

SCIENCE

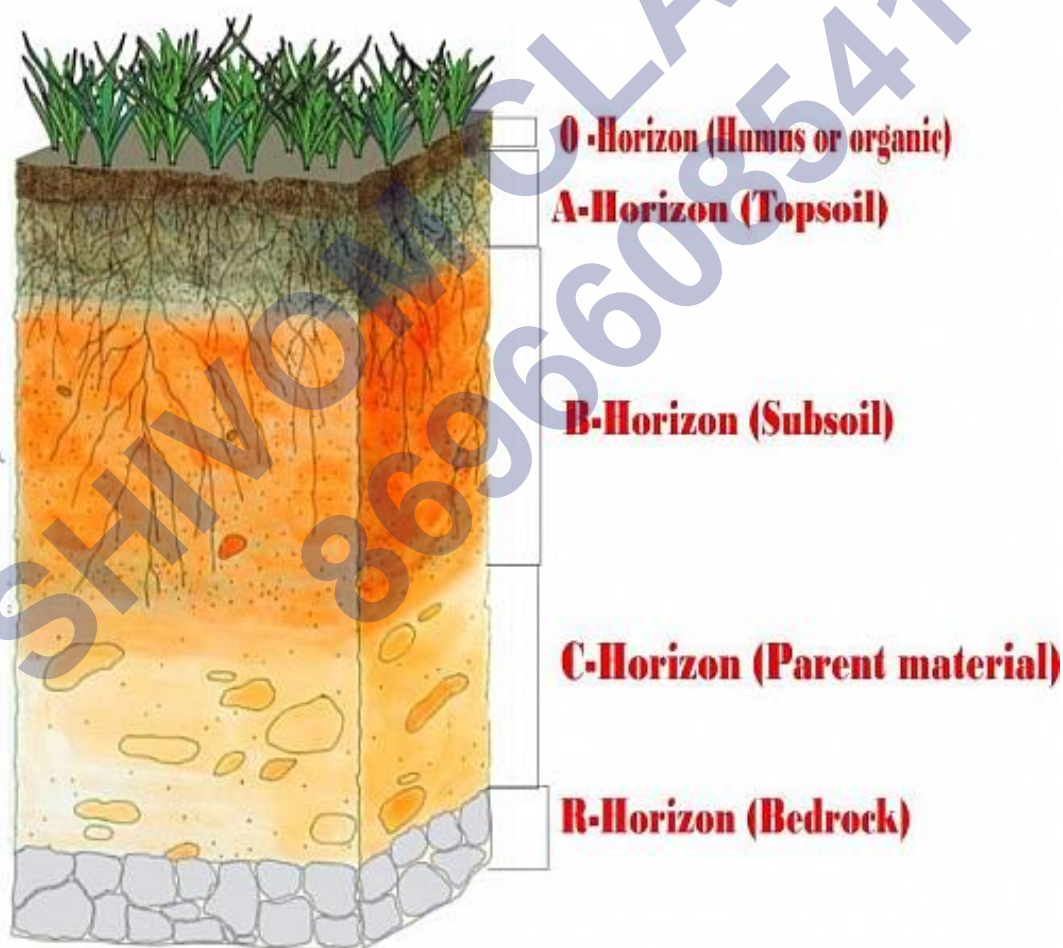
Chapter-9: Soil



Soil

Soil Profile

- **soil** is a mixture of decomposed rock and mineral material with decayed organic matter called **humus**.
- A process termed weathering results in the formation of soil. **Weathering** is the disintegration and decomposition of rocks and minerals over a period of time.
- The nature of the soil depends on the rocks from which it has been formed and the type of vegetation which grows on it.
- A **soil profile** is a vertical section through different layers or horizons of the soil. Each layer has different texture, colour and chemical composition.



Types of Soil

Sandy Soil

- Sand particles are larger and have more air spaces between them.
- Sandy soil is well aerated and water drains quickly through the spaces between sand particles.
- It is less fertile.

