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Articles

## **Historical origin of water pollution and legal analysis of the Atoyac River**

### **Origen histórico de la contaminación hídrica y análisis jurídico del río Atoyac**

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#### **Abstract**

The hydrological basin of the area subject to the present study is described, to which the Atoyac River and the San Francisco River belong, of which a cultural description is made that allows the

understanding of the social significance of its channel and the impact of its degradation on the ecosystem , detriment directly related to the Derivation Works of the rough waters of La Malinche carried out between 1939 and 1947, work prior to the river ditching (1963-1975), within the Micro-basin of the San Francisco River, current municipality of Puebla belonging to the Alto-Atoyac Basin; Consequently, the causes that gave rise to this decision are determined, consisting of one of the first inter-institutional collaboration exercises on modern water management in Mexico, and the influence of this decision on the current contamination of the Atoyac River and the negative effects it contracted are described. In the investigation, official technical information is analyzed, interpreted and linked to the positive and current legal system of Mexican water law under the methodology of legal hermeneutics and broken down chronologically in tables under the hierarchy described by the Founding Norm of Hans Kelsen. In a gradual process, the legal regulation of the Atoyac River, its contamination and human rights at risk are deciphered, through the principle of concurrence, public utility and federal ownership of water, its relationship with the state and municipal orders and the factor of constitutional supremacy. Finally, the topics previously described are linked to the Recommendation No. 10/2017 issued by the National Commission for Human Rights on March 21, 2017 (CNDH, 2017), an instrument promoted to determine whether the authorities or public servants violated or not the human rights of those affected in specific populations of the state of Puebla and Tlaxcala, on which the legal

scope of the authorities related to the contamination and sanitation of the Basin are verified and the current management model on national waters is questioned.

**Keywords:** Tubing, Atoyac, concurrence, contamination, order.

## Resumen

Se describe la cuenca hidrológica del área sujeta al presente estudio, a la que pertenecen el río Atoyac y el río San Francisco, del que se realiza una descripción cultural que permita entender la trascendencia social de su cauce y el impacto de su degradación en el ecosistema, detrimento relacionado directamente con las obras de derivación de las aguas broncas de La Malinche realizadas entre 1939 y 1947, labores previas al embovedamiento del río (1963-1975), dentro de la microcuenca del río San Francisco, actual municipio de Puebla, perteneciente a la Cuenca Alto-Atoyac; en consecuencia, se determinan las causas que originaron esta decisión, consistente en uno de los primeros ejercicios de colaboración interinstitucional sobre la gestión moderna de aguas en México, y se describe la influencia de esta decisión sobre la contaminación actual del río Atoyac y los efectos negativos que contrajo. En la investigación se analiza información técnica oficial; se interpreta y vincula con el ordenamiento jurídico positivo y vigente del derecho hídrico mexicano bajo la metodología de la hermenéutica jurídica, y se desglosa de forma cronológica y en tablas bajo la jerarquía descrita por la norma fundante de Hans Kelsen.

En un proceso gradual, se descifra la regulación jurídica del río Atoyac, su contaminación y los derechos humanos en riesgo, a través del principio de concurrencia, de utilidad pública y de la propiedad federal de las aguas, su relación con el orden estatal y municipal, y el factor de la supremacía constitucional. Finalmente, se vinculan los tópicos tratados con la Recomendación No. 10/2017, emitida por la Comisión Nacional de los Derechos Humanos el 21 de marzo de 2017 (CNDH, 2017), instrumento promovido para determinar si las autoridades o servidores públicos violaron o no los derechos humanos de los afectados en poblaciones específicas del estado de Puebla y de Tlaxcala, sobre la cual se verifican los alcances jurídicos de las autoridades relacionadas con la contaminación y saneamiento de la cuenca, y se cuestiona el modelo de gestión vigente sobre las aguas nacionales.

**Palabras clave:** embovedamiento, Atoyac, concurrencia, contaminación, orden.

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## Introduction

Maldonado (2016) points out that humanity lives in a growing and complex world, which requires to understand and to identify the types of problems that emerge; therefore, the duty of the legal sciences is the development of studies with other disciplines that address these difficulties. Merino and Cejudo (2019), indicate that a problem of this nature is defined by the way in which the State intervenes to correct anomalies in the set of interests of society.

In the case of environmental sciences, and in particular for natural water bodies, the legal study can focus on the regulatory framework, when the water body is contaminated. Knowing the current legal regime of water in Mexico, allows us to be certain how and who are responsible for planning and managing surface and underground water resources (Jacobo-Marín, 2016).

Pollution of the Atoyac River, caused by untreated domestic and industrial wastewater discharges, constitutes a serious problem in the states of Tlaxcala and Puebla, producing negative impacts that harm the population, economic activities and ecosystems (Rodríguez-Tapia, Novelo, & Vargas, 2012). To solve this problem, it's necessary to identify the causes that gave rise to its contamination and recognize those responsible for its preservation, use and vigilance.

In addition to the problem of pollution, Mexican water law and national water management require a strenuous and methodical review based on its historical revolutionary-protectionist origin and its eminent liberal-decentralizing tendency, since the relationship between the Federal authority, the States and municipal authorities continue to be embedded in a complicated network of reciprocal rules, inefficient interactions and late and imperfect exchange of resources, in particular on the conjunction of budgetary resources, the exchange of information and the coordination for the execution of actions (Minero, 2010).

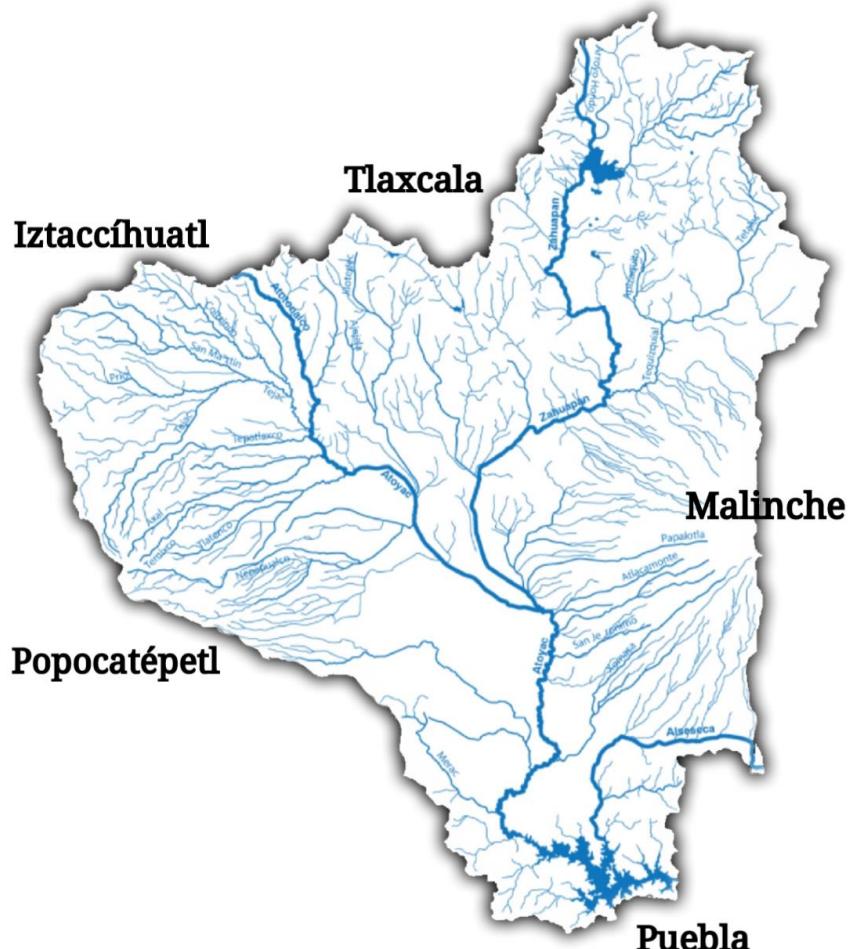
## Methodology

According to the proposed vision, the cultural analysis of the San Francisco River is developed to verify the importance of its waterway among the inhabitants of the study area and thus decipher the reason for its deterioration and the decisions by which it was cased. The study follows a historical chronology of the public works carried out with sustenance in the current regulatory framework during its elaboration, which deciphers the origin of the contamination in the Atoyac River,

