

Mount Everest: Climbing the World's Tallest Physical Feature

Introduction

On April 25, 2015, a powerful earthquake shook Mount Everest. The powerful shaking dislodged huge portions of snow that clung to the mountains. This snow slid quickly down a treacherous icefall before slamming into a mountaineering base camp. One climber said that the huge earthquake and ensuing avalanche forced him to flee from his tent and run for his life. In the end, 22 of the climbers died. It became the single deadliest climbing day on Mount Everest.

Despite the dangers, Mount Everest is an extraordinary place. At over 29,000 feet, it is the tallest mountain in the world. It lies within Nepal's Sagarmatha National Park, which was named a **World Heritage site** in 1979. These sites are places that UNESCO, a branch of the United Nations, identifies as being of great natural or cultural value to the world. UNESCO places these sites on its World Heritage List and assists countries in preserving and protecting these sites.

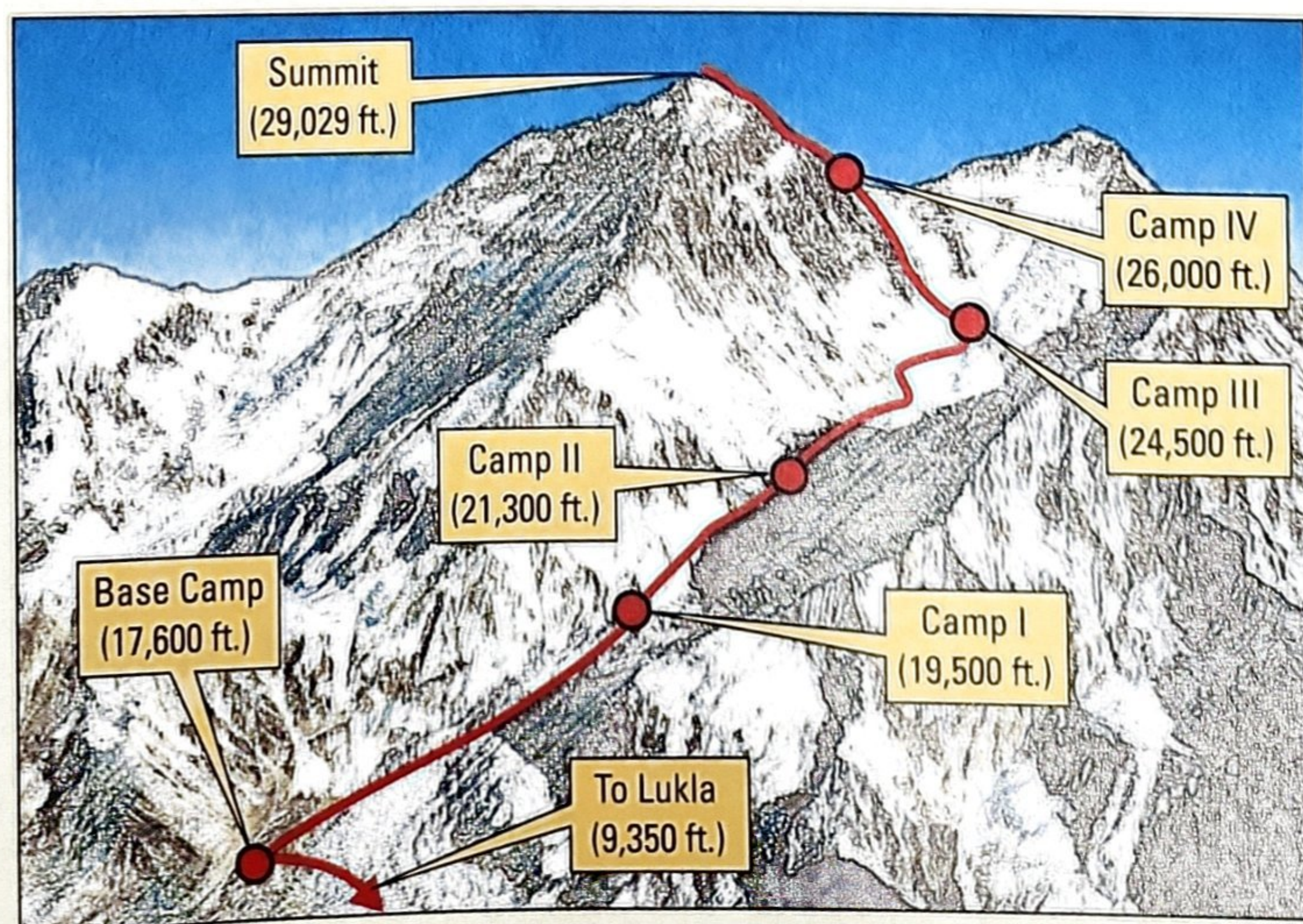
Climbing Mount Everest is an extremely difficult feat. Even so, more people come to Nepal each year to attempt the ascent. In this lesson, you will read about the challenges these climbers encounter on their way to the summit. In addition, you will see how **tourism** to Mount Everest is affecting Nepal and its people, and you will discover what is being done to protect this remarkable site from overuse.

