

General information about water in La Paz, BCS Document prepared by Natural History Society Niparajá, C.A.

The La Paz watershed is located in the Municipality of La Paz, in the state of Baja California Sur, Mexico. Situated in the west coast of the peninsula, this watershed drains to the Bay of La Paz in the Gulf of California. The city of La Paz has a population of 222,745 (CONAGUA, 2010; INEGI, 2010) and this aquifer is its only source of water, since there are no important water springs and no perennial streams or natural surface water deposits in this watershed.

The city is facing a severe water shortage crisis stressed particularly by the rapid development of the area and increasing water demand by the population. The population growth has positioned the state of Baja California Sur (BCS) as Mexico's second fastest growing state (3%) in the past years. Furthermore, the aquifer of La Paz is currently overexploited and has severe saline intrusion because of the excess water usage in the City. To exemplify the latter, the theoretic travel time of saltwater intrusion is estimated to be between 150 and 200 m per year (Cruz, et al., Alternativa 71). The aquifer of La Paz is one of the 16 aquifers of Mexico which present saltwater intrusion (CONAGUA, 2011). Moreover, the aquifer has reduced its infiltration capacity due partly to the loss of vegetation in its main recharge area, located in the upper part of the watershed in a mountain chain called Sierras El Novillo and Las Trincheras. This degradation is mainly caused by illegal logging and cattle overgrazing.

As a measure to solve the current water crisis, the local government is building an aqueduct which was expected to be finished between 2013 and 2014, to enable bringing water from an adjacent watershed called El Carrizal. This may solve the water crisis for a couple of years, but conflicts for water may be expected in the near future, since the El Carrizal watershed's main activity is agriculture.

Key information about the watershed:

- The approximate area of this watershed is of 1,417 km². The recharge for this aquifer occurs through rainwater infiltration which falls mainly in Sierras El Novillo and Las Trincheras in the upper Southeastern part of the watershed.
- The main recharge area has reduced its infiltration capacity due to degradation (loss of vegetation and cattle overgrazing).
- The rainfall in this watershed is between 180 to 250 mm/year (Cruz, et al., PPT).
- La Paz aquifer has a fresh water recharge of 18.5 Mm³/year, a saltwater intrusion of 4.5 Mm³/year, and a water extraction of 31.8 Mm³/year (Cruz, et al., Alternativa 71).

- Officially a 2.98 Mm³/year water deficit has been reported (CONAGUA, 2002), but other studies show the imbalance is more significant (from -8.98 to -20 Mm³/year) (CONAGUA, 2001; IPN-CICIMAR/CIBNOR/UABCS, 2002; Dragoo, et al., 2004; Cruz, 2007).

This water shortage is understood by the combination of many factors: The two main ones are the rapid water demand triggered by the population increase and the fact that BCS is the driest state of Mexico.

BCS receives on average only 161 mm of rainfall per year, while the average rain fall in the rest of the country is 760 mm/year (CONAGUA, 2011). The rainy season runs from May to November (85% of the rainfall), although most of them are associated to hurricane events (56% from the total), which result in enormous amounts of rainfall in very short spans of time. In the urbanized areas of the city, this water can't infiltrate so it runoffs to the sea. There is limited storm water management infrastructure in the city. Other factors can be related to the diminished infiltration capacity within the watershed, since all the constructed area has concrete and there are even new developments in recharge areas.

Furthermore, there is a lack of hydraulic infrastructure, a lack of an efficient water consumption measurement, as well as performance deficiencies by the local Water and Sewerage Utility (CCA, 2011). Authorities grant development authorizations without considering water availability and the lack of hydraulic infrastructure for water or sediment retention to enhance the aquifer recharge.

The main recharge area, called Sierra El Novillo and Las Trincheras, is used for cattle grazing, which is causing the loss of vegetation and infiltration capacity of this area. Thus, most of the water simply evaporates or flows to the Gulf.

We firmly believe and have evidence to sustain that there are possibilities to improve the health of this watershed and its aquifer. The water from the aquifer is used in the following percentages: 2% by industrial use, 35% by agriculture and livestock and 63% by urban and domestic activities. This presents several opportunities to improve the water future of this city by restoring the retention and infiltration capacity of the watershed. This could be achieved by improving its natural state (reforesting, building soil conservation works, etc.) and by increasing the awareness of the citizens of La Paz in order to start using water in a more rational and efficient way.

The main challenge we face is a lack of water culture within the population of La Paz and little to none awareness of the need to start rationing water and start using it as efficiently as possible. Furthermore, decision-makers often lack understanding of this problem in all its dimensions, whilst having to face the politicization of water issues and the proposed

solutions. There are no comprehensive studies in the area that recharges the only aquifer that sustains the city. There is also little participation from organized social groups towards promoting dialogue between citizens and government regarding water management issues.

But despite the many water related challenges faced by the city, strong coordinated efforts are being done to try to change this, especially from the NGO sector. One of such efforts is the project called “Water Dialogs”, launched in 2009 by the nature conservation NGO based in La Paz and us. The main objective of the project is to implement an Integrated Water Resources Management (IWRM) approach in the La Paz watershed, which is being pursued by several strategies summed up in 4 main objectives:

- 1.- Key sectors of society changed their behavior regards to water usage and management.
- 2.- There are existing and effective coordinating platforms to achieve an integrated watershed management.
- 3.- There are existing financial mechanisms and support that ensure the participation of stakeholders and environmental services providers, as well as the viability of the activities to achieve a long term integrated management of the watershed.
- 4.- The health, knowledge and wellness of the communities and watershed have substantially increased.

As a result of these strategies several positive changes and projects have been achieved:

- 1.- Water culture and water awareness campaigns: several water related seminars open to the public and stakeholders; development of a school curricula specialized in water issues for students of La Paz.
- 2.- Creation of a Citizen’s Water and Sanitation Observatory for the city of La Paz.
- 3.- Allocation of private and public funding for water and soil conservation projects in the recharge area of the aquifer
- 4.- Implementation and design of water and soil conservation projects in the recharge area of the aquifer; water quality studies in the Los Planes, El Carrizal and La Paz watersheds; toilet exchange program for replacing high usage toilets; implementation of an integrated water saving and water quality program in the State University, with the help of the successful PUMAGUA project of the National Autonomous University of Mexico (UNAM); and restoration of parts of the arroyos that cross the city of La Paz through society’s participation in Tactical Urbanism type projects called Urbanería.



We know there is no single or simple solution to the water problems in the watershed in La Paz but with a coordinated participation at all levels, government, private sector, academia NGOs and citizens; we are on the right path towards finding adequate solutions to face the current situation.