

Land use change

We analyzed the change in land use and vegetation in the Upper Atoyac River Basin for the last 50 years.

Net change from 1970 to 2019 (hectares)

Agriculture	-32,993
Forest	-5,576
Water bodies	100
No vegetation	1454
Scrubs	-397
Pastureland	-5392
Hight mountain	-1117
Tular	-35
Secondary forest vegetation	429
Secondary scrub vegetation	-70
Urban	43,595

Diversity and distribution of heavy metals in the river

We found 15 heavy metals that exceeded one or more of the thresholds established by Mexican standards for 2009-2018. The Valsequillo dam is the site with the greatest diversity of heavy metals, both in water and sediments.

33 As Arsenic 74,82160	48 Cd Cadmium 112,411	exceed all norms	
13 Al Aluminum 26,981538	5 B Boron 10,811	56 Ba Barium 137,327	exceed at least one norm
25 Mn Manganese 54,938049	34 Se Selenium 78,96	26 Fe Iron 55,8457	29 Cu Copper 63,546

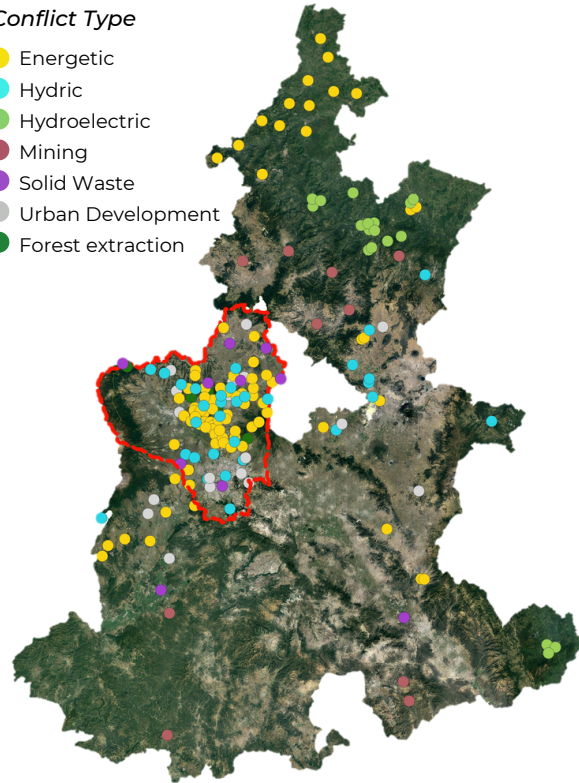
Silva Hernández et al. (2022) Diversidad y distribución de metales pesados en la cuenca alta del río Atoyac. DOI:10.13140/RC.2.2.31197.08160

Socio-environmental conflicts analysis

There are 21 conflicts in the Basin associated to water pollution and availability. We also found 46 more conflicts in the State of Puebla associated to illegal logging, urbanization and highway infrastructure, landfills, gas pipelines, and dispossession.

Conflict Type

- Energetic
- Hydric
- Hydroelectric
- Mining
- Solid Waste
- Urban Development
- Forest extraction



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<https://www.iberopuebla.mx/iima/>

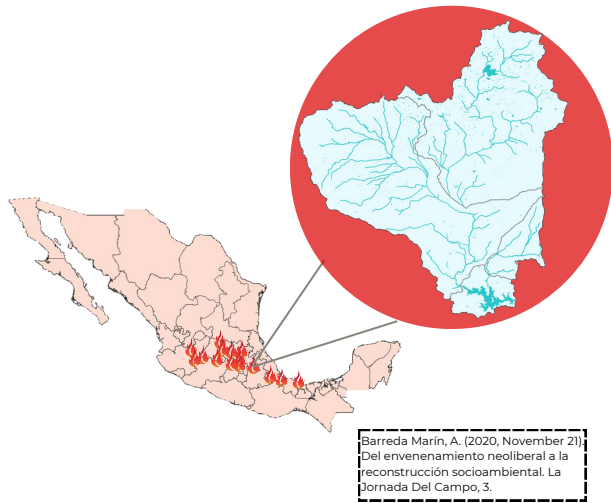
 IIMA Ibero Puebla



Mexico and its environmental infernos

There are 40 regions of the country with extreme levels of water and soil pollution due to industrial activity. There is no official estimate of the number of people affected by environmental risk factors.

The Upper Atoyac River Basin (UARB), located in the states of Puebla and Tlaxcala, is one of them.



Barreda Marín, A. (2020, November 21). Del envenenamiento neoliberal a la reconstrucción socioambiental. La Jornada Del Campo, 3.