Essential Question

How can people both experience and protect the world's special places?

This diagram shows one of the main climbing routes up Mount Everest. Notice that there are several camps along the route, each at a different elevation. Moving from camp to camp, climbers face tough physical challenges. Keep this diagram in mind as you try to answer the Essential Question.

Graphic Organizer

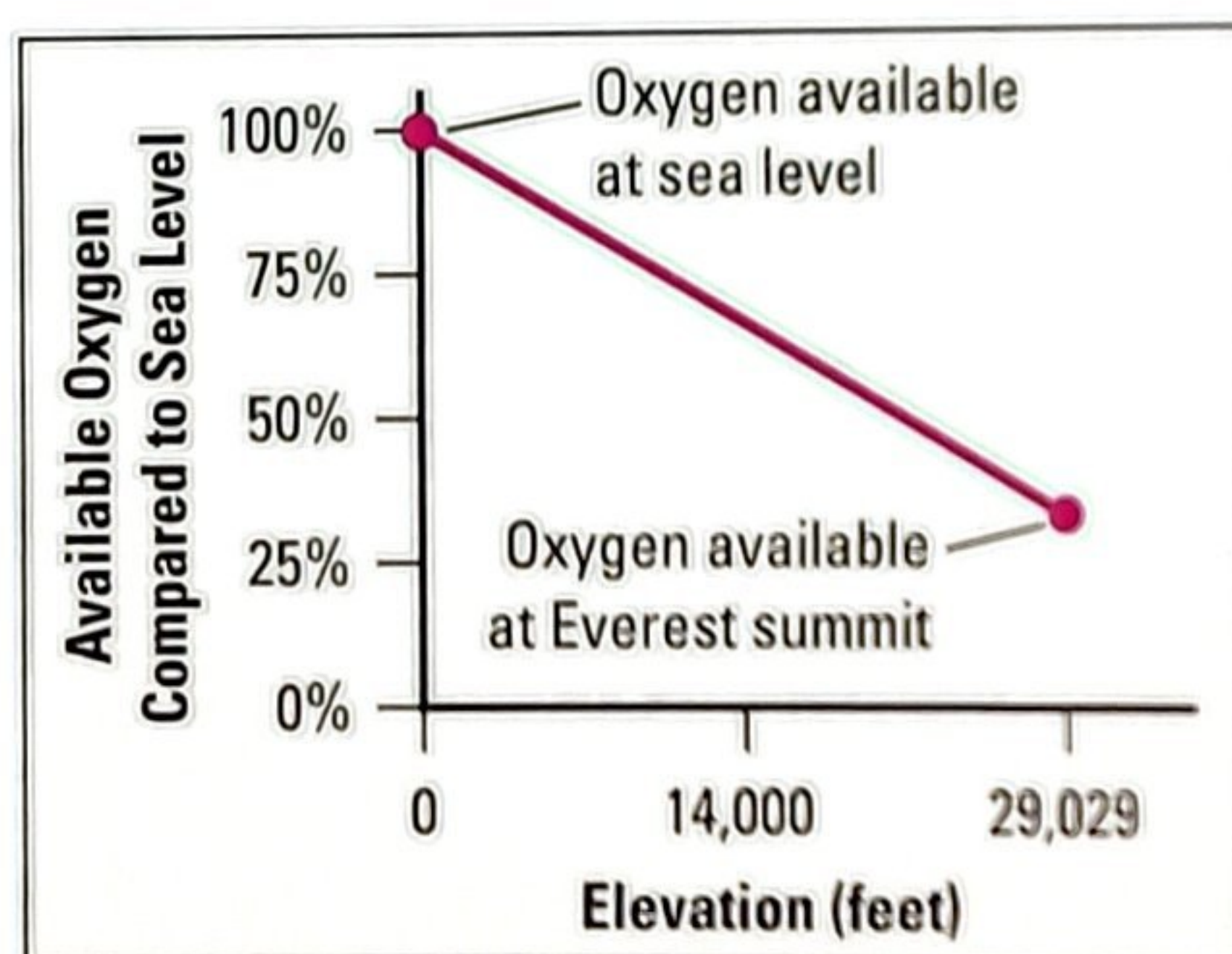




First to the Top

In 1953, Edmund Hillary and Tenzing Norgay became the first climbers to reach the top of Mount Everest. Since then, thousands of climbers have attempted to reach Mount Everest's summit. However, hundreds have died in the process.

Oxygen and Elevation



Breathing at a High Altitude

As altitude increases, the oxygen content in the air decreases. At the summit of Mount Everest, the air contains only about one-third the oxygen that it contains at sea level. Because of this, climbers can suffer from oxygen deprivation.

1. The Geographic Setting

Mount Everest is in the Himalaya Mountains of southern Asia, along the border between Nepal and the Chinese region of Tibet. Although measurements have varied, the summit's height is recognized as 29,029 feet. In the future, this number may change as measuring methods become more accurate. Whatever its exact elevation, Mount Everest is more than five miles high. The mountain was named Everest in 1865, after a British official in India. In Nepal, it is called Sagarmatha, which means "forehead in the sky," whereas in Tibet, it is known as Chomolungma, or "mother of the world."

