CHAPTER 3

Landforms and Life

Free from the burden of human beings, may the Earth with many heights, slopes and great plains, bearing plants endowed with varied powers, spread out for us and show us her riches! ... The Earth is my mother and I am her child.

— Atharva Veda, Bhūmi Sūkta ('Hymn to the Earth')



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The Big Questions ?

1. *What are the major types of landforms and their significance to life and culture?*
2. *What are the challenges and opportunities of life associated with each landform?*

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Introduction

Humans, like most mammals, live on land. Land, as you may have noticed, has many forms and features; its appearance changes a lot from one region to another. Suppose that you are travelling by road from the region known as Chhota Nagpur in Jharkhand, reach Prayagraj in Uttar Pradesh, and go on to Almora in Uttarakhand. On the way, you will see very different landscapes. In fact, you will encounter three major landforms, which we will now explore.



LET'S EXPLORE

- As a class activity, form groups of four or five students and observe the school's surroundings. What kind of landscape do you see? Will the landscape change a few kilometres away? Or within some 50 kilometres? Compare with other groups.
- In the same groups, discuss a journey that any of you has made through a region of India. List the different landscapes seen on the way. Compare with other groups.

Altitude: The height of an object above sea level. Examples: the altitude of a mountain, the altitude of a bird or plane in flight, the altitude of a satellite.

A landform is a physical feature on the surface of our planet Earth. Landforms take shape over millions of years and have a significant connection with the environment and life. They can broadly be divided into three categories — **mountains, plateaus and plains** (Fig. 3.1).

These landforms have different climates and are home to a variety of flora and fauna. Humans have adapted to all landforms, but the number of people living on different kinds of landforms varies throughout the world.

Mountains

Mountains are landforms that are much higher than the surrounding landscape. They can be recognised by a broad base, steep slopes and a narrow summit. Depending on their height, some mountains are covered with snow. At lower **altitudes**, the snow melts every summer and turns

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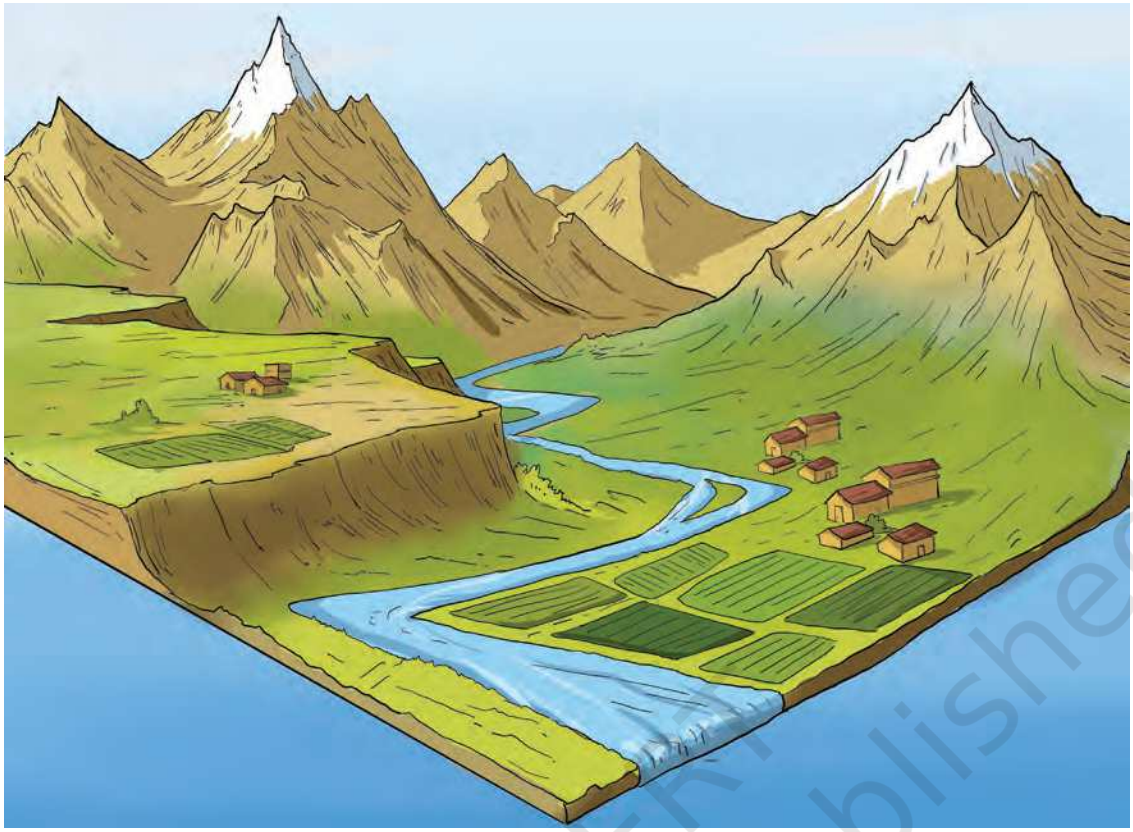


