Influences on Weathering

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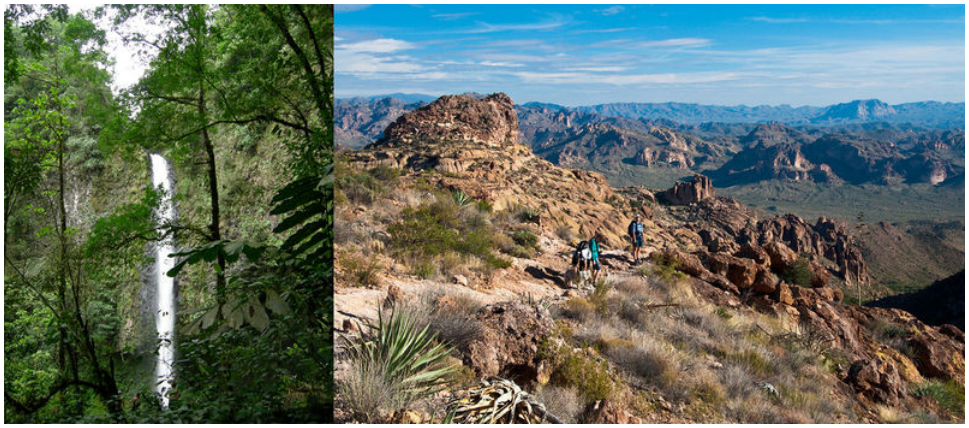
CHAPTER 1 Influences on Weathering

- Learn how different factors influence weathering.



How is weathering different in these two places?

Weathering varies for a lot of reasons. If you compare these two photos, one reason stands out. On the left, there is a lot of plant life. On the right, not so much. Why is the amount of plant life so different? The left is a rainforest, with a warm and wet climate. The right is a desert, with a warm and dry climate. Climate is very important for causing weathering. The way a landscape is modified depends on the climate of the region and other factors.

Rock and Mineral Type

Some types of minerals weather easily. Some types of minerals are very resistant to weathering. Some minerals in a rock might completely dissolve in water. This leaves behind the more resistant minerals, which are released from the rock. A beautiful example of this effect is the "Stone Forest" in China, shown in the video below:

- **Stone Forest** at http://www.youtube.com/watch?v=Ln5K3_8Cxrc (3:18)

MEDIA

Click image to the left for more content.

Rocks also weather differently. Igneous rocks are usually solid and are more resistant to weathering. Intrusive igneous rocks weather slowly because it is hard for water to penetrate them. Sedimentary rocks usually weather more easily. For example, limestone dissolves in weak acids like rainwater.

Different types of sedimentary rocks can weather differently. This will lead to differential erosion. In the photo of the Grand Canyon, some layers create cliffs. These are hard rocks that do not weather easily. Rock layers that resist weathering and erosion form the top of the canyon and the top of features. Softer layers form slopes. These are rocks that weather more easily (**Figure** 1.1).

FIGURE 1.1

The rocks in this photo of the Grand Canyon are all sedimentary. Hard rocks that are resistant to weathering form cliffs. Softer rocks that weather more easily form slopes.

Climate

Climate is the temperature plus precipitation of an area. Not just today, but over a long period of time. Climate affects chemical weathering. Chemical weathering increases as:

- Temperature increases. Chemical reactions are faster at higher temperatures.
- Precipitation increases. Chemical reactions increase when there is more water. Since water increases both mechanical and chemical weathering, more water strongly increases weathering.

Look at how temperature and precipitation change weathering. What type of climate has the lowest weathering rate? A cold, dry climate. A warm, wet climate has the highest weathering rate.

Vegetation

Plants increase mechanical and chemical weathering. Plant roots may enter cracks in rock and break it apart. Plant debris may increase the amount of acid in water. The warmer and wetter a climate is, the more plants it will have. Bacteria also grow more in warm, wet regions. So, warm, wet climates have more weathering from biological processes.

Resources from Weathering

Weathering may concentrate some resources. In tropical climates, chemical weathering can be intense. Some minerals dissolve and water carries them away. This leaves behind the materials that are not soluble. **Bauxite** is aluminum oxide that collects this way. Bauxite is our main source of aluminum ore.

Vocabulary

- **bauxite**: Aluminum ore that forms due to intense weathering.
- **climate**: Long-term average of weather.

Summary

- Different minerals and rocks weather at different rates under the same conditions.
- Different temperature and precipitation will cause the same materials to weather differently.
- Vegetation increases weathering, both mechanical and chemical.

Practice

Use the resource below to answer the questions that follow.

- **Erosion and Weathering: Sculpting Nature** at http://science.nationalgeographic.com/science/earth/the-dynamic-earth/weathering-erosion-article/

1. What is weathering?
2. What is erosion?
3. How does temperature influence weathering?
4. How can plants and animals influence weathering?
5. How do humans influence weathering?

Review

1. What types of rocks weather most readily? Why?
2. What types weather least readily? Why?
3. What climate types cause more intense weathering? What climate types cause less intense weathering?
4. How do plants increase both types of weathering?
5. How does bauxite form? What resource comes from bauxite?

References

1. Grand Canyon NPS. Weathering in the Grand Canyon, with hard rocks forming cliffs and soft rocks forming slopes. Public Domain