

Reconstructing hydroclimatic variability of the Bermejo River (Subtropical Andes of Argentina-Bolivia) through Archival Documents – 17th to 20th centuries

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The purpose of this paper is to use climatic history for contributing to the general objectives of the IAI -CRN II-047 Project. It will reconstruct, from archival documents, the hydroclimatic variability occurring in the high basin of the Bermejo River during the last centuries and its effects on the floods and swellings in the middle basin. The Río Bermejo in the Southern Andes, is a binational (Argentina-Bolivia) river that contributes the largest proportion of the sediment load to the La Plata basin. Its headwaters are in the Subtropical Andes, near Tarija, Bolivia (22°00'14"S, 64°57'38"W). The main headwater tributaries are the Río Grande de Tarija, in Bolivia and the Iruya and San Francisco Rivers in Argentina. When the river abandons the mountain and turns eastwards (Gran Chaco), it acquires the characteristics of typical lowland rivers, widens its course, and occupies a large, low sedimentary plain with vast floodland areas. Quite often during very high sediment discharge the main river avulses and changes its course, creating big alluvial plains that are occupied for many years.

Administrative documents from the colonial and republican periods have provided useful information to reconstruct climate and hydrology of the region. Documents from the Archivo General de Indias in Seville, Archivo Nacional de Bolivia and Archivo General de la Nación (Argentina) have been used to identify extreme floods and swellings in the high and middle-basin of the Río Bermejo from the 17th century to the first decades of the 20th century. Old maps of the region, reports from annals, chronicles, priests' and travelers' descriptions were also used. Diaries written by the military, explorers and government officials in charge of discovering and taking possession of the territory also provide important sources of information. The archival documents show abrupt hydrological changes in response to the climatic fluctuations in the headwaters region. These records document extensive periods of drought followed by periods of abundant precipitation that have led to changes in the river course, mainly during the 1870s. More than 20 distinct floods, low water periods and droughts have been identified between 1800 and 2000. The extent of floods and changes in the river course have been mapped most detailedly for the 19th century. There is historical evidence suggesting that flood events have increased in frequency and intensity during the last century. Finally, we have compared the results with other historical reconstructions of streamflow from the Andes region as the Sali-Dulce River (Tucuman) and the Mendoza River.