Fig. 3.1. This drawing illustrates three landforms — mountains in the background (two of them snow-capped), a plateau on the left and a plain in the foreground, with a river emerging from the mountains.

into water that feeds rivers. At high altitudes, the snow may never melt, leaving the mountain permanently snow-capped.

Other highlands with a lower height, less steep slopes and rounded tops are called **hills**.

Precipitation: Water from the atmosphere reaching the ground in any form — rain, snow and hail are the most common forms of precipitation.

THINK ABOUT IT

What is snow? Unless you live in a Himalayan region (such as Kashmir, Ladakh, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh), you may never have seen snow! In the rest of India, most **precipitation** is in the form of rain and hail. But at higher altitudes, if it is cold enough, snow will fall, covering the landscape in a soft and beautiful white blanket. Snow and hailstones are nothing but precipitation of water in a solid state.

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Fig. 3.2. Pictures of six mountains of the world

Most of the world's mountains are grouped in **mountain ranges,** such as the Himalayas in Asia, the Alps in Europe and the Andes in South America. Some of these ranges stretch for thousands of kilometres.

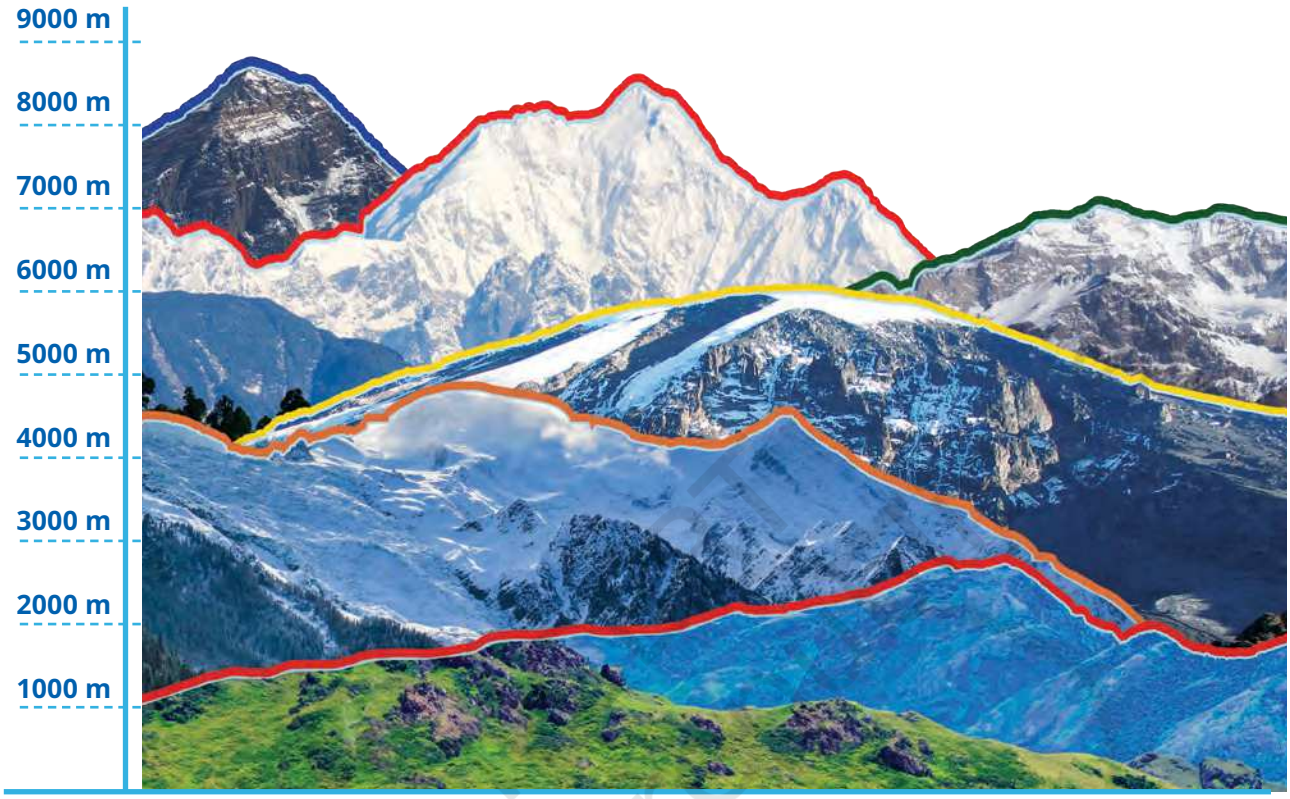


Fig. 3.3. A sketch showing the relative heights of six mountains of the world

Fig. 3.2 shows pictures of six mountains of the world. Fig. 3.3 brings them together to give a visual impression of their relative heights from top to bottom. Mount Everest (between Tibet (China) and Nepal) and Kanchenjunga (between Nepal and the Indian state of Sikkim) are the two highest peaks of the Himalayan range. Mount