



**The determining legal, political, and social factors that need to be
taken into account when trying to solve binational water
pollution:
The case of Tijuana, Mexico**



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This thesis is dedicated to the memory of two amazing persons who had great influence on my life:

my superb father,



Árni Vigfús Árnason
(19.01.1942 – 16.10.1991)

and my beautiful, talented, younger sister



Árný Hildur Árnadóttir
(05.09.1975 - 26.02.2007)

Rest in Peace

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Abstract

Rapid population growth in Tijuana, Mexico, due to the *maquiladora industry*, has brought with it unplanned development, resulting in large concentration of people living in shantytowns, lacking basic sanitation. The Tijuana River connects Mexico and San Diego, U.S.A. as it flows north-westwards through Tijuana, Mexico, and discharges to the Pacific Ocean through the Tijuana River Estuary which is in San Diego County, U.S.A. Uncontrolled urban runoff containing raw sewage from Tijuana has throughout the years caused beach closures at Imperial Beach, San Diego, as diseases such as hepatitis and dysentery are concomitant with bathing in water contaminated with large amount of raw sewage. Since 1987, the two nations have entered into number of binational agreements in attempt to solve the problem, resulting in agreement to build wastewater treatment plant, the South Bay International Wastewater Treatment Plant that treats wastewater to advanced primary level before discharging it into the Pacific Ocean. It has been operated in violation of federal and state law in the United States, ever since it was started in 1997. There are ongoing collective bargaining for future solution to the problem. The aim of this thesis is to explore the complexity of the legal, political, and social issues that have to be addressed in development of a management plan to solve the binational water pollution of the Tijuana River. To address the aim of the paper, literature such as scientific articles, reports, and books have been analysed as well as newspaper articles.

Keywords: *water pollution; binational cooperation; Tijuana River; maquiladoras; Tijuana, wastewater treatment.*

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List of Acronyms

BECC	Border Environment Cooperation Commission
BEIF	Border Environment Infrastructure Fund
BMD	Beach Mile Day
CESPT	Comisión Estatal de Servicios Públicos de Tijuana (State Public Service Commission of Tijuana, Mexico)
EHC	Environmental Health Coalition
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
IBWC	International Boundary and Water Commission
NADB	North American Development Bank
NAFTA	North American Free Trade Agreement
PROFEPA	Mexico's Federal Attorney General for Environmental Protection
SABWWTP	San Antonio de Los Buenos Wastewater Treatment Plant
SBIWTP	South Bay International Wastewater Treatment Plant
SBOO	South Bay Ocean Outfall
SEIS	Supplemental Environmental Impact Statement
SEMARNAT	Secretary of the Environment and Natural Resources, Mexico
TNC	Transnational Corporation
USIBWC	United States Section of the International Boundary and Water Commission

Foreword

Coming from a country that has small population that shares a great nature that is full of contradictions; Great glaciers vs. beautiful small creeks; Black and mystic lava vs. green fields; Wilderness vs. small “forests”; and Dangerous glacier rivers with a heavy currents vs. beautiful pure rivers, and having spent all summer vacations through my childhood travelling around the country with my family, camping by rivers – using its water to drink, cook and bathe – between visiting the swimming pools warmed up by geothermal heat; being a girlscout, travelling through the wilderness both during summer and cold winters where the only available drinking water was from creeks – and I survived, in Iceland. One could hardly imagine a river without a potable water or a nature that could possibly harm one, especially not due to human activities.

During my upbringing, I learned to love the nature, mostly through my father and the rest of my family, who taught me to respect the nature; not to throw anything inorganic to it and always pick up all garbage on our way, to throw away later. My father passed away prematurely in an car-accident in October, 1991.

I decided to become a natural science teacher to be able to teach others to respect our beautiful nature

While studying at the Iceland University of Education, the debates regarding sustainable development had started in Iceland. That woke my interest to broaden my mind and turned on my interest in studying abroad. Hoping to be, although only as a pawn, able to contribute to making a difference to our “sinking earth” I applied to LUMES, where I was – as I’m ever grateful for – accepted as a student. That lead me and my family to Sweden.

Studying at LUMES broadened my mind as I hoped for and while taking one of the LUMES-courses, *Water and Sustainability*, I, the tiny pawn, with my narrow scope of beautiful rivers got to know the case of Tijuana River.

I got so attached to the case, although I have never been to the United States nor Mexico, that I decided to take what I had learnt further. The knowledge I gained in the *Water and sustainability* – course provided me with the basics of this case. I found the topic very interesting, especially as the search for solution to the problem is ongoing. I decided therefore to take the topic further in this thesis.

Since some of the background information, such as facts regarding the cities, toxics that have been measured, and current wastewater treatment plant, are the same in this thesis as in the papers I wrote in the *Water and Sustainability* course, material regarding those parts are the same in both papers. This was approved by Ingegerd Ehn, the director of studies at Lumes.

1. Introduction

Environmental impacts know no political boundaries, they do not respect borderlines, and they are no respecter of persons. Rivers that flow into oceans carry runoff from city streets, sewage, and industrial waste that pollutes the ocean.¹

The United States and Mexico share borders that cover more than 3,100 kilometres from the Pacific Ocean to the Gulf of Mexico (The United States Environmental Protection Agency (EPA) 2003). The Tijuana River connects the US and Mexico side of the border as it flows north-westwards through Tijuana, Mexico, and discharges to the Pacific Ocean through the Tijuana River Estuary which is in San Diego County, U.S. (Sabet 2005).

Existing sewage systems in Tijuana are in bad conditions due to lack of maintenance and about 21 percent of households are not connected to one. Furthermore, there is a large concentration of commercial and industrial establishments in Tijuana and wastewater from their manufacture processes is often discharged into the sewer systems without any treatment (Comisión Estatal de Servicios Públicos de Tijuana(CESPT)) 2003: sections; 2:38, 14-10, ES-2:3). The landscape in Tijuana, hilly topography and lack of vegetation, makes all water, both urban runoff and sewage flow into the Tijuana River.

Such transboundary discharges have proven to be a threat to the health and well-being of inhabitants in both countries, as diseases such as hepatitis and dysentery are concomitant with bathing in water contaminated with large amount of raw sewage (TED 1994: section 2). Furthermore, the beneficial use of the recreational beaches near the boundary are threatened because of beach closures; Imperial Beach, which is the recreational beach closest to the Tijuana River Mouth was closed for 89 days in 2005, because of sewage contamination (County of San Diego 2006c).

There are numerous problems involved in the management of a binational water pollution problem, and when searching for solution that both countries can accept, decision makers are often strongly influenced and aggravated by cultural and political factors. Elected officials have tendency to take decisions that are most opportune for them at that time, instead of looking out for the future, or as Michel and Graizbord (2002:30) phrase it: "Politicians, in particular, tend to have a very short-term vision". The decision-making process can be complicated, specially when the countries involved are at different developing status and therefore with different order of priorities.

As the table 1 on next page shows, the differences in living conditions and human development in USA and Mexico are great. These differences clarify why it has been hard to tackle the sewage crisis in Tijuana. Thus, it seems as it will be a long and tedious struggle, as 21 percent of the population in the country are lacking access to sanitation.

¹ Water pollution is according to Miller (2005:492) any chemical, biological or physical change in water quality that either has damaging effects on living organisms that get in contact with the water or makes water unattractive for desired uses.

Table 1: Human Development in Mexico and USA

	Mexico	United States
HDI value	0.821	0.948
GDP per capita \$	9,803	39,676
Education index	0.86	0.97
HDI ranking	53	8
Popul. with sustainable access to improved sanitation 1990	58%	100%
Popul. with sustainable access to improved sanitation 2004	79%	100%
Public expenditure on education as % of GDP, 1991	3.8%	5.1%
Public expenditure on education as % of GDP, 2002-2004	5.8%	5.9%

Source: United Nations Development Programme 2006: 283-319

Throughout the years, officials at San Diego County have been worried about the amount of raw sewage that flows from Tijuana to the Pacific Ocean. Due to their concern, a search for solution to the lack of wastewater treatment in Tijuana has been going on for years. In 1997, the South Bay International Wastewater Treatment Plant (SBIWTP) began operation, as a path to solution to the wastewater crisis. It treats wastewater from Tijuana, Mexico to the advanced primary level² and then discharges the treated water 5.6 kilometres out into the Pacific Ocean through the South Bay Ocean Outfall (SBOO) (United States section of the International Boundary and Water Commission (USIBWC) 2005a: section 1:1).

The advanced primary treatment at the SBIWTP has not been enough, as the raw sewage continues flowing from Tijuana with the Tijuana River due to its sewage system condition. The journey for finding a solution to this problem continues, and is ongoing as this is written.

The debates over what needs to be done to stop the pollution coming from Tijuana and ending up in the Pacific Ocean have been ongoing for decades:

- Habitants in the Tijuana River Valley want continuity of present situation, as the pollution does not affect them.
- Surfers at Imperial Beach want the pollution gone – no matter what.
- Local governments in Tijuana want to go for what they believe to be the root of the problem and fix current sewage system and add to it.
- U.S. governments are the one who will pay for what will be decided on. First, they wanted to upgrade the current wastewater treatment plant, but in February, 2004, Minute 311 was signed, aiming for facilities for wastewater treatment at both sides of the borders. This switchover at the governments has resulted in accusations of corruption.

² The treatment starts with grit removal and screening, chemicals are then used to enable the settling of the remaining solids in the wastewater. Chemicals are used to aid coagulation and settling of small particles. Odour control, as well as disinfection, is part of the treatment (USIBWC 2005a:1-2). Originally, the plant was to provide for secondary treatment, nevertheless, only an advanced primary treatment module was built (CESPT 2003: section 3:74-75). Since the construction of SBIWTP was decided, population in Tijuana, Mexico has grown rapidly due to the fast growing maquiladora-industry. Hazardous waste mixes with the household sewage, due to lack of infrastructure of sewage systems. The plant violates their permit for chronic and acute toxicity. The Comisión Estatal de Servicios de Públicos de Tijuana approaches San Diego authorities repeatedly, looking for ways to develop an industrial pre-treatment program (Saldaña 2003).

- Some environmentalists point at ecoparks as the most logical solution to the problem, that proposition has not been popular by numerous agencies which point at lack of area in Tijuana for ecoparks.

Both countries have signed the “Global Programme of Action for the Protection of the Marine Environment from Land-based Activities” which commits them to take into consideration the effects on the health, biodiversity, and productivity of the marine environment, resulting from human activities (United Nation Environmental Programme 2007).

1.1. Objectives and scope

The aim of this thesis is to explore the complexity of the political and social issues that have to be addressed in development of a management plan to solve binational water pollution. As a guiding, the following question is the main question of the thesis:

What are the determining legal, political and social factors that need to be taken into account when trying to solve binational water pollution from the Tijuana River?

To answer the question, following sub questions are used as guiding:

- ***What has been done to work out the binational Tijuana River pollution problem?***
- ***Are the needs of the population in both countries considered when making decisions?***
- ***Has the binational decision process been successful? If yes, then how, if no, then why not?***

The structure of the thesis is as follows: Chapter two describes the methods and material used in this thesis, chapter three provides background information to the case, chapter four provides analysis of the legal and political factors of the case, in chapter five analysis of the social and environmental factors for the case are provided, and conclusion is reached in chapter six.

1.1.1. Limitations

Limitations to the scope of this thesis should be recognised.

1. This thesis is limited geographically to the city of Tijuana, and the Tijuana River; that is the lowest part of the Tijuana River basin;³ the basin per se is beyond the scope of this thesis.
2. The City of San Diego and its sewage system is not within the scope of this thesis, although the pollution dealt with in this thesis affects geographically areas from San Diego to Tijuana River, mainly the recreational beaches in the south of San Diego County.
3. Pollution having source within the United States and affecting the Pacific Ocean is beyond the scope of this thesis, mainly since it is a minor pollution compared to the one originated in Tijuana, Mexico.

³ The Tijuana River drains a 4,480 km basin located partly in the United States and partly in Mexico (International Boundary and Water Commission (IBWC) no year a).

4. Although the polluted water of the Tijuana River affects the ecosystems and the water quality in the Tijuana River Estuary, the Estuary is out of the scope of this thesis.
5. It is problematic to gain access to material regarding environmental and social status of the city of Tijuana from Mexico, due to two factors: Few Mexican institutions are accessible online, and available data are mostly in Spanish with an exception of information from the CESPT. Therefore, most of the official data regarding Tijuana in this thesis is extracted from other sources.