from which a legal analysis is carried out, both belonging to the same basin, through official information extracted from the Official Gazette of the Federation, from the Official Newspaper of the State of Puebla, of general and special laws, declarations, decrees, newsletters and other historical documents related to the City of Puebla, Mexico. Analysis of national water management, the degree of participation of the authorities responsible for its use and deterioration, and the fundamental rights violated for this reason were reviewed. The drafting of the present is governed by 1) the deductive logical method of legal research and the order proposed by the Founding Norm of Hans Kelsen (1973), consisting of the creation and subsequent validity of one norm being determined by another, whose higher degree It is the Political Constitution, forming a hierarchical structure and 2) by the hermeneutic exercise of the interpretation of the legal norm from a scientific point of view, analyzing the theoretical and practical part through the interpretation of texts (Hernández-Manríquez, 2019). Subsequently, the general mandates of Declaration No.10 / 2017 are synthesized in order to facilitate the legal and environmental understanding of the Basin.

## General description of the Alto-Atoyac Basin

The Atoyac River Basin has an extension of 4395 km<sup>2</sup>, it is flanked by the Popocatépetl and Iztaccíhuatl volcanoes to the west and by La Malinche to the east, whose continental waters feed it, as well as the Zahuapan River from the Sierra de Tlaxco to the North (Martínez-Tavera *et al.*, 2017) (Figure 1). Castro-González, Calderón-Sánchez, Moreno-Rojas, Tamariz-Flores and Reyes-Cervantes (2019) point out that since the end of the 20th century, the Atoyac and Zahuapan rivers, as well as the Manuel Ávila Camacho dam (Valsequillo channel) received discharges from the textile, petrochemical, automotive, metal-mechanical, chemical and construction industries, which contributed to the accumulation of heavy metals in agricultural soils that are irrigated with these waters.



**Figure 1.** Alto Atoyac Basin, Federal entities and volcanoes that compose it.

In 2013, a monitoring system that records water quality parameters to identify the source of contaminants was introduced into

the Atoyac River, through the detection of events and anomalies (Hernández-Ramírez *et al.*, 2019).

Regarding river sanitation or proposed solutions, Casiano, Bressers and Gleason (2017) indicate that in Puebla and Tlaxcala there is no capital or social participation in the implementation of public policies that govern wastewater treatment plants in both states. , they are dependent on government periods and politicization prevents them from achieving their purpose. Inefficient and risky water management in the Basin is not limited to contamination, it also faces water scarcity and shortages (Rosete, Romero, & Sánchez, 2019).

Soto-Montes-de-Oca and Ramirez-Fuentes (2019) refer that the participation of water users is essential to solve the problem of their contamination but that currently the authorities have maintained a minimal and erratic communication system with the population on the subject. Despite the situation in the Basin, Pérez-Castresana *et al.* (2019) advert that there are no specific studies on the risk of diseases in the Alto-Atoyac region due to the exposure of heavy metals to groundwater, the main source of supply in the Puebla metropolitan area.

## San Francisco River, institutionalized pollution

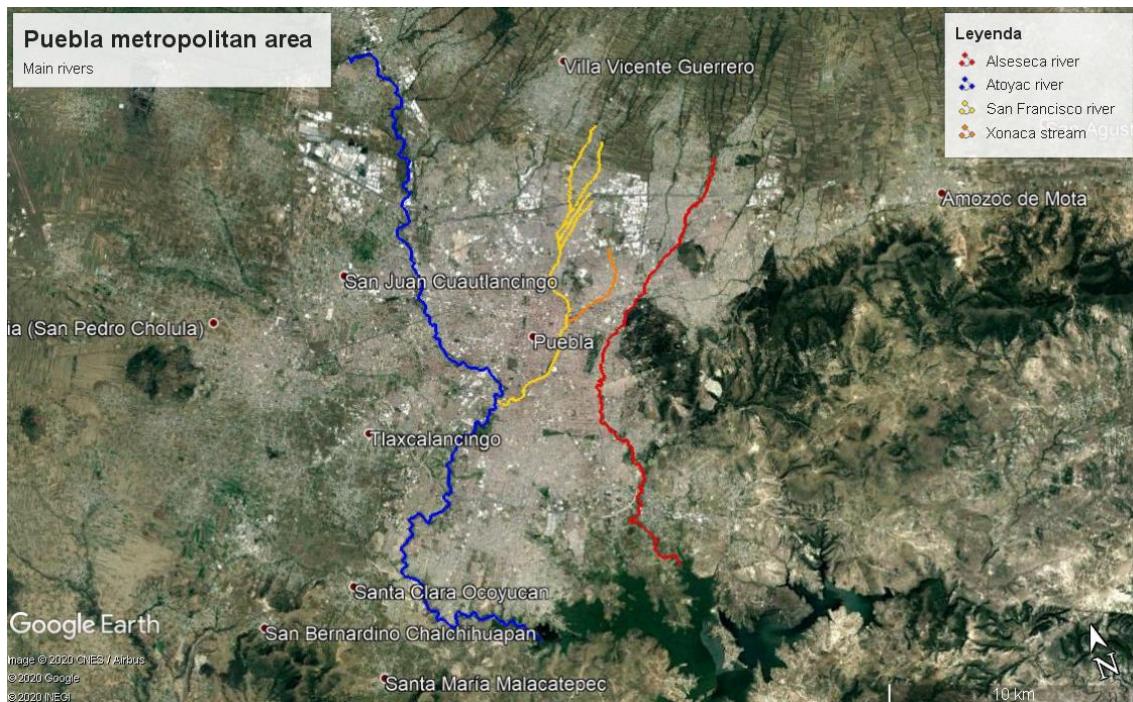
## Cultural description

The rivers, in addition to being fundamental natural resources for the water supply of the territories, also become socio-cultural axes where dynamics and manifestations of a material and immaterial nature are built and consolidated, which encourage the development of social groups (Moreno, 2015).

As expressed by Loreto (2009), Puebla was founded in 1531 on the banks of the San Francisco River, a successful urban project given the benevolent natural conditions that allowed it to achieve optimal economic development and a prominent industrial vocation that during the XIX century, in association with the expansion of the urban area, the new capitals, the railway network and the manufacturing corridors conditioned the river and its hydraulic infrastructure as the main outlet for sewage.

