

# Climate Change Eyewitness Accounts

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## Earth and Space Science Unit 4

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## **Climate Change Eyewitness Accounts**

Unless otherwise noted, accounts are adapted from the World Wildlife Fund's "Climate Witness" initiative. Teachers and students can visit WWF's climate change website to read more and view pictures of the eye witnesses: <http://www.panda.org/climatewitness>

### **Island—Pohnpei**

**BEN NAMA KIN** WORKS AS AN environmental educator in Pohnpei in the Federated States of Micronesia, a Pacific island nation.

During his childhood, Ben experienced storms but never severe sea flooding. Sea levels have continued to rise due to warmer ocean temperatures (as water gets warmer, it takes up more space) and melting glaciers. High tides and storm surges are eroding the coasts, flooding graveyards, and destroying homes. The intrusion of saltwater onto the land has affected the quality of water in wells, ruined gardens, and damaged plants and trees, killing the pandanus trees, which are used for building houses, as well as for medicine, food, and clothing.

Many islands are less than three meters (10 feet) above sea level, and some islets have already been submerged. Ben used to hang out with friends on a small islet on the barrier reef near his school in Pohnpei. In 2005, he was surprised to find that sea flooding had split the islet in two.

In the last five years, villagers on the coast of Pohnpei have started to build their houses on raised foundations and construct walls to avoid flooding during high tides and heavy rains.

Ben has spoken about what people can do to stop global warming at the International Youth Summit of the 2005 United Nations Climate Change Conference, and during a climate change tour across the United States in 2006.

### **Mountain—Switzerland**

**MARCO BOMIO** LIVES IN GRINDELWALD, Switzerland, at the foot of the Eiger mountain in the Alps. Grindelwald is a well-known tourist destination. Marco is a teacher and school principal and has also worked as a mountain guide for almost 30 years.

Up until about 20 years ago, the glaciers were directly visible from the school windows, and only a half-hour hike away from the village. Now Marco has to walk an hour and a half to reach them. The shrinking of the glaciers and the thawing ground have made the rock face more brittle and unstable, leading to more rock falls.

At the beginning of the record warm summer of 2003, peaks like the Eiger and the Wetterhorn could be climbed a month earlier in the summer than usual. Instead of snowing, now it rains. Mountain resorts have started using more artificial snow, but in the winter of 2006-07, temperatures were too high to produce even artificial snow.

Marco is concerned about the predicted drop in water levels due to a loss of glaciers. The Alps are Europe's major water reservoir, and Switzerland produces 60% of its electricity from hydropower.

As a teacher, Marco feels passionate about educating youth and adults about what is happening: "Why not establish a research institute for climate research in our valley? The subjects to study would be right at our doorstep."

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### River—USA

VAN BEACHAM LIVES IN NORTHERN New Mexico in the United States. Coming from four generations of fly fishermen, he has been fishing since he was six and working as a fly fishing guide for 27 years.

As a boy, Van remembers the snow sticking around all winter, without the spikes of warm weather that are common now. He has noticed that the time between the last and first frost is one month less than it used to be. For the last 8-10 years, Van has observed a loss of snow during the times of year when it would normally be accumulating. Even when it snows above the average amount, the snow melts faster than it used to. Instead of a slow continual runoff, the rivers rage violently before dropping down to a trickle by early summer. Some streams and small rivers have been drying up completely.

The spawning season has been changing because the fish won't spawn when the water is too warm. Van is seeing increasing algal blooms, sediments, and aquatic weeds, all of which hurt the fish. Van has also noticed a change in the hatching times of the aquatic insects that the fish eat. The fish are often too sluggish to feed during the summer months, which used to be Van's busiest time for fly fishing. Water temperatures above 21 degrees Celsius (70 degrees Fahrenheit) start to kill the fish.

Sometimes Van feels it is his duty to tell his clients why the fishing is poor, and how people are partly responsible for the warming of the globe. While some do not believe him, he says that more and more are starting to see the connections and the big picture.

### Glacial Lake—Nepal

NORBU SHERPA IS A TREKKING guide in the Khumbu region in Nepal, not far from Mount Everest, the highest peak in the world.

When he was 19, a glacier lake above Norbu's village collapsed. His family had barely enough time to grab a few belongings and run out of their house before it was swept away by the flood, along with rocks, trees, cattle, crops, and all of their possessions.

To support his family, Norbu gave up his plans to become a monk to start a trekking business. During more than two decades of expeditions he has seen many glaciers melting and mountain lakes expanding, increasing the risk of glacial lake outburst flood events. For example, Imja Lake used to be small enough to walk around just a few years ago. Now it is the biggest lake in the Khumbu region.

