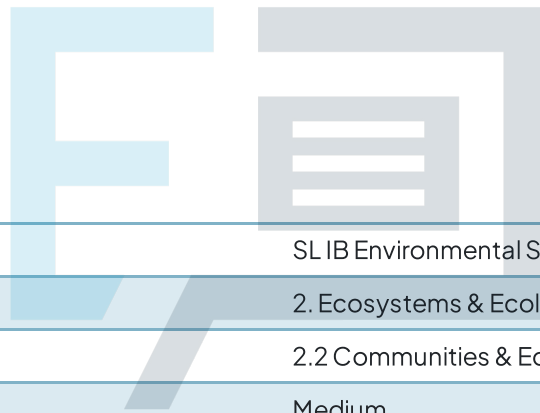




2.2 Communities & Ecosystems

Mark Schemes



Course	SL IB Environmental Systems & Societies (ESS)
Section	2. Ecosystems & Ecology
Topic	2.2 Communities & Ecosystems
Difficulty	Medium

Exam Papers Practice

To be used by all students preparing for
SL IB Environmental Systems & Societies (ESS)
Students of other boards may also find this useful

1a

Indicative Content
<p><i>i) A pyramid of numbers can have fewer producers than consumers because:</i></p> <p>Any one from the following:</p> <ul style="list-style-type: none">• The producers are large individuals; [1 mark]• Each producer has a large biomass (relative to the consumers); [1 mark]• The producers could be (large) trees/bushes/shrubs; [1 mark] <p><i>ii) The other type of ecological pyramid that can be used to demonstrate trophic levels within ecosystems is a:</i></p> <ul style="list-style-type: none">• Pyramid of productivity / pyramid of energy flow; [1 mark]

1b

Indicative Content	Commentary
<p><i>Strengths of pyramids of numbers include:</i></p> <p>Maximum of one from the following:</p> <ul style="list-style-type: none">• (Pyramids of numbers are) simple/easy method of giving an overview; [1 mark]• (Pyramids of numbers are) good for comparing changes in number of individuals over time/throughout seasons; [1 mark] <p><i>Limitations of pyramids of numbers include:</i></p> <p>Maximum of one from the following:</p>	<p>The command word 'evaluate' requires you to make an appraisal (i.e. a judgement or assessment of something) by weighing up the strengths and limitations</p>

- All organisms are included regardless of their size / (pyramids of numbers) do not give information on numbers of adults compared to juveniles/immature forms; [1 mark]
- Numbers (of individual organisms) can be too great to represent accurately **OR** some organisms (e.g. producer such as grasses) can be difficult to count accurately / distinguish between individuals; [1 mark]
- It can be confusing/not clear where to put animals that feed at more than one trophic level (e.g. omnivores); [1 mark]
- Specific species cannot be shown, only individuals; [1 mark]

Look at how many marks the question is worth and try and give a balanced evaluation by providing an even number of strengths and weaknesses - in this case 2 marks indicates you only need to give one strengths and one limitation

2a

Exam Papers Practice

Indicative Content

The possible food chains that include four trophic levels are:

Any **one** from the following:

- Aquatic plant(s) → Capybara(s) → Anaconda(s) → Jaguar(s); [1 mark]
- Terrestrial plant(s) → Capybara(s) → Anaconda(s) → Jaguar(s); [1 mark]
- Terrestrial plant(s) → Insect(s) → Toucan(s) → Jaguar(s); [1 mark]
- Terrestrial plant(s) → Insect(s) → Squirrel monkey(s) → Jaguar(s); [1 mark]
- Terrestrial plant(s) → Insect(s) → Squirrel monkey(s) → Harpy eagle(s); [1 mark]