The San Francisco River was used as a drainage taking advantage of its lowest level in the city's topography (Salazar-Exaire, 2010), it originates from the confluence of the Xalpatlac and Actipan ravines that collect the rainwater contributions from the southwest

slope of the volcano Malintzi (La Malinche), as well as in the Trinidad ranch in the City of Puebla (DOF, 1918), the current Santa María neighborhood. The tributary pours its flow into the Atoyac River south of Puebla, near the ex-Hacienda and now Mayorazgo neighborhood (Figure 2).



**Figure 2.** Rivers that cross the city of Puebla.

In a historical, economic, cultural and social transition, the San Francisco River lost its predominance in industry and agriculture, first due to the application of the electric current that was adapted to the

factories, relegating the direct hydraulic force, then with the transformation of Puebla in 1908 using its channel to carry the sewage from the drainage (Cordero & Torres, 1978). But the problem of water is not reduced to technical causes, or to the natural increase in demand, but to the exclusion caused by poverty, inequality and inadequate model of water management conceived under the protection of the State and oriented to interests other than those of the majority; that is, the problem is due more to causes social and political than purely technical (Zamora, 2013).

According to the Secretariat of Hydraulic Resources (SRH, 1952), due to the continuous citizen complaints received about floods, garbage and bad smells, the Puebla City Council ordered the cleaning of the San Francisco River in the mid and late 19th century, which was already filth receptacle, for which It decided to project his pipeline, to "avoid the destruction of movable and immovable property" and human losses due to the increasing maxima of the river.

## **Derivation of the rough waters of La Malinche**

In order to reduce the storm water of La Malinche and facilitate the pipework, diversions of these channels were carried out to the north of the City, called the Derivation Works of the rough waters of La Malinche (1939-1947). Regarding them, the Coordinator of the works of the interceptor channel of the San Francisco River and Xonaca stream's embassment, Raimundo Popoca Estrada (Popoca, 1963), mentions that the lands by which the deviations would be made, were assigned by the Regulatory Plan of the Municipality of Puebla (Ayuntamiento de Puebla, 1952), as an "industrial zone", so the space would be immediately occupied by two large companies and they would have to eliminate their waste water and the reference works could very well serve as receivers or "collectors" of industrial sewage. In the same project, it is proposed that according to the urgency of the works, monetary savings, functional satisfaction and sufficient degrees of efficiency, it was appropriate that the channels that made it up be designed and built in the open air.

The Secretariat of Hydraulic Resources (DOF, 1947) defines the diversion works of the waters of the San Francisco River as a combined work both to divert by means of interceptor dams and channels, the currents that lead from north to south the ravines of the skirt of La Malinche, as to regulate the same flows through temporary storage routes. The Technical Committee of the Puebla State Comprehensive Planning Commission structured the Regulatory Plan for the City of Puebla (Ayuntamiento de Puebla, 1952) on the following principles:

1. The decentralization of the commercial area.
2. Industrial and housing zoning.
3. Functional road integration.
4. The preservation of the ancient city.
5. The supply of drinking water, sewerage services, pavement and electricity to the colonies that lacked them.
6. The need to pipe the San Francisco River, which was a serious health problem.

The main emitter of sewage and rainwater would continue to be the San Francisco River, so its tubing “would be essential”. In addition, the municipal authorities in the aforementioned plan, the state and federal authorities, approve the canalization of the sanitary and industrial drainage to the adjacent rivers, where the Atoyac River to the west are indicated as sewage emitters for the future urbanization zone and Alseseca River to the east (SRH, 1952), inter-institutional approval to contaminate the basin entirely (Figure 3). The Risk Atlas of the Municipality of Puebla (2014) establishes that the Derivation Works of the rough waters of La Malinche were the following (Figure 4):

### **Westeros interceptor works system:**

D-1 Dams of the West Interceptor.

D-2 Channels of the West Interceptor.

**Sanctuary regulating vessel works system:**

D-3 Dam with the Actipan ravine.

D-4 Actipan diverter channel.

D-5 Protection of the slopes of the D-5-A Highway Slopes of the Sanctuary Board.

D-5-B Slopes of the Aparicio Board.

D-6 Dam Sanctuary.

**Diagonal Regulator Cup System:**

D-7 Child Gunner Dam.

D-8 Loreto Dam.

D-9 Loreto Intercom Channel.

D-10 Xalpatlac-Diagonal detour.

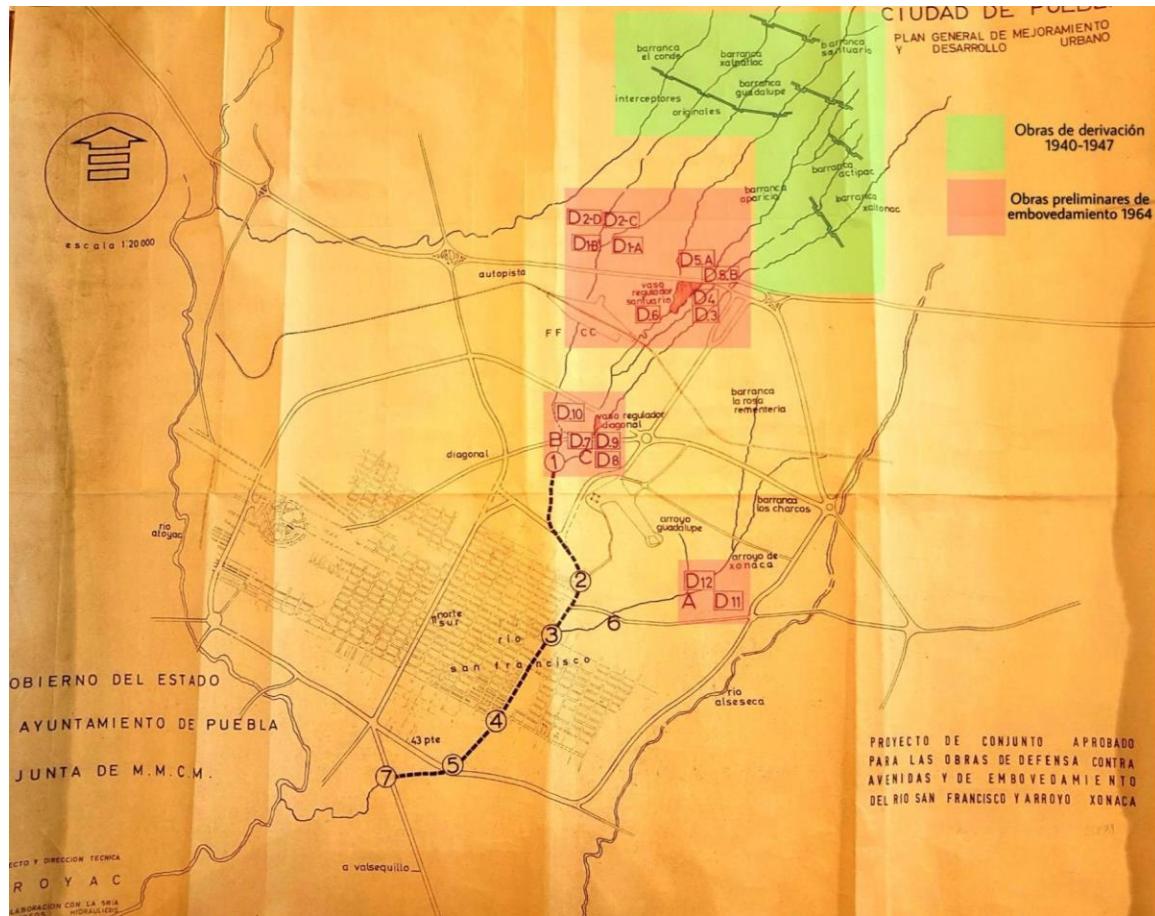
**Defense works of the Arroyo Xonaca:**

D-11 Xonaca - Alseseca detour.