Aconcagua (in South America) is the highest peak of the Andes. Mount Kilimanjaro in eastern Africa is an isolated mountain that is not part of any range. Mont Blanc in Western Europe is the highest mountain of the Alps. Anamudi (in Kerala, also known as 'Anai Peak') is the highest mountain in south India.

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Montane forest: A type of forests that grows in mountainous regions.

Moss: A small green plant without flowers or true roots, often spreading in a cushion-like cover.

Lichen: A plant-like organism that generally clings to rocks, walls or tree.

Mountains with tall and sharp peaks, like the Himalayas, are relatively 'young', which means that they were formed recently in the Earth's history — but that is still millions of years ago! Shorter and more rounded mountains and hills, like the Aravalli Range, are much older and have been rounded by erosion. Sometimes, as with the Himalayas, upliftment as well as erosion continue to this day. (You will learn more in Science about such processes and their causes; let us just say here that some mountains of the world, like the Himalayas, are still growing in height.)

Mountain environment

Mountain slopes are often covered with a type of forest called **montane forest,** where conifer trees such as pines, firs, spruce and deodar are common. These conifer trees grow tall and cone-shaped, with thin, pointed leaves. At higher altitudes, the trees give way to grasses, **mosses** and **lichen.**

Here are two verses from a long poem by Kālidāsa, who lived at least 1,500 years ago and is often considered to be the greatest poet of ancient India. The poem, *Kumārasambhava*, begins with an invocation to the Himalayas. (This is a simplified translation from the Sanskrit.)