Many Ways to the Top The first successful ascent of Mount Everest was achieved on May 29, 1953, the day that Edmund Hillary of New Zealand and Tenzing Norgay of Nepal reached the mountain's summit. "My first sensation was one of relief—relief that the long grind was over," Hillary later wrote. "I turned and looked at Tenzing. Even beneath his oxygen mask and the icicles hanging from his hair, I could see his infectious grin of sheer delight." Thousands of people have since attempted to climb the mountain. Nearly 5,000 people have succeeded, but around 300 have died while ascending or descending Everest's slopes.

There are many routes to the top, with the two main approaches being the southeast ridge from Nepal and the northwest ridge from Tibet. Most climbers take the first route, climbing in stages stretching over a period of weeks. At each stage, they stop at camps on the side of the mountain, which allows climbers to **acclimatize**, or adjust to the high elevation, as they go. If climbers did not acclimatize, they would risk becoming ill from the lack of oxygen at high elevations.

Another problem for climbers is **exposure**, or being unprotected against extreme weather conditions, such as freezing temperatures and high winds, which can cause injuries or even death. Most summit attempts occur during April and May, when the weather is most mild. However, the temperature drops 3.5°F for every 1,000-foot increase in elevation. Therefore, conditions can be deadly even in the spring.

Protecting the Future of Mount Everest As the popularity of climbing Mount Everest has grown, so have the problems caused by overuse. One such problem is trash. In the past, many climbers left old equipment, garbage, and human waste at camps as they climbed the mountain. Much of this trash has now been removed, but keeping the mountain clean remains a concern.