Clayey Soil

- Clay particles are smaller and closely packed, thereby leaving little air space between the particles.
- The water-retaining capacity of clayey soil is good because the particles are small.
- Clayey soil is more fertile than sandy soil.

Loamy Soil

- Loamy soil is basically a mixture of sand, clay and silt.
- It is made of almost the same amount of large and fine particles and has the optimum water-retaining capacity.

Properties of Soil

- Soil contains **air** and **moisture**.
- Soil allows water to percolate. **Percolation** is the process by which water passes down slowly through the soil.

Soil and Crops

- Soil profile is affected by climatic factors such as wind, rainfall, temperature, light and humidity which bring about changes in the soil structure.
- The **type of vegetation** in a particular area depends on the **type of soil** available in that region.

Type of soil	Crops grown
Clayey and loamy soil	They are suitable for growing cereals such as wheat and gram due to good water-retaining capacity.
Loamy soil	It is suitable for growing lentils and other pulses as this soil drains water easily which is good for the crops.
Sandy soil or loamy soil	Either of them is suitable for cotton because each drains water easily and holds plenty of air.
Clayey soil	It is suitable for growing crops such as wheat because it is rich in humus and is very fertile.

Soil Erosion



- The removal of fertile topsoil by wind or water is called **soil erosion**. As a result, infertile sub-soil is exposed which does not support plant growth.
- **Deforestation** is the primary cause of soil erosion. When trees are absent, there are no roots to bind the soil particles, and hence, rainwater or wind carries away this loose soil causing soil erosion.
- Soil erosion removes the fertile topsoil leaving the **land infertile**. The land can no longer support agriculture. Soil erosion even causes **floods**.
- Soil erosion can be prevented by **afforestation**, which is large-scale growing of forest trees instead of cutting them.

- A piece of land should not be left barren for a long period; the soil should be put to use by **regular farming**.

Effects of Soil Erosion



The important effects of soil erosion are as follows:

1. Soil erosion can turn lush green forests into deserts and spoil the environment: When the fertile top-soil in a forest gets removed by soil erosion, then the infertile sub-soil is left behind. No forest plants can grow in this remaining infertile soil due to which the once lush green forest can gradually turn into a desert.
2. Soil erosion can lead to famines (excessive scarcity of food): When the fertile top-soil is removed by soil erosion, then the food crops do not grow well in the remaining infertile soil. And due to bad crops, there is an excessive shortage of food-grains in that area.
3. Soil erosion can cause floods: The soil carried away from land by the flowing rainwater gradually deposits on river beds (decreasing their depth). So, when it rains heavily, the river cannot take away all the rainwater quickly. Due to this, river water overflows from its banks and causes severe floods by submerging surrounding areas.

Prevention of Soil Erosion

Soil erosion can be prevented in the following ways:

- 1) Soil erosion can be prevented by preventing large scale cutting down of forest trees. The large scale cutting down of forest trees is called deforestation. So soil erosion can be prevented by deforestation.

- 2) Soil erosion can be prevented by afforestation (large scale growing of forest trees in place of cut down trees). New trees should be planted in place of the cut down trees. And this tree cover will prevent soil erosion of the forest land.
- 3) Soil erosion can be prevented by increasing the green cover (vegetation) around us by planting more trees and plants ourselves.



Soil pollution

The contamination of soil with waste materials (especially used polythene bags and plastics), pesticides, fertilisers, acid rain and industrial chemical wastes, etc., is called soil pollution.