1.3. Methods and Material

This thesis is an in-depth study of a single case, a qualitative case study that applies both explanatory and descriptive methods (Yin 2003: 3-4). The research analysis covers two main themes essential for understanding the complexity of binational water pollution problem in the context of sustainable development. These include the political factors; policies, governance, and laws, and the social factors; poverty, public health, and environmental health.

In order to achieve the objectives of this thesis, secondary data such as scientific articles, reports and books have been analysed. Newspaper articles are also used in this thesis since the debates over this case are ongoing. Information regarding the status of what institutions involved see as a solution are not yet in any reports, but in the form of press releases, hence using the newspaper articles is essential for this case, to be able to provide and use the latest information in this thesis. Using documents as source of evidence has both strengths and weaknesses, according to Yin (2003:86-88); they are stable, exact and have a broad coverage, but at the same time they can be selectively biased, due to incomplete collection, and access to documents can be problematic. To minimise the weaknesses, broad range of documents is used in the thesis.

1.4. Theoretical framework

Negotiation theory

Binational cooperation is not a new phenomenon. It has been practiced throughout the years all over the world with varied results. Cooperation can mean different things, such as: different parties that join forces, aiming at reaching common goals, or different parties aiming at reaching certain goal through compromising in order to eventually reach common goals (Mostert 2003: 9). The compromising process is usually referred to as collective bargaining or negotiations.

Effective binational cooperation is a product of successful negotiation process. During negotiations, authority, aligned with power are the central concepts. *Power* in this context has been defined in many different ways by realist scholars of international relations, ranging from Claude definition of power as “military capability-the elements which contribute directly or indirectly to the capacity to coerce, kill and destroy” to Morgenthau’s definition “When we speak of power, we mean man’s control over the minds and action of other men. By political power we refer to the mutual relations of control among the holders of public authority” (Hopmann 1996: 102). Power is a strong word that can have various meanings, such as: possession of controlling influence, the rate of doing work, force, etcetera (WordNet). Hopmann (1996: 102-106) breaks the word power down in three components since he believes it is defined to broadly:

- (i) Raw capability of states, that is the resources such as military- and economic capabilities that the states have and can utilize to manipulate negotiations.
- (ii) Education level of one's population, since skilled well-trained diplomats increase the power of their nation when negotiating.
- (iii) Willpower, since willingness to negotiate by countries that care about an issue can result in longer negotiations, and therefore more solid outcome for willing countries.

If one party in bilateral relationship has more “power” than the other, it can result in “a significant asymmetry in their ability to affect the outcome of negotiations” (ibid 1996:109). That can be expected in the case of negotiations between Mexico and the United States, since it is undisputed that the U.S. has much more power than Mexico.

According to Mostert (2003: 9-10), the cooperation process starts with a potential for cooperation, or conflict which is determined by the hydrological, socioeconomic, institutional or political context. Cooperation usually takes form of an “agreement” which can be in different forms, such as private law contracts, treaties, or customary law. Most agreements need to be implemented, that process is not always successful and can lead to another cycle.

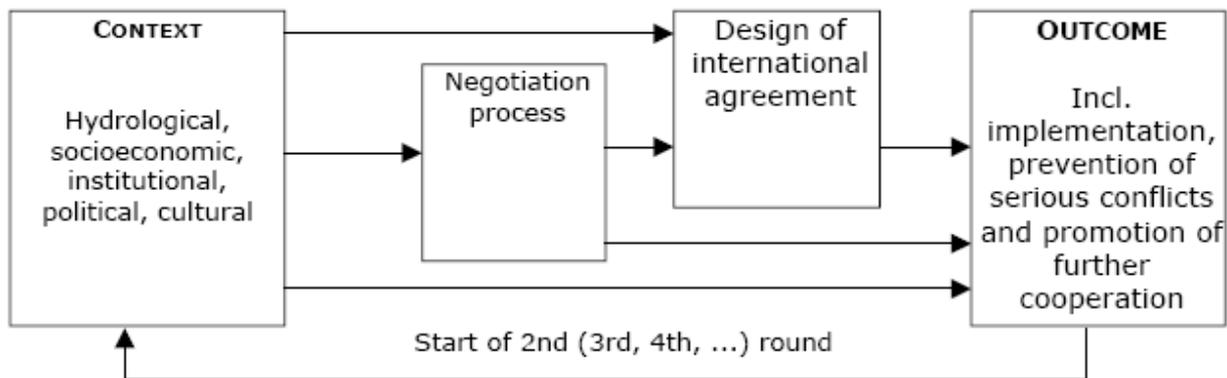


Figure 1: Overview of the binational cooperation process regarding international water management. **Source:** Mostert 2003: 17

Outcome from negotiations can be described with the game theory terms: “win-win”, “win-lose” or “lose-lose”, depending on how each side perceives their outcome. In the win-win scenario, it is likely that decisions from that negotiation will be voluntarily accepted and implemented (Spangler 2003a). Integrative bargaining, where parties focus on developing mutually beneficial agreements, is the most successful negotiation method to result in a win-win situation (Spangler 2003c). Outcome from a win-lose scenario is less likely to be voluntarily accepted by the party that sees the outcome from negotiations as negative (Spangler 2003a). Win-lose are usually resulted from distributive bargaining where fixed resource is being distributed (Spangler 2003b). Lose-lose scenario is the one that is least likely to be accepted voluntarily (Spangler 2003a) and most likely to result in a new round of negotiations.

2. Background information to the Tijuana case

This section provides a background information regarding the social condition in Tijuana, water quality in the Pacific Ocean, the *maquiladora industry*, and the current wastewater disposal system in Tijuana, that is essential for readers to deepen their knowledge, and understanding of the Tijuana case.

United States of America and Mexico share borders that cover more than 3,100 kilometres from the Pacific Ocean to the Gulf of Mexico (EPA 2003:4). Population in the border region has been growing rapidly, and was, according to EPA, more than 11.8 million people in May 2003 and estimated to reach 19.4 millions by 2020 with the same growth rate (ibid:5).

Around 90 percent of the population in the borderregion live in fourteen paired sister-cities. San Diego, USA, and Tijuana, Mexico, is one such pair. Both of the cities have borders to the Pacific Ocean (EPA 2003:8-11). The Tijuana River connects the US and Mexico side of the border as it flows north-westwards through Tijuana, and discharges to the Pacific Ocean at the US side of the border.

According to CESPT (2003: section ES:5), concentration of iron, turbidity and manganese has been measured higher than normal in the Tijuana River.

Local governments in Tijuana and San Diego are reporting increase in births where women are giving birth to deformed children; retarded, lacking brain etc. Numbers of infant mortality are rising and in San Diego, tuberculosis-cases are increasing (TED 1997:8, section 27; Frey 2003; Environmental Health Coalition (EHC) 2004).

2.1. San Diego

Population in San Diego was 1,223,400 in the year 2000 (The city of San Diego no year)). The main industry in the area is tourism, with the recreational beaches, and the Tijuana River Estuary as a primary tourist attractions. Due to contamination in the Pacific Ocean, the beaches south of San Diego County, have repeatedly been closed for large number of days, affecting the tourist industry. Furthermore, the biodiversity at the Tijuana River Estuary is endangered due to the pollution entering the estuary with the Tijuana River, which also affects the tourist industry (USIBWC 2005a: appendix 1-15).

2.1.1. Water quality

When measuring water quality in the United States, three indicators are used: Fecal coliform, Enterococcus bacteria, and total coliform. The Environmental Protection Agency has set standards for maximum contamination of the indicators in water, if the number of organisms exceeds the limits, it results in beach closures.

Table 2: Indicators for water quality

Indicator	Affects	Single sample standards (County of San Diego, 2006a)
Fecal coliform bacteria	Indicates high risk of presence of pathogens. There are various waterborne pathogenic diseases, such as: dysentery, typhoid fever, hepatitis A, ear infections and viral and bacterial gastroenteritis (cited in Michel and Graizbord 2002:2). ⁴	Max. 400 organisms per 100 ml. sample
Enterococcus bacteria	Indicates risk of pathogens that can cause: urinary tract infections, meningitis, diverticulitis, bacteremia and bacterial endocarditis (Surfrider Foundation 2002).	Max. 104 organisms per 100 ml. sample
Total coliform	Indicates raw sewage in the water (USIBWC 2005a: 4-2)	Max. 10,000 organisms per 100 ml. sample

All the contaminants listed in table 2, have originated from either human or animal faeces, the primary source for water pollution is therefore untreated sewage that drains without treatment to the ocean (Noble et al. 2003).

Water quality at the Tijuana River mouth has proven to be very poor. Brooks et al (2005) and Gersberg et al (2006) report concentration levels in ocean water samples collected from Imperial Beach pier and Tijuana River much higher than the EPA standard.⁵

In an attempt to protect users of the recreational beaches in San Diego County from polluted ocean water, the City of Imperial Beach teamed up with the San Diego County Department of Environmental Health, Scripps Institution of Oceanography, the California Regional Water Quality Control Board-Region 9 San Diego, and the State Water Resources Control Board to monitor on 24-hour basis the quality of the waters off the coast of southern California. The core of the monitoring is to identify sources of human fecal contamination in the water and follow its movements. Decisions regarding beach closures, or warnings of potential contamination are based on results from this monitoring (San Diego Coastal Ocean Observing system 2002b).

⁴ Original source: Texas Natural Resource Conservation Commission. 1996, *Water Quality in the Rio Grande Basin*. Austin: Texas Natural Resource Conservation Commission.

⁵ Brooks et al (2005) found concentration of fecal coliforms from 400 to 500,000 MPN/100 ml, enterococcus bacteria from 164 to >12,000 MPN/100 ml, and total coliforms from 170 to >16,000. Gersberg et al (2006) found even higher levels of enterococcus in their study, concentration of 72 to 754,000 MPN/100 ml.



Figure 2: *Plume from Tijuana Estuary flowing south.*

Photo: *Ocean Imaging, Inc.*

Source: *County of San Diego 2006: iv*

However, there are more than coliforms that poses health risk to those who utilise the recreational Imperial Beach, as studies on toxicity in the Tijuana River that have been conducted for the last two decades, unveil pollution⁶ in ocean water, soil, and river water. Out of eight rivers in California that were studied by the Southern California Coastal Water Research Project, the highest concentration levels of heavy metals, such as cadmium, copper, nickel, lead, zinc, and chromium, and suspended solids, was measured in the Tijuana River. The highest toxicity levels in the Tijuana River were measured at the first flush, in wet weather samples (Riveles and Gersberg 1999). Gersberg et al (2004) report similar results⁷ and state that the finding of peak at first flush indicates that toxins that are running off were in the ground in the urban areas.

San Diego county has since the year 2001 published annual *Beach Closure and Advisory Report* as a part of The Ocean & Bay Recreational Water Program. Beach closures are measured in “Beach Mile Days” (BMD),⁸ which “is used to represent the measurement of the number of days and the distance of ocean or bay shoreline waters that are closed due to a sewage spill...” (County of San Diego 2006b: 2). In the report for the year 2005, the sewage-contaminated run-off from the Tijuana River is identified as the biggest contributor for the south county beach closures as can be seen in figure 3, where closure BMDs are graphed, both the total closure BMDs including the Tijuana River and the number of closure BMDs excluding those due to the Tijuana River .

⁶ Major pollutants in urban runoff and the major sources are listed in appendix b.

⁷ Results from this study are as an appendix d.

⁸ Beach Mile Days are calculated by multiplying the number of days of a closure by the number of miles of beach closed: (Number of Days) x (Miles of beach closed or posted) = Beach Mile Days. Total numbers of available BMDs in San Diego County are 19,053 days (County of San Diego 2006b:2).



Figure 3: *Contribution of the Tijuana River to closure BMDs.*
Source: County of San Diego 2006b: 18

The raw sewage coming from Tijuana does not only contain human fecals. When it rains, the rain washes with it a lot of garbage that is believed to come from the shanties, as there is no sanitation available there and the habitants therefore throw their waste in the Tijuana Valley. From there, the rain brings it down to the Tijuana River that carries it towards the Pacific Ocean.

2.2. Tijuana

In the state of Baja California in Mexico, Tijuana is the largest city with fast growing population. Population in Tijuana was estimated to be around 1,500,000 inhabitants in 2003 (Frey 2003).⁹ Due to the rapid increase of population, living conditions in Tijuana have been worsening, as the government has not been able to follow the population growth when it comes to urban development. Illegal immigration to Tijuana has caused people to live in shanties, lacking access to sanitation, as housing is not available. Hence, inhabitants use latrines, septic tanks or open-air discharges to dispose of slop and wastewater (CESPT 2003: sections; 2:38, ES-2:3).

