

## Asia's Water Tower in Peril

### Introduction

Asia's 'water tower' refers to the Himalayas and the Qinghai-Tibet Plateau region. The Himalaya-Qinghai-Tibet Plateau glaciers feed the headwaters of Asia's seven major freshwater rivers. These rivers include China's Yellow and Yangtze rivers, as well as India's Ganges, Brahmaputra, Mekong, Salween, and Indus. Climate change is causing the glaciers that feed these rivers to melt at an unprecedented rate.



**Glacier at Mt. Everest**

© Greenpeace 2006/Dai Zheng

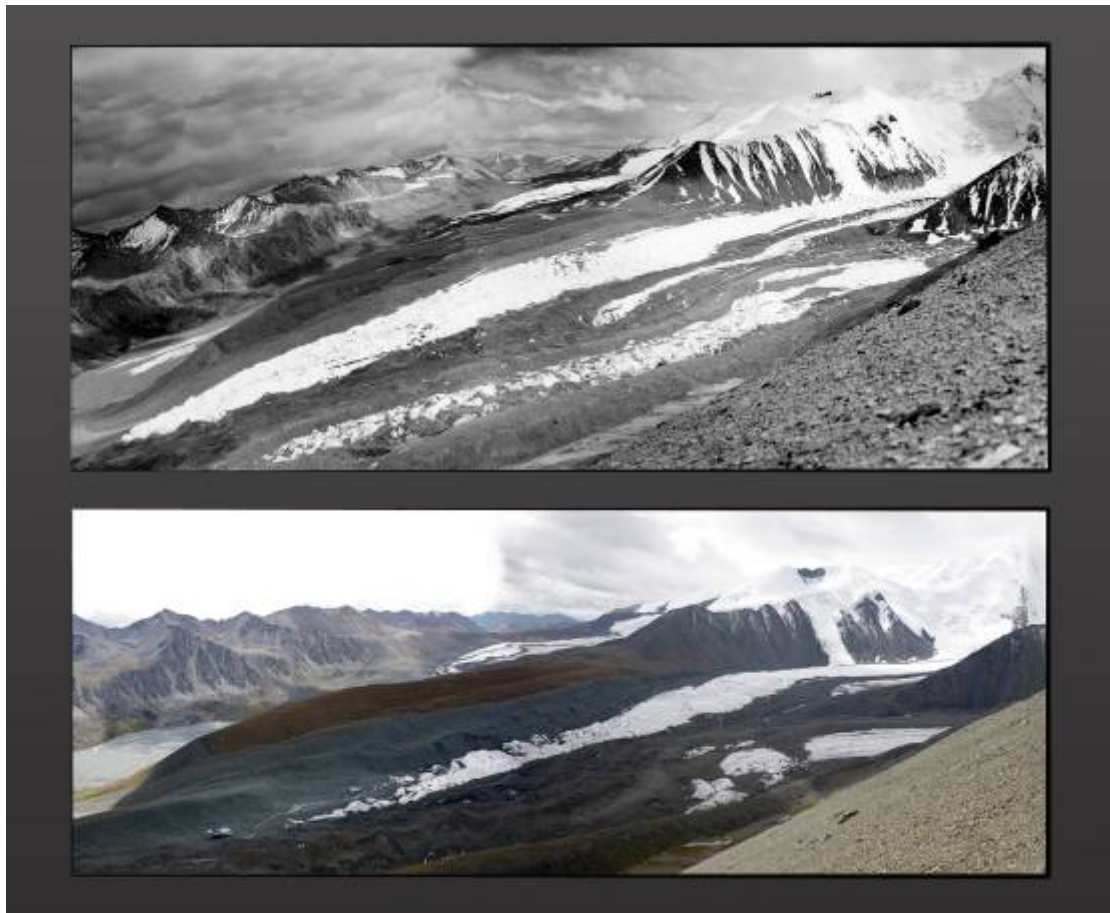
The Qinghai-Tibet Plateau's glaciers and lakes provide 8.6 million cubic meters of fresh water to Asia each year. If these glaciers disappear, it will jeopardize the water supply for 1.3 billion people, including 900 million people in China and India alone.

For example, more than half of the water in the Yellow River originates from the Qinghai-Tibet Plateau. In India, 45% of the flow in the Indus, the Ganges and the Brahmaputra rivers come from the meltwater of the Himalayan glaciers. More than 500 million people live along the banks of these rivers and depend upon this water supply .

“If we do not stop run away climate change, to prevent the melting of the glaciers - our solid water resources – then we are spending our next generation’s water resource.” Wang Xin, glacial lake expert,

## Asia's disappearing water tower

According to the Chinese Academy of Sciences, the 1990s were the warmest decade in the last one thousand years. Satellite data show that 82.2% of the glaciers in western China are retreating<sup>1</sup>. The Himalayan glaciers are melting at a rate faster than recorded for other glaciers anywhere in the world. Projections of glacier retreat in the region (based on IPCC scenarios) suggest that increases in the mean annual temperature for High Asia in the range of 1.0°C to 6.0°C (low to high estimate) by 2100 are likely to result in a decline in the current coverage of glaciers by 43 to 81 per cent.<sup>2</sup> Glacial coverage would be greatly diminished in the Himalayas–Hindu Kush.



