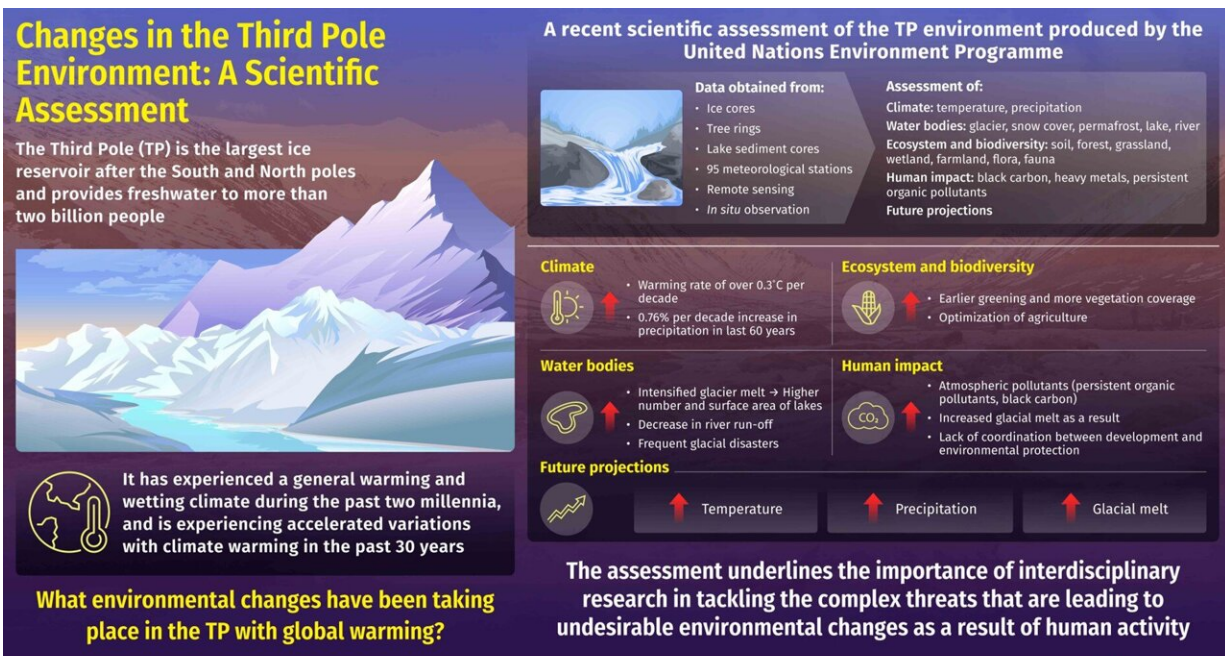


Assessing the past, present and future of the Third Pole environment

June 14 2022



Changes in the Third Pole Environment: A Scientific Assessment

The Third Pole (TP) is the largest ice reservoir after the South and North poles and provides freshwater to more than two billion people

It has experienced a general warming and wetting climate during the past two millennia, and is experiencing accelerated variations with climate warming in the past 30 years

What environmental changes have been taking place in the TP with global warming?

A recent scientific assessment of the TP environment produced by the United Nations Environment Programme

Data obtained from:

- Ice cores
- Tree rings
- Lake sediment cores
- 95 meteorological stations
- Remote sensing
- In situ observation

Assessment of:

- Climate: temperature, precipitation
- Water bodies: glacier, snow cover, permafrost, lake, river
- Ecosystem and biodiversity: soil, forest, grassland, wetland, farmland, flora, fauna
- Human impact: black carbon, heavy metals, persistent organic pollutants
- Future projections

Climate

- Warming rate of over 0.3°C per decade
- 0.76% per decade increase in precipitation in last 60 years

Ecosystem and biodiversity

- Earlier greening and more vegetation coverage
- Optimization of agriculture

Water bodies

- Intensified glacier melt → Higher number and surface area of lakes
- Decrease in river run-off
- Frequent glacial disasters

Human impact

- Atmospheric pollutants (persistent organic pollutants, black carbon)
- Increased glacial melt as a result
- Lack of coordination between development and environmental protection

Future projections

- Temperature
- Precipitation
- Glacial melt

The assessment underlines the importance of interdisciplinary research in tackling the complex threats that are leading to undesirable environmental changes as a result of human activity

A Scientific Assessment of the Third Pole Environment
United Nations Environment Programme (2022)

UN Environment Programme | TPE

Changes in the Third Pole Environment. Credit: TPE

The Third Pole, which encompasses the Tibetan Plateau and its surrounding mountain ranges, is the third largest reservoir of ice and snow after the North and South poles.

Its 100,000 km² of glaciers supply freshwater to thousands of lakes and rivers, sustaining the lives of over 2 billion people. The region is also

home to some of Earth's most biodiverse ecosystems. However, it is changing rapidly due to climate change caused by human activity.

In an attempt to raise awareness of this change, the United Nations Environment Program (UNEP) has recently published [a scientific assessment](#) of the Third Pole environment in cooperation with the UNEP-International Ecosystem Management Partnership, the Third Pole Environment (TPE), and the Pan-Third Pole Environment.

This comprehensive report condenses the latest knowledge about the Third Pole regarding climate, water systems, biodiversity, and the impact of human activity. It is also the first comprehensive assessment of the Third Pole environment.

In their review of the latest findings on the Third Pole's climate, freshwater bodies, ecosystems, biodiversity, land surface changes, and human impact on the region, the authors note that significant changes at the Third Pole are driving undesirable environmental changes at the local and global levels.

To get a full picture, the report traces environmental changes in the region over the past 2,000 years. Data derived from ice cores, lake sediment cores, and [tree rings](#) show that, since the 20th century, the warming and wetting of the Third Pole has become more pronounced, reaching record-setting average temperatures and precipitation. This is due to an acceleration of the warming rate by 0.3 °C per decade, which far surpasses the global warming average.

This trend has led to a marked increase in glacial melt over the past few decades along with expansion of the surface area of lakes and more river run-off. Together, these changes are increasing the frequency of natural disasters, such as ice collapses and glacial lake outburst floods, thus threatening local ecosystems and human lives alike.

Additionally, the Third Pole has become greener, with more vegetation coverage and, in turn, a surge in agriculture and farming. However, [invasive species](#), infrastructure projects, and [climate change](#) continue to threaten the Third Pole.

The report also analyzes the effects of [human activity](#) beyond the Third Pole on the environment of the Third Pole itself. The authors point out that air pollution, such as [persistent organic pollutants](#) and [black carbon](#), make their way into the Third Pole through various climate phenomena, leading to accelerated glacial melt. This is due to a lack of coordination between the economic development of nearby regions and environmental protection.

In addition, the report makes predictions of environmental changes the Third Pole can expect, including a continued rise in temperature and precipitation, thus causing glaciers to melt and water bodies to expand, among other effects.

Provided by Chinese Academy of Sciences

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