

Ecosystems

Component 3:

Contemporary Themes in Geography

32% of the A Level

Component 3

Written exam: 2hrs 15mins

Section A – Tectonic Hazards

One compulsory extended response question – 38 marks

Section B – Contemporary Themes in Geography

Two optional themes: Ecosystems and Weather & Climate

Two essay questions (one for each option – choice from two in each case) – 45 marks each
20 marks each for AO1 (knowledge of content) and AO2.1c (application of knowledge)
5 marks for AO3 (use of skills). This will be assessed through:

- the use of appropriate diagrams to support your answers
- by presenting well-constructed, coherent and logical arguments
- by drawing valid, supported conclusions

Course outline

See handout – pay attention to **specialised concepts** as these will be useful starting points for structuring your essays, though you won't necessarily need to make explicit reference to them

Global Distribution of Ecosystems

Ecosystem:

A community of living (biotic) organisms in an area and how they interact with each other and the non-living (abiotic) elements. [Systems]

Biotic elements are: plants (flora), animals (fauna), and micro-organisms (fungi, bacteria...).

Abiotic elements are: water, energy source, minerals (or nutrients) and gases. These come from the atmosphere, soils, and (usually) the sun.

Local-scale, e.g. an area of sand dunes or a deciduous wood.

Biome:

A major (i.e. global scale) terrestrial ecological community occupying a distinct region that is typically defined by its climate and dominant vegetation, e.g. tropical rainforest, tropical grassland, tundra...

(Water-based units are more accurately know as aquatic life zones)

Global Distribution of Ecosystems

1. Use your handout to summarise the distribution and characteristics of climate and soils for the following biomes:
 - a. Northern coniferous (aka *boreal*) forest, temperate deciduous forest and tropical rainforest (3 different biomes)
 - b. Temperate and tropical grasslands (2 different biomes)
 - c. Hot and cold desert (2 biomes)
 - d. Tundra
2. Summarise the relationship between temperature/precipitation and the distribution of biomes (think about the dominant vegetation type...)
3. From your own knowledge, to what extent would you say these biomes:
 - a. Have such precise boundaries?
 - b. Are uniform?
4. Suggest reasons for your answers to Q2.

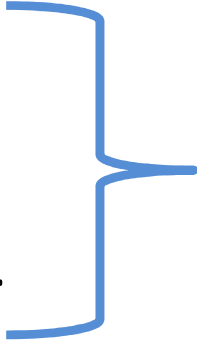
Global Distribution of Ecosystems

In fact, there are often rich and dense **ecotones** marking the transition from one biome to the next.

Four natural factors interrelate to produce the biome distribution:

- **Climate** Specification focus at this scale
- Soils
- Topography
- Other biotic elements

Human intervention is also very important.



Consider these at ecosystem scale

The importance of precipitation

In general, the larger the plant, the more water it needs to survive: trees need more water than shrubs or grasses.

Precipitation is the most important single determinant of vegetation type – *why?*