> *In the north rises Himālaya, the Lord of mountains, like a living god, who measures the Earth and stretches from the western to the eastern oceans. ...*
>
> *From it the wind comes down, carrying spray from descending Gangā, shaking the deodar trees, opening the peacocks' tail feathers and cooling the mountain people after they hunt deer.*

Discuss the verses and the following questions in class.

- What are the 'western to the eastern oceans'? Can you locate them as well as the 'Lord of mountains' on Fig. 5.2?
- Why is Gangā mentioned? *(Hint: There could be several reasons.)*

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Fig. 3.4. A few mountain animals

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Deep forests, flowing rivers, lakes, grasslands and caves in the mountains are home to diverse fauna, for instance, the golden eagle, the peregrine falcon, the Canadian lynx, the snow leopard, the ibex, the Himalayan tahr, the mountain hare, the yak, the grey fox and the black bear (Fig. 3.4).



DON'T MISS OUT

'Ganga' is the Indian name of the largest river originating in the Himalayas. In English, 'Ganges' is also used. Nearly 2,500 km long, this river has numerous tributaries (that is, other rivers joining it). Some of them, like the Yamuna and the Ghagara, also originate in the Himalayas. Others, like the Son or Sone, originate from the Vindhya Range to the south of the Ganga plain.



Fig. 3.5. Terrace farming in north India

Terrain: A piece or stretch of land, from the point of view of its physical features.

Life in the mountains

The mountain **terrain** is usually rugged or rough, and has steep slopes. This means that regular farming can only be practised in some **valleys**. Cultivation is practised on the

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slopes by cutting steps into the slope (Fig. 3.5). This is called terrace farming. In many mountainous regions of the world, herding is the preferred occupation over agriculture.

Tourism is often an important source of income for the people living in the mountains. The crisp mountain air and scenic beauty attract many tourists. Some tourists also go to the mountains for sports such as skiing, hiking, mountaineering and paragliding. For many centuries, people have also travelled to these uplands for pilgrimages to holy sites. But an excessive inflow of visitors can also put the fragile mountain environment under pressure; it is often difficult to find the right balance.

Valley: A lower area between hills or mountains, often with a river or stream flowing through it.



DON'T MISS OUT

- **Bachendri Pal** started climbing mountains from a young age and led many women's climbing expeditions. She was the first Indian woman to climb Mount Everest in 1984 and was awarded Padma Shri the same year (and Padma Bhushan in 2019).
- **Arunima Sinha** lost a leg in an accident when she was 22. With Bachendri Pal's encouragement and training, she managed to climb Mount Everest in 2013, and went on to climb the highest peak of every continent, including Mount Vinson in Antarctica! She was awarded Padma Shri in 2015.

LET'S EXPLORE



These images (Fig. 3.6 on page 50) depict a few challenges that people living in the mountains may face. Discuss them in groups in the class and write one paragraph on each. Also discuss why, despite many such challenges, people still choose to live in the mountains.

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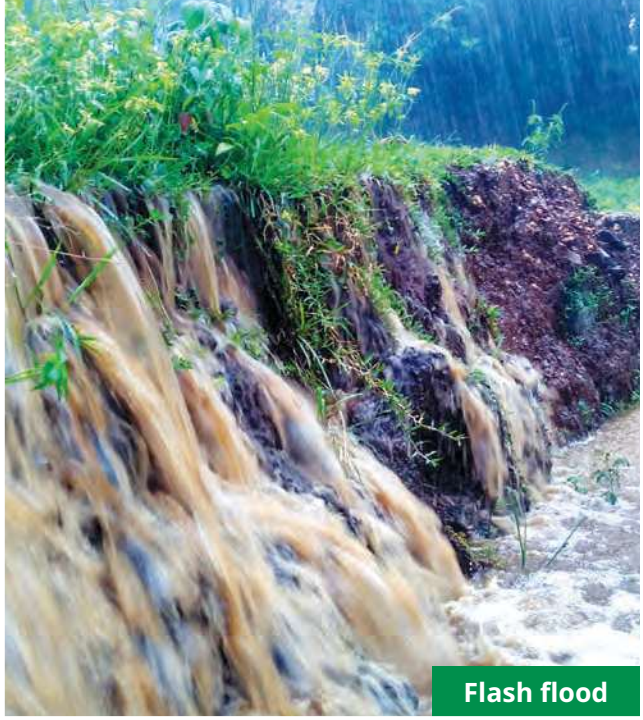
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Flash flood: A sudden local flood, often caused by a cloudburst.