Another problem is overcrowding. During the climbing season, the camps become small villages, with dozens of people. Hundreds of climbers might reach the summit in a day, and lines can form as climbers slowly make their way to the top, endangering everyone involved.

The growing number of climbers raises questions about the mountain's **carrying capacity**, a term that refers to the number of people or animals a particular area can support. When a population grows too large, the area is likely to be damaged, which is one reason Sagarmatha National Park was declared a World Heritage site. By drawing attention to the region, UNESCO hopes to protect it for future generations.

Geotermis

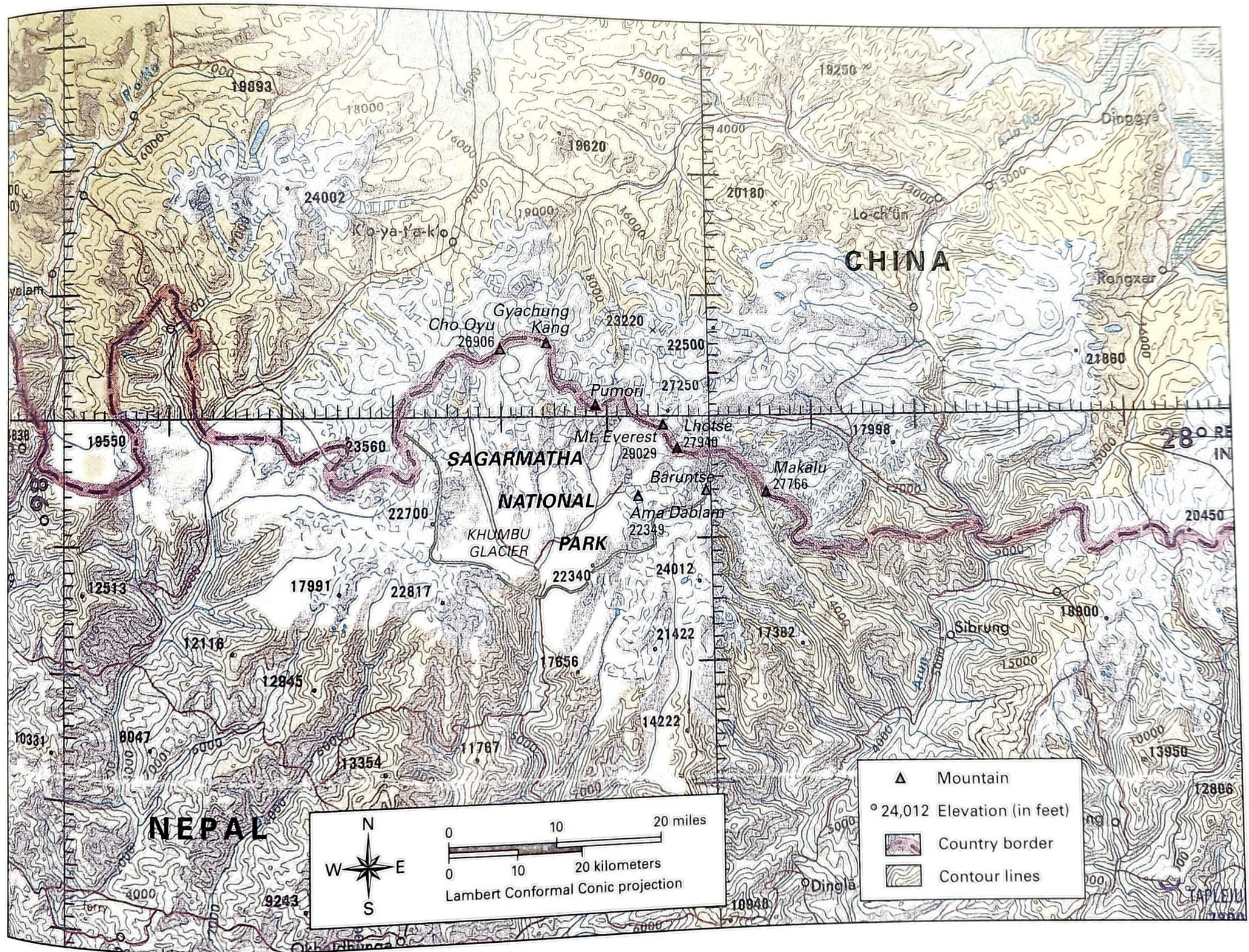
acclimatize the process of adjusting to lower oxygen levels at high elevation. Climbers adjust through exercise and rest as they gradually move higher.