D-12 Driver of excesses.



**Figure 3.** Confluence of the San Francisco River and the Atoyac River.



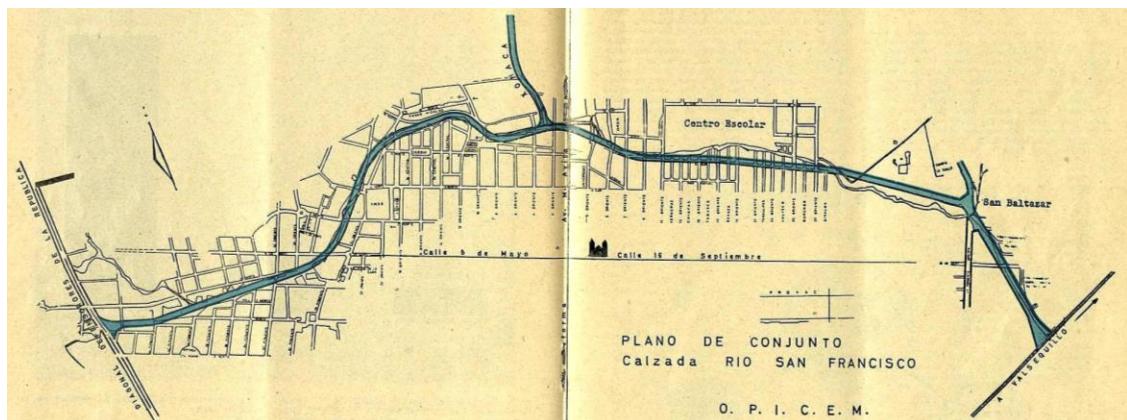
**Figure 4.** Derivation Works of the rough waters of La Malinche.

## Inter-institutional collaboration

Once the deviations had been completed, a Commission was established consisting of the Ministry of Communications and Public Works; of the Treasury and Public Credit, of Agriculture and Development, of the Government of the State of Puebla, of the City Council and of the riverine owners, which was one of the first documented examples of inter-institutional coordination in the management of national waters in the Alto-Atoyac Basin , because "it was urgent to protect the city of Puebla" from the periodic floods that it suffered in its urban unit, as well as from the sewage that caused infectious foci to the detriment of the population's health, so that these representatives would organize to carry out a comprehensive plan that would solve the problem through the study, financing and realization of the channeling and tubing of the San Francisco River in the City of Puebla, as well as the urbanization of the surface resulting from the tubing (DOF, 1946).

It is almost 20 years later, that the planned work (Figure 5) is raised to a legal order and the "Law on the Embodiment and Urbanization of the San Francisco River and the Arroyo de Xonaca, and the Resources to be Disposed of for its Financing", with which proclaims the vault of the San Francisco River and Arroyo de Xonaca, the opening and urbanization of the avenues and adjacent land, as well as the expropriation of private property necessary for the realization of these works, which had been declared of public utility approved by the Secretariat of Hydraulic Resources (POE, 1963), this regulation determined new taxes for the inhabitants of the municipality to pay for

5 years the cost of the works, which lasted two more years until September 30, 1970 (POE , 1968b).



**Figure 5.** Boulevard Héroes del 5 de Mayo on the San Francisco River.

## **Embossment of the San Francisco River, Arroyo de Xonaca and its urbanization**

For the construction of the road, it was necessary to totally or partially demolish 187 properties within the demarcation of the Historic Center

of the City of Puebla (POE, 1964c; POE, 1964d) and to demolish monumental hydraulic infrastructure such as the San José and Huexotitla dams (Figure 6) (the most old of America until its pulverization) and more than 10 old bridges because the city was riverside, this within the current Monumental Zone protected by the INAH (DOF, 1977) and Cultural Heritage of Humanity declared by UNESCO (Sanz, Delmont, & Panero, 2017).



**Figure 6.** River, canalization and Boulevard today.

The river vault project and the creation of the boulevard, was completed without ornaments and already in need of maintenance, at the beginning of the year 1975 (Cordero-y-Torres, 1978), for which reason it was more than 10 years of work within the framework most important in the City.

The works of the Derivation of the rough water of La Malinche, the vaulting of the San Francisco River, the Xonaca stream and the urbanization of their federal area in Puebla did not have sanitary purposes, despite the fact that there was a serious problem of contamination in the micro-basin, the concealment or channeling of wastewater did not improve the quality of life of the inhabitants, but the diversion works themselves spread the contamination to the Atoyac and Alseseca rivers. The main channel of the San Francisco River continued to be contaminated and running towards the Atoyac watercourse.

Despite running underground, it did not cease to be a national asset guarded and administered by the Federation, so its physical-chemical characteristics are still in the public interest, since this quality was not lost when artificial works had been altered its natural characteristics (DOF, 1934) and there was no subsequent federal suppression decree.

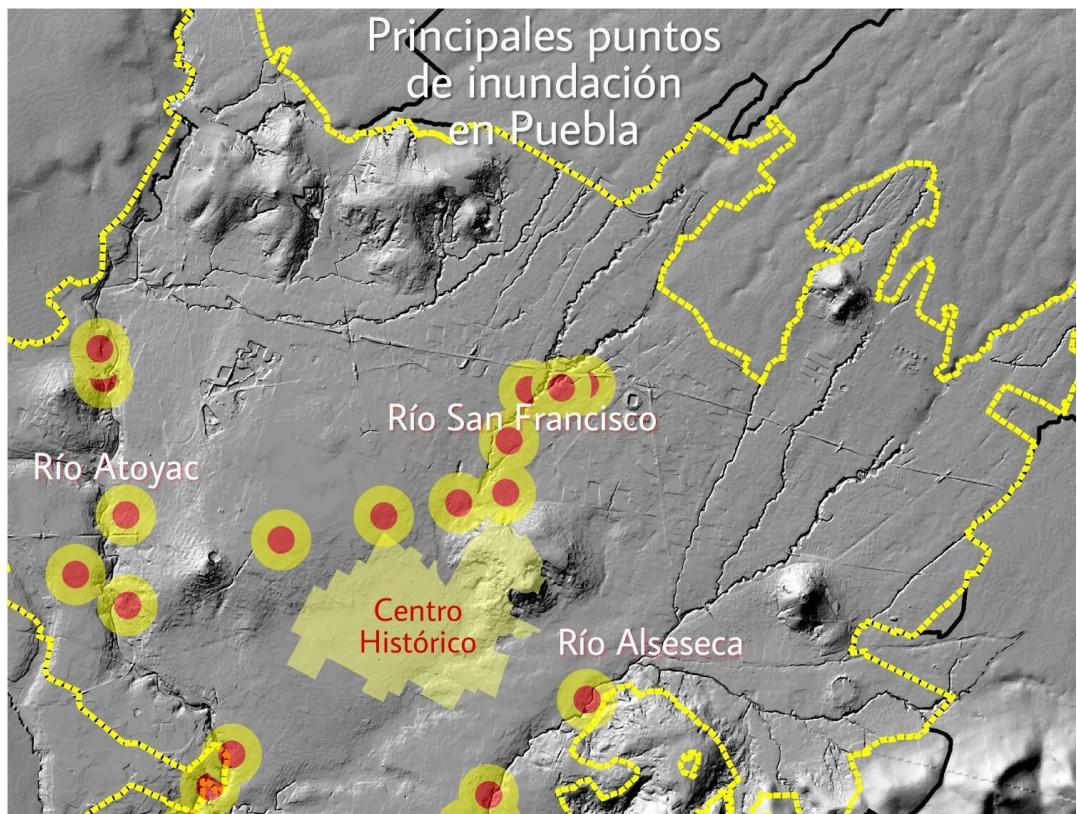
Although the channel and its vault maintain their legal regime, the natural elements that made it up, such as the banks, the flora and

fauna that resided in them and their waters, the river bed, the interaction of people with its channel, dams, dykes, bridges and historic canals, typical buildings, the founding site of the city and its memory were completely destroyed under the protection of federal laws and its patrimonial interest, above any other cultural or environmental value.