As a result of the lack of sanitation, residents are starting to suffer from both air- and waterborne diseases. Drinking water is polluted and inhabitants are often exposed to dangerous levels of toxins such as: Acetone, Methanol and Xylene (TED 1997:8, section 27; Frey 2003; EHC 2004).

Living under the above-described conditions makes people more vulnerable to environmental health problems, such as waterborne and respiratory diseases related to inadequate sewage treatment or improper management of hazardous waste (EPA 2003: 11). The United Nations Human Development Index shows significant change of population having access to improved sanitation in Mexico, the percentage rising from 58% to 79% between 1991 and 2004, as can be seen in table 1 at pg.5 in this thesis. The numbers are for the whole country, not specific cities.

⁹ Population figures from Mexico are estimated due to large number of illegal habitants (Frey 2003).

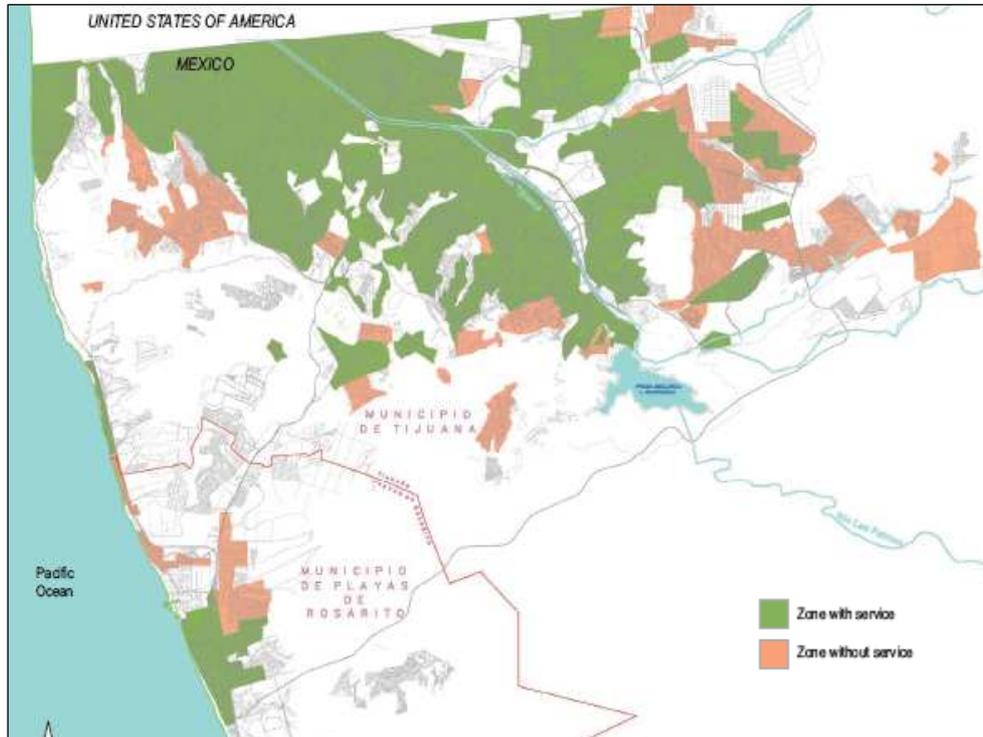


Figure 4: Areas in Tijuana with and without sanitary sewage system
Source: CESPT 2003: section 3-70

The rapid population growth in Tijuana is primarily due to the Mexican *maquiladora* industry. Maquiladoras are assembly plants where parts are shipped tax-free into Mexico and the finished product is shipped back across the border.

As highlighted in the introduction, the local government in Tijuana has not been able to keep up with the pace of fast growing population in Tijuana when it comes to infrastructure of the municipality. Although the majority of the population lives in decent houses with adequate sanitation, big portion of the inhabitants lives in *colonias*, that some researchers call shantytowns, but the United Nations defines as slums. The United Nations Human Settlements Programme defines slum household as:

A group of individuals living under the same roof lacking one or more of the conditions below:

- Access to improved water
- Access to improved sanitation facilities
- Sufficient living area, not overcrowded
- Structural quality/durability of dwellings
- Security of tenure (UN: 2003:7).

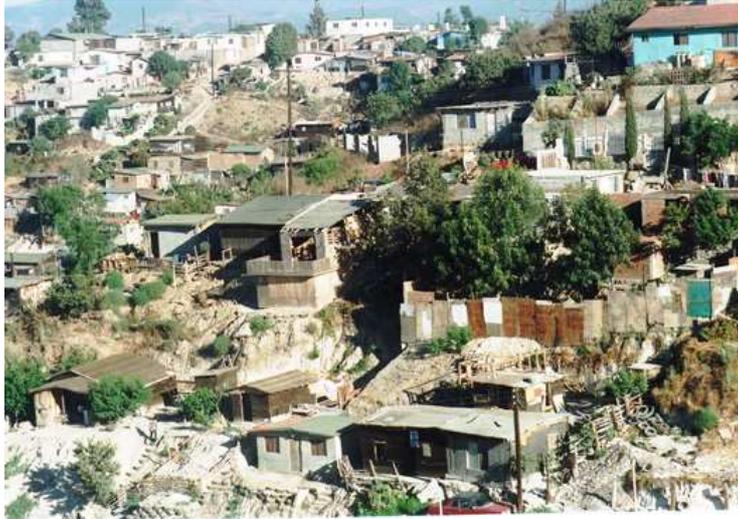


Figure 5: *Colonia Esperanza, La Mesa, Tijuana, Baja California, Mexico.*
Source: Americas Foundation, 2007

Population growth in the *Colonias* areas in Tijuana is around 10% (Frey 2003) while the growth rate for the entire city is 5% (The United States-Mexico Border Health Commission 2003:10). Ward (1997: 52) argues that these illegal, unauthorized, residential areas are left alone and tolerated by officials since while people live there, they at least have a roof over their head and by leaving them alone, politicians could get electoral support from the inhabitants. These areas are unfortunately quite often situated nearby industrial parks or at places at risk due to hazardous waste as Kopinak and Barajas (2002) found in their study.¹⁰

2.2.1. The maquiladora industry

The maquiladora industry, assembly plants owned by transnational corporations, started in 1965 when the Border Industrialization Program was launched by the Mexican state. It was meant to decrease the unemployment rate, promote industrialisation, and hence refine the economic crisis at the border states (Frey 2003). The maquiladora industry grew fast, and after Mexico became a full member of The North American Free Trade Agreement (NAFTA) on January 1st, 1994, the number of maquiladora plants climbed greatly (ibid). Due to the maquiladora-industry, lots of jobs were created in Mexico, especially in the border region, and the economy in Mexico started to improve. The industry is the core of economical development in Mexico, accounting for 41.5% of Mexican export in the period of 1993-1998 (United Nations 2002).

Unfortunately, according to the EHC (2004), the main reasons for companies that shifted their operations to Mexico from other countries, is not just because of the Border Industrialization Program and NAFTA, but also because of cheap labour, fewer environmental regulations, lack of supervision regarding hazardous waste and the fact that at that time, human rights were not respected in Mexico. All of which led to more profit for the companies. Clapp and Dauvergne (2005:157) define this situation as a case of “Transnational Corporation (TNC) environmental abuse

¹⁰ Colonias with the highest concentration of children under 14 years of age are around places categorised as generating high- and very-high-risk hazardous waste that poses risk to their health, such as below the abandoned *Metales Y Derivados* site.

in a developing country”, and state that the companies moved to Mexico to avoid the Californian environmental laws regarding toxic emissions.

The main sectors of the assembly plants are chemicals, furniture and electronics, all of which are known to heavily use toxics such as: lead, mercury, arsenic, chromium and polybrominated flame retardants (Frey 2003; EHC 2004; Clapp and Dauvergne 2005: 167). In the *Border Toxic Fact Sheet* by EHC (no year), list of seven highly toxic organic solvents is filed along with their potential effects on health and safety and the environment in border communities.¹¹

The fast growing maquiladora industry adds burden to the weak sewage system in Tijuana, which added to the soft environmental laws in the country results in significant amount of industrial waste flowing with the runoff.

2.2.2. Current wastewater disposal system in Tijuana

Wastewater generated in Tijuana, which is treated, is treated in two wastewater treatment plants, the San Antonio de Los Buenos Wastewater Treatment Plant (SABWWTP) in Tijuana, and the SBIWTP in San Diego.

The San Antonio de Los Buenos Wastewater Treatment Plant is located next to the Pacific Ocean, 18 km south of Tijuana. It was designed for an average flow of 750 l/s. In 2001, the average flow was 1,265 l/s, resulting in approximately 366 l/s of untreated wastewater evading treatment. It treats wastewater to primary level; the treatment is based on aerated pond system. All wastewater, both treated and untreated water, is chlorinated before being discharged at the shoreline of Punta Banderas through an open channel (CESPT 2003: sections 2-38, 2-39). According to a fact sheet by the North American development Bank ((NADB) no year), the bank funded through the Border Environment Infrastructure Fund, and with loans, reconstructing at SABWWTP, which aimed at preventing raw sewage to enter the Pacific Ocean by both increasing the capacity of the plant and reusing the treated water for irrigation. The Border Environmental Cooperation Commission certified the project ten years ago, in June 1997. Despite this project, raw sewage is still entering the shoreline of Punta Banderas. From there, ocean currents can bring the polluted water to the South California's shores.

The South Bay International Wastewater treatment Plant is located in San Ysidro, San Diego. It was designed for secondary treatment, but has from the start only treated wastewater to advanced primary level. It treats on average 1,100 l/s of wastewater. The wastewater plant discharges its treated water 5.6 km out to the sea through the underwater SBOO. Although SBIWTP is located in the U.S., it treats only wastewater generated in Tijuana (CESPT 2003: section 2-39). Further information regarding the SBIWTP is in chapter 5.1.

Both of the wastewater treatment plants are “products of” binational cooperation between Mexico and the United States.

In addition to those two above mentioned wastewater treatment plants, there are several private wastewater treatment-plants that do not treat wastewater from the municipal sewage system.

¹¹ List of toxics as appendix a.

Discharges from those plants are used to irrigate green areas such as golf courses, industrial parks and sports fields (CESPT 2003: section 2-37).

In Tijuana, an eco-park, “Tijuana’s Ecoparque” has been operated since 1986. The park began as a study by the Colegio de la Frontera Norte of a “decentralized system for wastewater treatment and reuse in urban areas”.¹² The park is located in Northeast Tijuana and treats wastewater from about 10,000 habitants by using bio filtration.¹³ Wastewater runs to the park by gravity as the treatment centre is located downhill. After the purification process, the water is reused for irrigating the surrounding hillside. When the eco-park was started, the area surrounding it was dry, with few brown plants. Today, the park is green – covered with trees, bushes, grass, and plants (Frontera NorteSur 2001).

3. Analysis of the legal and political factors involved in the Tijuana case

This chapter provides analysis of various legal and political factors, that combined make this case and solution to it complexed. The role of The North American Free Trade Agreement and the environmental laws in the two countries are explained. The dilemma of wastewater treatment in the San Diego-Tijuana bioregion in relation to existing laws and agreements is analysed, and conflicts regarding present recommendations for solution is explained. Lastly, available binational tools that can be utilised for stronger cooperation at the region are discussed.

Being a binational problem, cooperation for binational solution is needed. The difference between the countries when it comes to political systems and developmental status, makes it harder to find a solution that suits both countries. As Mostert (2003:18) asserts:

“... pollution problems can give rise to traditional upstream–downstream conflicts. The problems are greatest if the downstream country is more developed economically and has a stricter pollution control policy than the upstream country”.

Potential for cooperation can increase in case of pollution that is well covered in the media, since it creates pressure on the decision makers to fix the problem (ibid: 22).

Mexico has a six-year presidential cycle, which is according to Mumme¹⁴ the reason for repressed policy continuity, resulting in weak environmental regulations in the country (Harvey 2001). Felipe

¹² SIDETRAN = Sistema Decentralizado de Tratamiento y Reuso de Aguas Negras en Zonas Urbanas,

¹³ Biological filter is according to Porteous (2000:56) “A bed of inert granular material, e.g. plastic rings, clincker, etc., on which settled sewage effluent is distributed and allowed to percolate. In doing so, the effluent is aerated, thus allowing aerobic bacteria and fungi to reduce its biochemical oxygen demand. It is in effect an *aerobic process* and not a filter per se.

