

# Glaciers in the Hindu Kush-Himalayas

## New Inventory and Data Released



ICIMOD

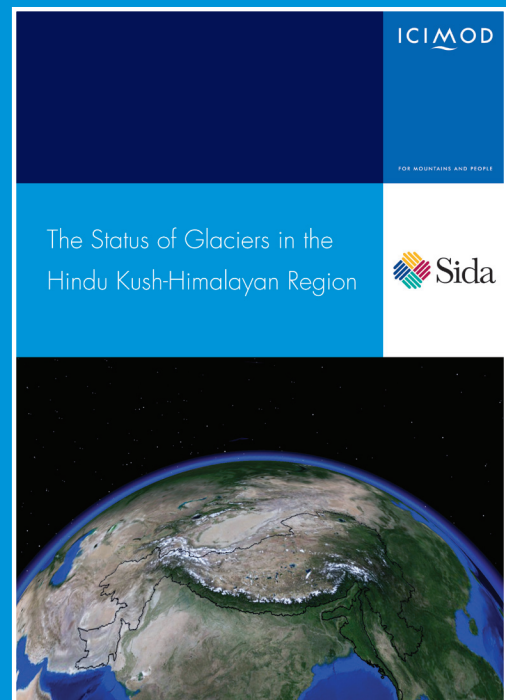
FOR MOUNTAINS AND PEOPLE

A new report released in December 2011 by the International Centre for Integrated Mountain Development (ICIMOD) offers the first consistent and comprehensive account of the glacier coverage of the entire Hindu Kush-Himalayan region. The study used a standardised methodology based on analysis of satellite images to prepare an inventory of glaciers in the ten major river basins and large interior basin of the region. The Mountain Geoportal has been set up to provide easy access to the data and analyses.

### The glacier study

The cryosphere plays a significant role in the regional climatic system and is a sensitive indicator of global climate change, but to date there has been a marked lack of consistent, long-term information on glaciers and snow cover in the Hindu Kush-Himalayan region to support assessments and analysis. The new report provides consistent datasets at the regional level based on a standardised analysis of satellite images (Landsat ETM+) from around the year 2005, in combination with Shuttle Radar Topography Mission (SRTM) digital elevation models and the use of a consistent semi-automated methodology. The data are analysed for the major basins and their sub-basins. Glaciers were analysed for area, elevation range, slope, and aspect. Elevation range and hypsometry are important indicators of the sensitivity of glaciers to changes in temperature.

In addition, 28,500 glaciers with a total area of 32,000 km<sup>2</sup> were analysed for debris cover, morphology, and hypsometry. Debris cover plays an important role as it has an insulating effect and reduces melting rates. Nearly 10% of the analysed glacier area had debris cover, generally found on the tongue of flatter valley glaciers (average slope 12°). The average slope of clean ice areas was 25°.

