

# Chapter 4

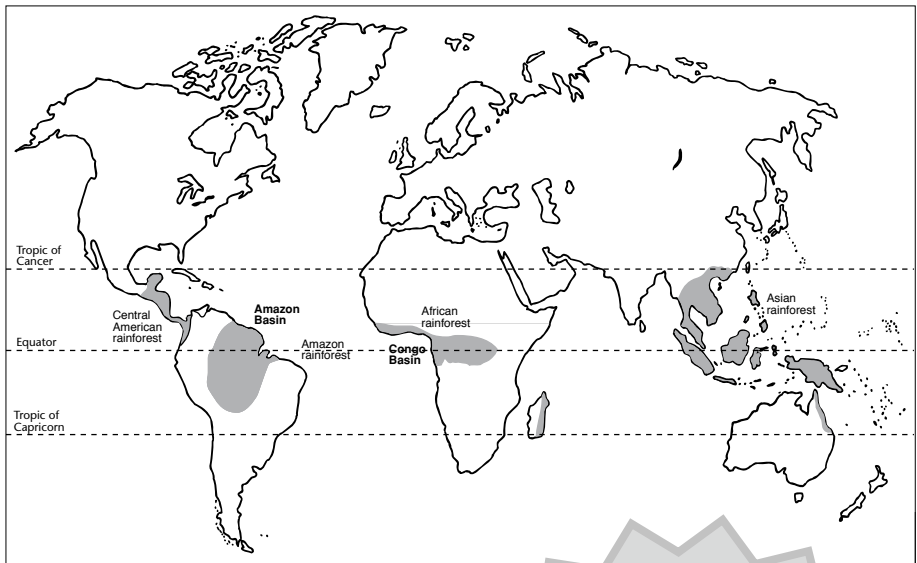
## The Amazon Basin – A Continental Landscape Region

NCEA Level 2 Geography material in this chapter includes material for Achievement Standard 90331 (Geography 2.1) 'Explain a natural landscape', through the context of a continental landscape setting, through understanding:

- Variations within a natural landscape.
- Evolution and change within a natural landscape.
- The effect of cultural perspectives and human activities on a natural landscape.

### Global Pattern of Tropical Rainforests

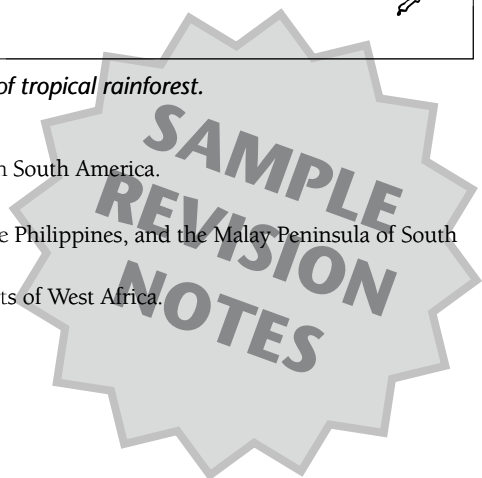
Tropical rainforests generally lie within a band 10° north and south of the equator.



*Global location of tropical rainforest.*

The principal regions of tropical rainforest are:

- The lowlands of the Amazon River Basin in South America.
- Central America.
- The islands of Indonesia, Sri Lanka and the Philippines, and the Malay Peninsula of South East Asia.
- The Congo Basin of Central Africa and parts of West Africa.



**Activity 4A: Global Pattern of tropical rainforest**

1. In one sentence, make a generalisation about the location of tropical rainforests.
2. Use the table below to construct a pie graph showing the distribution of tropical rainforests.

Distribution of tropical rainforests (% of area in rainforest)	
Brazil, South America	33%
Central America	25%
Congo, Africa	19%
S E Asia (including Australia)	23%

3. Name *one* feature of the climate of areas of tropical rainforests suggested by their location.

**The Natural Landscape of the Amazon Basin**

The Amazon Basin is one of South America's most significant natural landscapes. It is characterised as having:

- The largest area of tropical rainforest in the world (estimated to be greater than the area of continental USA), contrasting with savannah grassland.
- The Amazon River and its 1100 tributaries – which hold 25% of the world's fresh water.
- Highland areas such as the Andes Mountains and the Guyana and Brazilian Shields, contrasting with the huge **flood plain** of the Amazon River.
- The tropical 'wet-wet' and 'wet-dry' climates.
- A diverse indigenous population alongside developers and new settlers.
- Resources such as timber and minerals which have encouraged settlement and human activities such as logging and mining.



The Amazon Basin.