¹⁴ Mumme, S. 1997, Environmental policy and politics in Mexico. *Ecological policy and Politics in Developing Countries: Economic Growth, Democracy and environment*, Albany, NY: State University of New York Press. Cited in Harvey 2001.

de Jesús Calderón Hinojosa, member of the National Action Party¹⁵ is currently the president of Mexico. In the United States, George W. Bush has been president since 2001.¹⁶

Although there are differences in the political systems and different status of developing when comparing Mexico and the U.S., both countries have in common that they signed the “Global Programme of Action for the Protection of the Marine Environment from Land-based Activities” (United Nation Development Programme 2007). By signing the agreement, the governments pledged to take into consideration the effects on the health, biodiversity, and productivity of the marine environment resulting from human activities (United Nation Environment Programme 1995).

Besides the previously mentioned agreement, Mexico and the U.S. have signed several minutes, and laws have been set in the U.S. regarding solution to the pollution originating in Tijuana

The relevance of the involvement of both countries in the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities is a mystery since it is not mentioned in relation to solution finding for the wastewater-crisis in Tijuana. The existence of the agreement could be used to rationalise the need for a solid, long-term solution to the problem, and it should be one of the determining factor to solve this binational case.

3.1. Analysis of the legal factors

3.1.1. NAFTA

The North American Free Trade Agreement came into effect on January 1st, 1994. The overall aim of NAFTA was to remove trade barriers and tariffs between Canada, the United States and Mexico. The number of maquiladoras grew fast after NAFTA, especially in Tijuana; the city that was already struggling to serve both the maquiladora industry and the cities’ inhabitants with basic sanitation, was not able to keep up with the pace of the fast growing maquiladora industry when it came to infrastructure (Kopinak and Barajas 2002). As of January 1, 2001, NAFTA changed the requirements for the TNCs by no longer demanding them to return hazardous waste to the country of origin. Since then, the situation in Mexico, regarding pollution, has gotten worse; hazardous waste has been transported from the U.S. to maquiladoras for storage or simply abandoned illegally in several locations in and around Tijuana and other border cities on the Mexico side of the border. (Frey 2003).

There is an environmental side agreement parallel to the measures in the NAFTA text: the North American Agreement on Environmental Cooperation (NAAEC). Its role is to ensure that states enforce their own environmental laws, it keeps tab on the enforcement by obliging parties to report on the state of the environment. To oversee the NAAEC, the Commission on Environmental Cooperation was established. It settles disputes, and conducts studies on environmental performance in the NAFTA countries. Two other institutions were established by the side

¹⁵ Partido Acción Nacional is a conservative and Christian Democratic party and one of the three main political parties in Mexico.

¹⁶ The President’s Party, the Republican Party is one of two major contemporary political parties in the United States, along with the Democratic Party. It is often referred to as the Grand Old Party or the GOP. After losses in the 2006 Congressional elections, Republicans fill a minority of seats in both the United States Senate and the House of Representatives, and hold a minority of state governorships and control a minority of state legislatures.

agreement to provide environmental infrastructure along the Mexico-U.S. border: the Border Environmental Cooperation Commission (BECC) and a North American Development Bank (NADB) (Clapp and Dauvergne 2005:151). The chief objective of BECC and NADB is to “promote sustainable development to build stronger and healthier border communities” (Border Environment Cooperation Commission and the North American Development Bank 2007:2). The Border Environmental Cooperation Commissions primary role is to certify infrastructure projects related to environmental issues in the border region and to provide technical assistance to border communities. The North American Development Banks primary role is to finance projects that have been certified by BECC, NADB offers both funding and loans. The North American Development Bank offers funds through the U.S. EPA in form of grants and loans, through both public and private sources (ibid: 3).

The North American Free Trade Agreement is one of the most determining factor for solution of this case since BECC and NADB are the most probable sources for funding for infrastructure projects in Tijuana. At the same time, NAFTA is also the main agent for the existent condition of the Tijuana River since the enormous boost of the maquiladora industry in Tijuana is believed to be due to NAFTA. The North American Free Trade Agreement is an example of a win-win outcome from negotiations for all countries involved.

3.1.2. Environmental laws in the United States of America

The U.S. Congress has legalised a number of protection laws with the aim to protect the environmental quality and protect resources due to pressure from the citizens. There are five different approaches to implementing the laws; *standards for pollution levels*, as in the Clean Water Act, *screen new substances for safety*, as in the Toxic Substances Control Act, *encourage resource conservation*, as in the Resource Conservation and Recovery Act, *set aside or protect various ecosystems, resources and species* as in the Wilderness Act, and *require evaluation of the environmental impact of an activity proposed by a federal agency*, as in the National Environmental Policy Act¹⁷ (Miller 2005: 618). The National Environmental Policy Act acquires Environmental Impact Statement (EIS) for every major project that is likely to have effect on the environment. Making an EIS can be costly since it usually takes 6-9 months to develop one. Due to EIS, some intended projects have been cancelled because of estimated harmful environmental impacts (ibid). Environmentalists have used EISs as a device to get projects modified or even cancelled.

Throughout the years there have been different opinions on the environmental laws in the U.S. Democrats have been positive towards environmental protection. President Clinton vetoed for instance in 1996-2000 most of the efforts made by the Congress, which was dominated by Republicans, to weaken or abolish current laws. In 2001-2004, President Bush weakened many of the environmental laws, backed up by the Republican dominated Congress and withdrew the U.S. from participation in a global climate treaty. (Miller 2005: A7).

Having a Republican as a president in the U.S. makes a sustainable solution to the pollution problem in the Pacific Ocean that would benefit the populations of both countries, less likely to

¹⁷ “The federal law that requires Federal agencies to include in every recommendation or report on proposals for major Federal actions significantly affecting the quality of the human environment a detailed statement on the environmental impacts of the proposed action, any adverse environmental effects which cannot be avoided should the report be implemented, and alternatives to the proposed action (42 USC sec. 4321-4370e)” (USIBWC 2005a: section 10-6).

happen since the history has verified that the Democrats are more concerned about the environment while the Republicans rather tend to put the needs of industry ahead of the environment.

3.1.3. Environmental laws in Mexico

Market liberals argue that countries that trade with another country are likely to take into account when setting regulations, the policies and regulations in the export country, to facilitate export. The North American Free Trade Agreement has thus had positive effect on environmental regulations in Mexico (Clapp and Dauvergne 2005: 125-126). Prior to NAFTA, the U.S. EPA did a study of laws and legislations in Mexico and found that the General Law in Mexico was very similar to the one in the United States (Bailey 2004). History of environmental laws in Mexico is very short, since it was not until the year 1988 that Mexico passed its first environmental law. Till then, industry was unsupervised in respect to waste treatment and handling of hazardous waste (Kopinak and Barajas 2002). Mexican governments established the Secretary of the Environment and Natural Resources (SEMARNAT) to format legislation and environmental policy. Production of EISs is also in the hands of SEMARNAT. The agency oversees several agencies, among others the Mexico's Federal Attorney General for Environmental Protection (PROFEPA), which has the responsibility of enforcing SEMARNATs standards (ibid).

The Mexico's Federal Attorney General for Environmental Protection is open to civilians, they can file a claim to PROFEPA, which then investigates the allegation and takes measures if necessary. Findings of the investigation is reported to the complainant within thirty days (Bailey 2004).

Mexican law requires hazardous waste generators to report twice a year to SEMARNAT's offices, which stamps the reports as received and filed but does not verify them. The Mexico's Federal Attorney General for Environmental Protection takes over the reports and has the responsibility to verify the true value of them, since it is the agency responsible for enforcing Mexican environmental laws. (Kopinak and Barajas 2002). The process of verifying the reports by PROFEPA is not available. Since it is up to the plantowners to hand in reports regarding their operation, it can be assumed that plants where hazardous waste is generated but not rejected, according to environmental laws, do not hand in reports. Abandoning hazardous waste at the borders is one method that companies have been known for, like the case of former maquiladora Metales y Derivados proofs¹⁸ (ibid).

Kopinak and Barajas (2002) argue that one reason for the lack of enforcement of environmental laws in Mexico is due to shortage of "right-to-know" laws. The public is not aware of what effects on the environment, the fast growing industry in Tijuana has, furthermore the public might not worry that much since they have other priorities, like getting a roof over their head, access to clean water etc.

¹⁸ The Mexico's Federal Attorney General for Environmental Protection closed the Metales y Derivados factory due to violations in 1994. Because of the closing down, the owners abandoned the facilities and went to the U.S., The North American Commission for Environmental Cooperatin investigated the case. According to their report, approximately 7,265 cubic meters of hazardous waste, such as highly toxic lead, cadmium and arsenic, still remains above ground in 2002 and about 4,094 cubic meters of contaminated soil below ground. The area has not yet been refined, thus contaminants continue to flow away with the rain or blow in the wind. Metales y Derivados have history of dumping hazardous waste, in 1987 the company removed from a creek that flows into the Tijuana River, piles of lead oxide and lead slag that they had discarded there (Kopinak and Barajas 2002).

The weak environmental laws and the lack of their enforcement in Mexico make it vital for the decision makers of the solution to this case to have the needs of the population in Tijuana as a priority. The lack of environmental health in Tijuana is known by both politicians and institutions relevant to this case, therefore it should be a matter of course that the source of the pollution, which is the status of the sewage system in Tijuana, will be improved. Strengthening of environmental laws in the country would eventually increase environmental health in the country, if institutions would be prompted to enforce them.

The strong environmental laws in the United States, make the U.S. very powerful when negotiating for solution to the pollution from Tijuana. That could lead to a win-lose scenario, although it can be argued that the situation in Tijuana could not get any worse so all decision would lead to a win-win scenario.

3.2. Analysis of the political factors

3.2.1. Development and result of binational wastewater treatment

The United States and Mexico have long history of cooperation when it comes to wastewater treatment. Several international agreements and law have been signed¹⁹ aiming to resolve the sanitation problem in Tijuana, hence eliminate the pollution entering the Pacific Ocean with the Tijuana River. The International Boundary and Water Commission were established in 1889. It has the responsibility of applying the boundary and water treaties between Mexico and the United States, and settle any disputes related to them. (IBWC no year b). The mission of the IBWC is to:

“apply the rights and obligations which the Governments of the United States and Mexico assume under the numerous boundary and water treaties and related agreements, and to do so in a way that benefits the social and economic welfare of the peoples on the two sides of the boundary and improves relations between the two countries” (ibid)

Out of all the agreements that have been made by the U.S. and Mexico, Minute 270, Minute 283 and the Public Law 106-457 are the most significant ones. The San Antonio de Los Buenos Wastewater Treatment Plant (SABWWTP) was constructed in Mexico under Minute 270, providing primary wastewater treatment in Tijuana. Under Minute 283, the SBIWTP was constructed in San Diego, providing advanced primary treatment,²⁰ the process of designing the plant was complicated, and lawsuits were filed.²¹ In May 1991, EPA and the IBWC issued a draft EIS that examined

¹⁹ Minute 270, signed in April 1985. Mexican and U.S. governments recommendations for the first stage treatment and disposal facilities for the solution of the border sanitation problem in the San Diego-Tijuana border region. The San Antonio de Los Buenos Wastewater Treatment Plant was constructed in Tijuana as a result from this minute. Minute 283, signed in July 1990, by USIBWC and Comisión Internacional de Límites y Aguas authorised the building of an international wastewater treatment facility to provide secondary treatment in the U.S., and to construct an ocean outfall.. Minute 296, signed in April 1997, distribution of construction, operation and maintenance cost for the SBIWTP. Minute 298, signed in December 1997, rehabilitation of SABWWTP and recommendations for further work to improve the sanitation system in Tijuana. Public Law 106-457 Act enacted in November 2000, the law directs USEPA to develop a comprehensive plan to address the sanitation problem in Tijuana. Furthermore, it authorises the USIBWC to take the measures needed to provide a secondary wastewater treatment in Mexico (CESPT 2003:sections 2-59 – 2-61; Saldaña 2003; USIBWC 2005b).

²⁰ According to Minute 283, a secondary wastewater treatment plant was to be built.

²¹ San Diego Chapter of the Sierra Club et al filed suit against USIBWC in 1994. The court found for the plaintiff, demanding the USIBWC to come up with a solution for a treatment level upgrade. In 1999, plans for construction of

alternatives to implementing the Minute (USIBWC 2005a: 375²²). In 1994, the final EIS was issued after receiving public comment on the draft EIS. In the final EIS, the construction of a full secondary wastewater treatment plant to be located in the U.S. was recommended. Construction of the SBOO was also recommended for effluent disposal (ibid: 383²³). The agencies signed the Record of Decision selecting the recommended alternative in the final EIS same year. The Environmental Protection Agency certified that the USIBWC fulfilled the National Environmental Policy Act requirements (USIBWC 2005b: 4). The South Bay International Wastewater Treatment Plant began operation in 1997.