The various sources of soil pollution and their effects are as follows:

- 1) Dumping of waste materials (such as polythene bags plastics, glass and metal objects) causes soil pollution. Some waste materials (like paper and vegetable wastes) rot after some time and become harmless. But the waste materials such as polythene bags and other plastics (plastic bottles, etc.) do not rot on their own and remain as such indefinitely. They also kill the living organisms. The used glass and metal objects also do not rot in nature and cause soil pollution.
- 2) **The use of pesticides in agriculture causes soil pollution:** Pesticides are the poisonous chemical substances which are sprayed on standing crops to save them from the harmful insects and diseases. So, the grains, fruits and vegetables grown in this polluted soil contain pesticides. When we eat such contaminated grains, fruits or vegetables, the pesticides present in them enter our bodies and damage our health in the long run.
- 3) **The excessive use of fertilisers in agriculture causes soil pollution:** Chemical fertilisers are added to soil in the fields to increase food production. The excessive use of chemical fertilisers makes the soil acidic or alkaline. When the soil becomes highly acidic or alkaline it is said to be polluted. This soil becomes unfit for the growth of crop plants.
- 4) **Acid rain causes soil pollution:** Acid rain makes the soil highly acidic. This acidic soil becomes toxic or poisonous for plant growth. In this way, pollution caused by acid rain makes the soil less fertile.
- 5) **Dumping of industrial wastes causes soil pollution:** Many industries (or factories) dump their waste products containing harmful chemicals on soil. These chemicals cause soil pollution and harm plants which grow in it and the cattle which graze on it.

Prevention of Soil Pollution

The soil pollution can be prevented in the following ways :

- 1) The use of polythene bags should be avoided to prevent soil pollution. This can be done by using bags made of paper, cloth or jute.
- 2) Plastic objects should be sent to factories for recycling to prevent soil pollution. Discarded glass and metal objects can also be recycled.
- 3) The use of pesticides in agriculture should be minimised to reduce soil pollution.

Major requirements



Pollution control

Mercury is the closest planet to the Sun and the smallest one in the Solar System—it's only a bit larger than the Moon

Recycling center

Venus has a beautiful name and is actually the second planet from the Sun. It's hot and has a poisonous atmosphere

- 4) The use of excessive chemical fertilisers should be avoided in agriculture to prevent soil pollution.
- 5) Steps should be taken to reduce the emission of acidic gases like sulphur dioxide and nitrogen oxides from factories which cause acid rain.
- 6) The industrial chemical wastes should be treated properly to make them harmless before dumping into soil.

Important facts on soil

- Land covers 20% of the earth's surface.
- Top most layer of earth's crust is called Top soil. It is a mixture of mineral (soil) particles and humus.
- Soil particles are formed from rocks and the chemical composition of soil particles depends on the rock from which it is formed.
- Top soil is important for biological activity as it holds roots of all plants and contains different types of animals and micro-organisms.
- Loss of top soil is called soil erosion and it occurs due to natural and man - made causes.
- Floods and winds are the natural causes for soil erosion. Deforestation, overgrazing and improper tilling are man - made causes for soil erosion.
- Soil erosion is prevented by proper land management, preventing overgrazing,

deforestation and Jhoom type farming and by restoring of forest and grass cover.

