



## **Outburst Floods and Morphology of Colonia and Baker Rivers, Patagonia**

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Rio Colonia, a large gravel-bed braided tributary of the Baker River draining from the Northern Patagonia Icefield has experienced a new cycle of outburst floods starting in April 2008. Since then, 7 events occurred (7 Apr, 8 Oct, 21 Dec 2008; 5 Mar, 16 Sep 2008; 5, 20 Jan 2010; and 5 Mar 2011). The sudden draining of approximately 200 m<sup>3</sup> from glacier-dammed Cachet 2 Lake results in a 3-5 fold increase in discharge in Baker River, Chile's largest river by volume of drained water.

Suspended sediment concentration also increases 8-fold and sediment load 10 to 20-fold. As a result one single event contributes almost 5% of the annual load. Meanwhile base line studies for an approved US\$7 billion hydropower project don't consider these new dynamics and the possibility for a change in hydrology and geomorphology.

The braided Colonia River have been surveyed in the last years through topographic DGPS monitoring and suspended sediment concentration, with particular focus on the confluence with the Baker.

Changes in the morphological configuration of the braided river between the pre- and the post- outburst floods cycle have been assessed through remote sensing. Aerial and satellite images were used to collect data on the number of branches, gravel bar presence and dimensions, vegetation patch number and area, width of the Baker and riparian vegetation downstream from the confluence. In particular, ASTER visible and near infrared bands with a resolution of 15 m have been used to compute the NDVI parameter and land cover has been classified in bare soil, sparse and dense vegetation. Preliminary results show that vegetation cover decreased in the last 3 years, with a simultaneous increase of the number of branches. Larger changes have been observed in the confluence area, where the deposition front advanced by several meters.

These repeating events are an ideal opportunity to study the effect of very large floods on the sediment dynamics, in addition to being highly relevant to the hydropower generation planning and future energy management in Chile.