In accordance to the Public law 106-457, CESPT in cooperation with EPA, analyzed the needs for rehabilitation of current sewage infrastructure in Tijuana, and supplements to it to prevent further pollution from the flow of untreated sewage. Results from that study are presented in *The Potable Water and Wastewater Master Plan for Tijuana and Playas de Rosarito*, referred to as the Master Plan²⁴. The plan addresses all issues regarding the reconstruction of sewage systems in Tijuana and its nearby city, Playas de Rosarito, and takes into consideration social, economical and environmental factors. The master plan is a twenty year program and identifies not only necessary improvements for current situation, but goes further and identifies required additional wastewater treatment capacity based on population growth prediction (USIBWC 2005a: 2-2).

The Master Plan was created with the aim of getting funds from the NADB. For that purpose, it first has to be certified by the Border Environment Cooperation Commission (BECC) to be eligible for funding from the NADB. One of six criterias for certification by BECC is sustainable development. The Border Environment Cooperation Commission defines sustainable development as:

“Conservation oriented social and economic development that emphasizes the protection and sustainable use of resources, while addressing both current and future needs, and present and future impacts of human actions.” (Project Certification Criteria by the BECC, Ciudad Juarez, Chihuahua Mexico, November 9, 1996, cited in CESPT 2003: section 4-1).

Using a process developed by BECC, sustainable development as defined by BECC was incorporated in the Master Plan (CESPT 2003: section 4-1).

Development of the Master Plan started after the Public law 106-457 was approved on November 7th, 2000, which set the ground for it (U.S. Government Printing Office 2000: 21). Two years later, the first public meetings²⁵ were held by USEPA and CESPT to introduce the most likely options for

mixed aerated ponds were announced as the preferred alternative for treatment upgrade in compliance with the Minute 283. The SBIWTP remained though as an advanced primary plant, since the funding for the upgrading had been used for other projects (Saldaña 2003). The Surfrider Foundation filed suit against the City of San Diego claiming that the construction of the SBOO fails to comply with the Environmental Impact Report (EIR) standards. The court ruled in favour of the City of San Diego, and the SBOO was constructed.

²² As a part of Appendix A – Notifications: A copy of: *Federal Register/* Vol.68, No. 204/Wednesday, October 22, 2003/Notices, pages 60418-60420.

²³ As a part of Appendix A – Notifications: A copy of: *Federal Register/* Vol.69, No. 250/Thursday, December 30, 2004/Notices, page 78484.

²⁴ Section 801 and 802 in the Public law 106-457 outline the ground for the Master Plan: “*Tijuana River Valley Estuary and Beach Sewage Cleanup Act of 2000*” with the purpose of: “... to authorize the United States to take actions to address comprehensively the treatment of sewage emanating from the Tijuana River area, Mexico, that flows untreated or partially treated into the United States causing significant adverse public health and environmental impacts” (U.S. Government Printing Office 2000: 21).

²⁵ Public participation is required both by the Border 2012 Program and by BECC.

sanitation development in Tijuana (Saldaña 2003). In March 2003, the Master Plan was issued by CESPT and USEPA (USIBWC 2005a: 16). In February 2004, the United States and Mexican Commissioners of IBWC signed Minute 311²⁶ (ibid: 1-3). In December same year, the Regional Water Quality Control Board and the IBWC resolved a lawsuit by setting out a schedule for the SBIWTP to be in compliance with the Clean Water Act; IBWC is to publish a draft Supplemental Environmental Impact Statement (SEIS) in December 31st 2004, and final SEIS by August 2005, furthermore the SBIWTP must be operated in compliance with the Clean Water Act by September 30th, 2008 (The City of San Diego 2005). In 2004, draft SEIS was released, and the final SEIS was published by IBWC in July 2005 (USIBWC 2005b: 18). The final SEIS includes 7 different alternatives, out of which alternative 4-C was chosen, so called Bajagua project , LLC proposal. That proposes continuity of running SBIWTP as an advanced primary treatment facility and to provide a secondary treatment in Mexico (ibid: 22). The United States Section of the International Boundary and Water Commission explained the reasoning for their choice of alternative 4-C in the final SEIS:

“This alternative could address long-term needs of the San Diego/Tijuana region. This alternative provides an opportunity for Mexico to expand its treatment infrastructure/capacity and reduce or eliminate dry weather raw sewage flows into the United States. Alternative 4 Option C promotes potential re-use activities in Mexico thus reducing its dependence on Lower Colorado River water supply and other water sources. This alternative promotes, after 20 years, the enhancement of CESPT’s institutional capacity because construction of the facility will be paid in full. Given projected increased flows in Tijuana, this alternative would provide the best long-term approach to meeting the wastewater treatment needs for the region” (USIBWC 2005a: 2-61).

A sole source contract “development agreement” was signed between Bajagua and USIBWC on February 15, 2006, according to a press release from the USIBWC. U.S. Commissioner Carlos Marin states in the press release that “This contract is an important milestone in improving the sanitation infrastructure at the San Diego-Tijuana border” (USIBWC 2006). At February 22nd 2007, IBWC announced a list of three bidders²⁷ for the project. In the announcement, Arturo Herrera from the Mexican Section of the IBWC informed that federal land in Tijuana is according to governing agencies, available for use to construct both the plant and necessary pipelines (IBWC 2007).

May 2, 2007, was set as a deadline for the Bajagua LLC to reveal a signed construction contract. In March 2007, USIBWC received a notification from Bajagua LLC declaring that the company would not be able to fulfill the May deadline, also stating that the company might not be able to fulfill the court-order deadline of September 30, 2008. The United States Section of the International Boundary and Water Commission received another notification from Bajagua on April 25, 2007 where the company informed the agency that they were unable to fulfill the requirements for the Mexican facility to be ready in time by September 30, 2008. Bajagua asked for a five months extension of the deadlines. The United States Section of the International Boundary and Water Commission is under court order to treat wastewater in compliance with the CLW at the latest on September 30, 2008 and could therefore not extend any deadlines. As a result from this notifications, USIBWC has suspended all activities regarding Bajagua, until the Court has taken a decision regarding any extensions, therewithal USIBWC takes no responsibility of any actions

²⁶ Minute 311 “Recommendations for Secondary Treatment in Mexico of the sewage emanating from the Tijuana River Area in Baja California, Mexico” is an agreement of the U.S. and Mexican sections of the IBWC for a framework for the construction, operation and maintenance of secondary treatment facilities in Mexico for sewage originated in Tijuana.

²⁷ Although Bajagua holds a sole source contract, competitive bids are required for construction of the project (USIBWC 2006).

taken by Bajagua until further noticed according to USIBWC Commissioner Carlos Marin in his letter to the Executive Officer John Robertus at the California Regional Water Quality Control Board on May 8, 2007 (Davis 2007). According to a Bajagua spokesman, the company has not been able to fulfill their obligation regarding issuing a construction contract due to “bureaucratic and international factors” (Lee 2007b).

U.S. governments seem to becoming sceptical regarding Bajagua, as in February they made \$66 million available for a U.S. plant in case of Bajagua failing to fulfill its deadlines. Statement from the Justice Department on May 2, 2007 regarding Bajagua reveals the growing concern for Bajagua failing to come through: “the government is pursuing all available options to bring it [SBIWTP] into the compliance with the Clean Water Act” (Lee 2007b), thereby opening the possibility of upgrading the SBIWTP instead of going through with the Bajagua project.



Figure 6: Proposed Bajagua plant and pipelines.

Photo: Union-Tribune. Source: Lee 2007a.

Figure 6 explains the proposed Bajagua plant. The wastewater would first enter the Tijuana River, from where it would be pumped to the SBIWTP and be treated to advanced primary level, then sent upstream via pipeline to the Bajagua plant for advanced treatment. Bajagua plans to sell the treated water for industrial use, surplus water would be sent via pipelines to the SBOO to be discharged into the Pacific Ocean.

As can be learned by reading this chapter, a lot has been done in an attempt to solve the pollution problem resulting from the condition of the sewage system in Tijuana. The Master Plan offers a long-term solution to the problem by identifying the need for rehabilitation of the sewage system. Projects from the plan have potential for being funded by the NADB. At the same time, the U.S. governments lobby for construction of privately own secondary treatment facilitation in Tijuana without touching up on the sewage situation in Tijuana. Privately owned facilities are not funded

through the NADB, so the U.S. governments, or more precisely the taxpayers in the U.S. need to pay for it. The needs for the population in the U.S. are partly being considered by the Bajagua project, but it will not have any positive nor negative affects for the population in Tijuana since the proposed Bajagua plan will not fix the sewage system in Tijuana, it is mainly a upgrading of current wastewater treatment, not an addition to the system. The United States reveals clearly how powerful they are against Mexico when they decided on the Bajagua Plant without consulting the Mexican section of the IBWC. The project will be paid by the U.S., and by that power they took the decision. The situation can though not be labelled as a win-lose situation since Mexico is not losing anything by this decision.

3.2.2. Conflicts regarding the Bajagua project

Although political agreements were reached for construction of the 'Project Bajagua', there are critical voices regarding both the cost of it, compared to other alternatives, and the method that was used to get approval for the project.

Project On Government Oversight (POGO)²⁸ reported on March 31st, 2006 that the Bajagua project represents "business-as-usual in governmental contracting" in the United States. Their investigation of the decision process when the Bajagua project was agreed upon reveals "legal corruption" since lobbying for the project was done by politicians that had received a great deal of money in their election funds over some years from Bajagua officials and their families (POGO 2006). Paltrow (2007), a journalist on *The Wall Street Journal* argues that the Bajagua project is a reality due to "well-timed campaign contributions to local members of Congress and other political figures" on behalf of the Bajagua owners. Paltrow continues and claims that when the good will from the members of Congress was not enough, the owners of Bajagua met with the Vice President of the U.S., Dick Cheney to facilitate for approval of the project.

Few seem to understand why this particular option, the Bajagua project (alternative 4-C) was the one to be chosen as the most feasible in terms of eliminating the pollution in the Pacific Ocean and to improve the quality of life in Tijuana when it comes to public health of its citizens. The project does not improve the sewage system in Tijuana, it only adds facilities to treat wastewater flowing through current sewage system. The project is predicted²⁹ to be extremely expensive, or between \$580 million and \$780 million (Paltrow 2007). The cost of the project is going to be paid entirely by American taxpayers. Lori Saldaña, a State Assembly woman, argues that the project should have been structured in collaboration with the NADB or the Border Infrastructure Fund, instead of public-private partnership to secure the infrastructure (Rodgers 2005).

Alternative 5 in the final SEIS allowed for upgrading the SBIWTP to secondary treatment. According to the USIBWCs Record of decision, the agency did not consider the alternative feasible in the light of the history of USIBWC and EPA lobbying for funding for upgrading SBIWTP (USIBWC 2005c). Ever since the SBIWTP started operation at advanced primary level, EPA and USIBWC have repeatedly asked the Congress to authorise necessary funding for upgrading of the plant. The Congress always declined the request, and finally passed the Public Law 106-457, which made it clear that the government wanted the secondary treatment facility in Mexico.

²⁸ POGO is an independent non-profit organisation that investigates and exposes corruption and other misconduct in order to achieve a more accountable federal government (information from their homepage: pogo.org).

²⁹ Accurate numbers are not available until the Bajagua LLC reveals a signed construction contract.

The Bajagua plan was first proposed in the late 1990s. The Environmental Protection Agency and the IBWC rejected it at that time on the grounds of being “not a feasible alternative”. Michael L. Evans, an engineer at IBWC at that time states that the reason for why the IBWC rejected this alternative from the beginning was that the project was “unnecessarily costly, because the same sewage would ping-pong across the border three times before being discharged into the ocean” (Paltrow 2007).

Both Paltrow (2007) and POGO (2006) divulge a corruption regarding the Bajagua project that will not be listed here.

When the author of this thesis started to research the case, corruption in Mexico was expected to be unveiled. However, the whole decision process when deciding on the Bajagua-project gave a clue of corruption in the U.S. The debates regarding the project highlight previously mentioned corruption in the U.S., while Mexican governments seem to have been honest. The complexity of finding a win-win solution to this binational water pollution problem that would benefit both countries got even more complicated when the factor of corruption entered the picture. Since there is no legal documents available backing up this said corruption, it will remain as a accusations and therefore not considered as a factor in this thesis although it is clear that it affects the case.