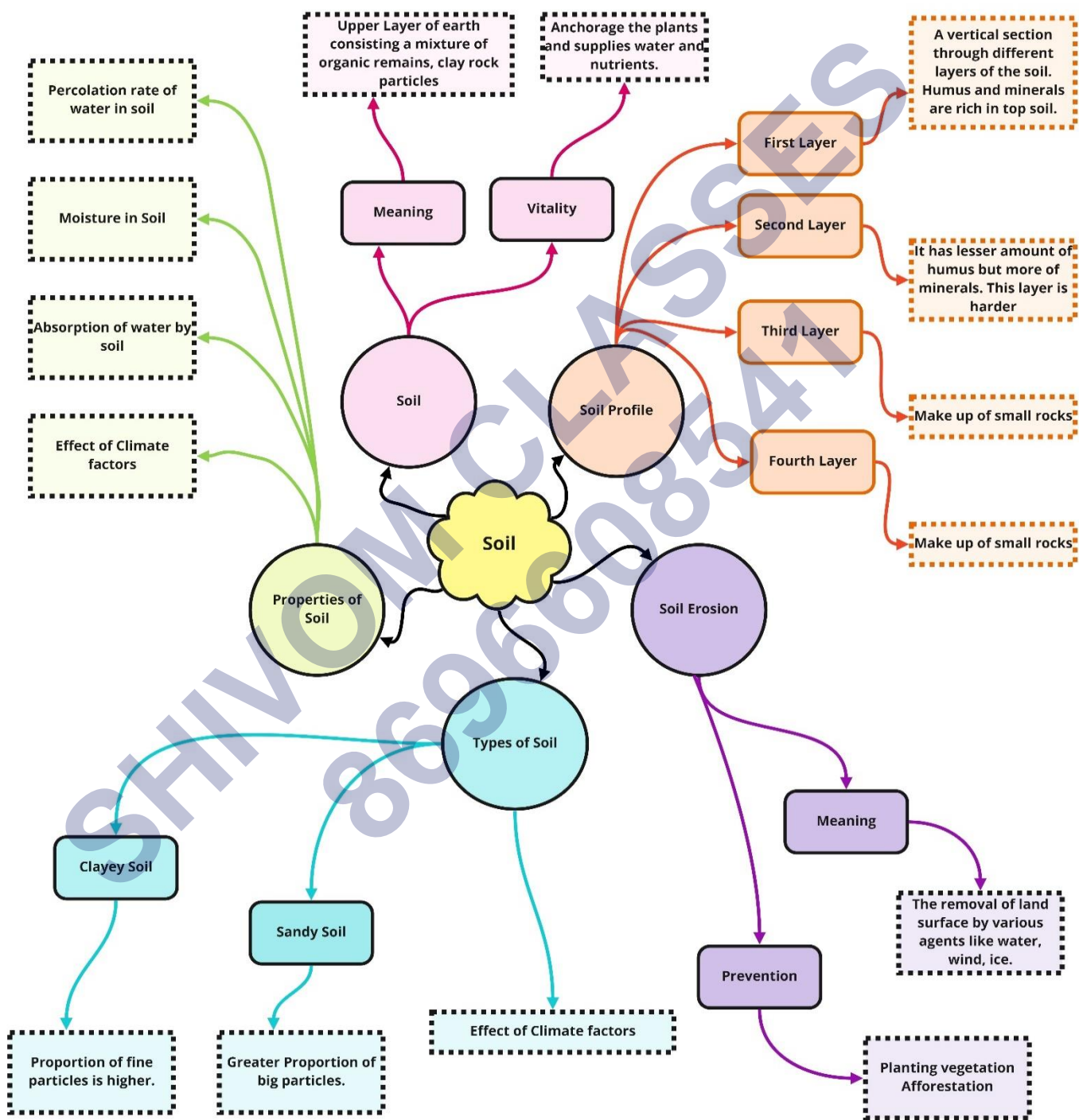
- Soil is another natural resource, which is rather most precious of all resources, as it is essential for our survival as well as all other life forms.

It provides

- food and fodder
- clothing
- provides anchorage to the plants
- water and minerals to the plants, and water for various human needs, irrigation and industry
- Home to a number of soil organisms.

SHIVOM CLASSES
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Class : 7th Science
Chapter-9: Soil



Important Questions

➤ Multiple Choice Questions:

Question 1. Soil is the substance which makes up the _____ of the earth.

- (a) rock
- (b) layers
- (c) surface
- (d) all of the above

Question 2. Which one of the following is a step in the formation of soil?

- (a) Earthquakes or volcanic eruptions
- (b) Weathering of rocks
- (c) Addition of humus
- (d) All of these

Question 3. Which factor influences soil formation?

- (a) Climate
- (b) Vegetation
- (c) Microorganism
- (d) All of these

Question 4. Which of the following does not cause soil erosion?