carrying capacity the number of people or animals the environment of an area can support. A place's carrying capacity depends on the environment.

exposure the harmful effects of cold, wind, or other extreme weather conditions

World Heritage site a place of great natural or cultural value that has been placed on UNESCO's World Heritage List. UNESCO helps countries preserve these sites for future generations.

The Mount Everest Region



A Rugged Landscape

A topographic map uses contour lines and symbols to show physical and human features in an area. Mount Everest lies in a very rugged region of the Himalaya mountain range. Climbers hike for days just to get to Base Camp. Then they face a nearly 12,000-foot climb to reach the summit.



The Effects of Tourism

This sign advertises one of the many tourist hotels in Nepal. Tourism has brought lots of money to Nepal. Climbing groups have also funded schools and medical clinics. Some Nepalese have benefited from tourism, but most are still very poor.

2. From Lukla to Base Camp

Expeditions to Mount Everest begin with a trek to Base Camp. Along the way, climbers can observe Everest in the distance. "I stared at the peak for perhaps 30 minutes," recalled one climber. "The summit looked so cold, so high, so impossibly far away. I felt as though I might as well be on an expedition to the moon."

A Slow Start Helps Climbers Acclimatize For most people, the quest to climb Mount Everest begins in Kathmandu, the capital of Nepal. From there, the adventurers fly to the town of Lukla, at 9,350 feet above sea level, where they begin their hike to Base Camp. This trek, which typically takes between six and eight days, helps hikers to acclimatize to the thinning air. By the time they reach Base Camp, they have ascended to an elevation of 17,600 feet.

Base Camp is set up every climbing season at the edge of the Khumbu Glacier. Consisting of dozens or even hundreds of tents, this "tent city" includes kitchens, dining halls, and even solar-powered lights. Most climbers will spend several weeks at Base Camp to adjust to breathing the thin air. During this time, climbers will gradually ascend to each camp and then return to Base Camp before attempting to reach the next camp.

Climbers who do not acclimatize successfully may begin exhibiting symptoms of altitude sickness while they are at Base Camp. This illness is also called Acute Mountain Sickness, or AMS. Common symptoms of the sickness include nausea and headaches. In severe cases, AMS can cause fluid accumulation in the lungs, swelling of the brain, and even death.

The Impact of Tourism Climbing expeditions, and tourism in general, have had significant effects on the people and environment of Nepal, which is a poor **developing country**. On the positive side, tourism generates income, as tourists pay for food, lodging, and supplies. Villagers also earn wages as porters, carrying heavy loads of equipment and supplies for climbers. The porters often use yaks, a kind of longhaired ox, to help them transport goods.

At the same time, tourism has resulted in harmful effects. Porters, for example, are sometimes overworked and mistreated. Also, some of the villages have chopped down trees in the process of constructing lodging for the tourist trade. More trees may have been cut to provide fuel for cooking and heating for tourists. This loss of trees has led to **deforestation** and soil erosion in the Everest region.

The High Cost of Climbing

Climbing Mount Everest has become a big business. Private guide services charge as much as \$85,000 per person. A typical climber may spend another \$19,000 to \$40,000 on personal gear and airfare.