3.3. Available tools for binational cooperation

This section identifies different tools that have developed as products of cooperation between Mexico and the United States. The cooperation have resulted in many different programs and projects, other than wastewater treatment, which all aim to increase awareness among the residents in the border region, and to facilitate the access to valuable information regarding the environment. The Border 2012 program, The Healthy Border 2010, the US-Mexico Border and the U.S.-Mexican Border Environmental Information Web (Border EcoWeb) are important binational tools to provide information and environmental education to the border region population. Tox Town, another available tool is not binational in its nature, since it is owned and maintained by a U.S. institutions, it is though considered binational in this thesis since it is available in both English and Spanish and it provides important information of potential health risks in the environment for the population in the border region.

3.3.1. The Border 2012 program

The Border 2012 Program, signed by EPA and SEMARNAT on April 4, 2003 is the one most relevant for this case. Its aim is “To protect the environment and public health in the U.S.-Mexico border region, consistent with the principles of sustainable development” (EPA 2003: 2). Six goals are identified by the program, all of which are related to environmental and environmentally-related public health problems in the border region:

1. Reduce water contamination
2. Reduce air pollution
3. Reduce land contamination
4. Improve environmental health
5. Reduce exposure to chemicals and hazardous substances
6. Improve environmental performance (ibid: 13)

The Environmental Protection Agency and SEMARNAT serve as national coordinators and are to ensure that the goals of the program will be reached (Epa 2003: 25-26). The program focuses on the entire region and does not address specifically each city. Various tools are identified to achieve the goals of the program, such as: pollution prevention techniques, public health interventions, sustainable management of water resources, environmental information, development of regulation and policy, cooperative enforcement and compliance assistance, environmental education and training, and infrastructure planning and development (ibid: 21-23). Identifying environmental education and training as a tool is a good strategy to raise public awareness, hence engagement on environmental issues. The program reaches further in an attempt to reach the public, as open meetings are held in communities within the border region. Moreover, the coordinators post information regarding projects to Web sites, and in media to enhance information exchange (ibid: 29-30). This bottom-up method has potential to be successful although it must be recognised that not all citizens in the border region, especially people living in shanties in Tijuana, have access to the internet, nor subscribe to some media.

3.3.2. The Healthy Border 2010

The healthy Border 2010 was established in 2001. It is a binational program by the binational organisation The United States-Mexico Border Health Commission which is comprised of the Federal Secretaries of Health of both nations and health professionals from all the border states. The overarching goal of the The United States-Mexico Border Health Commission (2003: 2) is to “Increase and improve the quality of life and years of healthy lives, and to eliminate health disparities”. The program’s roots lay among others in the ever-growing cross-border traffic between Mexico and the U.S. The program is divided into eleven areas, which all have specific set of objectives, different for the countries. One area involved in the program and related to this thesis is *Environmental Health*; its year 2010 objective for Mexico is to reduce from 21.3 percent, the proportion of households not connected to compliant public sewage systems or septic tanks, while the objective at the same time for the U.S. is to Reduce to zero from 1.1 percent the proportion of households without complete bathroom facilities (The United States-Mexico Border Health Commission 2003: 27).

3.3.3. The Border EcoWeb

The EcoWeb is a collaborative effort between EPA, SEMARNAP, the Environmental Information Work Group of Border XXI (today Border 2012), San Diego State University, and the U.S.-Mexico Border Information Institute, to provide information on different agencies and organisations in the border region addressing environmental issues. The website is accessible in both English and Spanish. <http://www.borderecoweb.sdsu.edu/> (Institute for Regional Studies of the Californias No year)

3.3.4. Tox Town: US-Mexico Border

The U.S. National Library of Medicine offers valuable information regarding environmental health issues in the border region through its interactive website, <http://toxtown.nlm.nih.gov/>. The site is available in both English and Spanish. The site contains special instructions for teachers regarding activities and resources to use for teaching environmental health issues. This website is not a binational tool as in cooperation between binational institutions. It can though serve as a valuable

tool for binational cooperation since it is available in both Spanish and English language and it addresses issues that concern the bioregion (U.S. National Library of Medicine No year).

The Border 2012 program, the EcoWeb and Toxtown can all serve to raise awareness among the citizens in Tijuana. By emphasising the need for people to be aware of potential danger of chemicals and toxics in their surroundings, and by explaining the need for proper treatment of all waste, both water and solid waste, inhabitants could set pressure on local governments to accelerate the decision making process. The Border 2012 program is the tool that can best serve both the population and the governments since citizens have access to the governments through the open meetings, therefore their voice can be heard, the meetings can also serve as a tool for the governments to enlighten the inhabitants about what measures are being taken in the bioregion regarding various binational matters, such as the wastewater problem.

All these programs and projects have resulted from a successful cooperation. All of them can be labelled as a win-win although it is clear that the Mexican part of the border region will benefit more from them. Eventually the U.S. part of the border will gain from the projects since by raising awareness, there is a hope for improved environmental health in the border-region.

3.4 Summary on the influence of legal and political factors

The North American Free Trade Agreement is one of the most determining factor for solution of this case since BECC and NADB are the most probable sources for funding for infrastructure projects in Tijuana. Authorities in Tijuana can apply for funding to the NADB on their own, as long as the projects are certified by BECC. Mexican governments should use that approach to facilitate the development of the weak sewage system in Tijuana since they can not continue to depend on decision-making by the U.S. governments to retrieve the situation in Tijuana as the recent decisions regarding wastewater treatment options proof where the U.S. revealed their power and took decision without even consulting the Mexican section of the IBWC. The local governments in Tijuana have the Master Plan that offers a long-term solution to the problem by identifying the need for rehabilitation of the sewage system, the Master Plan should be used as a framework for actions taken, as it was meant to be by EPA and CESPT. It is strange that the making of the Master Plan was financed by the U.S. institution, EPA as decided by the Public Law 106-457, still the U.S. section of the IBWC does not take advantage of it when taking decision regarding pollution from Tijuana although that was the purpose of making the Master Plan. It is though not enough to have a plan for decreasing the pollution in Tijuana, Mexican government need to strengthen their environmental laws and enforce them to decrease and hopefully eliminate the pollution originating in the maquiladora assembly plants.

In the search for solution to the pollution, binational agreements have been signed, from that two wastewater treatment plants have been constructed. Since neither of them is operating in compliance to U.S. environmental laws, more minutes have been signed and law set to facilitate the solution to the pollution flowing with the Tijuana River. But although law has been passed, proposed solution resulted from it will not benefit both populations. The wastewater that would be discharged to the Pacific Ocean will probably contain less bacteria, which will benefit the U.S. population utilising the recreational beaches, but the streets in Tijuana will remain wet and polluted since the law does not touch up on that root of the problem.

4. Analysis of the social and environmental factors of the Tijuana case

This chapter provides analysis of the social and environmental factors of this case. It starts with discussion of the case pre and post NAFTA, continues with discussion of the relevance of this case in environmental context, and from there the case is discussed in relation to the public health. Binational considerations are then addressed in relation to wastewater treatment and the need to raise awareness in the region, and finally the case is analysed in relation to environmental sustainability.

4.1. The case of Tijuana, pre- and post NAFTA

Little (2003: 147) argues that free trading "... will increase the overall efficiency of the global production of all traded goods, thereby increasing the standard of living for every population", Little's reasoning cannot be applied to what happened in Tijuana, since standards of living did not increase following free trade. When Mexican governments were looking for a way out of the country's debt crisis, they laid the ground for the maquiladora industry through the Border Industrialization Program by offering TNCs duty free import of raw material for assembly plants and duty free export of goods. The Border Industrialization Program was meant to attract TNCs, hoping to create jobs, bring in foreign currency, and to promote development in the cities (Kambhampati 2004: 135; Frey 2003). The program started well, but the number of TNCs moving their assembly plants to Mexico was excessively high for the governments to keep up. The urban development, especially in the border region, placed too much pressure on the infrastructure in the cities, resulting in number of the immigrants living in shanties, lacking basic facilities such as sanitation.

When Mexico joined NAFTA, Carlos Salinas de Gortari³⁰, the president at the time in Mexico endorsed free market economy. Salinas' aim for the free trade agreement for Mexico was similar to when the Border Industrialization Program in Mexico was established, that is: to attract more TNCs to the country, thus decreasing unemployment rate, raise standards of living, increase national income, and make use of technology and management skills provided by the TNCs (Demmers 2001). It can be argued that Salinas made the right decision since the maquiladora industry blossomed after NAFTA: unemployment rates decreased, and national income increased substantially. But when it comes to standards of living, it has not improved. Population growth in the colonias is estimated to be 10 percent while population growth in the city is estimated to be 5 percent. While population growth in the colonias is twice higher than for the city itself, one cannot argue that standard of living has improved.

Environmental health decreased at same pace as the maquiladora industry increased. Therefore, the intention with NAFTA was not only to establish a free trade area between the United States, Mexico, and Canada, it was also aimed at being a tool to manage the environment at the international border between Mexico and the United States according to Sands (2003: 999). Moreover, through NAFTA, sustainable development should be supported in the countries by establishing principles and rules that were consistent with environmental protection and conservation (ibid). To promote sustainable development and environmental health, BECC and NADB emerged under side agreements of NAFTA. Part of their objectives is to facilitate the

³⁰Salinas, member of the Institutional Revolutionary Party (PRI) was president in Mexico from 1988-1994.

development of wastewater treatment, and sewage system infrastructures, which opens up the possibility for local governments in Tijuana to get funding to improve the infrastructure of the city. Influences of BECC and NADB are apparent in the development of the Master Plan that was developed by CESPT and EPA, as BECC's terms regarding binational development is the basis of the plan. By doing so, projects from the plan can be financed through the NADB. According to a press release from BECC (2006), it approved on August 10, 2006 a grant for "development of a feasibility study intended to determine the potential reuse of treated wastewater in Tijuana, Baja California, Mexico"; the study is one of suggested tasks in the Master Plan, it is meant to identify the infrastructure needs, suitable areas for reuse of wastewater and to estimate the volume of effluent that could be reused by industry, irrigation etc. in Tijuana. Furthermore, BECC (2006) informs that "to date, the BECC has certified nine environmental infrastructure projects in Baja California, totalling an estimated \$192 million, to benefit 3.2 million residents". Exactly what projects or where in Baja California is not reported, nor whether all the certified projects have received funding from the NADB. Nonetheless, for Tijuana, like all the other border communities, to have access to NADB for funding for developmental projects opens up a possibility for increasing the standard of living in the border region and to increase environmental health.

Environmental policies in Mexico began to strengthen as a result from NAFTA as the existence of SEMARNAT and PROFEPA witness. But although Mexico has institutions to regulate and enforce the environmental laws, they have not been enforced effectively (Clapp and Dauvergne 2005: 167). Logsdon and Husted (2000) found with their research on Mexico's environmental performance under NAFTA the first five years, that the policies regarding the environment strengthened under the negotiation time of NAFTA. Mexican governments are still trying to improve their environmental performance and use the available tools for the job. Unfortunately, Mexico does not have resources such as funds to rely on, therefore they do as they can at the international level as the Master Plan illustrates. The North American Free Trade Agreement can only be interpreted as a win-win deal for Mexico, especially when concerning the economy in the country. The decline of environmental health can not be blamed on NAFTA, rather the lack of enforcing the environmental laws in the country. Membership to NAFTA opens up possibilities for the Mexican governments to get fund for improvements of the infrastructure in Tijuana and other Mexican cities.

4.2. Environmental context

The sewage crisis in Tijuana poses a serious risk for environmental damage like the contamination of the Tijuana River and the coastal regions at the Pacific Ocean surrounding the Tijuana River Mouth proofs.

Although this thesis does not cover environmental damage such as biodiversity loss or disruption of ecosystems, the risk posed for human health can and should be considered as indication for other environmental damage.

4.2.1. The Pacific Ocean

The existence of coliforms and the high levels of toxicity in urban runoff coming from Tijuana should not be surprising, when the condition of the existing sewage system, the rapid population growth in shanties, and lack of resources regarding wastewater treatment, are considered. The urban runoff, including all its coliforms and toxics is supposed to be treated as wastewater in the

SBIWTP, but since the plant is inefficient, part of the wastewater flows untreated with the Tijuana River and discharges in the Pacific Ocean..