## **Effects of the diversion of La Malinche waters and of the San Francisco River**

The dome of the San Francisco River and Xonaca stream set a negative precedent in the management, administration and use of national channels and their inherent public goods.

In addition to losing a historical, cultural and intangible legacy with the demolition of the Historic Center of Puebla and its hydraulic infrastructure, the problem of floods continues (Figure 7) and the contamination worsened, which conditioned both the authorities and citizens on the efficiency and effectiveness of any public sanitation project or work and the Alto-Atoyac Basin itself.



**Figure 7.** Main floods in the city of Puebla in 2016.

Urban expansion without containment, discharges of industrial activities, exploitation of river resources as raw material for construction, agriculture or planning of linear (road and rail) and large-scale infrastructures (ports, airports) in the immediate vicinity of the river spaces, have been the reflection of an unprecedented anthropic pressure (Riu & Donada, 2019).

The Mexican legal system, such as the vault of the San Francisco River, determined a behavioral line on social work and water governance, the Regulatory Plan of the Municipality of Puebla and its normative scaffolding (1952) placed the urban bases on which the civil settlement lies of the Puebla-Tlaxcala metropolitan area, principles that did not conceive sanitation as a system of evacuation and treatment of urban and industrial waste (RAE, 2019a), but as a model for channeling, concealing and dispersing the city's black water.

Through a legal exercise, the project of vault buried the memory and management of the water contamination in Puebla and led its effects towards the Atoyac River, tributaries that share a similar destination, since now considering its restoration implies taking into account a great number of variables involved, making decisions with incomplete information, dealing with contradictory interests and social perceptions about what to do and having no margin for error, characteristics that Rittel and Webber (1973) define as "wicked problems", which cause the final decision in planning a work, always leave people unsatisfied; around each improvement proposal, a plurality of perceptions and valuations coexist, as well as other solution alternatives, that is, around an environmental problem it is possible to identify different frames of meaning with which it is interpreted (Zamora-Saenz, 2018).

Currently there is international recognition of the importance of having not only potable water, but also sanitation under equitable

conditions as an essential component of the enjoyment of all human rights, as well as the responsibility of States to promote and protect them, since they are universal, indivisible and interdependent (ONU, 2010), principles that have been established in current Mexican law and that need to be examined (Table 1).

**Table 1.** Regulations during San Francisco River's vault.

<b>Federal laws</b>	
Political Constitution of the United Mexican States (DOF, 1918)	Regulates national waters as permanent and intermittent rivers and streams
Declaration that the waters of the "San Francisco" river, of the State of Puebla, are the property of the Nation (DOF, 1918)	The San Francisco River recognizes the regulation of its use as a national asset
Law of Waters Owned by the Nation (DOF, 1934)	Specific regulation of the national water administration
Regulation of the Law of Waters Property of the Nation (DOF, 1934)	Specific regulations of the national water administration
Law on Protection and Conservation of Archaeological and Historical Monuments, Typical Populations and Places of Natural Beauty (DOF, 1934)	Background of the current area of monuments established by the INAH

Federal Expropriation Law (DOF, 1936)	Necessary in cases of national interest such as federal areas, however it was not exercised in the vault of the river
Law of Waters Owned by the Nation (DOF, 1946)	Promulgated and published but without regulations so it was never operational
Agreement by which the Secretariat of Hydraulic Resources is entrusted with powers in relation to channels, vessels or areas of national property (DOF, 1947)	The administration of the country's waters is granted to the Secretariat of Hydraulic Resources
Hydraulic Resources	It establishes the federal declarations and demarcations consisting in giving notice to the riparian owners and users of the water about the status of the river
National Property Waters Law (DOF, 1972)	
<b>State laws</b>	
Law on Protection and Conservation of Natural Monuments of the State of Puebla (POE, 1932)	Regulation of the typical area of the Historic Center of Puebla and its protection decrees.
Decree issued by the C. Constitutional Governor of the State, in accordance with the provisions of article 26 of the Law on	A state protection is created for the buildings of the Historic Center that would eventually be destroyed by the

Protection and Conservation of Monuments and Natural beauties of the State and declaring the Typical Zone of the City of Puebla (POE, 1938)	river's dome.
Comprehensive Planning and Urban Improvement Law of the State of Puebla (POE, 1956)	Normalizes urban actions of the Regulatory Plan of 1952.
Law that creates the Moral, Civic and Material Improvement Board of the Municipality of Puebla (POE, 1958)	Manager between private initiative and government for works funds.
Law on the Embassment and Urbanization of the San Francisco and Xonaca River: Resources to be Available for Financing (POE, 1963)	Determination of contributions to pay for the work.
Decree by which the San Francisco and Xonaca river is expropriated for public use to make buildings or fractions in the Municipality of Puebla (POE, 1964c)	Expropriation of 145 properties in the Historic Center to expand the Boulevard urbanization area.
Expropriatory decree of buildings or fractions for the Embassment and urbanization of the river of San Francisco and Xonaca, and the opening of the avenues and adjacent land, in the Municipality of Puebla (POE, 1964c)	Expropriation of 42 properties in the Historic Center to expand the urbanization area of the river and creation of the Boulevard.
Decree by which the transitory article 5 of the Law on the Embassment and	Express appraisals to grant compensation to the owners of

Urbanization of the San Francisco River and the Arroyo de Xonaca is added (POE, 1964b)	demolished properties.
Decree by which the State Executive is authorized to enter into an agreement with Financiera Bancomer, S.A. a credit for the completion of the works of vault of the river (POE, 1964b)	Loan to pay for the work in order not to delay work.
Decree by which the effects of the Law on the San Francisco River vault are extended (POE, 1968)	Expansion of contributions to pay for works.
Decree extending the effects of the San Francisco River Embodiment Law (POE, 1968)	Length of time improvement contributions would be paid
Expropriation decree in favor of the Municipality of Puebla for the construction of a green area to be called "Parque Juárez" (POE, 1978)	Creation of the Juárez Park in federal lands as a result of the river's ditching
<b>Local or municipal laws</b>	
Regulatory Map of the Municipality of Puebla (Municipal Historical Archive of Puebla) (Ayuntamiento de Puebla, 1952)	Antecedent of current sustainable urban development plans