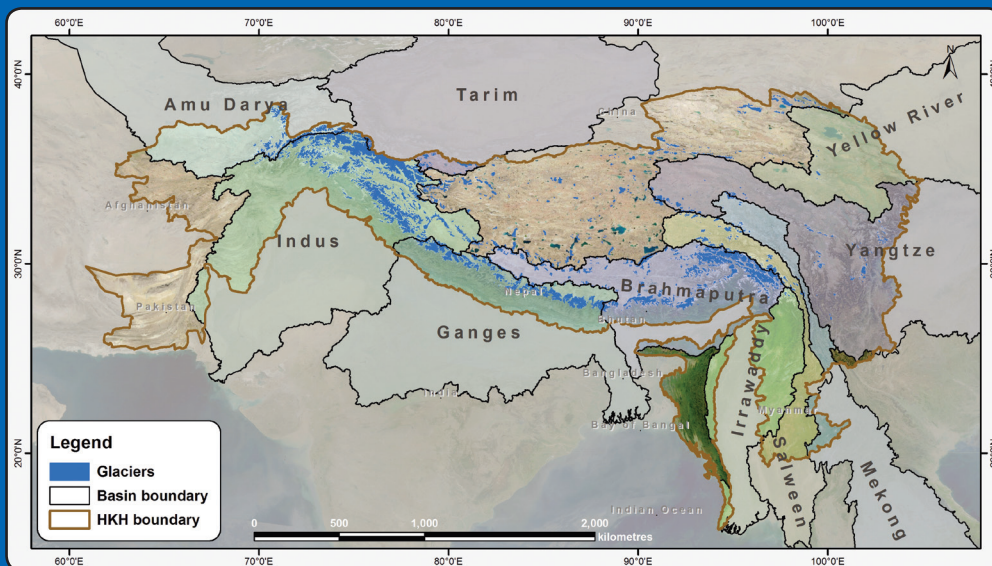


### The Hindu Kush-Himalayan Region

The Hindu Kush-Himalayan region spreads over 4.2 million km<sup>2</sup> in the eight countries of Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan. The meltwater from snow and ice feeds ten large river systems: the Amu Darya, Brahmaputra, Ganges, Indus, Irrawaddy, Mekong, Salween, Tarim, Yangtze, and Yellow River. The river basins cover an area of about 9 million km<sup>2</sup>, of which 2.8 million km<sup>2</sup> lie within the Hindu Kush-Himalayan region. All the river basins have glaciated areas, as do all the countries of the region except Bangladesh.

### New Figures on Glaciers in the Hindu Kush-Himalayan Region

- **Number of glaciers (>0.02 km<sup>2</sup>):** 54,252
- **Glaciated area:** 60,000 km<sup>2</sup>
- **Estimated ice reserves:** 6,100 km<sup>3</sup>
- **Average glacier size:** ~1.1 km<sup>2</sup>
- **Largest glacier:** Siachen glacier, Karakoram mountains, Indus basin, 926 km<sup>2</sup>
- **Lowest glacier terminus:** 2,400 masl (Indus basin)
- **Highest glacier terminus:** 8,800 masl (Ganges basin)
- **Largest glaciated area concentration:** 5,000–6,000 masl



The glaciers of the Hindu Kush-Himalayan region

## Glaciers and glaciated area in the major basins of the Hindu Kush Himalayan region

Basin	Basin area within HKH (km <sup>2</sup> )	Number of glaciers	Glaciated area (km <sup>2</sup> )	Estimated ice reserves (km <sup>3</sup> )	Average glacier area (km <sup>2</sup> )
Amu Darya	166,686	3,277	2,566	162.61	0.78
Indus	555,450	18,495	21,193	2,696.05	1.15
Ganges	244,806	7,963	9,012	793.53	1.13
Brahmaputra	432,480	11,497	14,020	1,302.63	1.22
Irrawaddy	202,745	133	35	1.29	0.27
Salween	211,122	2,113	1,352	87.69	0.64
Mekong	138,876	482	235	10.68	0.49
Yangtze	565,102	1,661	1,660	121.40	1.00
Yellow	250,540	189	137	9.24	0.73
Tarim Interior	26,729	1,091	2,310	378.64	2.12
Qinghai-Tibetan Interior	909,824	7,351	7,535	563.10	1.02
<b>Total</b>	<b>3,705,721*</b>	<b>54,252</b>	<b>60,054</b>	<b>6,126.85</b>	<b>1.11</b>

\*An additional 486,725 km<sup>2</sup> non-glaciated area lies outside the basins.

## Outlook

The report and the database represent a significant first step in filling the gap in information on the glaciers of the Hindu Kush-Himalayan region. The database is expected to support regional level assessments and the development of strategies and policies in the context of climate change. It will also contribute to increased understanding of the impacts of climate change on glaciers and the implications for the mountain ecosystem and for water availability in the downstream countries.

ICIMOD intends to develop the information base further through regional cooperation and promotion of sharing and exchange of data and information at the international level. The data will become more precise as more reliable information becomes available from in situ investigations and mass balancing studies.

## The Status of Glaciers in the Hindu Kush-Himalayas

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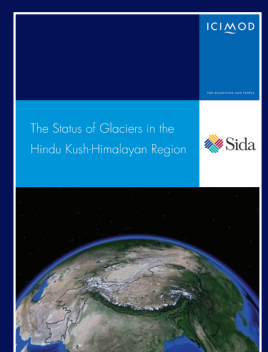
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