

As its glaciers melt, Nepal is forced into an adaptation not of its choosing

by Johan Augustin on 27 December 2021



- *Climate change is causing the glaciers in Nepal's Himalayan region to melt at an alarming rate, threatening fragile ecosystems, vulnerable communities, and billions of people downstream who rely on the rivers fed by the ice pack.*
- *If global greenhouse gas emissions continue on a business-as-usual trajectory and average global temperatures rise by more than 4°C (7.2°F) by 2100, the Himalayan region could lose up to two-thirds of its glaciers, a study shows.*
- *For farming communities, this means water shortages, less feed for their livestock, and increased risks of natural disasters such as landslides and glacial lake flash floods.*
- *The Himalayas are, at present, heating up at rates up to 0.7°C (1.3°F) higher than the global average, and poor communities are already feeling the impacts.*

"Life is different now," says Chhireng Tamang, 75.

She has lived her whole life in Langtang National Park, in northeastern Nepal. The area, famous for its trekking trails through pristine forests and river valleys, is surrounded by snowcapped mountains and glaciers. However, this scenery is quickly melting away. Literally.

Chhireng Tamang says she remembers, not too long ago, when there was heavy snowfall in the mountains and the glaciers were "white and big." For much of her life it was easy to keep yaks, an animal many rural communities still depend on for wool, milk and meat, along with sheep and horses. But with warming temperatures, the amount of water and fresh grass available for the animals has diminished rapidly. From a herd of 40 yaks, Chhireng Tamang now has just nine.

"There is not enough grass to feed them anymore. All the farmers face the same problem," she says.

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Many local communities still depend on yaks but it has become increasingly difficult to keep big herds due to a changing climate conditions. Image by Jonas Gratzler for Mongabay

Retreat of the glaciers

The outlook for the Himalayan glaciers is bleak. It took more than 70 million years for them to form, and in just the last five decades they've receded rapidly. If global greenhouse gas emissions continue on a business-as-usual trajectory and average global temperatures rise by more than 4° Celsius (7.2° Fahrenheit) by 2100, the Himalayan region could lose up to two-thirds of its glaciers, according to the [Hindu Kush Himalaya Assessment](#), published by the International Centre for Integrated Mountain Development (ICIMOD) in 2019. Even if all human GHG emissions stopped today, we've already pumped so much of it into the atmosphere that one-fifth of the glaciers would still disappear.

This loss could lead to severe freshwater shortages for the 250 million people living in the Hindu Kush Himalaya (HKH) region, and affect another 1.6 billion downstream who depend on the rivers fed by the ice pack. The HKH encompasses eight densely populated countries, including India and Bangladesh, which depend on intact glacier ecosystems for their energy, clean air, and livelihoods.

The Himalayas are, at present, heating up at rates up to 0.7°C (1.3°F) higher than the global average. For Nepal, a hotter climate and changing rainfall patterns would affect current livelihoods centered around tourism and traditional agricultural practices. Poor communities in particular are already seeing their way of life changing, with water sources drying out and impacting agriculture.



Ghyalbu Tamang, manager at Organic Yak Cheese Production Center, says that the mountain range receives much less snow nowadays. Image by Jonas Gratzler for Mongabay.

Dying traditions

The village of Kyanjin sits at 3,800 meters (12,500 feet) above sea level in Langtang National Park. For more than 50 years, it



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manager for cheese production, says the mountain range that rings the village receives much less snow now, resulting in a drop in the water tables. That's had a far-reaching knock-on effect: less water means less grass for the yaks, which in turn means less milk, and a decline in cheese production. The village today produces just half of the 6,000 kilograms (13,200 pounds) it used to churn out annually.

"Before, we could trust the glaciers, but now they are disappearing due to climate change," Ghyalbu Tamang says. "Soon we will have to find other work."

Next to the cheese factory, Jingba Tamang tends his cows. He looks up at the towering peak of Kyanjin Ri at 4,773 m (15,659 ft). In early March, it should be covered in snow and ice.

Instead, what looms before him is a "black mountain."

Jingba Tamang says people will have to move to lower altitudes when the lack of freshwater and livestock feed becomes more acute.

"When we get summer temperatures of 25 degrees [Celsius, or 77°F], it will be a problem for the next generation," he says. "They will have to move away."

Many people in the area have already given up farming and grazing, and now work in tourism. But even this sector is threatened by climate change and shrinking glaciers. Chhen Bel and his wife run a guesthouse in Kyanjin, an area that, in February, in the dead of winter, was blanketed in a meter (3 ft) of snow. A month later, only a few patches remain.

"Before the snow would stay," Chhen Bel says. "That is not the case anymore."

The couple's five children study in Kathmandu, the capital, and have no plans to carry on the family tradition in the mountains. Even if they did, the drying up of the freshwater sources means there won't be any tourism left at all, Chhen Bel says.

"Then we have to move or die. There is nothing we can do about it," he says.

Jangbu Sherpa knows about the impact on the tourism industry firsthand. He runs a business in Kathmandu organizing guided climbing tours all around the country.

"The glaciers are melting everywhere, and it's really scary!" he says, citing the case of Imja Tse, or Island Peak, the 6,160-m (20,210-ft) mountain that's part of the Everest massif. The area around it used to be covered in snow, he says, but now "half of it has turned black."

Jangbu Sherpa describes similar scenes throughout Nepal, including world-famous sites like the Annapurna massif and base camp at Mount Everest, known as Sagarmatha in Nepali.