Distribution throughout the year is more important than annual total – *why?*

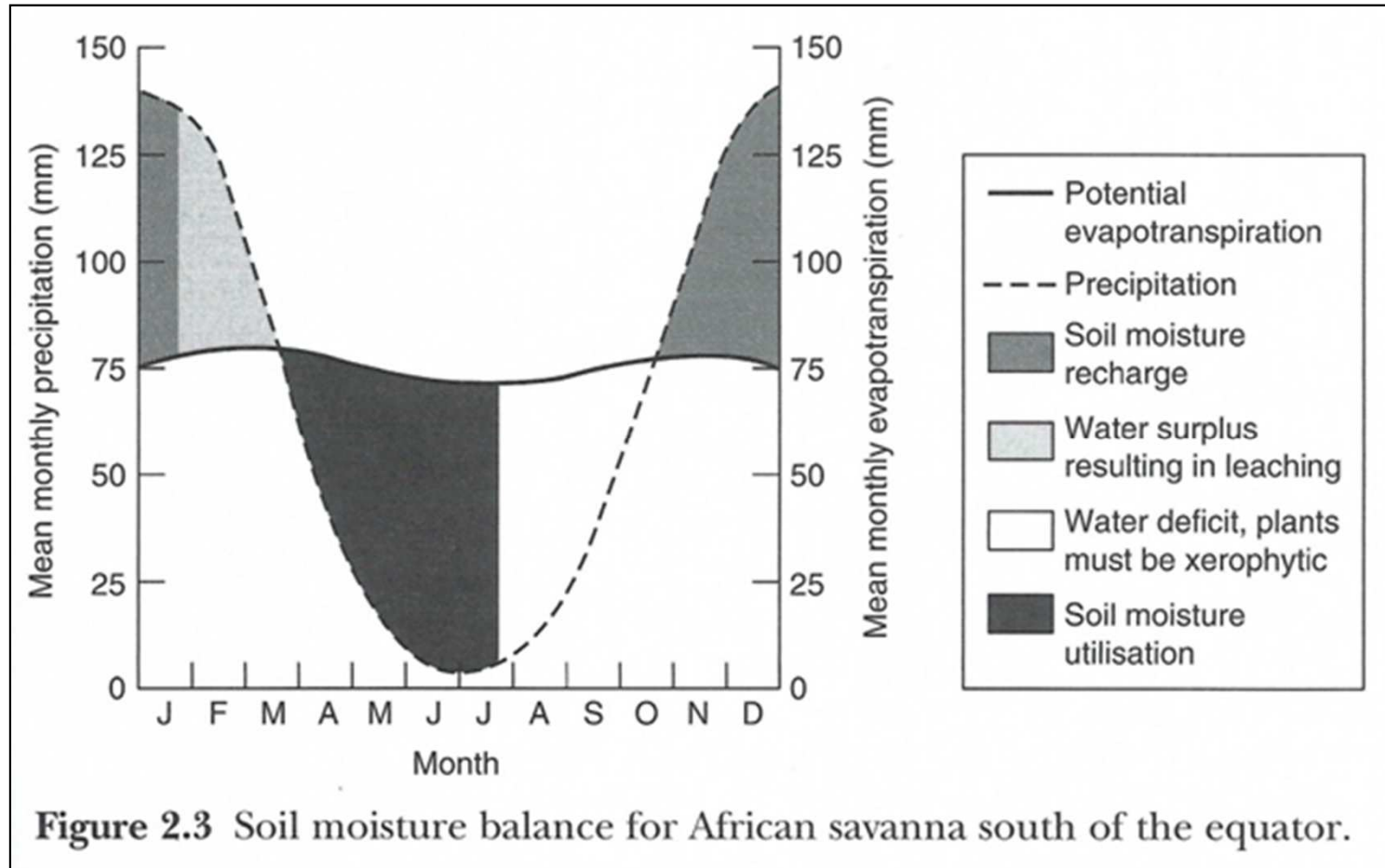
Ambient temperature is also a controlling factor as it affects how much of the precipitation is available for plants – *how?*

Forests only exist where a sufficient water supply is available. It is easy to explain the existence of tropical rainforests – *how?*

...but why are there northern coniferous forests in high latitudes (where temperatures and precipitation are both low)?

The importance of precipitation

The amount of moisture available to plants can be illustrated by the soil moisture balance:



From Ecosystems, M Gillett, Hodder Education, 2005, p23

Referring to this diagram, explain why plants in the African savanna must be drought resistant (*xerophytic*) [**adaptation**].

The importance of temperature

Though there's quite a wide range of temperature tolerance, generally plants cease to produce chlorophyll if temps fall below 6°C and ideally temps should exceed 10°C for effective photosynthesis.

Growing season = length of time when temps are > 6°C.

If temps > 15°C throughout the year there's potentially a continuous growing season, though optimum temp for most plants is 25°C.

Above this, water requirements increase greatly, and if temps > 35°C plants exhibit signs of stress.

If temps are < 6°C for > 5 months, trees shed leaves to prevent frost damage and water loss during cold-induced drought (*trees called?*)

If temps are < 6°C for > 6 months, trees keep leaves to maximise photosynthesis as soon as temps > 6°C (*trees called?*)

Essay

To what extent is water availability the most important factor in determining the natural distribution of vegetation at the global scale? [45 marks]

Generic markscheme for Component 3 essays

AO1 [20 marks]	AO2 [20 marks]	AO3 [5 marks]
Demonstrate knowledge and understanding of places, environments, concepts, processes, interactions and change at a variety of scales	Apply knowledge and understanding in different contexts either to analyse or interpret or evaluate geographical issues and information	Use a variety of relevant 'geographical skills' to construct arguments and draw conclusions

Plan: view – supporting arguments – contradictory arguments considered – evidence

Structure: opening paragraph – main arguments – concluding paragraph

The value of ecosystems

Ecosystem services

Medicines

Gene Pools

Hazard resilience

The value of ecosystems - reading

<https://jeffollerton.wordpress.com/2014/07/27/how-do-we-value-nature/>

<http://www.ecosystems-services.org.uk/ecoserv.htm>

<http://www.sciencedirect.com/science/article/pii/S0959378014000685>

<https://earthobservatory.nasa.gov/Features/Deforestation/>

<https://www.iucn.org/theme/ecosystem-management/our-work/environment-and-disasters/about-ecosystem-based-disaster-risk-reduction-eco-drr/five-reasons-why-ecosystems-are-central-disaster-risk-reduction>

<https://www.thoughtco.com/tropical-rainforests-natures-medicine-cabinet-1204030>

<http://factsanddetails.com/world/cat52/sub329/item1304.html>

http://www.rainforestinfo.org.au/good_wood/the_imp.htm