

Yala Glacier update

Located at 5,170 - 5,750 metres above the sea level, the Yala glacier in the Langtang Valley of Nepal, is a part of the central Himalayas. It is one of the most studied glaciers in Nepal, steadily shrinking in a 1.5°C world and may eventually disappear by the 2040s if this warming trend continues.

Yala is Nepal's 'benchmark glacier'. Change in Yala matters

Mountain regions warm faster than the global average – even if the rest of the world can manage to limit global warming to 1.5°C, the Hindu Kush Himalaya (HKH) mountains may warm up by 1.8°C to 2.2°C³, and the HKH glaciers could lose up to 80% of their current volume by the end of the century.

Given its accessibility, Yala serves as a prototype for glaciologists – especially young scientists and practitioners- to understand the

Between the 1970s and 80s the Yala glacier was sporadically monitored by Japanese researchers for mass balance and other cryosphere measurements. Since 2011, the International Centre for Integrated Mountain Development (ICIMOD) has been monitoring Yala regularly to better understand its long(er) term transformations.

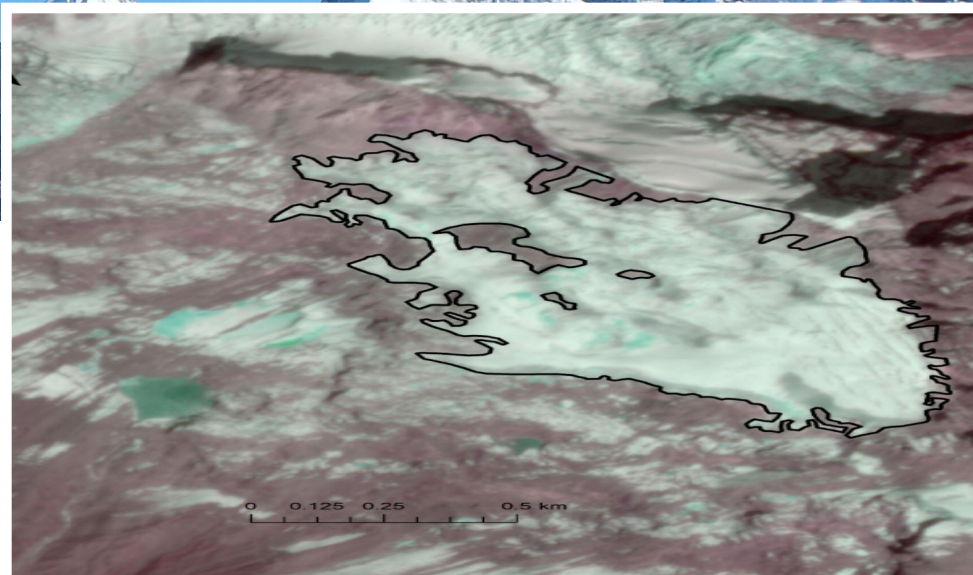


Figure 3: Changes in Yala Glacier area over 50 years show the outline from November 1974 and February 2025, represented in black and red lines, respectively, using Hexagon KH-9 and Planet satellite images.

ongoing phenomenon of glacier retreat and thinning across the HKH region. Nearly 100 early career researchers, students, and representatives from partner agencies have attended field-based glacier monitoring training on this glacier since 2011. Seasonal and annual mass balance records from 2011 to the present have shown significant retreat and thinning of Yala. Additionally, meteorological data, including temperature, precipitation, and radiation, confirm the detrimental impacts on the glacier's health.

Area change

Since 1974, the glacier has shrunk in area by 66% and retreated 784 meters. In autumn 2021, a large 66% and of glacier's ablation area (lower section) broke off from the main glacier and is slowly melting. This made significant change to the overall area of the glacier (Fig. 3). Rising temperature has been a major driver of Yala's area change (Fig 4).

Change in glacier mass balance

Yala is experiencing a significant loss in ice mass annually, indicating a negative mass balance, where the ice loss is higher than accumulation. A comparative analysis of cumulative mass balance data of four monitored glaciers in Nepal - Yala, Rikha Samba, Mera, and Pokalde - from 2011 to 2025 reveals that the Yala glacier has been losing ice at an average rate of 0.74 ± 0.53 meter water equivalent, with in situ measurements between 2011 and 2017 showing a slightly faster loss vis-a-vis the other glaciers (Fig 5). The Yala glacier is melting faster, perhaps owing to its relatively smaller size compared to the other monitored glaciers.