What Does It Cost to Climb Everest?

| Item | Cost for a Team of Seven Climbers |
|---|-----------------------------------|
| Crew (includes guides, cooks, and doctor) | \$175,000 |
| Transportation and lodging en route to Base Camp | \$48,000 |
| Permits and fees | \$79,000 |
| Supplies (includes fuel, oxygen, batteries, tents, medical supplies, and climbing gear) | \$153,000 |

3. From Base Camp to Camp I

Just above Base Camp lies the Khumbu Icefall, which consists of giant chunks of ice known as *seracs*. "Imagine trying to hopscotch uphill through a field of ice boulders the size of houses and weighing some 30 tons, each of which could shift at any moment without warning," wrote a climber about the icefall. "It's like a jigsaw puzzle of giant blue ice puzzle pieces."

Surviving the Khumbu Icefall Climbers reach the Khumbu Icefall during the second stage of their journey, a stage that takes them from Base Camp at around 17,600 feet to Camp I at an elevation of 19,500 feet. It usually takes one to three weeks to set up Camp I, as climbers move up and down the icefall each day, transporting supplies to the higher camp. This process also helps them to acclimatize.

The Khumbu Icefall is one of the most dangerous sections of the climb, and many have died on this part of the mountain. Some climbers have been crushed by shifting seracs. Others have died after falling into a crevasse, or a deep crack in the ice. Still others, including 16 climbers in 2014, have been swept down the mountain by an **avalanche**.

Climbers try to reduce the risks by beginning their hikes before dawn. Their objective is to get through the Khumbu Icefall before the sun melts the ice. That is because the ice starts to shift when it melts, becoming more dangerous.

Everest's Expert Climbers: The Sherpas On expeditions to climb Mount Everest, much of the work is performed by a Himalayan people known as Sherpas. Tenzing Norgay, one of the first two climbers to reach the summit, was a Sherpa. Many of the great climbers on Everest, including a few women, have been Sherpas.

Sherpas play a critical role during Everest expeditions. They function as guides, cooks, and porters, setting up the camps and carrying most of the supplies. They go through the Khumbu Icefall before other climbers in order to set up ladders and ropes for safe passage. Many Sherpas have died doing this hazardous work.

Every climbing expedition has a head Sherpa, called a *sirdar*, who has authority over the other Sherpas. In some cases, an expedition will include two sirdars, with one remaining in Base Camp while the other makes the climb to the summit.



Climbing the Khumbu Icefall

The Khumbu Icefall is one of the riskiest sections of the Everest ascent. Climbers must cross deep crevasses on shaky ladders. They have to beware of falling blocks of ice. One mountain climbing guide warns that "everything you stand or climb on can fall any minute without warning."



Sherpas Play a Key Role

Few Everest climbs would succeed without Sherpas. These natives of the Everest region work as guides and porters on most expeditions.



The Long Climb

Scaling Everest requires great skill and endurance. The risks of climbing are much greater at such high elevations. The lack of oxygen makes it hard to function, and as people's thinking gets fuzzy, it is easy to make mistakes. And even a small mistake can prove fatal.

4. From Camp I to Camp IV

The third stage of the climb takes climbers from Camp I at around 19,500 feet to three additional camps. The highest is Camp IV, perched at an elevation of approximately 26,000 feet. One of the most difficult parts of the climb is the Lhotse Face, a steep rock wall covered in ice. "The wind kicked up huge swirling waves of powder snow," a climber recalled of his climb up Lhotse. "Ice formed over my goggles, making it difficult to see. I began to lose feeling in my feet. My fingers turned to wood. It seemed increasingly unsafe to keep going."

Through the Valley of Silence When climbers depart from Camp I, they enter a long valley called the Western Cwm (pronounced *koom*). The Western Cwm is also known as the "Valley of Silence," because the ridges on either side of the valley block the wind. As a result, the most common sounds that climbers hear are their own labored breathing and the crunch of boots on ice and snow.

