Mendoza and Lower Tunuyán river basins at a glance

Overview – The Northernmost watershed of Mendoza province in Argentina encompasses the drainage basin of the Mendoza and Lower Tunuyán rivers. These provide water for the city of Mendoza and its surrounding irrigated lands, composed of vineyards and other crops. The basin provides approximately 60 percent of the water demand in Mendoza province. (1). Global climate change has reduced streamflow from snowmelt in the Andes and heightened groundwater stress as societal water needs grow. Adapation strategies are needed.

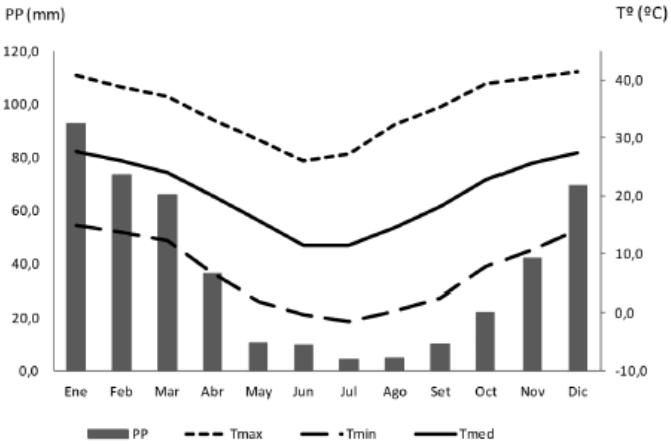
Geographic and climatic features –The Mendoza and Lower Tunuyan basins are located at approximately 33 degrees south, 69 degrees west. Average annual rainfall in Mendoza province is 180 mm, of which little falls during the winter. Summer temperatures range from 18.4 to 32 *C, and winter temperatures from 2.4 to 14.7 *C (National Meteorological Service averages 1971-1990). Mendoza province is generally considered to have three watersheds. Its North Basin drains the Mendoza river and the lower Tunuyan river. This North Basin suffers the worst water balance because it encompasses the capital city of Mendoza and much periurban agriculture and industry (1). The Mendoza river oasis provides groundwater for the departments of Godoy Cruz, Guaymallen, Las Heras, Lujan de Cuyo, Maipu, Lavalle and Capital. The Lower Tunuyán river oasis provides groundwater to the departments of Junín, La Paz, Rivadavia, San Martín y Santa Rosa (2).

Hydrologic features – Both the Mendoza and Tunuyan rivers originate in the snowcapped Andes mountains. After flowing eastward to the city of Mendoza, the Mendoza river bends north. The Tunuyan bends north to then curve south-east away from Mendoza city. Groundwater is found entirely in quaternary deposits of the intermontane valleys and the eastern plains. In the first case, subterranean water is bounded by formations of resistive bedrock and where this doesn't occur, by tall structures of low-depth bedrock (2).

Socioeconomic features – The total demand of water in the basin amounts to 2170 cubic hectometers per year, of which 91.5% is used in irrigation (1). Drinking water accounts for 7.3% of water demand and is drawn exclusively from groundwater. Between 1-3% of demand is industrial. Viticulture is an extremely important and growing industry in Mendoza, accounting for approximately 15% of the state's GDP in 2010 (1). The wine industry depends not only on irrigated grapes but also water for the winemaking and bottling process. Approximately half of industry in Mendoza province is dedicated to food and beverage processing, of which wine accounts for half. Use by wineries ranges from 1.5 liters of water per bottle of wine among "sustainability" focused wineries to 20 liters of water per bottle. (1)

Institutional features –

By the 1916 Constitution of Mendoza province, water administration is public, not private. The Departamento General de Irrigacion (DGI), or General Irrigation Department, presides over all water use in the province (3). Water user association representatives form an intermediary representative body beneath the executive administrative offices, headed by one subdelegate for each of the five river basins in the province. The lower Tunuyan river and the Mendoza river count as separate basins under DGI structure. Water user fees paid through water user associations from each basin finance the administrative structure. Argentina's water sector was privatized during the presidency of Carlos Menem in the 1990s, which has caused increased legislative conflicts. An ongoing project funded by the Inter-American Development Bank ($800,000) aims to restructure water and sanitation in Mendoza Province through privatization of operations and strengthening of public sector regulatory capacity (www.idb.org). DGI is actively adapting its strategies to best manage future water use (4).



Average monthly precipitation (mm) and temperature (*C) for the City of Mendoza, 1971-1996 (Kielo 2012).

Current challenges – **Climate change** poses grave threats to the sustainability of water resources in the Cuyo region of Mendoza. A DGI prognosis for the current year (2014-2015) shows that snow cover from the winter has been absent below 4,000 meters of elevation. The predicted Mendoza river load for 2014-2015 is 930 hm3, is less than 65 per cent of its historical flow averages. (5). In years of water scarcity the deficit of surface water is supplemented through the exploitation of groundwater, yet uncontaminated groundwater is limited and competition may arise between sectors. As of 2004 the index of **hydrological stress** in the Mendoza river basin was 1.560 m3/inhabitant/year, as compared to an the estimated 1.7 m3/inhabitant/year required to ensure quality of life. **Salinization** of groundwater, **pollution** of surface waters, **subsidence**, and **flooding** of agricultural properties by urban runoff all constitute challenges (6). Investment in mining is predicted to overcome regulatory barriers and increase demand for water in Mendoza province (4). An interdisciplinary team of researchers from six countries in the arid Americas is working toward strengthening science-policy dialogue over complex water security challenges in this and other basins (http://aquasec.org).

References – 1. Duek and Fasciolo 2012; 2. Bermejillo et al 2012; 3. Agredano and Bos 1997; 4. DGI 2014b; 5. DGI 2014; 6. UCUYO 2004. Full citations are available at http://aquasec.org. (First page map credits: Left - http://www.politicaspublicas.uncu.edu.ar/articulos/index/hacia-un-aprovechamiento-mas-eficiente-del-rio-mendoza; Right side - http://www.cricyt.edu.ar/)

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