Landslide: The sudden collapse of a mass of earth or rock from a mountainside.

Avalanche: The sudden fall of snow, ice or rocks from a mountainside; often occurs when the snow starts melting.

Cloudburst: A sudden violent rainstorm.


Flash flood


Landslide


Uncontrolled tourism


Avalanche


Heavy snowfall


Cloudburst


Cold weather

Fig. 3.6. Life in the mountains has definite positives, from pure air to the beautiful scenery. It also involves potential challenges, both natural and human-made, some of which are depicted in these pictures.

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DON'T MISS OUT

Many traditional communities around the world consider mountains to be sacred places and worship them. Mount Everest, the highest mountain in the world at 8,848 m, has many names. Tibetans call it 'Chomolungma', which means 'Mother Goddess of the World' and worship the mountain as such. Nepalis call it 'Sagarmatha', meaning 'Goddess of the Sky'. Similarly, Mount Kailash in Tibet is held sacred by followers of Hinduism, Buddhism, Jainism and Bon (an ancient Tibetan religion). Such reverence for mountain summits is also found elsewhere in India, as well as in other parts of the world.

Plateaus

A plateau is a landform that rises up from the surrounding land and has a more or less flat surface; some of its sides are often steep slopes. Like mountains, plateaus can be young or old in terms of the Earth's history. Two examples of plateaus are the Tibetan Plateau, the largest and highest plateau in the world, and the Deccan Plateau. The height of plateaus can vary from a few hundred metres to several thousand metres.



DON'T MISS OUT

- The Tibetan Plateau has an average altitude of 4,500 m, which explains why it has been nicknamed the 'Roof of the World'! From east to west, it is nearly 2,500 km long — the distance from Chandigarh to Kanyakumari.
- The Deccan Plateau of central and south India is one of the oldest plateaus in the world, formed through volcanic activity millions of years ago.

Like mountains, plateaus are rich in mineral deposits; they have been called 'storehouses of minerals'. As a result, mining is a major activity on plateaus, where many of the world's largest mines are found. For example, the East

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African Plateau is famous for gold and diamond mining. In India, huge reserves of iron, coal and manganese are found in the Chhota Nagpur Plateau.

The plateau environment is very diverse across the world. Many plateaus have a rocky soil, which makes them less fertile than plains (see next section) and therefore less favourable to farming. An exception is that of lava plateaus (that is, formed through volcanic activity), as they often have a rich black soil.

Plateaus are also home to many spectacular waterfalls. The Victoria Falls on the Zambezi River in southern Africa, the Hundru Falls on the Subarnarekha River in the Chhota Nagpur Plateau and the Jog Falls on the Sharavati River in the Western Ghats are a few such waterfalls. The Nohkalikai Falls (Fig. 3.7) drop down 340 metres from the Cherrapunji Plateau (in Meghalaya).



Fig. 3.7. The Nohkalikai Falls emerging from the Cherrapunji Plateau

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Plains

Plains are landforms that have an extensive flat or gently undulating surface. They do not have any large hills or deep valleys. They are generally not more than 300 metres above **sea level**.

Sea level: The average level of the surface of the oceans, also called 'mean sea level'.

Floodplains are one type of plains formed by rivers originating in mountain ranges, where they collect particles of rock, sand and silt called 'sediments'. These sediments are carried all the way to the plains, where the rivers deposit them, making the soil very fertile. As a result, these plains are ideal for growing crops of all kinds, and agriculture is a major economic occupation in this landform. Plains also support a variety of flora and fauna.