## Legal framework of the Atoyac River in force

### Human Rights and the Principle of Concurrency

In the proposed methodological order, the following examination is carried out: according to the United Nations Organization (ONU, 1948), human rights are inherent prerogatives of all human beings, without distinction of race, sex, nationality, ethnic origin, language, religion or other condition and correspond to all people without discrimination. Along the same lines, the Political Constitution of the United Mexican States, in its article 1, establishes that in Mexico all people enjoy the human rights recognized in this regulatory body and in the international treaties to which the country is a party, thus as well as the guarantees for their protection, the exercise of which cannot be restricted or suspended except in the cases and conditions established by it. From this constitutional protection, article 4, paragraphs fourth, fifth and sixth (DOF, 2019) is derived, which indicate that everyone has the right to health protection, access, disposal and sanitation of water for both personal consumption as domestic, the concurrence and participation of the Federation, the States, Municipalities and citizens

in general health matters is established and the right of everyone to a healthy environment for their development and well-being is also recognized, for which the State will be guarantor in exercise of these rights. In this sense, Carbonell (2003), refers that in concurrent or coincidental matters, the Mexican Constitution indicates that the authorities of the three levels of government (municipal, state and federal) must take part in its practice, that is, that due to the transcendence or uniqueness of certain matters, their regulation or execution cannot be left to the single governmental level, but rather, several authorities with territorial powers of different scope must participate.

Article 73 of the Constitution, section XXIX-G (DOF, 2019), indicates that the Congress of the Union issues laws under the concurrence principle, where the federal government, state governments and municipalities take part in matters of environmental protection, preservation and restoration of ecological balance. The need for more than one authority to face an environmental problem lies with the fragility of ecosystems, where the time lost in administrative procedures can generate irreversible deterioration (Trujillo-Segura, 2011). Mexican federalism makes state authorities collaborators and responsible for both federal laws and general laws (González-Oropeza, 2010), or at least that is what it seeks. The concurrence supposes that the authorities will act effectively before any environmental problem.

## Federal water ownership and administration

According to Constitutional Article 27 (DOF, 2019), the ownership of land and water corresponds to the Nation, that is, to a central government, including among them rivers, their direct and indirect tributaries, the vessels and channels that they constitute. This precept is complemented by the National Waters Law (DOF, 2018c), which in its article 3, section XLVII, defines the federal bank or zone as the bands of ten or five meters wide, contiguous to the channel of the currents of national ownership. This regulatory law is strengthened with the study of the General Law of National Assets (DOF, 2018b), ordinance that establishes as channels of common use the channels of streams, the banks, dams, boards and federal areas of streams. All the inhabitants of the Republic can use the goods of common use, without more restrictions than those established by the laws and administrative regulations. For special uses on common use goods, a concession, authorization or permission is required, granted with the conditions and requirements established by law (General Law of National Assets, Article 8, 2018). For example, it is possible to swim in a lake, walk along a river, walk through a dam; however, if you want to obtain an

economic use of the waters of that lake, extract the sands from the river bed or obtain blocks of water from the dam, a specific permit is required.

## **Federal property and public utility**

In sum, the National Water Law (DOF, 2018c) in its article 7, sections I, II and IV, expresses that the integrated management of water resources is of public utility, understood as the capacity of the State to regulate private property, for the benefit of hydrological basins in the national territory, as a priority and a matter of national security, as well as the protection, improvement, conservation and restoration of the ecological balance of the basins and their federal areas. At this point, the aforementioned Water Law introduces another concept, public utility, defined by the SCJN (Suprema Corte de Justicia de la Nación) (s.a., 2006), such as the State's obligation to provide a public service or fulfill an economic, social, sanitary and even aesthetic need, required in certain population. Therefore, the natural water flow, perennial or intermittent, that leads to other currents, to a natural or artificial reservoir, or to the sea defined as "river" (Ley de Aguas

Nacionales; DOF, 2018c) is explained and is about protect in the developed regulations.

In accordance with the principle of concurrence established in the General Law of Ecological Balance and Protection of the Environment (LGEEPA) (LGEEPA, 2018c), the following powers emerge: the federation is in charge of regulating the protection and preservation of national waters and biodiversity that integrate them; For their part, the States have the power to regulate the sustainable use, prevention, and control of pollution of the waters under state jurisdiction, as well as of the national waters assigned to them.

The waters that are not included in paragraph 5 of article 27 of the Constitution are of a State order; they can also be assigned by the Federation through the Ministry of Environment or Natural Resources, through agreements or coordination agreements, in order that the governments of the federal entities, with the participation of their municipalities, can assume control of actions for the protection, preservation and restoration of the ecological balance and protection of the environment of federal areas and bodies of water considered as national pursuant to the LGEEPA, Article 11 (DOF, 2018c).

## **State and municipal reaches**

For the study of the waters managed by the figure of the municipality, the provisions of constitutional article 115 (DOF, 2019) must be observed, which states that this level is responsible for the functions of drinking water, drainage, sewerage, treatment and disposal of its wastewater, as well as the transfer, treatment and final disposal of the waste that is generated in its territorial demarcation; also the cleaning of its streets and gardens, places near rivers and banks, whose care or abandonment is usually linked. Derived from these services and according to the LGEEPA, article 8, it corresponds to the municipalities, the preservation and restoration of the ecological balance and the protection of the environment in the population centers in relation to the effects produced by the sewerage services, cleaning, markets, supply centers, pantheons, trails, transit and local transport (DOF, 2018c). On the subject of prevention and pollution, the LGEEPA 119 BIS (DOF, 2019), establishes that it corresponds to the State (see this as the formation of municipalities, states and federation) and to society, to prevent the contamination of rivers, basins, vessels and groundwater. Likewise, it indicates the obligation that urban wastewater receive treatment prior to discharge into the designated water bodies. Water pollution corresponds to the governments of the federal entities and municipalities, by itself or through their public bodies that administer water (such as state commissions or water and sanitation operating systems), actions consisting of controlling the Wastewater discharges to drainage and sewerage systems, monitoring

of official Mexican standards and requiring discharge generators to install treatment systems (DOF, 2018c).

## **Federal Pact, constitutional supremacy**

The normative scaffolding to define similar actions and responsibilities is described in article 73 fraction XXIX-G (DOF, 2019) as a Principle of Concurrency, consisting of the power of the Congress of the Union to issue laws that establish the simultaneity of powers and actions of the Federal Government, of the States and Municipalities in matters of environmental protection, preservation and restoration of ecological balance. The concurrent faculty can be confusing, such is the example of article 120 of the LGEEPA (DOF, 2018c), which indicates that to avoid water contamination, they are subject to "federal or local" regulation: discharges of industrial origin, municipal, its uncontrolled mixture, those of agricultural activities, those of waste, those generated in activities of extraction of non-renewable resources, the application of pesticides, fertilizers and toxic substances, infiltrations that affect aquifers and the dumping of solid waste, hazardous materials and sludge from wastewater treatment, in bodies and streams. According to the Royal Spanish Academy (RAE, 2019b), the

letter "o" (meaning of "or") denotes difference, alternative or equivalency, so the aforementioned rule infers that there are three possibilities 1) that river pollution can be regulated by the Federation, or by local governments, not specifying whether local refers to the 2) states or 3) municipalities. The legislator leaves the possibility that any of the three levels is in charge of the contamination (Table 2).

