

LOCAL SPOTLIGHT

San Juan Watershed, Monterrey, Mexico—Adapting to extreme hydro-meteorological events



Photo: © Juan Ángel Sánchez de Llanos



The challenge

Monterrey, Mexico, one of Latin America's industrial capitals with a population of over 4 million, is an important economic center for residents and Mexico alike. Unfortunately, the city is positioned in an area that is naturally prone to intense hydro-meteorological events (floods and droughts). Because most (approximately 60 percent) of Monterrey's drinking water supply comes from upstream areas that have been degraded on a recurring basis from land-use change and phenomena such as forest fires and invasive species, Monterrey is one of the top 25 Latin American cities for water risk.

Climate events can be devastating. In 2010, Hurricane Alex cost the state of Nuevo León US\$1.35 billion. Poor land management cannot be solely blamed for these losses, but it plays a role. Deforestation and erosion in the San Juan watershed, alongside rampant and poorly planned expansion of urban areas, can reduce infiltration in recharge zones that, in turn, exacerbates runoff and can contribute to flooding. Future flood events are projected to intensify in the watershed, potentially exceeding the retention capacity of the existing dam that protects the city from high flows.

The year following Hurricane Alex, Monterrey was hit again, this time by a severe drought. The effects of the drought were made worse by the weakened storage and regulation capacity of upstream areas. The scarcity of water ultimately damaged over 50,000 hectares of crops and killed more than 10,000 livestock. Within the first few months alone this resulted in a loss of US\$3 million for Nuevo León, but the severe drought persisted three years, ending in 2013.

In addition to the cycle of extreme weather events that increases risk for Monterrey's residents and its drinking water supplies, five of the six aquifers in the region are already over-drafted. By 2030, the gap between water supply and demand is expected to increase by 33 percent as the state works to meet the needs of an estimated 1.3 million new residents. Almost all of Monterrey's water originates in the San Juan watershed, which means there is a lack of alternative sources to use in dry years. Maintaining reliable base flows through revegetation has become a clear priority and one of several strategies to help the state avoid costly interbasin transfers.

Action and opportunity

The Monterrey Metropolitan Water Fund (FAMM) is a multi-stakeholder platform developed to increase the San Juan watershed's capacity to regulate its water flows. After three years of preparatory work, structural design, feasibility studies and fundraising (mainly through the FEMSA Foundation and The Nature Conservancy), the FAMM recently became Mexico's first legally established water fund.

Over the next 20 years, the water fund will focus its work on a strategically targeted area covering over 124,000 hectares. While this only covers around 5 percent of the San Juan watershed, the areas chosen are highly sensitive and located in parts of the watershed that produce approximately 60 percent of Monterrey's water supply. As such, the water fund activities are expected to help address the water quantity problem for the whole watershed. For example, it is estimated that the water fund's work in the 9,752 hectares of highest sensitivity (8 percent of the potential intervention area) would reduce runoff by 262 cubic meters per hectare per year, whereas if this same landscape were to be continually degraded, runoff would increase by 622 cubic meters per hectare per year (Figure 2.7). Reducing runoff allows more water to infiltrate into the soil, which increases base flows and can reduce moderate flood flows off the landscape.

FAMM already has US\$8 million pledged from the private sector and is currently supported by 60 diverse partners. Four key objectives drive the water fund's work:

- 1. Reduce flooding.** Reduce the amount of water flowing in the Santa Catarina River by up to 750 cubic meters per second during catastrophic rains.
- 2. Improve infiltration.** Contribute to increasing the San Juan watershed's capacity to absorb available water by 20 percent.
- 3. Develop a water culture and raise environmental awareness among the population.** Help the population to understand the relationship between the watershed and the city.
- 4. Develop environmental resources management skills.** Promote an increase in the percentage of federal resources managed that favor the watershed.

These objectives will be achieved through a combination of green and gray infrastructure, including reforestation, firebreaks, erosion barriers, fencing, retaining walls, runoff traps, check-dams, earth dikes and large-scale urban rainwater harvesting areas, along with public awareness campaigns. Although source water protection activities cannot prevent catastrophic flooding or mitigate all impacts from extreme droughts, they have significant potential to reduce the severity of flooding and sustain critical base flows during droughts.

Predicted runoff changes resulting from source water protection activities in the San Juan watershed



Figure 2.7. Model predictions for how source water protection activities can improve base flows and reduce flooding. Each bar represents runoff change due to passive conservation (red), and reduced runoff due to restoration (green) for areas grouped into five levels of sensitivity.

MONTERREY DASHBOARD

Water fund start date

2013

Number of upstream participants to date

30

Number of potential downstream beneficiaries

Between 1,000,000 and 5,000,000

Number of partners to date

More than 60

Primary funding sources

Private
NGO/Foundation
Bilateral/Multi-lateral
Public
Utility

Activities



Anticipated co-benefits