In his early days of trekking, an expedition to Mount Everest would take around 90 to 100 days with no guarantee of success. As the glacier has shifted upward, people complete the climb in 30 to 40 days.

The decline in rainfall has resulted in droughts, killing trees and crops. There has been less precipitation in the winter, with unexpected snowstorms in the spring instead. Norbu and his family no longer have to make the wall of their houses as thick for insulation.

Norbu is glad he has a chance to tell people around the world about the impacts of climate change that he has witnessed, and to encourage everyone to act quickly to help reduce the impacts.

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### Grasslands—Argentina

OSVALDO BONINO LIVES IN THE small town of Aarón Castellanos in the Province of Santa Fe, Argentina. The province belongs to the region of La Pampa, where the land is very flat and mainly used for agriculture and farming. Osvaldo has served as Head of the District of Castellanos since 2003.

Due to increased rainfall over a period of seven years, a large lagoon named La Picasa tripled in size, washing away farms, crops, and homes. Many members of the community had to switch from farming to fishing. The main road and the railway connecting the region to the rest of Argentina were flooded. Before the lagoon's rise, Aarón Castellanos had more than 600 inhabitants; now it has 300.

When the lagoon began to grow, people thought it was temporary because it is common for lagoons to expand during certain seasons of the year and then return to their normal size. But La Picasa just kept on growing, until recently, when drainage measures were implemented and the region had a year of slightly less rainfall. Still, the grassland that was inundated will take a long time to recover its agricultural value – assuming the lagoon remains at its current, smaller size.

Osvaldo hopes that governments will do something to cut CO2 emissions and prevent things from getting worse so that his region can regain its grasslands.

### Icecap—Antarctica

ROBERT SWAN IS A POLAR explorer who has been visiting the Antarctic continent for 23 years. On his expeditions, Robert used to visit the Larsen B ice shelf, a giant floating extension of the permanently frozen land of Antarctica. In 2002, the Larsen B ice shelf (over 3000 km<sup>2</sup> of ice) broke off from the mainland, and hundreds of billions of tons of ice dissolved into the sea in less than a month. Larsen B is one of five huge ice shelves that has broken off in recent years.

The ice sheets that form in Antarctica each winter are larger than the continent's total land area. When the water freezes to form ice sheets, salt is released into the ocean. Ice sheets are frozen freshwater. The saltier, colder ocean water is denser than the ice, so it sinks to the bottom of the ocean. From there it flows under the oceans of the world, breathing life into the algae and deep sea plants and animals. With the Antarctic ice sheets melting, more freshwater is flowing into the oceans, threatening to slow the circulation of deep sea waters.

The Antarctic continent contains approximately 90% of the world's ice. If all of this ice were to melt, sea levels would rise about 61 meters (200 feet). Because it reflects 90% of the sun's rays, the Antarctic ice is also crucial in keeping Earth's temperatures lower.

In recent years, Robert has seen fewer Adelie penguins on the peninsula, which require the sea ice to hunt and feed. He has observed more rainfall and more grass growing.

Robert gives talks about his expeditions around the world in order to urge individuals, businesses, and government to reduce greenhouse emissions and meet the challenge of global warming.

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### Farmland—Spain

JOSÉ LUIS OLIVEROS ZAFRA IS a farmer in Villanueva de Alcardete, a town in the region of Castilla La-Mancha in Spain. He has been working in the fields for 30 years.

In recent years the seasonal cycle has changed, going straight from summer to winter and back to summer. Spring and autumn seem to have disappeared completely. It has become difficult for farmers to adjust their growing cycle to the unpredictable frosts and heat waves, such as snow in May and extreme heat in February.

As a boy, José Luis liked going to a stream in his town to hear the frogs croak and look for watercress. Now there is no stream, no frogs, and no watercress anywhere. It rains much less than it used to in the fall. Serious droughts in the spring and summer have caused José Luis and farmers across Spain to lose some of their harvests.

With the hotter temperatures, the region suffers more insect plagues. A locust plague recently occurred in Castilla-La Mancha. José Luis had never heard of a locust plague in Castilla-La Mancha. They used to happen only in subtropical places such as the Canary Islands.

José Luis worries that “if the changes keep coming as fast as they currently do, we have no chance to adapt to them.”

