed to animals;
lower energy/food yield per unit area; MAX 2

(d) Cheaper to import;
income;
pay for imports/development/debt;
ref subsidies; 2

Total marks = 15

Question 6

(a) No artificial fertilisers
nutrients maintained by recycling
legumes
rotation;
no pesticides
pest control via biological control, cultivation techniques/companion planting, natural pesticides
maintain complexity
minimise unsustainable inputs eg fossil fuels
sustainability
no GM

OR

(b) Wood and timber products
foodstuffs
firewood
paper
scientific/medicinal products
microclimatic effect
biodiversity/habitat/wildlife
soil conservation
role in helping economic development
recreation/amenity
catchment protection
atmospheric regulation
regulation of water cycle

Total marks = 20

Essay Questions

The essay questions are marked using the following marking criteria.

Scientific content
(maximum 14 marks)

Category	Mark	Descriptor
	14	
Good	12	Most of the material of a high standard reflecting a comprehensive understanding of the principles involved and a knowledge of factual detail fully in keeping with a programme of A Level study. Some material, however, may be a little superficial. Material is accurate and free from fundamental errors but there may be minor errors which detract from the overall accuracy.
	10	
	9	
Average	7	A significant amount of the content is of an appropriate depth, reflecting the depth of treatment expected from a programme of A Level study. Generally accurate with few, if any fundamental errors. Shows a sound understanding of most of the principles involved.
	5	
	4	
Poor	2	Material presented is largely superficial and fails to reflect the depth of treatment expected from a programme of A Level study. If greater depth of knowledge is demonstrated, then there are many fundamental errors.
	0	

Breadth of Knowledge
(maximum 2 marks)

Mark	Descriptor
2	A balanced account making reference to most if not all areas that might realistically be covered by an A Level course of study.
1	A number of aspects covered but a lack of balance. Some topics essential to an understanding at this level not covered.
0	Unbalanced account with all or almost all material based on a single aspect.

Relevance
(maximum 2 marks)

Mark	Descriptor
2	All material present is clearly relevant to the title. Allowance should be made for judicious use of introductory material.
1	Material generally selected in support of title but some of the main content of the essay is of only marginal relevance.
0	Some attempt made to relate material to the title but considerable amounts largely irrelevant.

Quality of Written Communication
(maximum 2 marks)

Mark	Descriptor
2	All material is logically presented in clear, scientific English and continuous prose. Technical terminology has been used effectively and accurately throughout. At least half a page of material is presented.
1	Account is logical and generally presented in clear, scientific English. Technical terminology has been used effectively and is usually accurate. Some minor errors. At least half a page of material is presented.
0	The account is generally poorly constructed and often fails to use an appropriate scientific style to express ideas.

Total marks = 20