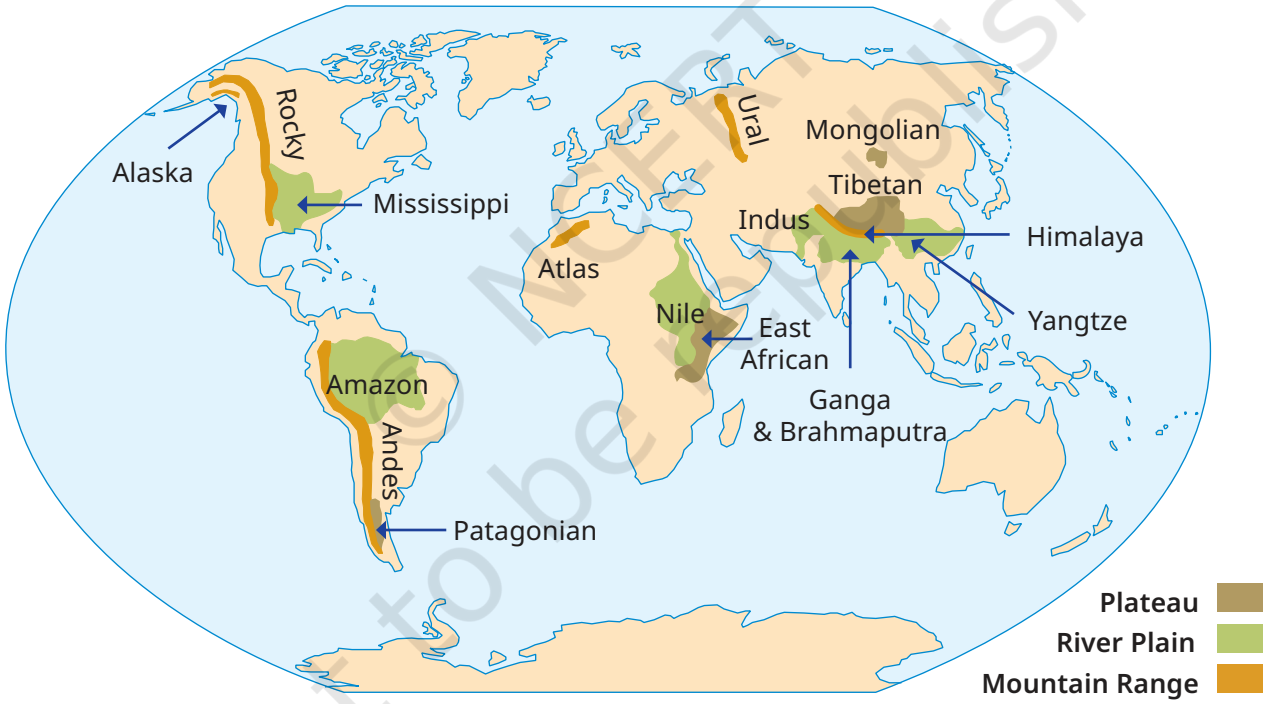


Fig. 3.8. This world map shows a few major mountain ranges, plateaus and plains.

LET'S EXPLORE

Use the colour code in Fig. 3.8 to add a landform to each name. For instance, 'Tibetan plateau', 'Rocky range', 'Nile plain'. *(You do not have to remember the names in this map.)*