2b

Indicative Content	Commentary
<p><i>Examples of human activities that can alter the pyramid structure of the trophic levels within a tropical rainforest ecosystem include:</i></p> <p>Any two from the following:</p> <ul style="list-style-type: none"> • Crop farming increases the numbers/biomass of producers / decreases the numbers/biomass of consumers/higher trophic levels; [1 mark] • Livestock farming increases the numbers/biomass of primary consumers (and producers for feed)/ decreases the numbers/biomass of consumers/higher trophic levels; [1 mark] • Hunting/poaching/trapping/fishing decreases the numbers/biomass of secondary/tertiary/quaternary consumers OR decreases the numbers/biomass of top predators/carnivores OR decreases the numbers/biomass of primary consumers/herbivores if hunting e.g. elephants/rhino/antelope; [1 mark] • Deforestation/logging/forest management decreases the numbers/biomass of producers OR decreases the numbers/biomass of consumer (due to habitat loss); [1 mark] • Trampling of vegetation (by tourists) / (clearance for) the development of tourism facilities could decrease the numbers/biomass of producers; [1 mark] 	<p>The question specifically asks how human activities alter the pyramid structure of trophic levels, so each point you make needs to state how the numbers/biomass/energy of specific trophic levels will be affected by that particular activity</p>



- Introduced species e.g. cats/dogs/plants/invertebrates would add additional predators/prey/competitors/herbivores, so could increase/decrease the numbers of any trophic level; [1 mark]

3a

Indicative Content

The role of primary producers in ecosystems can be outlined as follows:

Any **four** of the following:

- Primary producers are plants that convert light energy into chemical energy through the process of photosynthesis; [1 mark]
- During photosynthesis, carbon dioxide and water are transformed into glucose/sugar and oxygen; [1 mark]
- Glucose forms the raw material for biomass / glucose is the basis/foundation of food chains; [1 mark]
- Primary producers provide food/energy for consumers, supporting energy transfer along food chains; [1 mark]
- Oxygen production (by primary producers during photosynthesis) is vital for ecosystems / supports aerobic organisms / respiration; [1 mark]
- Absorption of carbon dioxide (by primary producers during photosynthesis) helps maintain atmospheric balance / reduces global warming; [1 mark]
- Some primary producers use chemosynthesis, utilising chemical energy to produce food without sunlight (e.g. in deep-sea hydrothermal vent ecosystems); [1 mark]
- Additionally, plants may offer other resources/services e.g. habitats / soil conservation / nutrient cycling; [1 mark]

3b

Indicative Content	Commentary
<p><i>Top carnivores are vulnerable to non-biodegradable toxins for the following reasons:</i></p> <p>Any four from the following:</p> <ul style="list-style-type: none"> • Small/non-lethal quantities of non-biodegradable toxins are absorbed by plants / organisms lower down the food chain / in lower trophic levels; [1 mark] • These toxins accumulate/stay/persist in the bodies/tissues of these organisms (due to non-biodegradability) / bioaccumulation of toxins occurs; [1 mark] • As these organisms are consumed by predators / organisms higher up the food chain / trophic levels, the toxins are transferred to higher trophic levels; [1 mark] • Overall biomass is lower at higher trophic levels / is lost/decreases along food chains, but (the mass of) toxins remain, leading to an increase in their concentration / biomagnification of toxins occurs; [1 mark] • The increasing concentration of toxins results in a severe impact on the health of top carnivores (compared to lower trophic levels); [1 mark] • Non-biodegradable toxins accumulate/persist in the bodies of top carnivores (e.g. resulting in thin egg shells of raptors); [1 mark] 	<p>Make sure you know the difference between bioaccumulation (the build-up of persistent or non-biodegradable pollutants within an organism or trophic level because they cannot be broken down) and biomagnification (the increase in concentration of persistent or non-biodegradable pollutants along a food chain)</p>

4

Indicative Content

An ecosystem can be defined as:

- A community of organisms; [1 mark]
- ...and the physical environment they inhabit/live in; [1 mark]

OR

- The living/biotic parts/components of a natural system; [1 mark]
- ...and the non-living/abiotic parts/components they interact with; [1 mark]



Exam Papers Practice