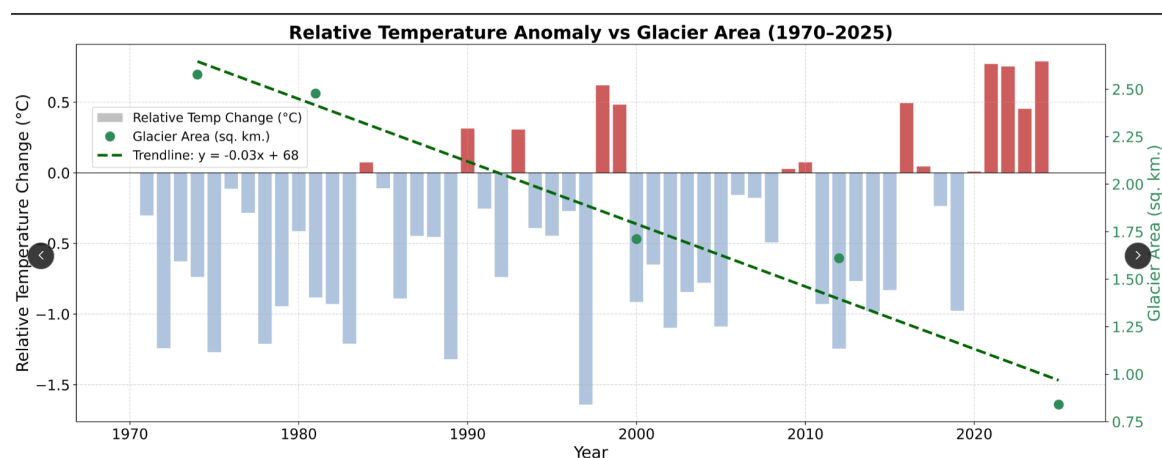


Figure 4: Trend of Yala Glacier area change compared to Temperature data (1970-2025) at mean ELA 2012-24, highlighting a significant increase after 2000. This shows rise in temperature as the main driver for area change.

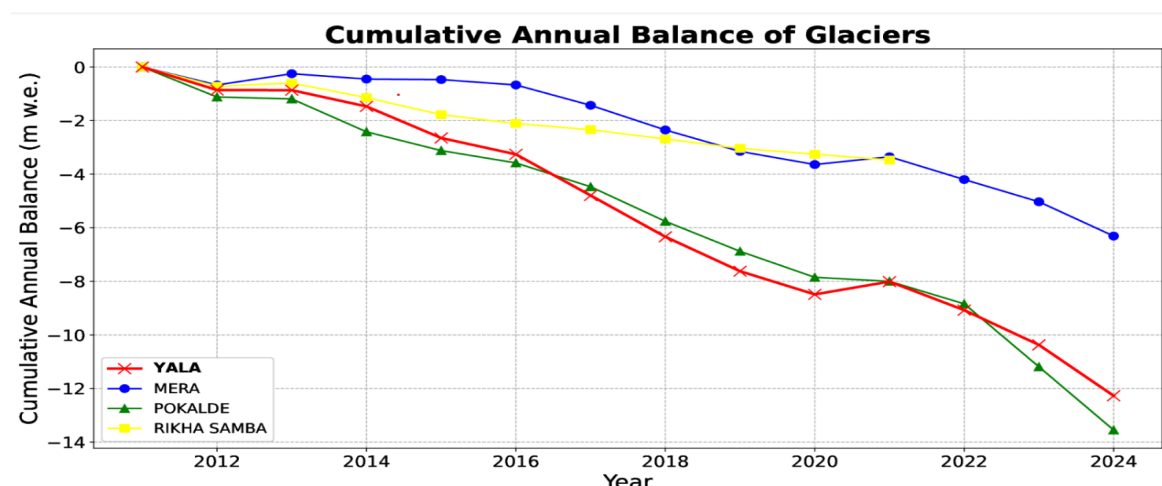


Figure 5: Records of Glacier melt trend in Nepal from 2011 to 2025 based on mass balance data. Data for Mera and Pokalde are sourced from the World Glacier Monitoring Service (WGMS, 2025).