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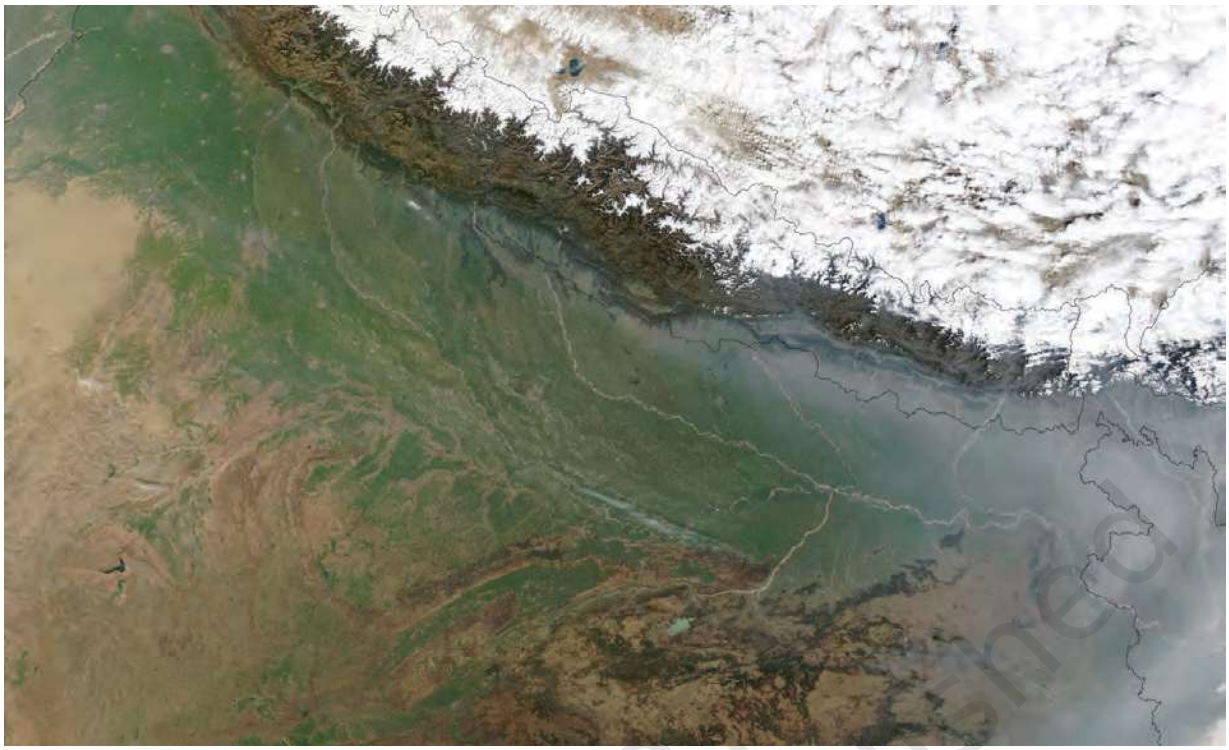


Fig. 3.9. A satellite view of the Ganga plain



LET'S EXPLORE

The picture in Fig. 3.9 has been taken from a satellite. It captures a portion of north India from a high altitude. Observe and discuss the image as a class activity.

- → Which colour is the Ganga plain?
- → What does the white expanse represent?
- → What does the brown expanse at the bottom left of the image represent?

Life in the plains

Thousands of years ago, the first civilisations developed around rivers in fertile plains. In our times too, a large part of the world's population lives in plains.

About 40 crore people, more than one-fourth of the total Indian population, live in India's Ganga plain (often called the 'Gangetic plain'). As with many other plains of the

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world, the major occupations of people in this region include river fishing and agriculture. Food crops such as rice, wheat, maize, barley and millets are grown. Fibre crops such as cotton, jute and hemp are also grown in the Gangetic plain. Traditional agriculture has been mostly rainfed (that is, watered through rainfall). In recent decades, however, agriculture has turned to irrigation, with water brought to the fields through networks of canals or pumped from groundwater. While irrigation has increased agricultural production, it has also contributed to the depletion (or decrease) of groundwater. This presents a challenge for the future of agriculture in the region. Some of the other problems affecting the Ganga plains include high population and pollution.