### Glacial Lake—China

ZHA ZHENGSUO IS 41 YEARS old and has spent her life near Qinghai Lake (also called Lake Koko Nor) on the Qinghai-Tibet Plateau in China. Fed by glacial rivers from surrounding mountains, Qinghai Lake is the largest inland saltwater lake in China.

In the last three decades, many of the rivers that empty into the lake have dried up, and the lake’s water level has dropped 3.7 meters (12 feet). The lake has shrunk and split off into smaller lakes.

When she was growing up, Zha Zhengsuo remembers seeing 20 or 30 pairs of blacknecked cranes nested in the marshes behind her two-room house. Now only one pair comes each summer. Other bird populations have declined as well, and some animals are facing extinction, including a rare antelope of which there are only 300 left in the wild.

The remaining water is becoming increasingly salty, causing changes in the lake’s ecology. A species of rare carp that feed and grow in the water have adapted by drastically changing their physiology. Still, in the last few years, the number of carp has fallen to 10 percent of what it was 40 years ago.

On the eastern shore of Qinghai Lake, Zha Zhengsuo and her family say that life has gotten better over the last decade. They recently bought a television and a motorcycle and a few shops renting go-karts to tourists have opened nearby, providing jobs. But locals are concerned that the black-necked cranes, considered holy by many Tibetans, have stopped nesting in the area. “Everyone says it’s bad luck that the cranes aren’t coming,” Zha Zhengsuo says.

References: Simons, Craig. 2007. Amid Fears Of Global Warming, China Weighs Profits and Pollution. Cox News Service, April 8. [http://www.coxwashington.com/hp/content/reporters/stories/2007/04/08/BC\\_CHINA\\_WARMING08\\_COX.html](http://www.coxwashington.com/hp/content/reporters/stories/2007/04/08/BC_CHINA_WARMING08_COX.html).

Receding Shoreline of Lake Qinghai. EurekAlert!, <http://www.eurekalert.org/multimedia/pub/2737.php>

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### Forest—Germany

GEORG SPERBER LIVES IN BAVARIA, Germany. He has worked as a forester harvesting timber for more than 30 years.

In the last couple of decades, Georg has noticed a weakening of the trees, especially spruce trees, which cover 28% of Germany's forest and support the country's forest industry.

It used to rain most in the spring and early summer when the plants needed the extra water. However, since the 1990s, the peak in rainfall has moved to autumn. The weather has become unpredictable, with more frequent droughts and violent storms wreaking havoc on the forests.

The spruce trees are also under attack from growing numbers of bark beetles. Georg has observed a spread in other previously rare parasites such as the oak procession moth, which attacks people with its poisonous hairs, causing painful skin irritations that can last two years. Local authorities have had to hire fire brigades to battle the moths and seal off oak forests to protect the public.

Every spring the migratory birds return a bit earlier than usual, and they leave much later in autumn. Some Chiffchaffs or Blackcaps don't leave at all these days, but try to stay over winter. Sometimes Georg sees species he would not have seen in the past. Even though he is excited about these encounters, they also worry him, because they show that things are changing.

Georg is co-founder of the German working group on Sustainable Forest Management and the German Ecological Hunting Association.

### Orchard—Australia

JONATHAN BANKS LIVES IN THE town of Pialligo near the Australian capital of Canberra. He has been an apple farmer since 1984. The orchard has been certified as organic since 1994.

In the 1980s and 1990s, Jonathan remembers having to pick apples between rain showers. These days it is always drier and hotter. The apple trees come into bloom one week earlier than they used to, and the growing season lasts longer.

Jonathan can now grow new types of apples, such as Lady William, which used to not have enough time to ripen. He has also seen less fungus. But other pests have become more damaging. In the early years of the orchard, there used to be only an occasional occurrence of fruit flies, because it was too cool for the flies to breed in large numbers. Now flies are increasing in number every year. In 2005, a third of the crop was lost due to fruit flies. He has seen more fruit bats as well.

Water no longer runs continuously throughout the year in a creek on the property, so Jonathan has to irrigate the orchard from the lake as early as spring. He is also losing more trees and fruit to sunburn.

Even with increased fruit prices, the farm is less productive and less profitable, and Jonathan is seriously considering what else to grow – even though the 50-year-old orchard is still potentially productive in “normal” seasons.

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### Rice Field—Japan

KATSUO SASAKI LIVES IN MIYAGI, Japan, where he has been a rice farmer for more than 40 years.

Miyagi is known as a high-quality rice producing area, but during the last ten years Katsuo has noticed the rice quality degrading. When the summer temperature is high, the rice grains become more opaque and cannot be sold. Farmers like Katsuo are trying to adapt by delaying the planting so that the rice will ripen in autumn, when the temperature is lower.