- (a) Deforestation
- (b) Terrace farming
- (c) Floods
- (d) Overgrazing

Question 5. Soil conservation measures are mainly aimed at protecting

- (a) plants
- (b) top soil
- (c) sub soil
- (d) soil organisms

Question 6. In which horizon of soil minerals are found?

- (a) A
- (b) B
- (c) C

(d) None

Question 7. The best top soil for growing plants is

(a) sandy soil

(b) loamy soil

(c) clayey soil

(d) all of these

Question 8. The mixture of rock particles and humus is called

(a) soil

(b) weathering

(c) silt

(d) gravel

Question 9. One of the following is not a type of soil. This one is

(a) loamy soil

(b) silty soil

(c) clayey soil

(d) sandy soil

Question 10. Which of the following has smallest size soil particles?

(a) Gravel

(b) Silt

(c) Clay

(d) Sand

Question 11. Cotton grows well in

(a) black soil

(b) laterite soil

(c) red soil

(d) loamy soil

Question 12. In which of the following humus is present in reasonable amount?

(a) A-horizon

(b) B-horizon

(c) C-horizon

(d) Bedrock

Question 13. Which of the following cannot prevent soil erosion?

- (a) Reforestation
- (b) Deforestation
- (c) Silviculture
- (d) Plantation

Question 14. The topmost layer of soil is known as

- (a) top soil
- (b) sandy soil
- (c) sub soil
- (d) bed soil

Question 15. Sandy soils are found in

- (a) hilly areas
- (b) tropical region
- (c) deserts
- (d) polar region

➤ **Fill In the Blanks:**

1. B-horizon is also known as
2. is removed during soil erosion.
3. The soil with large amount of fine particles is called soil.
4. The soil with a mixture of humus, sand and clay is called soil.
5. soil is fit for cultivation.
6. Percolate means or gradually

➤ **True or False:**

1. Soil can be acidic, alkaline or neutral.
2. Upper portion of soil always contain air.
3. Capacity to hold water is more in clayey soil.
4. Clayey soil is used for making pots.
5. Polythene bags and plastics pollute the soil.
6. Erosion of soil is more severe in areas with high vegetation.

➤ **Very Short Question:**

1. Name an important natural resource that supports growth of plants.
2. Name major soil pollutants.
3. What do you mean by soil profile?
4. What is soil?
5. Name the process by which soil is formed.
6. Name the soil with highest water absorption rate.
7. Name the soil having very less space between particles.
8. Ram has to grow wheat crop in his field, what kind of soil he will prefer?
9. Name some places with severe soil erosion.
10. Classify soil on the basis of appearance and properties of particles.

➤ Short Questions:

1. Explain soil and factors affecting soil.
2. Define the following:
 - a) Soil profile
 - b) Horizon
3. Why is top soil known as the habitat of many living organisms?
4. Why Upper most layers in a soil profile are considered as most productive?
5. What is the similarity between physical and chemical weathering.
6. State the factors on which nature of soil depends?
7. Classify soil on the basis of the proportion of particles of various sizes.
8. Plants help the development of the soil. How?

➤ Long Questions:

1. What causes the wind to blow?
2. Explain monsoon.
3. What are the global wind patterns?
4. Explain Sea breeze.
5. What causes lightening?

✓ Answer Key-

➤ Multiple Choice Answers:

1. (c) surface

2. (d) All of these
3. (d) All of these
4. (b) Terrace farming
5. (b) top soil
6. (b) B
7. (b) loamy soil
8. (a) soil
9. (b) silty soil
10. (c) Clay
11. (a) black soil
12. (a) A-horizon
13. (b) Deforestation
14. (a) top soil
15. (c) deserts

