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Possibility of the glacial lake outburst floods in the Hongu Valley, eastern part of Nepal

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During the past several decades in the Mt. Everest and Makalu-Barun national parks of Nepal, 24 new glacial lakes have formed and 34 major lakes have grown substantially as a result of climate change and regional warming trends (Bajracharya et al. 2007). Recent satellite analyses have suggested that at least 12 of the new or growing lakes within the Dudh Kosi watershed, 9 of which are located in the remote Hongu valley of Makalu-Barun National Park, are "potentially dangerous" based on remote sensing that documented their rapid growth over the past several decades (Bajracharya et al. 2007; Watanabe et al. 2009). However, in spite of the large amount of national and international media attention recently generated by these new and/or growing lakes, relatively little was known about these lakes because of their extreme remoteness and difficulty of access.

Chamlang Pokhari, listed as West Chamlang in Table 1 by Bajracharya et al. (2007), was considered by many to be a "dangerous" lake based on satellite image analysis. It is also considered to be dangerous by local people as well. While it was observed that there is indeed considerable overhanging ice above the lake that could be dislodged and cascade into the lake that in turn caused a surge, the length and surficial roughness of the region between the lake and the terminal moraine (i.e., the region below the meltwater ponds that can be seen to the left) suggests that any surge would most likely be buffered and repelled.

In 2009 we carried out intensive investigation on the Chamlang Pokhari at the western foot of the Peak Chamlang in the remote Hongu valley of Makalu-Barun National Park of East Nepal. Geomorphological observations and bathymetric surveys at around the Chamlang Pokhari were carried out in November 2009 during the ice-melted period. The depth was confirmed continuously on an line using echo sounding with GPS positioning.

The bathymetric map shows that the current lake is about 550 m in width (north-south) and about 1,650 m in length (east-west). The lake was most probably very small in 1962 when a climbing expedition team from Hokkaido University scaled the summit of Mt. Chamlang. The lake area shown on the Schneider map (surveyed between 1955 and 1974) is roughly one-sixth of the current area. The bathymetric survey indicates that the maximum water depth is 87 m.

A survey around the terminal moraine was also carried out to reveal seepage of lake water from the moraine. The result showed that the glacier ice was grounding. The ice cliff at the terminus was in continual contact with lake water, and had drifted due to valley winds passing over the lake.

Keywords: glacial lake outburst flood, Nepal Himalaya, bathymetry, Makalu-Barun national park, Chamlang