Some worrying statistics in the UARB

More than 3 million inhabitants are affected by pollution.

More than 20,400 industrial plants operate in the basin. Most of them discharge toxic substances into the river.

The industries that pollute the most are the textile, automotive and chemical.

Centro Fray Julián Garcés (2017). Propuesta comunitaria para el saneamiento integral de la cuenca Atoyac-Zahuapan.

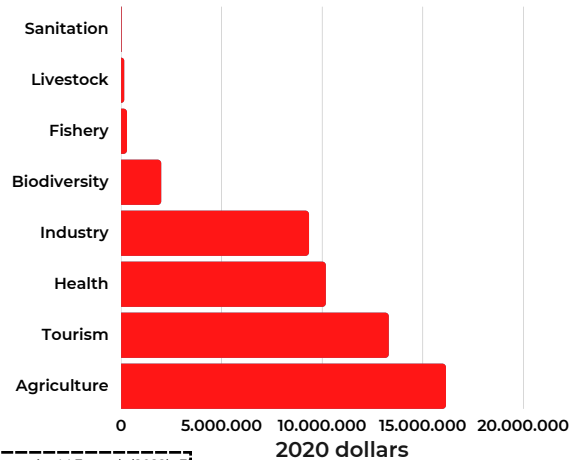
Health and river pollution

Citizen's complaints about the effects on health due to the river's pollution have increased in recent decades. However, as of 2020, there was no government information on the incidence, prevalence, and mortality of Chronic Noncommunicable Diseases (CNCDs) associated with environmental factors, nor on the medical care needs in the territory. Through research in data science we found that mortality from CNCDs have affected significantly in the last 20 years and are responsible for 76% of all deaths. Young people are the most affected and they are dying from a wide variety of CNCDs, including kidney failure and lymphoid leukemia.

<https://conacyt.mx/pronaces/pronaces-salud/ciencia-de-datos-y-salud/enfermedades-chronicas-no-transmisibles-en-la-cuenca-del-alto-atoyac/>

Economic valuation of river pollution

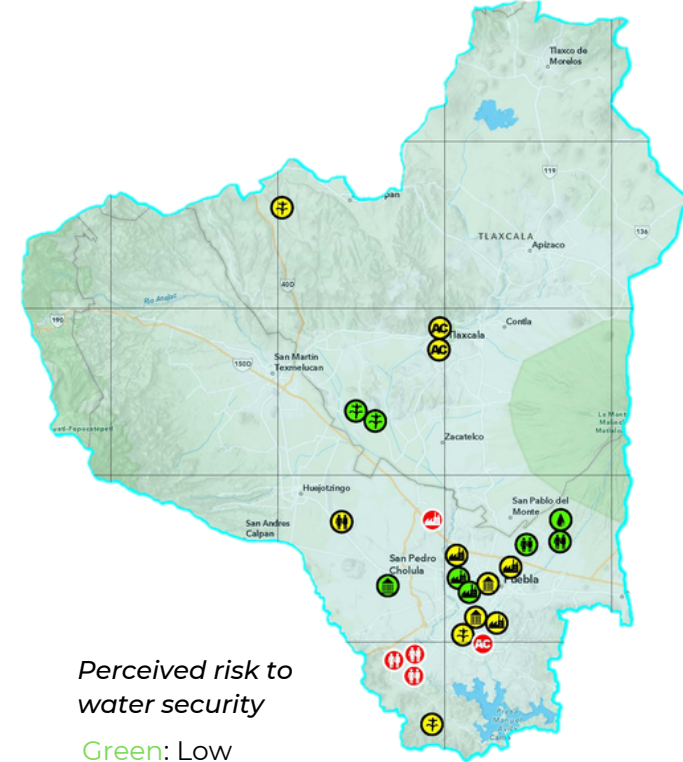
Through a systematic review of the literature, the costs of pollution in different sectors were assessed.



Ibarrarán, M.E. et al. (2022). El costo de la contaminación en la Cuenca del Alto Atoyac. Regiones y Desarrollo Sustentable 22(43).

Social perception of risk to water security

Based on the UN concept of water security, industrial, government, civil society, rural, peri-urban, and urban stakeholders were interviewed on their perception of risk to water security. Several aspects were assessed, such as quantity, quality, infrastructure, protection to ecosystems, risk management, and governance of water. Results of how different actors perceive water quality as a threat to water security are shown below



Perceived risk to water security

Green: Low
Yellow: Moderate
Red: High

Ibarrarán, M.E. et al (2023). Seguridad hídrica en la Cuenca del Alto Atoyac: informe de percepciones. Universidad Iberoamericana Puebla. DOI:10.13140/RG.2.2.20935.37287