**Glacier tongue of Halong Glacier in 1981 and in-2005**

Top: taken by Dr. Matthias Kuhle in June 1981

Bottom: taken by John Novis for Greenpeace in June 2005.

According to the China Academy of Sciences, the impact of climate change is already clear if a comparison is made between the end of the glaciers, the thickness and the debris cover in the two

<sup>1</sup> Liu Shiyin et al, Impacts of climate change to glaciers in Western China, Quarterly Sciences, Sep 2006 中国西部冰川对近期气候变暖的响应, 刘时银等, 2006年9月

<sup>2</sup> Global Outlook for Ice and Snow, UNEP, 2007, p.130

photos. Satellite images were also used to show that the Halong Glacier had shrunk over 400m in length between 1966-2000.

#### **Yellow River source:**

The Yellow River source region has been warming up in the past 50 years, especially in the 1990s. All the glaciers in the region are retreating, at 10 times the speed of the past 300 years.

- Yehelong Glaciers has retreated 1950m (77%) in 1966-2000.
- Since 1966, Yellow River source region has lost 17% of its glaciers (22.74 square km), equivalent to 2.39 billion cubic meters of water.<sup>3</sup>
- Overall precipitation in the river source region has decreased, especially in the 1990s<sup>4</sup>.

#### **Yangtze River source:**

The Yangtze River source region has been greatly influenced by global warming in the past decades. Most glaciers in this area are retreating, which is threatening the ecosystem of the Qinghai-Tibetan Plateau.

- According to the study of Qinghai Geological Survey Institute and China University of Geosciences, glaciers coverage in the Yangtze River source region was 1,051 square km in 2008, 196 square km less than that recorded in the *Source of Yangtze River Zhi*. – equivalent to 989 million cubic meters per annum.<sup>5</sup>
- In 17 years (1969-1986), Yangtze's main source Jianguodirou Glaciers had receded 154m (South glacial tongue) and 125m (North glacial tongue) in length. The glacial tongue has now completely disintegrated into small islands.<sup>6</sup>
- Yuzhufeng glaciers has receded 1500m in length since 1971 (43m / year)<sup>7</sup>
- Gangjiaquba glaciers has receded 750m between 1990 and 2004. (57m / year)<sup>8</sup>

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<sup>3</sup> Ding Yongjian et al, Changes to glaciers in the Yangtze and Yellow River source regions and its impacts on the river flow, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, 2003.长江黄河源区冰川变化及其对河川径流的影响,中国科学院寒区旱区环境与工程研究所, 丁永建等, 2003 年

<sup>4</sup> Liu Jifeng et al, Features of climate and water resources evolution in the Yellow River Basin, China Water Resources, 2009 黄河流域气候与水资源演变特点研究, 刘吉峰等, 中国水利, 2009

<sup>5</sup> Announcement of findings of the Geological, Environmental and Ecological Survey of the Yangtze Source Region长江源区生态环境地质调查项目, February 2009

[http://news.xinhuanet.com/newscenter/2009-02/04/content\\_10760659.htm](http://news.xinhuanet.com/newscenter/2009-02/04/content_10760659.htm)

<sup>6</sup> Yangtze Conservation and Development Report, WWF, 2009, p. 59

<sup>7</sup> Same as 3

<sup>8</sup> Same as 3



### Gangotri Glacier, India

Greenpeace activist holds a photograph of the glacier in 1984. Glaciers in the upper Ganges have shrunk significantly since that time with Gangotri Glacier receding, on average, 34m per year.

### Source of Ganges:

- Source of Ganges, Gangotri glaciers has receded 850m between 1971-1996 (34m / year)<sup>9</sup> It is worth noting that, while the Ganges is less dependent on glaciers melt water than on rainfall, there is increasing scientific evidence to suggest that climate change may also affect the monsoon pattern.<sup>10</sup>

### Water Crisis

The rapid melting of the Qinghai-Tibet Plateau glaciers and other climate change factors will likely affect the seven great rivers. According to a 2007 UNEP report that examines the hydrological role of mountains, glaciers and snow in these river it is likely that increases in seasonal floods but also significantly reduced overall water flow could result. Accordingly during critical times of low rainfall, some 1.3 billion people could be exposed to the risk of increased water shortages<sup>11</sup>. (see Table 1).

Table 1.