# Variations within the Natural Landscape of the Amazon Basin

## Relief and Landform Processes

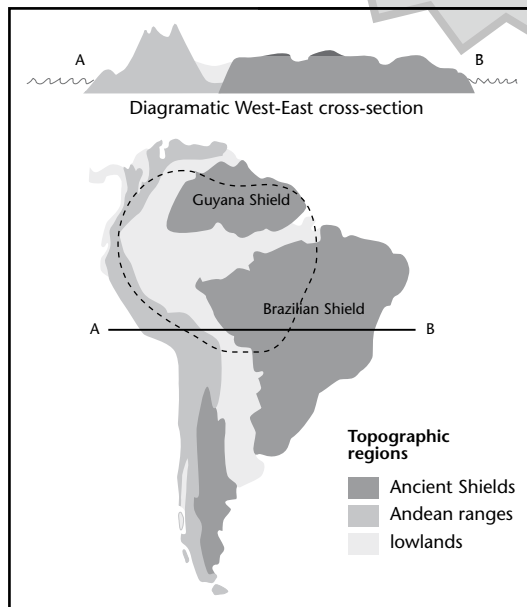
The Amazon Basin is a saucer-shaped river **drainage basin** of low elevation (eg Iquitos, 3 700 km upstream from the mouth of the Amazon, is less than 90 metres above sea level and Manaus is only 44 metres above sea level) and high elevation (Mt Huascarán is 6 768 m above sea level)).

- The Amazon Basin has been formed over the last 250 million years as the South American continent has moved slowly westward, moving away from Africa as the mid-Atlantic ridge widens.
- As the continent moves, the South American plate collides with the Nazca plate, forming the Andes mountains.
- The natural landscape of the Amazon Basin lies between the Andes and the Brazilian and Guyana Shields created by land-building processes. Vast quantities of eroded material from the Andes and the Ancient Shields are deposited on the central lowlands as a result of land-modifying processes.

## The Brazilian and Guyana Shields

The Brazilian and Guyana Shields are composed of rocks at least 250 million years old that have faulted and been uplifted.

- The Shields are plateaux of relatively regular surface, cut by **fault scarps** and broad river valleys.
- The highest points are isolated flat-topped mountains around 3 000 m high, located on the edge of the Guyana Shield to the north of the Amazon Basin.
- Erosion of the hard rocks of these Shields is limited and extremely slow compared with that of the much younger rocks of the Andes to the west.



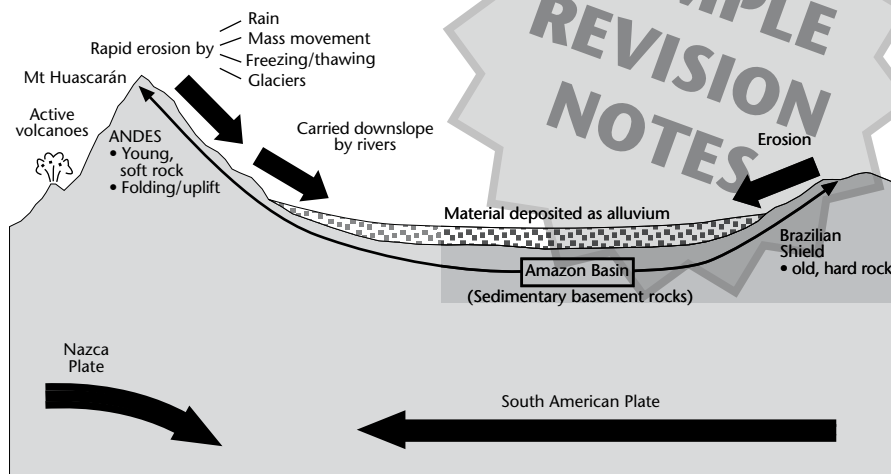
*Topographic Regions of South America.*

## The Andes Mountains

The Andes Mountains form a chain stretching 9 000 kilometres along the western edge of the South American continent and the natural landscape of the Amazon Basin.

- The Andes are formed mostly of sedimentary rocks, which have been uplifted and folded as the South American continent and the Nazca plate collided.
- These sedimentary rocks were deposited off the coast when South America was part of the Gondwana supercontinent, over 250 million years ago (the Brazilian and Guyana Shields are remnants of this ancient land).
- In addition to uplift and folding, volcanism also operates throughout the Andes as the Nazca plate subducts beneath the South American plate, causing convective rising of magma through to the surface of the continent.

The tectonic uplift and folding that formed the Andes is still in operation. The sharp ridges and peaks of the Andes average 2 700 metres in height, with the highest being Aconcagua in Argentina, at 6 960 m.



*Land-building processes in the Amazon Basin.*

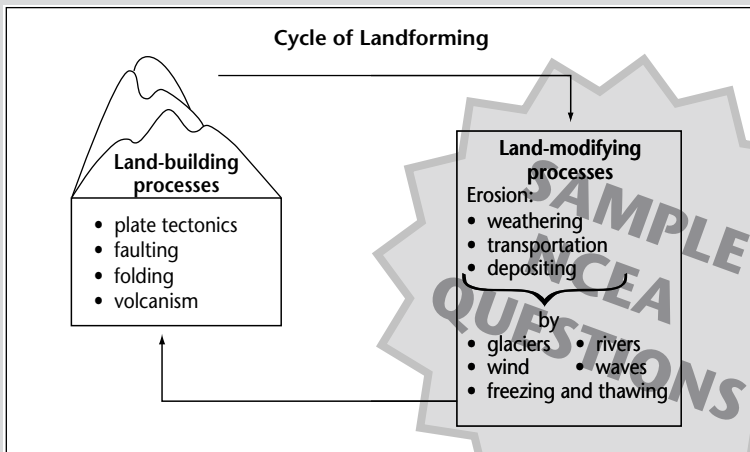
## River Erosion and Deposition

Although uplift in the Andes is ongoing, the dominant relief processes in the region are the land-modifying processes of river erosion and deposition – **alluvium** is seasonally deposited on the wide raised banks (**varzea**) beside the larger rivers.