**Table 2.** Chronological and hierarchical legal order.

<b>International legal order</b>	
Universal Declaration of Human Rights (ONU, 1948)	Inherent in all human beings as the right to an environment not fulfilled due to the condition of the Atoyac River
Resolution A / RES / 64/292 General Assembly on the Human Right to Water and Sanitation (ONU, 2010)	Intrinsic relationship of all human rights, one is not fulfilled without the other
<b>National legal order</b>	
Declaration that the waters of the Atoyac River are the property of the Nation (DOF, 1937)	Historical survey of the waters of the Atoyac River
Law of the National Commission of Human Rights (DOF, 2018a)	Order giving rise to Recommendation 10/2017 (DOF, 2017)
National Waters Law (DOF, 2020)	Regulation of water volumes of the

<b>Atoyac River</b>	
Regulation of the National Waters Law (DOF, 2014)	Regulation of the specific regulations of water bodies
Regulations of the National Commission of Human Rights (DOF, 2017)	Regulations that specify the procedure of the CNDH itself that issued the recommendation
General Law of National Assets (DOF, 2018b)	Regulation of inherent public goods of the river: River bed, river bank and hydraulic works that constitute it
Recommendation no. 10/2017 issued by the CNDH on violation of human rights (CNDH, 2017)	Responsibilities of the authorities indicated regarding the contamination of the Atoyac River
Political Constitution of the United Mexican States (DOF, 2019)	Ownership of national waters, regulation of their use
<b>State legal order</b>	
Puebla City Risk Atlas (Ayuntamiento de Puebla, 2014)	Risks in canyons and national waters within the municipal district
<b>Official Mexican Standards</b>	
NOM-001-SEMARNAT-1996, NOM-002-SEMARNAT-1996 y NOM-003-SEMARNAT-1997	Regulations for wastewater emitted to the Atoyac River
<b>Jurisprudence</b>	

Expropriation. Public utility concept. Administrative constitutional jurisprudence (9a.) (s.a., 2006)	Concept that regulates private property in defense of water resources and their inherent public goods
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## Results

### Federal supremacy

To dissolve the confusion, the previously developed legal scale must be addressed: first, no state or municipal authority can exceed the limits of action established by the Mexican Constitution (DOF, 2019), which indicates in article 41 that neither the states Neither their internal regimes (such as municipalities or auxiliary boards), can contravene the Federal Pact that constitutes the Mexican Republic; In the same way, it establishes in its article 133 that the Constitution, the laws of the Congress of the Union that emanate from it and all the treaties that are in accordance with it, concluded by the President of the Republic with the approval of the Senate, will be the Supreme Law

of the entire Union, like the judges of each federal entity, will abide by said ordinance, despite the local provisions to the contrary that may exist, so that the responsibility for regulation and administration of national assets and their use rests primarily with in the Federation.

## **Responsibility for river pollution**

Regarding the reasonable doubt that one may have about which authority can be used to regulate pollution, it is necessary to return to article 11 of the LGEEPA (DOF, 2011), which empowers the Federation to sign coordination agreements for the participation of States and / or municipalities, assume the powers of protection, preservation and restoration of the ecological balance in the federal zone of the bodies of water affected as nationals, so that in the aforementioned compromise it will be established which authority is responsible for what. Thus, the collaboration agreement is the tool that can give a greater degree of certainty to the three levels of government to establish the actions of who, how and when to use their powers to solve one or several specific problems, in a period or specified term.

Regarding the levels of pollution, according to article 123 of the LGEEPA (DOF, 2018c), it is contemplated that all discharges into the

state or municipal collection networks, basins, rivers, channels and wastewater spills on the soils or its infiltration into land, must satisfy the physical-chemical parameters established in the official Mexican regulations issued for this purpose (NOM-001-SEMARNAT-1996, NOM-002-SEMARNAT-1996 and NOM-003-SEMARNAT-1997) and where appropriate, the particular download conditions determined by the Semarnat or local authorities.

When the regulations and their application fail and a waterway requires special attention, a legal regulation of particular discharge conditions is created, such as the Declaration of classification of the Atoyac and Xochiac or Hueyapan rivers, and their tributaries (DOF, 2011), created by the Federation based on the National Waters Law and its regulations, to determine the parameters that discharges should meet, the assimilation and dilution capacity of national bodies of water and the loads of pollutants they may receive, as well as quality goals and deadlines to achieve them. By 2011, the waters of the Atoyac and Xochiac or Hueyapan rivers had suffered an alteration in their quality due to the discharge of wastewater from industrial processes and human settlements, calculated at 146.3 tons per day of organic matter measured as chemical demand of oxygen, 62.8 tons per day of total suspended solids, 14.7 tons per day of nutrients, 0.14 tons per day of heavy metals and 0.09 tons per day of toxic organic compounds, in addition to microbiological contamination, among others, according to the content of the declaration of classification of the Atoyac and Xochiac or Hueyapan rivers, and their tributaries (DOF, 2011).

## Discussion

According to the proposed study, there is international recognition by the United Nations (ONU, 2010) on the human rights to the provision and sanitation of water and a healthy environment, the Mexican Constitution reaffirms them and, paradoxically, the nation is the owner of the tributary that transgresses them (DOF, 2019).

The federal government, the states and municipalities have the substantive law that safeguards the protection, conservation and restoration of the ecological balance of the river, in addition to having a law specialized in its management, protection, improvement, conservation and restoration (DOF, 2020). The dilemma lies in how incredibly intricate and convoluted it is to understand and effectively apply the provisions on water, given that it is not only technical-administrative authorities who observe their compliance.

People and their relationship with water goes beyond a basic need and their exercise, rivers have a tangible value perfectly described in current regulations, but their intangible value lies under the ground, under tons of contamination or in oblivion, that the current

management model based on market principles, has not been able to decipher.

To reduce the complexity described, there is the implementation and application of coordination or collaboration agreements or conventions so that federal entities and municipalities participate in the preservation and restoration of the river with fully determined powers (LGEEPA, 2018c).

The agreements described can make progress in determining responsibilities, however there have been problems in collecting signatures, in which the parties reach consensus, in leaving crucial social actors out of their signature, in the allocation of budgets, priorities and agendas. of each political authority and in the time required to solve each of these circumstances.

The result is that it takes more time to comply with the procedural assumptions of the principle of concurrence, than to protect the water asset or enforce it itself. If the responsibility of public servants and officials is unknown, there are constitutional limits that allow the federal pact to prevail over local provisions (DOF, 2019), so that the contamination of the Atoyac River falls mainly on the technical and administrative ineffectiveness of the federation in matters of national waters.

Similarly, there are official Mexican standards that determine the physical-chemical parameters of the tributaries and effluents of the river (DOF, 2018c), which are the basis for timely decision-making,

despite the fact that the current contamination of Surface waters in Mexico have exceeded them and require updating.

When the work of the authorities, the responsibility of the citizens and the exposed norms are surpassed and insufficient, which finally happens, the legal regulation of particular discharge conditions is created, such as the Declaration of classification of the Atoyac and Xochiac rivers or Hueyapan, and its tributaries (DOF, 2011), to try to confront the problem, the literal meaning of which has not been followed. Under this perspective, on March 21, 2017, the National Commission on Human Rights (CNDH) issued a recommendation on the violation of human rights to a healthy environment, water sanitation and access to information, in relation to the contamination of the Atoyac, Xochiac rivers and their tributaries.