Officials in both Tijuana and San Diego have recognized the water pollution problem concerning raw sewage flowing with the Tijuana River, and strong collaboration has developed in the San Diego-Tijuana border region to address the wastewater treatment problem as well as to address the lack of infrastructure in Tijuana regarding sewage system. Binational water issues along the Mexico – U.S. border are to be addressed by both U.S. and Mexican sections of the IBWC.

Concentration of bacteria levels is used by the U.S. governments to measure ocean water quality, although it is mainly viruses that cause illnesses in humans. The Brooks *et al.* study on Hepatitis A virus is a clear indication of the need of both more comprehensive indications use, as well as more in-depth analysis of the water quality at the beaches, since the water quality is the base of the tourist industry in San Diego. The need for upgraded wastewater treatment and actions to prevent urban runoffs from Tijuana by constructing an applicable sewer system in Tijuana, as well as to treat its wastewater to tertiary level is undisputed.

4.3. The Public Health Issue

4.3.1. Human Health

Those exposed to the contaminated sewage water in the Pacific Ocean are at risk of come down with diseases such as dysentery, hepatitis, and other diseases. Those who live in the colonias are at even greater risk since they are constantly in contact with pollution due to the lack of sanitation.

4.3.2. Education

Although not addressed in the paper, it must be recognised that the environmental awareness of inhabitants must and can be strengthened through the various tools available, such as the EcoWeb and the ToxTown webpage. By increasing environmental awareness, citizens would be more aware of both current situations, what can be done to improve current situation, and what can be avoided.

4.4. Binational Considerations

4.4.1. Wastewater treatment

The Master Plan identifies different alternatives regarding wastewater treatment, all of whom include: Cleaning, inspection, and rehabilitation of the sewer system; Rehabilitation of water distribution system with focus on distribution lines and leak reduction; Control of industrial and commercial discharges; Separation of the stormwater and sanitary systems; Improvements of the operation and maintenance of treatment plants; Water reused for industrial- and green areas; Rehabilitation of the discharge system (discharge in the Pacific Ocean beyond the surf); and Different studies regarding water quality and quantity (CESPT 2003: section ES:17).

The proposed Bajagua project does not include rehabilitation of current sewage system in Tijuana, nor does it challenge the conditions at the San Antonio de Los Buenos, which discharges wastewater mixed with chlorinate onto the beach. In fact, the expensive Bajagua proposal does not

make things better at Imperial Beach, as it does not address any future needs of Tijuana nor does it fix the root that is the lack of infrastructure in Tijuana.

As debates regarding the matter root for, the Bajagua is only a reality due to money scoop of the owners of the sole source contract of Bajagua. The facility in Tijuana is going to be paid by taxpayers in the U.S.A. since it is a private property instead of aiming at binational owned facility that would be regulated by the IBWC and could therefore be financed by the Border Environment Infrastructure Fund or the NADB.

Not to mention the main thing that is causing the pollution in the Pacific Ocean: although a 600 \$ million facilities would be constructed, it would only be able to treat wastewater in dry-weather conditions. During the raining season, the Tijuana River would still be flowing to the Pacific Ocean full of urban runoff as before, containing the toxics and heavy metals as before. So, the situation would not get any better.

The binational development is though not as concrete as it should be since there is an abyss between goals of civil participation and civil participation in reality. There is though a hope with the Border 2012 program that has established binational task forces. By starting the Border 2012 program, governments in both countries are recognising the importance of civil participation in decision-making. According to Chambers (cited in Downs 2007), participation by stakeholders has proven to be successful when implementing policies, as by participating, stakeholders such as inhabitants, sense a responsibility if they were in when deciding on affairs. NGOs are also important when it comes to lobbying for binational environmental improvement.

4.4.2. Raising Awareness

With systematic use of current resources through the Internet, it should be easy to raise awareness of the inhabitants in the Tijuana-San Diego bioregion. Knowledge is the key to the future. Being able to either spread knowledge or to be able to exploit knowledge for oneself and the near ones, can prevent further environmental damage.

4.5. Environmental sustainability

It is hard to gain environmental sustainability in Tijuana while the city continues to absorb the negative elements from the maquiladoras, which are produced by economic and industrial patterns in the western society. There is though a light in the dark with the Master Plan and the Border 2012, as the Border 2012 is a good tool for public participation and therefore a good platform for making the voice of the commons to be heard. The Master Plan addresses all the needs for the population in Tijuana for increased standards of living, especially concerning sanitation. By lobbying for the Master Plan through the environmental task forces of Border 2012, success can be achieved.

Under NAFTA, Mexico has improved its environmental sustainability (Logsdon and Husted 2000), but it can be taken further. By strengthening the PROFEPA, so they could check out all the reports from the maquiladoras, the TNCs assembly plants, it could result in fewer “toxic incidents”, hence cleaner environment. There is a precedent to strengthen PROFEPA, as from 1996, the generators of hazardous waste became responsible for it from “cradle to grave” unless they had done deals with liable companies. Penalties were increased for violations of the hazardous waste legislation; the law only needs more supervision (ibid).

Environmental sustainability is essential for the population living in the San Diego-Tijuana region, not only for their own health but also for the tourism, which is an important industry in the region. While the pollution is allowed to continue, beach closures prevent the recreational uses of the beaches which, through chain reaction, affects the whole border population.

4.6. Summary on the influences of social and environmental factors.

After Mexico joined The North American Free Trade Agreement, the maquiladora industry grew fast in Tijuana. Concomitant with activities of the assembly plants, the population growth increased as well as the pollution.

Due to the rapid increase of population, living conditions in Tijuana have been worsening, as the government has not been able to follow the population growth when it comes to urban development. Standards of living have been worsening, and increased number of habitants live in illegal housing, so-called colonias. The lack of basic sanitation in Tijuana is a serious health risk to both the population of Tijuana as well as the population that utilises the recreational Imperial Beach in San Diego.

There are binational governmental institutions in the bioregion working towards raising environmental awareness at the population in Tijuana. A solution to the problem that would fit both countries could be established by using the task forces of Border 2012 and its public participation as binational coordinator.

The binational cooperation between Mexico and the United States has had positive effects on the population in Tijuana. Although the U.S. governments could have, by their power, ignored the poor environmental and public health situation in Tijuana, they have not. Instead, the U.S. governments have done what they can to improve the situation in Tijuana. There is though a lot of work ahead until the situation in Tijuana can be considered as decent.

5. Conclusion

Uncontrolled commercial and industrial waste into the weak sewage system of Tijuana poses a serious risk to the environment. Local governments in Tijuana have made a long term planning for the current infrastructure of the fast growing city by developing The Master Plan, which lays the ground for the needs of the present situation, and to the predicted future population. But colonias are growing at too fast pace, and for the local governments in Tijuana to be able to provide a proper housing that are linked to sewage systems for both new industrial plants and immigrants they need to activate the Master Plan and start to improve the infrastructure of the city. And from there to work on solutions to provide proper housing for the fast growing colonias population to prevent further increase of families living in colonias.

Mexico needs an ocean outfall for its wastewater plant, SABWWTP, that is crucial for the Pacific Ocean pollution. Secondary treatment is also essential, since the available treatment is not sufficient. It is not suitable to pump untreated wastewater to recreational beaches that are crucial for the tourism industry in the areas, not to mention the effects on the biosphere in the Pacific Ocean, the Tijuana River and the Tijuana River Estuary which are out of the scope of this thesis.

There are currently binational governmental institutions in the bioregion that need to be coordinated to solve the current problem. By using the active task forces of Border 2012 and its public participation as binational coordinator, to find proper solution to the fast growing sanitation problem at Tijuana, a solution that would fit both countries could be established. The main issue is to find a way for the two countries to collaborate to find a proper solution to the problem. Thanks to the Master Plan it is already known what needs to be done, the governments of Tijuana, San Diego, Mexico and the United States need to find a collective ground for cooperation.

The tool is already there with the IBWC, NAFTA, NADB and the Border 2012, not to mention the funding available through the BECC. It is time to attack the roots and start improving the sewage system in Tijuana before spending hundreds of millions of dollars on wastewater treatment facilities that are only a short-term solution, since unless the roots of the problem is tackled nothing will change.

If the \$600 millions were to be used for recreating the current sewage system in Tijuana, to structure similar system in all the colonias in Tijuana, to upgrade the SBIWTP, and structure a ocean outfall for the SABWWTP, instead of building a secondary treatment facility in Tijuana, it would result in purer ocean with less contamination than today.

The North American Free Trade Agreement has brought with it a positive effect on the environmental health, although the bad situation in the environment can also be partly linked to activities due to NAFTA. Membership to NAFTA brings with it a potential for the Mexican governments to fund renovation of the sewage system in Tijuana through BECC and NADB.

A binational vision is needed to ensure the environmental future of the Pacific Ocean and its ocean regions. It is urgent for Mexico and the United States to see the potentials that the binational Border 2012 program is providing. The improvement of the sewage system in Tijuana should be a priority for both countries, and funding should be possible either through the NADB or the U.S. since the improvement of the sewage system in Tijuana is the key to solving this dilemma. Citizen participation cannot be left behind, because the citizens have both the best knowledge of the current situation and the biggest will to make things better.

Promoting information exchange through, for example the Internet, or by hosting a neighbourhood-meetings can be a successful strategy to promote public participation. Educational projects are also essential, as they would raise the environmental awareness of participants, which would result in increased respect for the environment.

Toxic sites, such as the Metales Y Derivados in Tijuana should also be cleaned up since they continue to pour toxics into the environment although abandoned.

It must be admitted that it bothers the author of this thesis that no articles suggest nor promote the development of ecoparks in Tijuana although it should be considered as a feasible alternative, especially when there is a precedent for a successful ecoparks in the region. By ecologically purifying the wastewater instead of using chemical treatments the wastewater treatment is more sustainable and bearing in mind the developing status of Mexico, compared to the U.S. The author's recommendation is that less technical solution to the binational water problem should be considered

more feasible from all angles. Although it takes more land to function than high-tech solutions, as described in all the USIBWC reports, one cannot ignore the developmental status of Mexico. To answer the sub questions of the thesis:

- **What has been done to work out the binational Tijuana River pollution problem?**

A lot has been done. The Tijuana Master Plan is the most solid tool to use, although there are other solutions available that the U.S. might finance presently, such as the proposed Bajagua plant in Mexico. The U.S. solution is not the most feasible one in the author's opinion since it does not address the origins of the pollution, which is the lack of working sewage system in Tijuana

- **Are the needs of the population in both countries considered when making decisions?**

According to the author's finding the answer is no since the recommended solution will be extremely costly for the U.S. taxpayers without being a real solution. The proposed Bajagua plant that will be built in Tijuana is a upgrading to current system since the plant would provide secondary treatment to wastewater treated at the SBIWTP. Although the wastewater that discharges to the Pacific Ocean through the South Bay Ocean Outfall will contain less bacteria, Tijuana River will still carry along with it a lot of urban runoff from Tijuana during wet weather unless the sewage system in Tijuana will be renovated. While that issue is not addressed, the water pollution problem will continue to increase. In Tijuana, majority of the population will continue to lack access to basic sanitation, and the population that utilises the recreational beaches at San Diego will continue to be in danger of becoming infected by the pollutants, beaches will continue to be closed during wet weather due to the amount of coliforms.

- **Has the binational decision process been successful? If yes, then how, if no, then why not?** The author argues no to this question since the decision of making a sole contract to the Bajagua LCC is a short-term solution and hardly a solution since it only addresses the problem at a minimum level. Long-term solution is need, it was not even considered by the decision makers in this case. It must be noted that the decision was made by the US section of the IBWC, and the Mexican part was not addressed until after the decision had been reached. The U.S. section needed a decision that would benefit both countries and set the operation of the SBIWTP in compliance to the Clean Water Act of the U.S. as the court ordered.

To answer the main question of this thesis:

What are the determining legal, political and social factors that need to be taken into account when trying to solve binational water pollution from the Tijuana River?

Although the most important legal factors to the solution of the Tijuana case should be the existing environmental laws in the two countries that is not the case. Existing laws in Mexico are weaker than in the United States, therefore the North American Free Trade Agreement serve as the most important legal factor for the solution. The Border Environment Cooperation and the North American Development Bank, institutions of NAFTA, play the key role since through them

infrastructure in Tijuana can be funded. Through BECC and NADB, the source of the pollution entering the Pacific Ocean with Tijuana River, can be eliminated.

The most important political factor to solve the Tijuana case remains to be founded, since the creation of a binational institution that is able to tackle the problem is necessary, which leads to the most important social factor to the solution of the Tijuana case, which is public participation.

The Border 2012 programme is as tailored to serve as both political and social tool for the solution search since the Border 2012 is a binational programme where public participation is encouraged and hence the aspects of everyone involved can be addressed.