The missing snow and ice has translated into canceled reservations from his mostly foreign clients. A large group of Norwegian climbers scrapped a trip to Imja Tse because there was insufficient snow on the mountain.

"This will affect every mountain," Jangbu Sherpa says, adding there is "nothing we can do about it."

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The glaciers around Kyanjin are melting fast. The Himalayan region could lose up to two-thirds of its glaciers by 2100. Image by Jonas Gratzler for Mongabay.

Mapping the glaciers

As Nepal's glaciers melt, what's left of the ice is often dusted with a layer of [soot from distant polluting cities](#), mostly in India. Air pollution from India's densely populated Indo-Gangetic Plains, one of the most polluted regions in the world, is speeding up the melting: the deposits of black carbon and dust trap solar radiation that would otherwise be reflected out by the white ice.

Tracking the changes in mountain glaciers is among the best ways to keep tabs on climate change. Under the scenario of a 4°C temperature rise by 2100, two-thirds of the Himalaya's glaciers will be washed down the Indus, Ganges, Brahmaputra and other great rivers fed by the ice pack.

Initially, the summer flow of these rivers will rise until 2050, according to estimates, but will drop off eventually as the amount of ice diminishes. The extent of that loss is already apparent — and severe. Between 1980 and 2010, Nepal lost a quarter of its glacier area, according to an ICIMOD study using satellite data. Every year, 8 billion tons of ice melt, without being replaced by new snow. Scientists have tracked changes in 650 Himalayan glaciers and identified a clear pattern: from 1975 to 2000, the glaciers' surface shrank by nearly 23 centimeters (9 inches) a year, a number that steadily rose between 2000 and 2016, when the glaciers experienced an annual loss of about 43 cm (17 in).



Langtang National Park is a true gem for tourists, but even tourism may soon be risky business in Nepal. Image by Jonas Gratzler for Mongabay

Rising threat of natural disasters

Over the millions of years that glaciers form, they're in a constant state of flux. They expand, cleave through rocks, and carve valleys through the mountains. And all the while, along their edges, they build up walls of rock debris known as moraine. When the glaciers melt and form lakes, these moraine dams are all that hold the water back.



numbers are rapidly growing. For the communities that live near them, this translates into an increased risk of glacial lake outburst flood (GLOF), which occurs when large volumes of meltwater cause the lakes to burst their moraine banks. A GLOF event in Kedarnath, India, in 2013, fueled by a torrential downpour rather than meltwater, killed thousands of people and affected more than 100,000 others. In Nepal, 21 glacial lakes are considered at high risk of a GLOF event. Records show that such events in the Himalayas occur every three to 10 years. In a warming climate, their frequency is expected to rise.

Avalanches, too, risk becoming more common. As the glaciers shrink, the ice that previously held the rock and gravel slopes in place disappears, raising the risk of disastrous landslides. One such incident occurred during a 2015 earthquake, known as the Gorkha quake, when an avalanche on the slopes of the 7,234-m (23,734-ft) Langtang Lirung wiped out the village of Langtang, killing 243 people.

"Before, we didn't have many landslides, but now we get them often," says Chhireng Tamang from Langtang National Park.



Local people have left farming practices and maintaining grazing livestock as the climate is heating up. Image by Jonas Gratzler for Mongabay

Adapting to climate change

Coping with the threat of climate change here at the roof of the world will require more than just dealing with melting glaciers, says Austin Lord, an anthropologist at Cornell University who has spent five years living and working in Nepal. His research focuses on post-disaster recovery, the impacts of climate change, and the ways people cope with uncertainty in the Langtang Valley.

"Any climate change response has to be a series of nested and coordinated responses, each of them developed in place, and in the context of situated socioenvironmental relationships," he says.

That means that, "in most cases, it will be the people who live in these places who themselves come up with the most realistic and sustainable solutions," Lord says. "Herders and other people living in the high Himalayan region near melting glaciers, people living on the edge of and with rivers where seasonal flows are changing, farmers and people harvesting non-timber forest products — these are the people with an intimate knowledge of the changes occurring, who will innovate and who need to be meaningfully consulted. In short, we should be listening to them more closely."

With a changing climate comes the need to adapt, and even if some people have chosen to move to the cities, some local communities will find ways to adapt, Lord says.

"Traditions have always been changing, and it is that kind of creative social and environmental adaptation that has occurred



Jangbu Sherpa, who runs the climbing tours, is among those trying to set an example. He sold his internal combustion engine car and bought an electric one, and has gotten involved in tree-planting projects. He has also given up using plastics.



Jangbu Sherpa runs a climbing business in Kathmandu, which is directly affected by less snow. Image by Jonas Gratzler for Mongabay.

"I'm talking to people, to make them change their minds as well," he says.

But for Jangbu Sherpa and others across Nepal, climate change is something that was imposed on them by the rest of the world. The glaciers that define the country "are subject to decisions made across the world, to patterns of consumption and pollution that Nepali people have little or no control over," Lord says.

But he still holds out a glimmer of hope.

"I do have faith that some people will find ways to adapt and continue their traditional livelihoods, but also government officials and experts need ask these people what they need and to take their answers seriously," he says.

"Meaningful, equitable and sustained dialogue is the key."



Kyanjin, situated at 3800 meters, is famous for its snow capped mountain peak Kyanjin Ri. Image by Jonas Gratzler for Mongabay.

Banner Image Caption: Chhen Bel runs a guesthouse in Kyanjin. "Before the snow would stay," he says. Image by Jonas Gratzler for Mongabay

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