FIELD VISIT TO SUN/BHOTE KOSHI FOR THE CLIMATE REALITY PROJECT

23 JANUARY 2012, MONDAY

Background

Poiqu/Bhote Koshi is a tranboundary basin between the Tibet Autonomous Region of China and Nepal. The basin is located between latitudes 26°37' and 28°32'N and between longitudes 85°43' and 86°18'E (Figure 1). The total basin area is 3,393.7 km^2, where 2,006.5 km^2 (60%) is in China and 1,387.2 km^2 (40%) in Nepal. The only highway linking Nepal and China (called the Arniko highway in Nepal) passes through this basin and is aligned along the Poiqu/Bhote Koshi River. The Poiqu River originates from the northwestern slope of Laptshegang Mountain in Tibet. The highest elevation in this basin is 8,012 m a.s.l. at Xixiabangma and the lowest is 620 m a.s.l. at the river outlet near Dolalghat, Nepal. After the river enters the territory near Liping, the river is named Bhote Koshi. A small tributary named Sun Koshi converges with Bhote Koshi near Barabise. Thereafter, the river is called Sun Koshi.

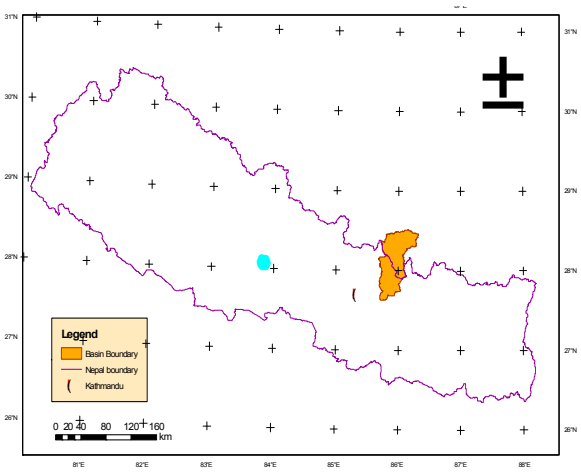

Figure 1: Location of Poiqu/Bhote Koshi basin

Rainfall in the Basin

The Poiqu basin is located on the leeward side of the Himalayan range. The mean annual precipitation in the Chinese part at Nialamu is around 700 mm and at Dingri is about 300 mm. The precipitation is considerably higher at the southern side of the Himalayas in the Nepalese part of the basin. The annual rainfall in the Nepalese part of the basin ranges from about 1,300 to 4,100 mm.

Status of Glaciers and Glacial Lakes in the Basin

The Tibetan side of the basin is heavily glaciated, while the Nepalese side has very little glaciated area. In 2000 glaciers covered 231.58 km^2 – 7% of the whole basin and 11.5% of the Tibetan part of the basin. In 1988, the area covered by glaciers was 243.86 km^2. This suggests that the glaciers in the basin had shrunk by 5% in 12 years. The rapid deglaciation in the basin has resulted in the formation and growth of several glacial lakes. In 1988, there were 119 glacial lakes in the basin, covering 13.42 km^2. By 2000 the number had grown to 139 and the area of the lakes had increased to 16.39 km^2. This is equivalent to 18% growth of the lake area in 12 years. According to an ICIMOD analysis, there are 9 potentially dangerous glacial lakes in the basin (Figure 2). Temporal analysis of glaciers in this

Figure 2: Major glacial lakes and identified potentially dangerous lakes in the Poiqu basin

basin shows that the number, area, and ice reserve are in a declining trend but the number of glacial lakes and their area are increasing. This clearly shows that the risk of glacial lake outburst flood in Bhote Koshi/Sun Koshi is likely to increase in the future.

Flash Floods in the Basin

The basin has already experienced 3 glacial lake outburst floods (GLOFs) in the past.

The first event occurred in 1935 when Tara Co Lake burst out. This event damaged a wide area devoted to agriculture and livestock in the basin, mainly in the headwaters close to the lake. Because of debris deposit there is no cultivation in the valley just downstream of the lake.

In 1964, Zhangzangbo Lake burst out. It was perhaps a partial outburst because of piping in the moraine dam. It did not cause remarkable damage. The same lake experienced an outburst on 11 July 1981. This GLOF caused significant damage, mainly in the Nepal part of the basin. The GLOF lasted for about 1 hour. The flood swept away 5 people, 41 houses, many water mills, and 2 highway bridges, including the Friendship Bridge at the China-Nepal border. In addition, 191 people were injured and 47 houses, 10 suspension bridges, and 8 culverts were damaged. The diversion weir of the Sun Koshi hydropower plant in Nepal was severely damaged by the GLOF. The total damage in Nepal amounted to about US$ 3 million.

Remnant of a bridge destroyed by the 1981 Zhanzanbo GLOF alongside the bridge constructed after the GLOF

Apart from GLOFs, the basin is frequently affected by intense rainfall floods. One such flood occurred on 30 June 1987 and caused severe damage to the Arniko highway. There have also been many landslide dam outburst floods (LDOFs) in the basin. The Bhairabkund LDOFs of 1996, 1998, and 1999 and the Devisthan Khola LDOFs of 1999, 2002, and 2005 are some example of LDOFs in the basin. The most remarkable LDOF event in this area is the Larcha LDOF of 22 July 1996. Consequent outburst of the dam caused flood and debris flow which wiped out Larcha village; 22 houses were washed away or damaged and 54 people were killed in a matter of a few minutes. The loss of lives was high because the event occurred around midnight. The flood also damaged 150 m of the Arniko Highway.