FOLD MOUNTAINS ARE the result of tectonic activity. They occur either at **subduction zones** (destructive margins with one oceanic and one continental plate moving towards each other), or at a **collision zone** (two continental plates pushing towards each other). The Himalayan range of mountains has formed, and is still forming, at a collision boundary. The Indo-Australian plate is moving northwards into the Eurasian plate. In the past, the Indo-Australian plate was part of **Gondwana**, the more southerly of the two massive continents that formed from the original single landmass of **Pangaea**. The Eurasian plate belonged to **Laurasia**, the northern continent. Between them was the **Tethys Sea** (Figure 1).

The Himalayan range is the largest mountain system in the world, 2,400 km long and on average 200 km wide, forming a massive barrier between the Indian subcontinent and the main body of Asia to the north – China, Russia and Korea (Figure 2).

‘Himalaya’ means ‘abode of snow’ (Figure 3). It includes dozens of mountain peaks above 6,000 metres. Mount Everest is the highest mountain in the world at 8,850 metres. Other high peaks are Kanchenjunga, Makalu, Annapurna and K2. Mountaineers aim for Everest because it is the highest, and K2 because it is the most difficult from certain angles.

The Himalaya, or Himalayas, is only the central part of an enormous mountain belt created by the Indo-Australian

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**Figure 1:** Some key terms

**Collision zone** Two continental plates move towards each other. Neither is destroyed. Rocks are pushed upwards into fold mountains or downwards to form mountain roots.

**Subduction zone** One continental and one oceanic plate move towards each other. The denser oceanic plate is subducted (forced downwards) into the mantle below the less dense continental plate.

**Laurasia and Gondwana** Alfred Wegener worked out the Theory of Continental Drift in 1912. Later, Plate Tectonic Theory was based on this. He said that all land was once one continent, Pangaea, which later split into two: Laurasia (north) and Gondwana (south).

**Tethys Sea** The ancient sea lying between Laurasia and Gondwana. It is thought that the Mediterranean may be a remnant of this.

**Figure 2:** The countries and main peaks in the Himalayas region

Today, the Himalayan range is made up of many rocks, including sections that were part of the bed of the Tethys Sea. Previous sea-floor rocks are now found thousands of metres above sea level. This is a fact which people find difficult to understand: shells and fossils of sea creatures can be found in the rocks at the top of the highest mountain range in the world!
Plate moving northwards and crunching the sediments upwards into mountain folds. Continuous ridges of mountains stretch northwards into China (Tibet), and eastwards and westwards into Pakistan, Afghanistan and India. There is a clear landscape change between the plains of northern India and the steep slopes of the Himalayas. Like the Alps (France/ Switzerland/Italy/Germany/Austria), the Atlas Mountains (north-west Africa), and the Pyrenees (French/Spanish border), the Himalayas are young fold mountains. This means earthquakes still occur here: they happen frequently and can be violent. There is evidence of continued plate movement, and laser measurements show the Himalayas are still increasing in height.

A barrier between regions
To the south of the Himalayas the wet/dry monsoon climate operates, but to the north the dry, bitterly cold winds of Central Asia dominate for much of the year. In terms of landscape and economy, this climatic difference creates two worlds. More importantly, the mountain barrier separates the people living within it from other societies. This separation controls the way people live and cope with their environment. Vegetation across the Himalayan region varies dramatically. The south-facing slopes are wet and well forested. The inland western section is much more dry and barren. The high mountains have tundra ecosystems. 

Making a living
The communities in the Himalayas live in some of the hardest conditions in the world, not just in terms of the difficult environment, but also in terms of their social and economic exclusion – in other words, they are very cut off from the rest of the world. A variety of different ethnic groups live in small, sparsely distributed settlements. The harshness of mountain life and a lack of access to public services mean that people rely heavily on each other for even basic survival (Figure 4).

Most people in this region live in the southern foothills and valleys. The high peaks are simply too inhospitable. The population is a mixture of Caucasoid and Mongoloid peoples. They live mainly by arable and pastoral farming, and there is tea-growing in Darjeeling in the east. No railways and few roads cut through the Himalayas. The region has many mineral and timber resources, but so far exploitation of these has caused many problems.

Farming and trade
Traditionally the Himalayan economy has focused around herding of animals and limited arable agriculture. The low temperatures and poor-quality soil in the region have limited arable production to the growing of only two main crops, wheat and millet. The herding of yak and sheep provides wool, an important resource for warm clothing but also for trade. Every year Himalayan traders make long, difficult journeys to southern Nepal and to Tibet in the north, where they can buy and sell animals, wool and grains. Tibetan markets provide access to salt, an important commodity.

Yaks are essential in remote communities not just for their wool but for the ingredients for making yak butter tea, a high-calorie drink which people consume in large amounts as a way of surviving harsh winters when there is little food and temperatures plummet as low as –45°C.

Tourism
Over the last several decades, traditional farming and trading have been overshadowed by a new main economic activity: tourism. The successful expedition of Sherpa Tensing and Sir Edmund Hilary to the top of Mount Everest in 1953 caused the Himalaya region to become a world attraction. The appeal of conquering these inhospitable mountains gave birth to the concept of ‘mountain tourism’, and in doing so dramatically changed the economic lives of the people who live here. Although initially mountain tourism was a specialist activity, its popularity grew, especially in the 1960s and 1970s as the construction of roads and infrastructure in the Himalayan region made access far easier.

