

## AGE, PEAT ACCUMULATION AND DEVELOPMENT OF BOFEDALES IN THE PUNA ZONE OF THE CHILEAN ALTIPLANO

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Wetland systems, locally referred to as bofedales, are distinctive features of the high-elevation puna grasslands in the Altiplano of central Andes. A "moist puna" zone with an average annual precipitation of 1200 mm occurs in Ecuador, Peru and northwestern Bolivia. Farther south, a "dry puna" with annual precipitation of about 500 mm extends from southern Peru to western Bolivia, northern Chile and northwestern Argentina. A "desert puna" occurs at the extreme southern part of the Altiplano in Chile and receives no more than 150 mm of precipitation annually. We have been involved in studying the age, origin and developmental history of bofedales in the dry and desert puna zones of the Chilean Altiplano.

Bofedales are soligenous peatland-open water wetland complexes. We have studied one representative system in the National Park Nevado de Tres Cruces, about 150 km east of Copiapo, Chile. The wetland is characterized by *Oxychloe andina* and *Patosia clandestina* (Juncaceae) with *Calandrinia affinis* (Portulacaceae), *Nastanthus caespitosus* (Calyceae) and *Arenaria rivularis* (Caryophyllaceae) in the peatland areas. Aquatic macrophytes such as *Potamogeton strictus*, *Myriophyllum quitense* and *Ranunculus* sp. occupy open water areas. *Deyeuxia* sp., *Deschampsia* sp. and *Hordeum* sp. occur in mineral hypersaline wetland soils at edges of the wetland. Eight cores of sediment and peat were collected along a 1.75 km longitudinal transect on the downslope of the wetland. Maximum depths were 3.6 m. Organic matter began to collect in the wetland basin 1800 to 1000 cal. yrs. at a time when climate is thought to have been more humid than present which fostered the growth of riparian *Oxychloe-Patosia* cushion plant communities. Rapid horizontal accumulation and lateral expansion of the riparian plant community continued and eventually spread over open water in topographic depressions during a period when climate progressively became more arid. When cumulative mass of organic matter is converted to mass of carbon per unit volume to estimate longer term and recent rates of carbon accumulation, values of 80-300 g C/m<sup>2</sup>/yr are obtained for the former and values of 440-1000 g C/m<sup>2</sup>/yr are obtained for the latter. These estimates of carbon accumulation are at least one order of magnitude higher than comparable values for peatland systems in the northern hemisphere. We attribute such rapid accumulation rates to any one or combination of factors such as the extreme cold and anoxic environmental conditions that may not be conducive to "normal" decay processes.

We are currently studying a second bofedales system farther north in the dry puna zone, east of Iquique, Chile. Over 10 m of peat, including 6 m of peat with sand lenses throughout, 4 m of sand gravel and clays with a marl layer, have been deposited in the last 8600 radiocarbon years. Stratigraphic information and radiocarbon ages show a complete record of Holocene climates and history of bofedales development in this region. Work in this second region compliments our work on bofedales in the desert puna zone in the southern part of the Chilean Altiplano.