

Editorial

Tula Basin, the most polluted region in Mexico Cuenca de Tula, la región más contaminada de México

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To be modern is to live a life of paradox and contradiction.¹

Tlalli (Land)

Tenochtitlan was founded in an endorheic basin at more than two thousand meters of altitude, surrounded by mountains in the lacustrine river basin of the Valley of Mexico. Its geographical location explains the water vulnerability of the current Metropolitan Area of the Valley of Mexico (MAVM). The ancient Mexicas implemented systems capable of preventing floods in the city, controlling avenues, and supplying clean water for consumption. Despite knowing the problems of land subsidence, the Spaniards decided to keep the capital of New Spain in that same place. In addition to the geographical location, other profound environmental changes (deforestation, expansion of crops, soil degradation) caused frequent flooding in the city. After the overflows of 1604 and 1607, viceroy Luis de Velasco y Castilla published a call to present projects for a new drainage system in Mexico City. The winning project included the construction of a drainage tunnel and cutting the hills to drain the Cuautitlán River, although its capacity was insufficient, and it failed to drain the required volume of liquid. In 1637 the reconstruction of the Tajo de Nochistongo began in the open to drain Lake Zumpango and direct its waters toward the Tula River. Currently, the flow of wastewater and rainwater from the MAVM is sent to the Tula River through three emission tunnels (East, Central, and West) and the Gran Canal de Desagüe.²

Atl (Water)

The Tula River runs through the State of Hidalgo, is part of the Pánuco hydrological region, and is born from the influx of the Tepeji River with the drainage systems of the MAVM. The flow of the Tula River is controlled by Lake Zumpango and the dams built on the river itself and its tributaries (Endhó, Requena, Rojo Gómez, and Vicente Aguirre). The hydrographic basin of the Tula River is formed by a system of interconnected valleys whose set is known as Valle del Mezquital, where agriculture and livestock constitute the main economic activities. After crossing the Mezquital, Ixmiquilpan, and Tasquillo valleys, it receives other important tributaries to form the Moctezuma River and continues its course through the Pánuco River until it empties into the Gulf of Mexico. The Mezquital Valley constitutes the most prominent agricultural area irrigated with wastewater worldwide. This region –historically associated with the Valley of Death³– receives around 60 m³/s of wastewater from the MAVM and uses 94% of these bodies of water to irrigate 95,000 ha of crops. The basin also receives wastewater from the textile, refinery, cement, hydroelectric industries, and municipal water. These waters have recharged the aquifers and have contaminated the supply sources with fungi, parasites, and pathogenic microorganisms.⁴ The soil irrigated with this wastewater presents changes in the composition of the microbiological communities (fungal and bacterial); it has also accumulated pharmaceuticals, herbicides, antibiotics, antimicrobial resistance genes, and a host of contaminants of emerging concern.⁵ The dams that receive all these tributaries contain high levels of chemical contaminants and heavy metals.⁶

Ehecatl (Wind)

In the Tula atmospheric basin –made up of 12 municipalities with almost half a million inhabitants– a hundred local and federal companies have settled, among which two electricity generation plants stand out (one conventional thermoelectric and one natural gas combined cycle), an oil refinery that produces 25% of the national total of barrels of crude oil, six cement factories, four lime kilns, and various chemical and metal-mechanic industries. The Tula thermoelectric plant generates more than 5 million tons of carbon dioxide (CO₂) and contributes 136 thousand tons of sulphur dioxide (SO₂) annually. After the complex of thermoelectric plants, the Tula oil refinery is the second with the highest polluting emissions within the MAVM. The Tula atmospheric basin is the largest generator of pollutants in Hidalgo; annually, it contributes with 97% of the SO₂, 45% of the PM_{2.5} suspended particles, and 43% of the nitrogen oxides emitted in the state.⁷ One-fifth of the pollution registered in Mexico City is caused by the dispersion of SO₂, PM₁₀, and PM_{2.5} suspended particles from the Tula-Tepeji area. The region does not have enough landfills or spaces for final disposal, so

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some sectors have become open-air dumps. Contrary to all established environmental protection regulations, some companies incinerate municipal solid waste in their facilities.

Tletl (Fire)

The state of Hidalgo has the largest network of tunnels built by organized crime in the country to steal hydrocarbons and gas condensate.⁸ Since 2018, Hidalgo has had the highest number of clandestine intakes and permanent parallel networks to pipelines. In 2021 alone, 4,489 clandestine intakes were located, along 24 tunnels, with a coverage of 609,363 km.⁹ Given that the criminal infrastructure has lighting, ventilation, and non-landslide systems, the hydrocarbon theft value chains have become more complex and sophisticated. Between 2012 and 2015, hydrocarbon leaks or spills caused a 13.5% growth in contaminated areas. Disasters generated by toxic clouds, explosions, and fires cause severe damage to public health with poisoning, injuries, and deaths, in addition to general environmental degradation and irreversible impact on ecosystems.

Xiuhmolpilli (Expiration of a life or justified term of time)

The contamination of water, air, and soil has turned the Tula basin into a practically uninhabitable area. The Endhó dam has been catalogued as "the largest open-air septic tank in the world"; the National Water Commission (CONAGUA) considers the Tula River is the most polluted in Mexico; in 2006, Tula was named by the United Nations Organization as the most polluted city on the planet due to the large number of residual fluids it receives; in 2018 the Federal Commission for the Protection against Sanitary Risks declared the region in a sanitary emergency; in 2019 the Ministry of Environment and Natural Resources declared an environmental emergency in Tula; federal and state authorities themselves have referred to this demarcation as "an environmental hell" and an "ecological hell," respectively.¹⁰

The authorization for the use of wastewater in agricultural production in the Mezquital Valley, as well as the establishment of the industrial corridor in the Tula basin, never anticipated the impact it would have on the environment, fauna, and the health of the inhabitants, mostly Otomi farming families, who have occupied the Neovolcanic Axis since several millennia before the Christian era.

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