A binational institution structured as Border 2012, that would cooperate with BECC and the NADB would therefore be the solution to the binational water pollution from the Tijuana River.

For a solid solution to this problem, the political factor is the most important one, although it is yet to be founded. Since without a strong politically founded institution the path to a solution can be challenging since the political systems in both countries are so unlike. The social and legal factors are of course important, but without a political support, the road ahead will be challenging.

Throughout the long history of binational cooperation between Mexico and the United States, the U.S. does not seem to have used their “superpower” (which is the right word to describe their superiority), when negotiating with Mexico, although the decision regarding the proposed Bajagua Plant can be labelled as a “use of power”. The whole process can be seen as a win-win situation since Mexico has not lost anything when negotiating and making agreements with the U.S.. Whether the U.S. has gained more out of the cooperation is left aside.

Recommendation from the author: upgrade the current SBIWTP to a tertiary wastewater treatment plant, using the U.S. taxpayers’ money, but use the difference from the cost of the \$600 millions to found ecoparks at the colonias in Tijuana. Use funding from the North American Development Bank and the Border Environment Infrastructure Fund to fix and renovate the sewage system in Tijuana and most of the urban runoff that is now affecting the Pacific Ocean on the U.S. side of the borders should disappear.

It is time to change from pollution cleanup to pollution prevention. By taking a step-by-step action, starting with renovating the existing sewage system in Tijuana, hook up to the system the housings in the colonias, and regulate the maquiladora industry when it come to hazardous waste. Structure ecoparks where possible, make either an ocean outfall for the SABWWTP plant and upgrade it to either secondary level or even better, to tertiary level so the discharges from both the ecoparks and the SABWWTP can be used for irrigation or for the industry in the region, which is lacking water. for all activities.

6. References

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Appendices

Appendix a: Toxic chemicals in maquiladoras plants as listed in the Border Toxic Fact Sheet.

Chemical	Health and Safety Effects	Environmental Effects
1,1,1-Trichloroethane	Affects the central nervous system, liver and heart. It is an irritant and probable carcinogenic to humans.	Bioconcentrates in aquatic organisms.
<i>Acetone</i>	Acutely toxic and flammable.	Forms ground-level ozone.
Dichloromethane	Affects the central nervous system, acutely toxic, may cause spontaneous abortions and is probable carcinogen.	Depletes ozone and pollutes water (can leach through subsoil into groundwater basins).
<i>Methanol</i>	Acutely toxic, is highly flammable and may damage liver and blood.	Toxic air contaminant.
<i>Methyl Ethyl Ketone</i>	Affects the central nervous system, kidneys and liver. It is an irritant and possible carcinogen. Flammable.	Air pollutant in lower atmosphere.
<i>Toluene</i>	Affects the central nervous system, kidneys, liver and respiratory system. It is also a possible reproductive toxin.	Forms ground-level ozone.
Xylene	Affects the central nervous system, liver and kidneys. It impairs muscle coordination and it is an irritant.	Forms ground-level ozone, pollutes water, persists in soil and can leach into groundwater.

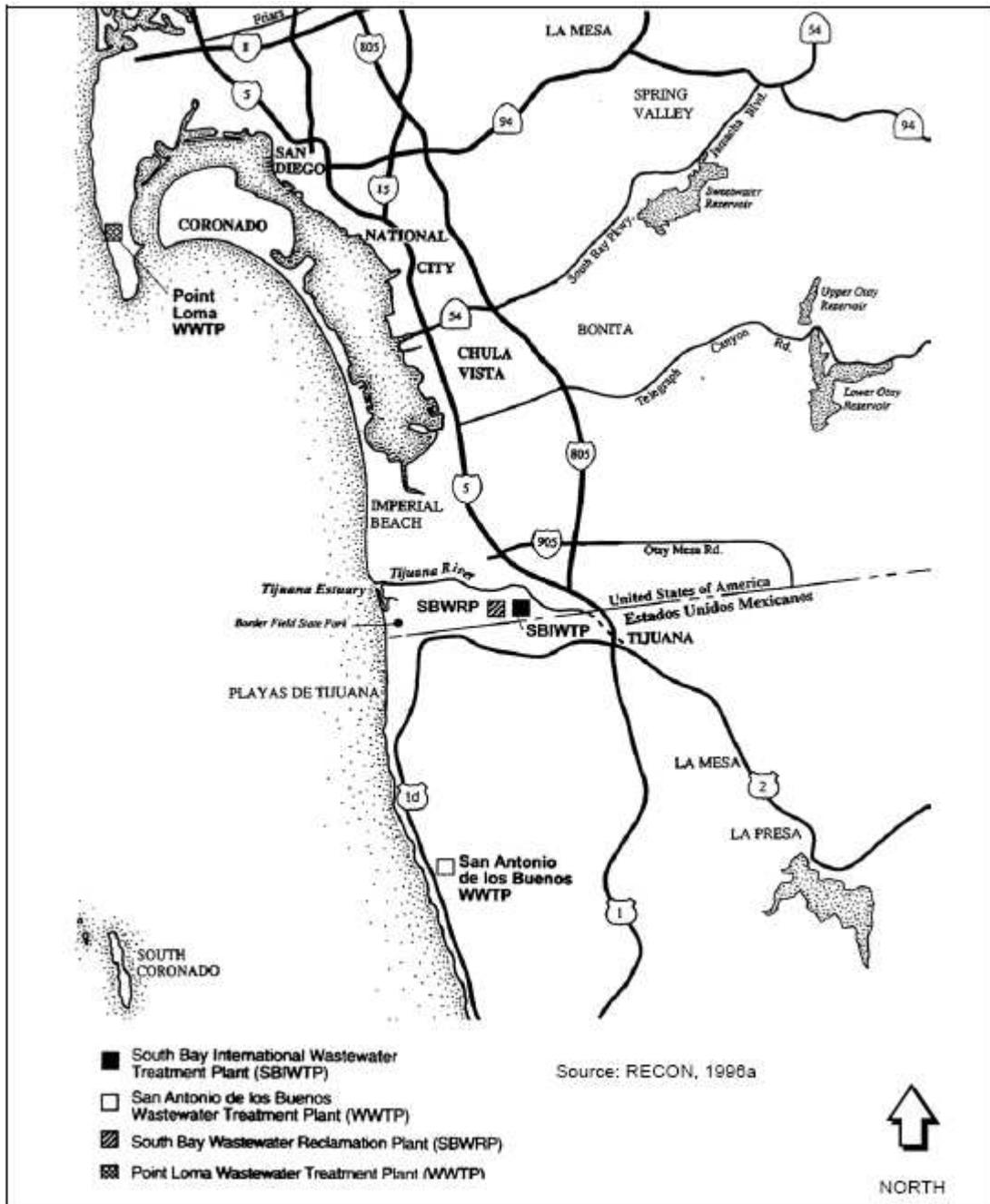
Source: Environmental Health Coalition No year

Appendix b: Major Pollutants in Urban Storm Water

Pollutant		Major Sources
Heavy Metals	Chromium, lead, mercury, copper, cadmium, zinc, mercury.	Industrial activities Atmospheric deposition Automobile usage Commercial activities
Hydrocarbons	Oil, grease, petroleum-based products, polycyclic aromatic hydrocarbons	Parking lots Roads Restaurants Household activities Improper disposal of motor oil Illegal dumping into storm water conveyance system
Nutrients	Nitrates and phosphates	Fertilizers Animal Waste Detergents Atmospheric deposition Leaking sewer pipes
Toxic organics	Pesticides, polychlorinated biphenyls (PCBs)	Agricultural use Industrial uses Household activities Illegal dumping into storm water conveyance systems
Bacteria and other pathogens		Pet wastes Rotting organic material Sewage overflows Leaking sewer pipes

Source: American Ocean Campaign, cited in Michel and Graizbord 2002

Appendix c: Map of current wastewater treatment facilities in Tijuana – San Diego bioregion.



Source: USIBWC 2005a : 1-17

Appendix d: Results of toxicity measurements at Tijuana River 1999-2000

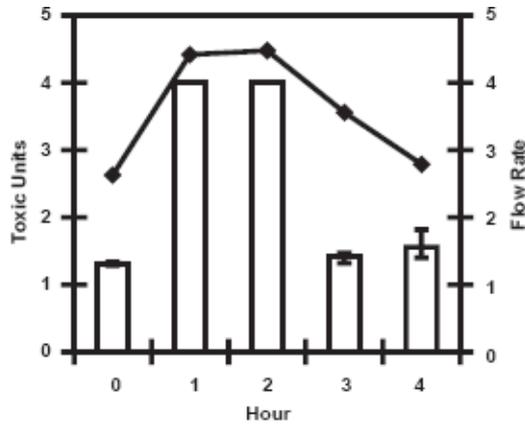


Fig. 2. Acute toxicity (vertical bars) of wet weather runoff (March 25, 1999) in the Tijuana River, as a function of time after the start of the storm event. Flow rate (m^3s^{-1}) at time of sampling is denoted by (\blacklozenge) symbol. Histogram bars are the mean of 4 replicate samples, and the histograms are bracketed by the confidence interval.

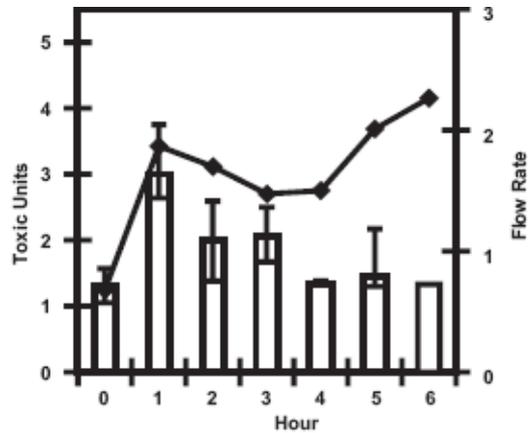


Fig. 4. Acute toxicity (vertical bars) of wet weather runoff (April 6, 1999) in the Tijuana River, as a function of time after the start of the storm event. Flow rate (m^3s^{-1}) at time of sampling is denoted by (\blacklozenge) symbol. Histogram bars are the mean of 4 replicate samples, and the histograms are bracketed by the confidence interval.

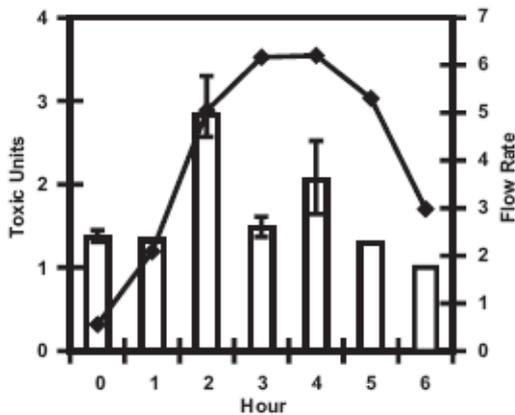


Fig. 3. Acute toxicity (vertical bars) of wet weather runoff (April 1, 1999) in the Tijuana River, as a function of time after the start of the storm event. Flow rate (m^3s^{-1}) at time of sampling is denoted by (\blacklozenge) symbol. Histogram bars are the mean of 4 replicate samples, and the histograms are bracketed by the confidence interval.

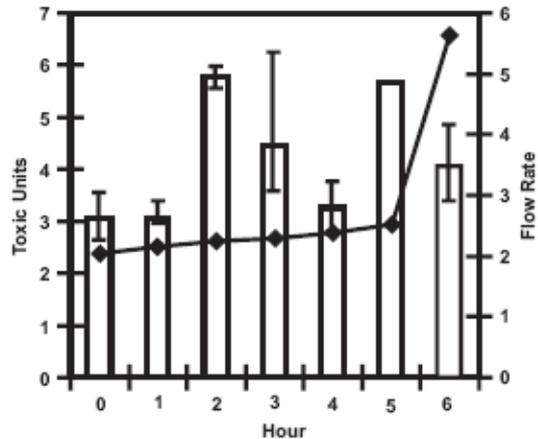


Fig. 5. Acute toxicity (vertical bars) of wet weather runoff (March 5, 2000) in the Tijuana River, as a function of time after the start of the storm event. Flow rate (m^3s^{-1}) at time of sampling is denoted by (\blacklozenge) symbol. Histogram bars are the mean of 4 replicate samples, and the histograms are bracketed by the confidence interval.

Source Gersberg et al 2004.

Appendix e: Timeline of elements affecting the search for solution to the Tijuana River pollution