- The volume of water carried in the rivers increases markedly at times, so that the Amazon can rise by up to 20 metres in times of heavy flow.
- Tributaries from the north (eg Rio Negro) tend to be black with substances derived from decayed, waterlogged vegetation, while rivers from the south (eg Rio Tapajos) lack mud and so are clear.
- In contrast, rivers from the younger Andes mountains carry down large quantities of mud and minerals, in colours of white, yellow and brown – these are the ‘white water’ rivers, such as Rio Solimoes.

- An interesting fluvial phenomenon occurs at Manaus, where the Rio Negro joins the Amazon. The Negro carries water of a very dark colour, while the Amazon carries water of a lighter colour, from the Andes area. The waters of the two rivers do not mix until 7 km downstream so that for a time, waters of different colours flow side by side.

**Activity 4B: Variations in relief within the Amazon Basin**



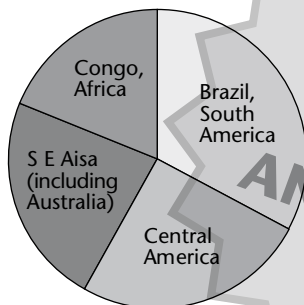
1. Select one or a combination of land-building processes and explain how they have created the Amazon Basin.
2. Select one or a combination of land-modifying processes and explain how they have modified the Amazon Basin over time.

## Chapter 4

**Activity 4A: Global pattern of tropical rainforest**

1. Tropical rainforests are located within 10° north or south of the equator. (A)
- 2.

**Distribution of tropical rainforests**



3. Very hot temperatures. (A)

(A)

**Activity 4B: Variations in relief within the Amazon Basin**

1. A quality answer includes the following:

- The basic geologic formation – from Pangaea to Gondwanaland, 250 million years ago, and its break up.
- An explanation of how the original Gondwanaland landscape was exposed and weathered and eroded.
- A general discussion of plate tectonics, involving the Pacific and South American (Nazca) plates – including subduction and the upthrusted Andes from sediment laid down by previous erosion of the original Gondwanaland rock. Mention of the difference between the soft, sedimentary, Andean rock and the hard, resistant, Guyana and Brazilian shield rock – an ancient remnant of Gondwanaland.
- Explanation of the faulting and folding and volcanism that occurred on the plate boundary and still do, ensuring that the Andes continue to grow.
- Mention of the fact that the Amazonian landscape region is dominated by the Andes and ancient remnants of Gondwanaland, with the Amazon basin between them.

Diagrams must be annotated and labelled and explained, showing plate tectonics, faulting and folding in the Andes. If answer diagrams only, they must be detailed and accurate.

(**A** – at least one land-building process explained, generally by written text, diagram or map or a combination of text and diagrams. Some detail from continental landscape referred to. **M** – one land-building process explained in detail, using information from the chosen continental landscape, or a combination are explained generally. Maps and diagrams are labelled or annotated. **E** – a land-building process is explained in comprehensive detail, or a combination are explained in detail. Maps and diagrams are fully annotated or labelled. Comprehensive use of the chosen continental landscape evident throughout the answer.)

- 2.
- An explanation as to how and why the Andes weather – through mechanical erosion, chemical and frost-shattering erosion, the effects of glaciers, freeze and thaw, mass movement. The Andes continued ‘growth’ and accelerated erosion provide the sediment input to the Amazon Basin.
  - An explanation of how material is transported (by gravity, slope, rivers) and how and where it is deposited – the creation of the alluvial Amazon Basin and the overlying latosol soils. The deposition of tonnes of sediment on the Amazon floodplain.
  - The effect of the river system on further erosion and transportation, and the ‘gate’ effect of the ancient resistant rock of the Guyana Plateau and the Brazilian Shield on trapping the sediments in the Basin.

Diagrams should show the different processes by which the Andes are weathered, material is transported and then deposited, and how the Amazon River system then transports alluvial silt and soils towards the Atlantic Ocean.

An answer of diagrams only would require fully detailed and annotated diagrams and maps which explain the processes *without* further text.

(**A** – at least one land-modifying process explained, generally by written text, diagram or map or a combination of text and diagrams. Some detail from continental landscape is referred to.

**M** – one land-modifying process is explained in detail, using information from the chosen continental landscape, or a combination are explained generally. Maps and diagrams are labelled or annotated.

**E** – a land-modifying process is explained in comprehensive detail or a combination are explained in detail. Maps and diagrams are fully annotated or labelled. Comprehensive use of the chosen continental landscape evident throughout the answer.)