## **News and Recommendation No. 10/2017**

In view of what has been described and the serious problem of its contamination, the National Human Rights Commission intervened with a draft recommendation, where the elements of conviction and

diligence carried out were analyzed, in order to determine whether the authorities have violated or not human rights of those affected by the conditions of the river, which is composed of: 1) the complaint written by 16 people against federal, state and local authorities, for acts and omissions to the detriment of the inhabitants of the municipalities of Huejotzingo and San Martín Texmelucan, Puebla; and Ixtacuixtla de Mariano Matamoros, Nativitas and Tepetitla de Lardizábal, Tlaxcala, due to environmental contamination of the Alto Atoyac hydrological sub-basin, particularly of the Atoyac, Xochiac rivers, and their tributaries; 2) the events described by the protesters' dissent against said authorities; 3) the documents of which the investigation carried out by the CNDH is composed; 4) the legal status of the rivers mentioned and the administrative procedures of which the National Water Commission is part; 5) the logical legal reasoning that motivates the recommendation 6) the responsibility of public servants 7) the repair of damage and 8) the recommendations, defined as the obligations that each authority must comply with.

Under the Constitutional Concurrency Principle, the responsible authorities have the obligation to fulfill the same mandates according to the powers set forth in the Constitution, in the General Law of Ecological Balance and Environmental Protection and in this recommendation. They are encouraged to:

- I. Allocate resources for the construction, periodic maintenance and proper operation of the wastewater treatment plants;
- II. Design a health care program and information campaigns establishing measures against health damage, control, symptoms and signs to identify poisonings. Aquino-Moreno, Rodríguez-Tapia and Morales-Novelo (2015) specify that an adequate treatment for river waters, investment in the improvement of the drinking water and drainage system, the installation of wastewater treatment plants and strict monitoring of compliance with environmental regulations, existing contamination would decrease significantly and there would be a decrease in disease cases;
- III. Permanently publish information collected on sanitation and the dangers of pollution, in mass media and develop a program of inspection visits to monitor wastewater discharges. A problem that is not known is not studied, is not addressed, and spreads. In this sense, Soto-Montes-de-Oca and Ramirez-Fuentes (2019) specify that providing information about the severity of the problem is a key step for the success of the project, transparency in all phases is important to avoid corruption and that the population take part in the progress of the actions taken. Community members should be involved in the discussion, design, planning, implementation, and evaluation of water management policies. The authors cited express that any future policy that considers contributions from direct and

indirect users of the river and surface water bodies, needs to strengthen the administrative aspects of the service system;

- IV. Provide education and training courses on human rights: environment, water, sanitation, health, access to information and risks, aimed at public servants. It is important that the authorities in charge of the environment and health at the state, municipal and federal levels, supported by the different research centers existing in the states of Puebla and Tlaxcala, implement control programs for industrial discharges; They must establish treatment programs for wastewater used in agriculture and for soil remediation, all aimed at avoiding the danger that the contamination of these media represents for the general population (Castro-González *et al.*, 2019).

The concurrent mandates between all the authorities indicated in the Recommendation are:

1. Sign an inter-institutional coordination agreement between each other and
2. Provide investigative data to the CNDH and the corresponding authorities to determine those responsible for the contamination, tasks that can only be carried out through multidisciplinary and orderly work. Morales-Sánchez and Segoviano-Contreras (2016) write that the study of human behavior involves the consideration

of an important set of factors and variables that no discipline can cover completely and exhaustively, so it will be necessary for the agreement to be reached to be taken into account. It has not only political authorities or public servants, but also scientists, activists and other disciplines such as the humanities.

## Conclusions

Pollution of the Atoyac River is an unsolved problem that has as a direct antecedent the devaluation of the San Francisco River.

Knowing the human rights and legal regulation of national waters is necessary for researchers from the Atoyac River dedicated to other areas of knowledge, because the efficiency or deficiency of its regulation and the condition of its contamination originate in constitutional mandates and in the laws that emanate from it.

The current water management model, its operation and application can only be understood and applied under very rigorous examinations such as the present one, the powers, rights and obligations in the law are diffuse for any area of knowledge, in addition

to the fact that the market laws consider water as a product or a service beyond a human right.

In the specific case of the San Francisco River, the Xonaca stream and their embassment, are only considered by authorities and citizens as drains or regulatory vessels, they are not described in the plans of other researchers dedicated to the study of the Atoyac River as important channels, their waters are just one more volume that is directed towards the Manuel Ávila Camacho Dam, without taking into account its importance or role in the micro-basin that is the city of Puebla, an epistemological wealth that has not been deciphered by the academy or by the citizens nor by authority.

It is not possible to end the contamination of the Alto-Atoyac Basin only from the legal perspective, nor can any other discipline by itself generate a significant impact on its conditions, if there is no social and academic participation that puts pressure on the authorities in charge of care and sanitation of the river and its integral composition, given the centralism that exists in the regulations.

The authorities responsible for the preservation and sanitation of the Atoyac River have the obligation to know the concurrent legal framework of water law, and if they do not know it, they must quit their job, since the study of the Atoyac River is a complex and interdisciplinary problem, any decision that is taken in the current circumstances of its channel, it must be fully based on technical bases of high scientific rigor.

Determining the subjects responsible for the current contamination conditions of the Atoyac River is one of the main tasks that the CNDH has undertaken, but the problem is not only in its channel and its physical-chemical characteristics, each day more shock organizations and subdivisions of high added value are illegally invading its banks, which, with the approval of the three levels of government, continue to destroy hectares of federal, risk and protection areas that constitute the river, which promotes the extermination of flora, fauna and the suppression strategic conservation sites important for the regeneration of the social recovery that the entire country needs; among other problems that arise and are ignored, when conceiving the river as a simple contaminated riverbed, without understanding the environmental and social system it comprises.

As of the date of the conclusion of this study, the inter-institutional coordination agreement between the responsible authorities and the interested parties, required by the CNDH, has not been concluded, which is the only instrument that Mexican law currently has to reduce the imprecision of authorities responsible for the conservation and regeneration of the Atoyac River and the degrees of social participation and private initiative, its drafting should be done with the participation of a collegiate body of researchers from various areas of knowledge due to the complexity of circumstances in which the river is found, which must be published, disseminated and permanently reviewed.

In the coordination agreement for the rescue of the Atoyac River, technical and specific aspects of collaboration must be formalized, to effectively take advantage of the investment, it is necessary to tackle the causes and not the effects of its contamination, cleaning the lower part of the basin is only possible if water above, there are adequate conditions for the water to continue its course according to the quality of physical-chemical parameters required by the Mexican legal system.

Any agreement between authorities and society whose objective is the regulation, use or regeneration of the Atoyac River, must weigh environmental principles over any other interest, since there is a risk of generating more serious and costly damage than the Alto-Atoyac Basin has already suffered, as it was the vault of the San Francisco River.

The projects that arise on the regeneration of the San Francisco River, the Xonaca stream, the Atoyac River and its tributaries, must be reviewed and authorized by the responsible authority, but that does not restrict or limit other disciplines in search of solutions, provided when they are aimed at conserving the river and its inherent public goods.

Social participation and the dissemination of information are key to direct the population to recognize and promote an effective regeneration project.

Knowledge of the Micro-basin of the San Francisco River is an academic and citizen exercise that has turned the attention of other

specialists and social actors towards water, its relationship with the city and what happens in it, which has generated a link between the Anthropogenic dynamics of the urban center and its relationship with the Alto-Atoyac Basin, knowledge that had been suppressed by vaulting its channels, until now.

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