Major Asian River Basins Vulnerable to Glacial Melt				
River	Population	Basin Area	Cropland	Dependence on Glacial Meltwater
	Millions	Thousand Square Kilometers	Percentage	
<b>Indus</b>	178	1,082	30	Very high
<b>Ganges</b>	407	1,016	72	High

<sup>9</sup> An overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China , WWF , March 2005

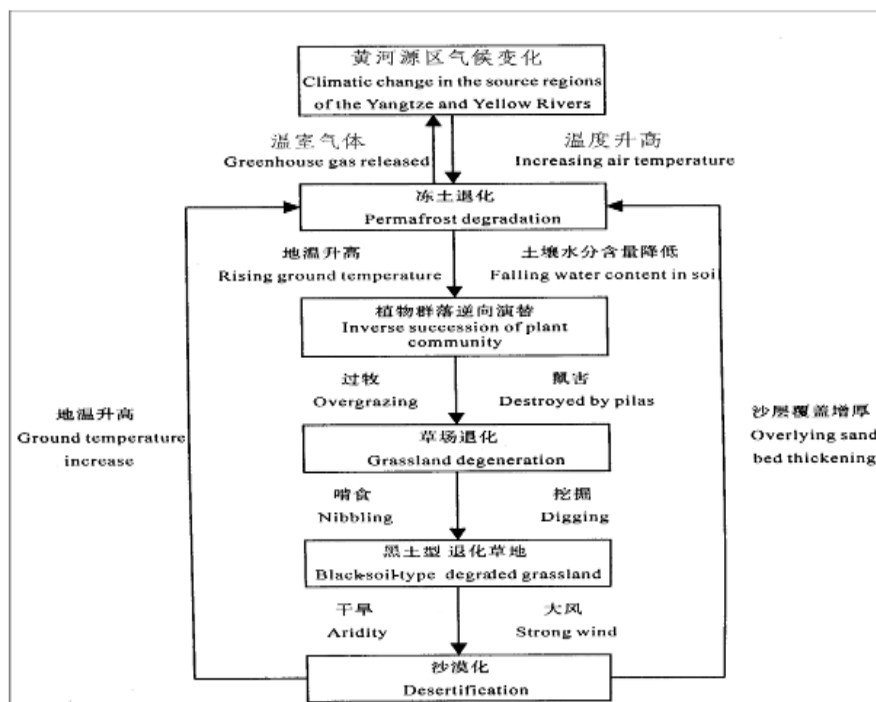
<sup>10</sup> Paul Johnston, Vinuta Gopal, Monsoon Wager, Greenpeace India, 2009  
<http://www.greenpeace.org/raw/content/india/press/reports/monsoon-wager.pdf>

<sup>11</sup> Global Outlook for Ice and Snow, UNEP,2007, p.131

<b>Brahmaputra</b>	118	651	29	High
<b>Yangtze</b>	368	1,722	48	High
<b>Yellow</b>	147	945	30	High
<b>Salween</b>	6	272	6	Moderate
<b>Mekong</b>	57	806	38	Moderate

**Source:** U.N. Environment Programme, *Global Outlook for Ice and Snow*, Nairobi, Kenya. 2007

Also as a result of climate change, lakes shrink, permafrost degrades and soil moisture also decreases. These factors, combined with overgrazing and other development, leads to grassland degradation, rodent plagues, land desertification, and the gradual deterioration of the environment (see Chart 1).



### Climate refugees

Climate refugees are people whose livelihoods have been destroyed by climate change impacts. Climate refugees not only have to struggle for food supply and shelter, but must also deal with cultural displacement issues.



Photo: When a nearby glacial lake burst in 2005, it destroyed most of the grassland in Ze Ba's family farm. Their farm once had included 54 hectares of grassland, 200 yaks and over 1000 sheep. are now totally dependent on state support. Xiadawu Village, Mabi County near the Yellow River Source, Qinghai, China.  
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### **Bearing Witness**

In July 2009, Greenpeace launched its fourth Qinghai-Tibet Plateau expedition traveling to the source of the Yangtze, Yellow and Ganges Rivers. The expedition teams witnessed the impacts of climate change on the local environments and local people.

The two expedition teams both found out that, due to climate change, local residents are being forced to change their lifestyle or even relocate to adapt to the harsh natural environment caused by the glacier retreat, snow havoc, grassland degradation and rampant rodents.



**July 2009, Tuotuo River, Yellow River Source, China**

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Zha Xi – “In the past, there were more than 20 streams formed by the meltwater of the Gladin Glacier. Those streams were flowing down like the space between my fingers. Now there are only seven or eight streams left.”



**Ra Ji, Amne area, the source region of the Yellow River, China**

Ra Ji "Before 2004, my family was one of the richest in the village. We are a family of three and we had 170 cattle and 480 sheep. After an avalanche, our ranch was destroyed. We had to go into debt and had to sell all our cattle and sheep. We still owe the bank money. "

"For herdsmen, water is as important as life. Without water, cattle and sheep could not drink. Without cattle and sheep, we won't have milk, butter, yogurt, milk tea, and cow dung for winter heating. With less water, what shall herdsmen do in the future?"



**June, 2009 – Ganges source, India, portrait of Swami Sundaranand, a Hindu sadhu or 'holy man'**

He said: "The glacier has been sick for a long time. Especially in the last 20 years, it has been changing rapidly. The holy river became smaller from its beginning. It keeps reminding me how terrifyingly spectacular it was in old days."

## **Greenpeace demands**

The adverse climate impacts are threatening the lives of more than one billion people in Asia and the economic development of the Asian countries. Greenpeace calls on the leaders of China and India to take immediate action to fight climate change.

[www.greenpeace.cn](http://www.greenpeace.cn)

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