The hike through the Western Cwm is a long, gradual climb. On a sunny day, the valley can become extremely hot, which surprises most climbers because they expect to find freezing conditions throughout the expedition. "You literally pray for a puff of wind or a cloud to cover the sun," one climber recalled.

Crampons and Rocks: Ascending to Camp IV Camp II lies at the base of the Lhotse Face. To ascend this ice-covered wall, which rises up 3,700 feet, climbers use crampons and ropes attached to the ice. Climbers kick the crampons, which are spikes that attach to their boots, into the ice to get a foothold, and then they pull themselves up on the rope.

Camp III is perched on a narrow ledge halfway up the Lhotse Face. On a clear day, it offers an astounding view. "I sat with my feet hanging over the abyss, staring across at the clouds, looking down at the tops of 22,000-foot peaks," wrote one climber. "At long last, it seemed as though I was really nearing the roof of the world."

From Camp III, climbers ascend another 1,500 feet to the South Col. This saddle between the Lhotse Face and the summit of Mount Everest is the location of Camp IV. A saddle is a low point on a ridge that connects two peaks.

At around 26,000 feet, Camp IV is in the "Death Zone." At this elevation, humans have difficulty breathing. The lack of oxygen places tremendous stress on the body, and climbers are at great risk of experiencing altitude sickness. Additionally, with so little oxygen reaching their brains, they are more likely to make fatal mistakes. Most climbers breathe bottled oxygen to survive, but even then, it is a challenge to remain at this altitude for more than two or three days. If the weather turns bad, most climbers are forced to turn back down the mountain.

Cleaning Up the World's Highest Junkyard Camp IV is the final camp before the summit. In the past, it was also a major dumping ground, littered with empty oxygen bottles, used climbing equipment, and human waste. Even dead bodies were abandoned on the mountain. All of this dumping led to the South Col being nicknamed "the world's highest junkyard."

Between 1953 and the mid-1990s, climbers discarded an estimated 50 tons of glass, plastic, and metal on the slopes of Mount Everest. In recent years, however, groups of climbers have scaled the mountain to bring down the trash. One Japanese team returned with 2.6 tons of garbage, including old tents, fuel bottles, and plastic. As a result of these efforts, the mountain is now much cleaner than it once was. As one climber commented, "If you want to find garbage on Everest now, you have to go looking for it."

Partly to keep Mount Everest clean, the government of Nepal requires each climber to purchase an \$11,000 permit to climb the mountain. Some of this money helps pay for waste cleanup. Climbing groups are also required to leave a \$4,000 "garbage deposit" with the government. If climbers fail to carry their trash off the mountain, they lose their deposit.

Nepal's government is also working to reduce deforestation, which is a significant environmental problem in this country. Mountain climbers must now bring their own fuel with them to Everest or use solar power because cutting down trees for fires is prohibited. Tree-planting programs have been organized in many parts of Nepal, with new forests being planted and protected from overuse.

The World's Highest Junkyard

Piles of trash were once a common sight on Everest. In recent years, climbing groups have cleaned up the mountain. This Sherpa collects garbage at an altitude of 26,000 feet as part of a Nepalese clean-up expedition. The 20 climbers in this group picked up nearly two tons of garbage that had been left on the mountain.





Summit Gear

Climbers who reach the top of Everest today wear special gear designed for high altitudes. Earlier climbers made the ascent with far less equipment. They wore wool sweaters, scarves, and jackets. They had heavy oxygen tanks but no radios.

5. From Camp IV to the Summit

After resting for several hours at Camp IV, climbers begin the final and most grueling stage of the climb—the journey to the summit.

Climbing in the Death Zone is a time-consuming physical test. “At those altitudes you’re going quite slowly. You take a step and you breathe six to eight times and then you take another step and then you breathe six or eight times,” a climber recalled. “You can’t look at the whole ascent. You have to break it down into small sections and into tiny little steps. That’s how you eventually chew your way to the summit.”