Katsuo has also been experiencing more frequent extreme weather than when he started as a farmer. Summer temperatures have been fluctuating – one year they are hotter than average, the next year colder. Both extremes are detrimental to rice growing. There have been unusual weather events such as torrential rainfall in December, something Katsuo had never seen before.

There has also been an increase in shield bugs that cause black spots on the rice, reducing the crop's commercial value. While many farmers are using more pesticides to control the insects, Katsuo has been focusing on growing organic rice and has managed to keep his rice resistant to the bugs. He believes humans should live in harmony with nature rather than abusing it. Still, he fears that Miyagi will no longer be a suitable place for growing rice in the coming decades.

### Coast—Tanzania

RAJABU MOHAMMED SOSELO IS A fisherman in Kunduchi, a coastal village north of Tanzania's capital Dar Es Salaam. Kunduchi's sandy beaches are famous as a tourist destination.

In the last 50 years, Rajabu has seen the beach in Kunduchi being gradually eroded by increasing headwater waves. The seashore has moved 200 meters (660 feet) closer to the village. A mosque, a hotel, a fish market, and five residential houses have been washed away by the sea. Dune structures along the beach are decreasing and disappearing, and sea grasses are being buried by sand.

Rajabu has noticed the cold season being less cold, and the rainy season getting shorter, reducing the river flows entering the Indian Ocean. The decreased supply of freshwater has made water in the delta near the mouth of the river more salty. Fish species that were normally caught there are no longer part of the catch. The saltwater intrusion has also affected the cultivation of agricultural products like grains and legumes that are critical for the village.

Rajabu's business is struggling since people who usually buy his fish can no longer afford the high prices. Rajabu hopes that governments and individuals will do whatever they can to stop the climatic changes and help his community to cope.

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### Tundra—USA

ATHENA ANGEL SAM IS 16 years old and lives in Huslia, a small town in Alaska in the United States. In 2006, she worked with other students to record the stories of some of the elders in her town about changes they are experiencing in the climate.

People in Athena's town have noticed that it stays warm longer into the winter and that cold spells are shorter. Fifty years ago it never rained into November like it does now. The ground that used to be permanently frozen (permafrost) is thawing. It is more dangerous to travel across the land by snowmobile or dog team, and more difficult to hunt for food in the wintertime.

Lakes are draining into the thawed ground, and many have dried up completely. The beavers have had to move from the lakes to the rivers, and there has been a drop in the population of muskrats. While there used to be hundreds of geese flocking in the springtime, now hunters see only five or six geese at a time.

Some fish populations are disappearing, causing problems for both bears and people who rely on eating fish. At the same time, new species of fish that locals have never seen before are appearing. The warmer winters makes the snow soft and therefore harder for large animals like bears and moose to move on it. Some get stuck in the snowdrifts and die.

Because it rains less in the springtime, there are fewer blueberries for the bears to eat, which can lead to starvation. As a consequence, the bigger brown bears started killing moose and black bears. People have also noticed the tops of trees drying up and turning brown, even evergreen trees such as the spruce.

### Forest—Kenya

NELLY DAMARIS IS A FARMER who lives in a village called Kipchebor, in western Kenya. She grows maize, tea, and tree seedlings, and also has a few dairy cattle. Nelly is a volunteer working with the Forest Action Network to educate her community about forest conservation. Nelly has witnessed destruction of forest land to allow more room for farming and human settlements.

The most frightening changes to the environment in Kipchebor are related to weather patterns. Kipchebor used to receive rainfall throughout the year, but now part of the year is completely dry. She remembers 20 years ago that even during the dry season, the grass would remain green. Now the dry season is warmer and all the grass dries up.

Starting in the 1980s, warmer temperatures have led to an increased number of mosquitoes. 20-30 years ago, almost no one in the region had malaria because it was too cold for mosquitoes to survive in the high altitude region. But now people there are dying of malaria.

Warmer and drier weather has affected agriculture in the region. Some of the edible insects that people used to depend on when food was scarce are now extinct. People are now even more dependent on the food crops they grow, which are vulnerable to changes in rainfall. There are also more crop pests now that it's warmer, so farmers in Kipchebor use more pesticides.

In 2006, Nelly Damaris spoke of the climate impacts she has witnessed at the World Wildlife Federation's Climate Witness event at the annual UN Climate Change Conference in Nairobi, Kenya.