In 1962, just over 6,000 tourists were recorded entering Nepal. By 2010, the number of yearly tourists had reached over 600,000! According to Nepal’s Ministry of Tourism, the majority of tourist activities are ‘wilderness activities’ such as trekking (Figure 5), bungee-jumping, hot-air ballooning and, of course, mountain climbing. Today, tourism is Nepal’s largest industry and source of income (see Figure 6 on page 4).

The high levels of tourism to the Himalayan regions bring both benefits and problems. Many areas rely heavily upon the income that mountain tourism brings, and tourism hotspots are often characterised by higher levels of economic exploitation of these has caused many problems.

• Lack of rights to local land and resources
• Competition for land and resources from organisations moving into the area (e.g. tourist firms, lumber companies)
• Limited job opportunities due to the remoteness of the region
• Limited access to health, education and other social services
• Increasing population growth which places a heavy pressure on resources

Figure 4: Social issues facing Himalayan communities
growth and the construction of larger settlements. However, the increased activity in these areas can lead to severe pollution, from the general littering and vehicle pollution from tourists themselves, and from the industrialisation of tourist towns. For example, the Indian city of Nainital receives over 80,000 tourists a year, leading to an economic boom centred on hotels and wilderness activities, but the amount of pollution that has accompanied this boom has been extreme. With hotel development, the city grew faster than the infrastructure of the area could sustain, and the water of Nainital Lake is now so contaminated by waste that it is undrinkable.

Another problem with economic reliance on tourism is that tourist numbers can change suddenly due to unforeseen factors. Something as simple as a period of unseasonable weather can have a serious impact on tourism, and thus on the income of an entire area. Following the Nepalese royal massacre in 2001, earnings from tourism dropped dramatically to 50% of that in the previous year. Economic recession in Europe and North America also limits the number of people able to afford expensive holidays.

**Himalayan ecosystems and sustainability**

The ecosystems of the Himalayas are unique and wide-ranging, including rainforests, glaciers, tundra, lakes and the two great river systems of the Ganges–Brahmaputra and Indus. In the past the small settlements in these regions worked in harmony with these ecosystems. However, the rapid increase in human population and a desire for economic development in recent decades has placed new demands on the region’s natural resources. These increases in population and the economy threaten the region’s sustainability.

With greater numbers of people comes an increased use of natural resources like water, food and wood. Fuelwood is the primary energy source for these communities, and as they have become larger, huge areas of forestland have been cut down to sustain them. Even more forest is cut down for farming. To combat the poor soil quality, it is common practice to clear a forested area for farmland, use it for a few years until it loses its fertility and then move on to a new area. As native forest is lost at a faster rate than it can be replenished, this means that not only have large areas of forestland been wiped out completely, but also the loss of the trees further contributes to soil erosion. Such erosion causes channel silting lower down the major river basins, increasing the flood risk in Pakistan (Indus basin) and Bangladesh (Ganges–Brahmaputra basin). As the region becomes more economically developed, the arrival of lumber companies and the large-scale production of cash crops like tea has only increased the rate of deforestation.

Another serious problem is pollution. Increased population, farming, tourism and industrial activities all create waste products, which are generally not disposed of effectively. Effluent and waste often enters the river system, affecting plants and animals as well as contaminating the water supply.

**Conclusion**

You will be writing the conclusion to this unit, in the Activities section on the next page!
Activities

1 Domino game
Work in pairs. Each pair will be given a full set of terms and definitions. Put these together so that each term matches the correct definition.

2 Figure 6 shows a tourism honeypot location. On a copy of the photo, annotate all the impacts of tourism. Remember: look for both positive and negative impacts.

3 Figure 7 shows how fast Nepal’s population is growing. Remember: an annual growth rate of 2% means that for every 100 people alive in one year, there will be 102 the next year.
(a) Describe the pattern of population growth in Nepal between 2000 and 2012.
(b) What impact might a growing population have on the fragile environment and economy of a young fold mountain region like the Himalayas?
(c) Extension activity: To what extent will population growth in Nepal threaten the sustainability of the environment and the economy?

4 The Himalayas are a difficult region in which to live. People have survived there on a subsistence level for thousands of years and have developed a traditional, sustainable lifestyle. Today, however, tourism is growing and this has both positive and negative impacts. Write your own Conclusion to this unit, reflecting this situation. Use as many examples as you can to support your text.

5 Extension activity: The impact of climate change
The Himalayas seem to be especially vulnerable to global climate change, experiencing rapid temperature rise and the melting of glaciers. Average temperatures in the Himalayas have risen by 0.6°C per decade, compared with the worldwide average increase of 0.74°C in the last century.
(a) Make a list of likely impacts of temperature rise in a fragile mountain area like the Himalayas. Also think about any possible knock-on effects in regions surrounding the Himalayas.
(b) Compare your ideas within a small group, perhaps three to six people. Finalise your joint list of impacts.
(c) Do some internet research to find evidence to support your ideas. (Hint: If you think that flooding in neighbouring regions is an issue, then find examples of such floods.)