➤ **Fill In the Blanks:**

1. sub-soil
2. Top soil
3. clayey
4. loamy
5. loamy
6. filter, ooze

➤ **True or False:**

1. True
2. True
3. True
4. True
5. True
6. False

➤ **Very Short Answers:**

1. Answer: Soil.
2. Answer: Polythene bags, plastics, waste products, chemicals and pesticides.

3. Answer: A vertical section through different layers of the soil is called the soil profile.
4. Answer: Soil is the crust part of the earth. It is mainly the mixture of rock particles and humus.
5. Answer: Weathering
6. Answer: Sandy soil.
7. Answer: Clayey soil
8. Answer: Clayey soil
9. Answer: Areas of little or no surface vegetation, such as deserts and barren lands.
10. Answer: Sandy soil, Clay soil and Loamy soil

➤ Short Answer:

1. Answer: Soil is the crust part of the earth. It is mainly the mixture of rock particles and humus. Wind, rainfall, temperature, light and humidity are the factors which affect the soil profile and bring changes in the soil structure.
2. Answer:
 - a) A vertical section through different layers of the soil is called the soil profile.
 - b) Each layer of soil differs in feel (texture), colour, depth and chemical composition. These layers are called horizons.
3. Answer: Soil is the habitat for many living organisms, like bacteria, fungi, protozoan and earthworms as it contains large amounts of nutrients. Therefore top soil is called the habitat of many living organisms.
4. Answer: In the soil profile, Horizon – A, also known as Topsoil is best suited for the plant growth. As we know that availability of nutrients and water in soil helps to determine the productivity of soil. Top soil is rich in humus minerals along with water. Thus, Top soil is considered as more productive.
5. Answer: They both reduce the size of a rock body.
6. Answer: The nature of any soil depends upon the rocks from which it has been formed and the type of vegetation that grows in it.
7. Answer:
 - If soil contains greater proportion of big particles it is called sandy soil.
 - If the proportion of fine particles is relatively higher, then it is called clayey soil.
 - If the amount of large and fine particles is about the same, then the soil is called loamy.
 Thus, the soil can be classified as sandy, clayey and loamy.
8. Answer: The plants attract animals, and when the animals die, their bodies decay. Decaying matter makes the soil thick and rich. This continues until the soil is fully formed. The soil

then supports many different plants.

➤ Long Answer:

1. Answer: Soil is one of the most important natural resources because

- It supports the growth of plants by holding the roots firmly and supplying water and nutrients.
- It is the home for many organisms.
- Soil is essential for agriculture. Agriculture provides food, clothing and shelter for all.
- Soil is thus an inseparable part of our life.

2. Answer: Different layers of the soil are referred to as horizons.

The uppermost layer, the top soil, also known as A-horizon is generally dark in colour and fertile as it is rich in humus and minerals. This layer is generally soft, porous and can retain more water. This provides shelter for many living organisms such as worms, rodents, moles and beetles. The roots of small plants are embedded entirely in the topsoil.

The next layer, middle layer called B-horizon has a lesser amount of humus but more of minerals. This layer is generally harder and more compact.

The third layer is the C-horizon which is made up of small lumps of rocks with cracks and crevices.

Below this layer is the bedrock, which is hard and difficult to dig with a spade. Water can be held in the tiny gaps.

3. Answer: A non-living organic matter formed from remains of dead and decay plants and animal by the activity of microorganism present in soil. Humus controls and regulates many soil functions, as well as plant growth. The better the humus content in the soil the healthier and more productive soil will be. Good humus count in soil will hold soil moisture longer, thus lesser water is required for crop production, also good humus count reduces wind erosion of soil.

4. Answer: Physical weathering is the breakdown of rock into smaller particles due to factors such as freezing and thawing, release of pressure, water absorption, salt crystal formation, land mass uplift, expansion and contraction from the sun or fire, plant root growth, actions of animals, abrasion, or other means that do not directly affect the rock's chemistry. It is also called mechanical weathering.

5. Answer: Chemical weathering is the dissolution, carbonation, oxidation, or hydrolysis of rock and mineral by chemical means only, mostly from reactions with water or the acids contained in rainwater. Other materials are formed in the process. Warm, tropical climates are ideal environments for chemical weathering to take place as the chemical reactions are quickened by the bountiful rain and warm temperatures.