Climbing in the Death Zone It is only about 3,000 vertical feet from Camp IV at around 26,000 feet to the summit at 29,029 feet, but each step requires tremendous effort. Deep snow, steep drop-offs, and exposure to harsh weather make this part of the climb even more difficult.

It takes between 8 and 16 hours for climbers to reach the summit from Camp IV, and an additional 4 hours to make the descent back to the camp. Most climbers begin the final ascent in darkness at around 11 p.m., which usually gives them sufficient time to reach the top and return to Camp IV before the end of the following day.

Climbers first set their sights on the South Summit, a small dome of snow and ice just below the summit. To get here, they must ascend a long, steep ridge that is covered in unstable snow. “It took an age to climb that ridge, hour after hour,” a climber later wrote. “Each step was a monumental effort of will, requiring a kick, and another kick, to secure a footing and ensure you didn’t slide with the soft snow down again to where you had started.”

From the South Summit, climbers have only 300 feet to go. However, they have to climb along a terrifying knife-edge ridge, where one slip can mean a fall of thousands of feet and certain death.

Climbers must also get over the Hillary Step, a rock cliff 40 feet high that lies just below the summit. The Hillary Step is one of the toughest obstacles that climbers face on Everest.

On Top of the World When climbers reach the summit, they are greeted by an extraordinary view. They see Tibet to the north and Nepal to the south, and surrounding them on all sides are other giant peaks of the Himalayas. They are truly on top of the world.

The summit itself, which is about the size of a picnic table, is covered with an assortment of flags, photographs, and other offerings from previous visitors, as well as used oxygen bottles and other trash. Climbers typically do not remain at the top for long because they have to return down before it grows dark or the weather changes.

By the time they reach the summit, climbers are exhausted. This fatigue makes the return to Camp IV extremely dangerous because even a small mistake can cause climbers to lose their footing and plummet down the mountain. If the weather turns bad, the mistakes can multiply.

Seeking Even Greater Challenges Over the years, climbers have sought new challenges on Mount Everest, such as making the ascent without oxygen or doing it very rapidly. In 2003, a Sherpa set a speed record by climbing from Base Camp to the summit in just under 11 hours. In 2001, an American became the first blind person to scale Everest. And in 2013, an 80-year-old Japanese climber became the oldest person to reach the top.

Some people come down the mountain in challenging ways. A few have skied down or descended on snowboards. One man performed his descent with the use of a paraglider, which is a device like a large kite.

For some others, the adventure of climbing Mount Everest is part of a greater challenge called the Seven Summits. To meet that challenge, a climber must scale the tallest mountain on each of the seven continents. Whatever a climber's goals may be, reaching the summit of Mount Everest is an amazing feat.

Summary

In this lesson, you read about the challenges that climbers experience on the world's highest mountain. You learned that climbers must acclimatize as they ascend Mount Everest, and you read about the danger of exposure to extreme weather conditions. In addition, you discovered some of the effects of tourism on the Mount Everest region and saw that tourism raises questions about the carrying capacity of the mountain environment.

People come to Mount Everest because it is a very special place. However, Everest is only one of the world's many wonders. Keep this in mind as you look at more World Heritage sites in the next section.

Seven Summits Challenge

| Mountain (Continent) | Elevation |
|----------------------------|------------|
| Denali (N. America) | 20,310 ft. |
| Aconcagua (S. America) | 22,831 ft. |
| Elbrus (Europe) | 18,510 ft. |
| Kilimanjaro (Africa) | 19,340 ft. |
| Everest (Asia) | 29,029 ft. |
| Kosciusko (Australia) | 7,310 ft. |
| Vinson Massif (Antarctica) | 16,050 ft. |

The Lure of Summits

The Himalayas contain 9 of the world's 10 tallest mountains. Every continent has its highest peak, and taken together, they make up the Seven Summits Challenge. The challenge is to climb the highest mountain on each of the world's seven continents.