Whether in mountain ranges or plains, rivers around the world have carried immense cultural value. In particular, many communities have considered a river's source and its **confluence** with one or two other rivers to be sacred. In India, numerous festivals, ceremonies and rituals are conducted at such locations.

Because plains have a gentle slope, river navigation is easy and supports a lot of economic activities. In earlier days, people also used rivers extensively to travel from one place to another. Even today (Fig. 3.10 on page 56), there are stretches along the Ganga where people prefer to use boats to move around!

Confluence: The meeting point of two or more rivers.

LET'S EXPLORE



- → Can you give examples of river sources or confluences from your region that are regarded sacred by any community?
- → Visit a nearby river and observe all activities there, whether economic or cultural. Note them down and discuss with your classmates.

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→ Name some popular tourist destinations in India and identify the category of landform they are associated with.



Fig. 3.10. River transportation on the Ganga

Resilience: The capacity to meet challenges and difficulties, adapt to them or overcome them.

In this chapter, we explored the three main landforms. But its surface is very complex and experts often define a few more landforms. One such landform is the desert. Deserts are considered to be large and dry expanses with very little precipitation. Their flora and fauna are also unique. Some deserts are hot, like the Sahara Desert in Africa or the Thar Desert in the northwest of the Indian Subcontinent. Others are cold, like the Gobi Desert in Asia. (Some experts also describe the Antarctica continent as a desert.)

Despite harsh living conditions, humans have adapted to most of the deserts. In India, communities living in the Thar Desert, or migrating through it, hold rich cultural traditions, such as folk songs and legends, related to the desert.

The diverse ways in which humans have made all landforms their home is a testimony to our adaptability and **resilience**.

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The five *tiṇais* of ancient Tamil Sangam poetry are five landscapes associated with certain specific deities, lifestyles, moods or emotions (such as love, longing, separation, quarrel, etc.). This table only lists the characteristics of the five landscapes and the main human occupations in each:

Tiṇai	Landscape	Main occupation
Kuriñji	mountainous regions	hunting and gathering
Mullai	grassland and forests	cattle rearing
Marudam	fertile agricultural plains	farming
Neydal	coastal regions	fishing and seafaring
Pālai	arid, desert-like regions	journeying and fighting

These five *tiṇais* constitute a different classification of landforms than the one we have seen, but they reflect a keen awareness of the diverse regions and their characteristics. They also illustrate the deep connection between humanity and the natural environment. *(You do not need to remember the details of the tiṇais, but the concepts they reflect need to be understood.)*

Before we move on ...



- Landforms are classified into three main types — mountains, plateaus and plains. They have very different physical characteristics and environments.
- Throughout history, people's lives and activities have been much impacted by the type of landform they have lived in. These landforms are an integral part of culture across the world. Indian culture, in particular, has celebrated them in diverse ways.
- Each landform offers different challenges as well as opportunities.

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Questions, activities and projects

1. In what type of landform is your town / village / city located? Which features mentioned in this chapter do you see around you?
2. Let us go back to our initial trip from Chhota Nagpur to Prayagraj and Almora. Describe the three landforms you came across on the way.
3. List a few famous pilgrimage spots in India along with the landforms in which they are found.
4. State whether true or false —
   - → The Himalayas are young mountains with rounded tops.
   - → Plateaus usually rise sharply at least on one side.
   - → Mountains and hills belong to the same type of landform.
   - → Mountains, plateaus and rivers in India have the same types of flora and fauna.
   - → Ganga is a tributary to the Yamuna.
   - → Deserts have unique flora and fauna.
   - → Melting snow feeds rivers.
   - → Sediments from rivers deposited in the plains makes the land fertile.
   - → All deserts are hot.
5. Match words in pairs:

Mount Everest	Africa
rafting	roof of the world
camels	rice fields
plateau	desert
Gangetic plains	river
waterway	Ganga
Mount Kilimanjaro	tributary
Yamuna	climbing

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