Yala Glacier over the years. 1980 (L- Koji Fujita) and 2024 (R- Sharad Joshi)

Yala is retreating fast under accelerating climate change

The glacier lost significant ice mass of -0.87 and - 1.90 meter water equivalent in 2011/12 and 2023/24 , respectively . The Equilibrium Line Altitudes (ELAs) reached 5454 and 5552 meters above sea level, while the Accumulation Area Ratios (AARs) dropped to just 28% and 7%, in 2011/12 and 2023/24, respectively (Fig 6), indicating that very little snow remained to compensate the large melt in ablation area (ridge).

The glacier-wide mass balance trend has been extrapolated using a gradient derived from field measurements. Over the past 13 years (2012–2024), the glacier lost an average of - 0.94 meter water equivalent – roughly equivalent to a meter thick blanket of ice from the glacier surface - per year.

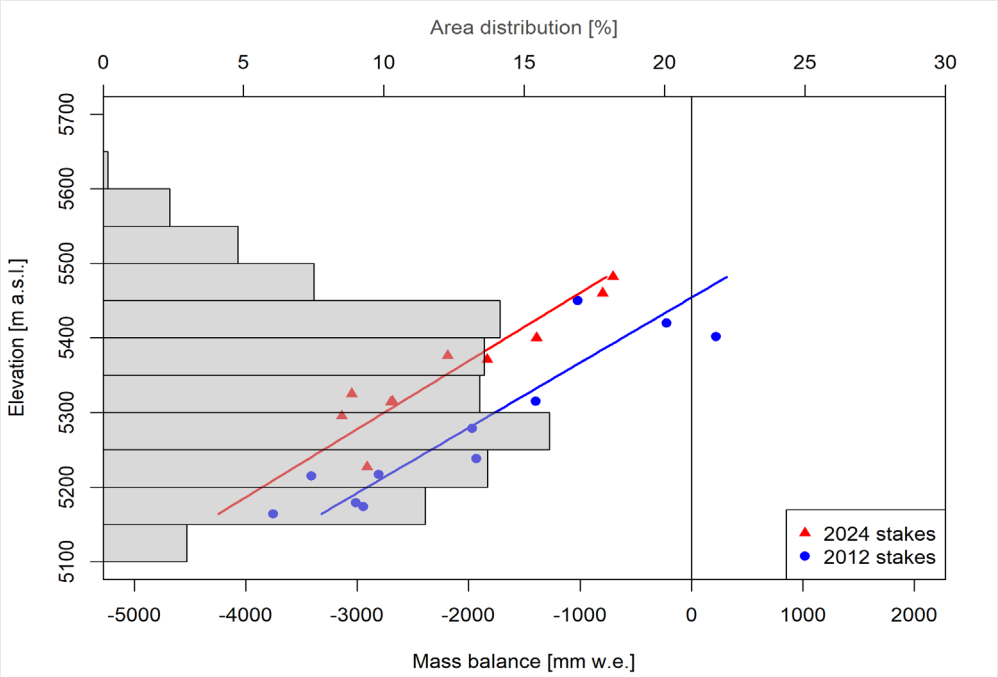


Figure 6: Glacier mass balance versus elevation for 2011/12 and 2023/24 shows mass loss (net balance) for two hydrological cycle 2012 and 2024. The red and blue dots and lines on the graph represent stake locations and trends for 2012 and 2024, respectively.



The Yala glacier’s terminus (edge) has been retreating for decades. Between 1974 and 2000 the retreat was estimated at 6 meters per year retreated vis-à-vis about 14 meters annually over steep terrain from 2000 to 2012. While the retreat slowed down to 5 meters per year across flatter ground after 2012, it again escalated to 16 meters per year between 2016 and 2021, with an estimated additional retreat of 326 meters of ice cover.

The glacier is flowing more slowly now than it did in the 1980s and 1990s, and there are visible surface changes like deepening depressions, signalling that the glacier is becoming thinner and weaker.