

Glaciers in retreat around the world

Steve Connor

Thursday, 08 December 2011

Millions of people who rely on water from the glaciers of a mountain range in Peru are experiencing what scientists have called "peak water" - the point at which the runoff from the glaciers becomes progressively weaker even though the ice continues to melt.

Scientists believe it is the first time that they have been able to document the important threshold that marks the transition from an increased flow of water, when the glacier first starts to retreat, to an ever-diminishing discharge that will eventually lead to severe water shortages.

The discovery has implications for the hundreds of millions of people in the world - from the Andes of South America to the Himalayas - who rely on a steady and regular flow of glacier water to prevent rivers running dry during summer months.

The glaciers of the Cordillera Blanca mountain range in the Andes to the north of the Peruvian capital Lima have been in steady retreat for several decades but in recent years there has been an accelerating rate of disappearance, scientists said.

At the same time, the flow of run-off water has for the first time started to diminish, the study found. This will affect the millions of people in the region who rely on the local glacier-fed rivers for irrigation, drinking water and industrial uses such as the generation of hydro-electricity.

The researchers had previously thought that they would not see peak water for a set of glaciers supplying water to a population of several million for at least 10 or 20 years. However, the speed at which some glaciers are disappearing has been faster than predicted, said Michel Baraer of McGill University in Montreal, Canada.

"For almost all the watershed that we studied here we have good evidence to say that we have passed the peak water. We have passed the peak discharge, and that will have consequences for the dry season," Mr Baraer said.

"When a glacier starts to retreat, the volume of the water being discharged increases until you reach a point where the surface of the glacier is too small to sustain this increase in the discharge," he said.

"It reaches a plateau and from this point you have a decrease in the discharge of meltwater from the glacier," Dr Baraer told the American Geophysical Union meeting in San Francisco.

"What it means now for the population is that instead of having 10 or 20 years to find ways of adapting to less water, in fact this time does not exist. With glacier retreat it means we get less and less water each dry season now," he said.

The study, which is scheduled to be published by the Journal of Glaciology, found that although the glaciers in the Cordillera Blanca were retreating faster than for the past 80 years, the amount of water running into the rivers was actually beginning to decrease for the first time.

"What we are seeing in the tropical Andes is a steady but accelerating retreat of the glaciers. Each year we have to hike up the mountain a bit further to get to the glaciers. Over the long term the retreat has been quite enormous," Mr Baraer said.

"This study is a really good example of what happens in different places in the world with glacier-fed [rivers] where you have significant packs of ice supplying water to dry regions or in dry periods of they year," he said.

"Globally, we are losing a high mass of ice and it's accelerating," Mr Baraer added.

Peru and Chile both rely on mountain glaciers for much of their water, especially during dry seasons. All glaciers in the region are in retreat, as are many in the Himalayas which supply regular flows of water to hundreds of millions of people in Pakistan, India and China.

In retreat: the world's glaciers

Canada: the glaciers of British Columbia and Alberta in western Canada store more ice by volume than the European Alps, estimated to be 2,600 square kilometres. Scientists the University of British Columbia in Vancouver estimate that many of these glaciers will completely disappear by the end of the century, based on a thinning rate of more than 0.5 metres per year and a total ice thickness of less than 60 metres.

Himalayas: Hundreds of meltwater lakes have appeared in recent years on the surface of glaciers in the Himalayas. Ulyana Horodyskji of the University of Colorado is the first to take time-lapse photographs of one such lake, which over a period of 48 hours discharged some 105,000 cubic metres of water, equivalent to 42 Olympic-sized swimming pools.

Greenland: computer models of the melting Greenland ice sheet and associated glaciers reveal that the melting in 2011 was the third most extensive since 1979 when records began, lagging behind only 2010 and 2077. The "mass balance" of ice shows that there is more ice melting than is being formed by fresh snowfall.

European Alps: Glaciers in the French Alps have lost a quarter of their area in the past 40 years. The ice fields around Mont Blanc and the surrounding mountains of the European range covered some 375 sq km in the 1960s. By the late 2000s, this area had fallen to about 275 sq km.