7.1 Natural resources: uses and management

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

KEY WORDS natural capital • natural income • renewable resource • ecosystem services • sustainable yield • circular economy

Objective

Build the skills to answer exam questions on **natural resources** : **natural capital** and **natural income** , renewable and non-renewable resources, **sustainable yield** , ecosystem services and the circular economy.

You must be able to:

- distinguish between natural capital and natural income, and renewable and non-renewable resources
- explain why the value of a resource changes over time and between cultures
- calculate a sustainable yield and explain what happens when it is exceeded
- evaluate ways to value and manage natural resources

1 Key knowledge and worked examples

■ Natural resources

Natural capital is a stock of natural resources (a forest, an aquifer, a fish population, an oil field). **Natural income** is the yield that flows from it (timber grown each year, water recharged, fish born, oil extracted).

type	meaning	example
renewable	replaced by natural processes within a human lifetime	forests, fish, fresh water
non-renewable	formed far more slowly than we use it	coal, oil, metal ores

Ecosystem services: benefits people get from nature: provisioning (food, timber, water), regulating (flood control, carbon storage, pollination), cultural (recreation, spiritual value) and supporting (soil formation, nutrient cycling).

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Value changes: a resource only has value when people have the technology and need to use it. Uranium was of little value before nuclear power; lithium became valuable with batteries. Cultures also value the same resource differently (e.g. a sacred forest).

Sustainable yield (SY) is the amount that can be taken each year without reducing the stock:

$$\text{SY} = \text{growth (natural income) per year}$$

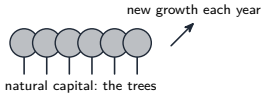
Taking more than SY reduces the natural capital, so future yields fall.

Circular economy: design products to last, be repaired, reused and recycled, so resources stay in use and waste is designed out, instead of "take, make, throw away".

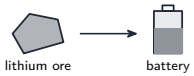
Answer shapes: say which is the stock (capital) and which is the flow (income), then link to a yield or a value.

2 Practice

2.1 Distinguish between natural capital and natural income, using a forest as an example. [2]



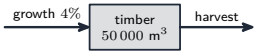
2.2 Explain, with an example, why the value of a natural resource can change over time. [3]



3 Exam-style questions

3.1 A managed forest holds 50 000 m^3 of timber. The trees add 4% of this volume each year.

(a) Calculate the sustainable yield of timber per year. [2]



(b) The owner harvests 3 500 m^3 a year. Explain the effect on the forest over time. [2]

3.2 Mangrove forests grow along tropical coasts.

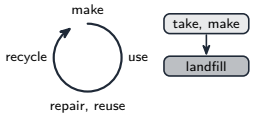
(a) Identify **two** ecosystem services provided by mangroves. [2]



(b) Evaluate giving mangrove ecosystem services a money value. [3]

3.3 Many governments now promote a **circular economy**.

Discuss the use of a circular economy model to manage natural resources. [6]



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Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

natural capital: the stock of the resource, e.g. all the trees in the forest; natural income: the yield or flow from it, e.g. the new wood that grows each year

2.2

a resource only has value when people need it and have the technology to use it; e.g. lithium was of little use until rechargeable batteries; demand for electric cars raised its value; value can also fall, e.g. coal as countries move to renewables

3.1

(a) $0.04 \times 50\,000 = \mathbf{2000}$ m^3 per year

(b) harvest is 1500 m^3 more than growth each year, so the stock (natural capital) falls; a smaller stock grows less each year, so the sustainable yield falls too, until the forest may be lost

3.2

(a) any two: protect coasts from storms and erosion; nursery for fish; store carbon; timber and fuel; filter water

(b) strength: a money value lets services be compared with the profit from clearing, e.g. for shrimp farms, so they are counted in decisions; limitation: many values (cultural, spiritual, existence) are hard to price, and estimates vary widely; judgement: useful as one tool alongside other values

3.3

award up to [6]: linear economy: take, make, throw away, using up natural capital and making waste; circular: products designed to last, be repaired, reused and recycled; waste becomes a resource; benefits: less extraction of non-renewable resources and less waste and pollution; new jobs in repair and recycling; greater resource security; limits: some materials degrade when recycled; needs redesign, investment and consumer change; rebound effects; conclusion: an important step that works best with laws, standards and lower consumption

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