A Dry Waterfront

by

Maria Elosua

B.S. Architecture
Instituto Tecnologico y de Estudios Superiores de Monterrey

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Picture New York’s Central Park in your mind, now take down every tree, then take out the grass and picture just the remaining dirt. Now fit as many soccer fields as you can, add a small dirty stream on one side, surround it with fast roads, and finally forget about urban guidelines on the buildings around it. Would it still be New York?
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in Architecture Studies

ABSTRACT

Metamorphosis is a marked change in appearance, character, condition or function. This thesis foresees a metamorphosis of the Santa Catarina River in the city of Monterrey, Mexico. It envisions a new role for the river as part of the city's urban system.

This thesis explores similar cases where elements of a city transform in order to adapt to new physical, economical and cultural environment. It discusses how and why the outcomes differ in these cases and the lessons they have to offer for Monterrey.

In this thesis, I develop a vision for Monterrey where the river plays a new role and, indeed, serves as a catalyst in the process of transforming the downtown of this city and the river edges. I develop a master plan for a section of the river and draft a set of more general principles or guidelines that can be used in similar situations.

Thesis Supervisor: John de Monchaux
Title: Professor of Architecture and Urban Planning
Thesis Supervisor: Ann M. Pendleton-Jullian
Title: Associate Professor of Architecture
# Table of Contents

Abstract ................................................................................. 3

1 Introduction ........................................................................ 9

2 Background of Monterrey City ............................................. 11
   2.1 History ...................................................................... 11
   2.2 Geography .................................................................. 14
   2.3 Physical description .................................................. 15
      2.3.1 Transportation .................................................. 15
      2.3.2 Open space ...................................................... 16
      2.3.3 Land marks ...................................................... 16
      2.3.4 Land use ........................................................ 27
      2.3.5 Water .............................................................. 29
   2.4 Urban Planning and Regulations .................. 30
   2.5 Trends and possible impacts ...................................... 30
   2.6 Visions for Monterrey ................................................. 31

3 Project Background ............................................................. 33
   3.1 History of the river .................................................... 33
   3.2 Rompe Picos Dams .................................................... 34
   3.3 Site description ........................................................ 35
   3.4 Visions ..................................................................... 37

4 Precedents ........................................................................... 39
   4.1 Vienna ................................................................. 39
   4.2 Rio Salado .............................................................. 40
   4.3 Berlin ................................................................. 41
   4.4 Boston Artery ......................................................... 43

5 Proposed Master Plan ......................................................... 47
   5.1 Site analysis ........................................................... 47
   5.2 Master Plan ............................................................ 49
      5.2.1 Big Moves ...................................................... 49
      5.2.2 Planning objectives .......................................... 58
      5.2.3 Planning outcomes ........................................... 58
      5.2.4 Program for the river sections ......................... 58
      5.2.5 Urban design objectives .................................. 60
      5.2.6 Design Guidelines ......................................... 62

6 Implementation ................................................................. 71

7 Conclusion .......................................................................... 73

Footnotes .............................................................................. 74

Bibliography .......................................................................... 75
Illustrations

Pictures

1. Alberto Villarreal "Chamuco"
2. Alberto Villarreal "Chamuco"
3. Maria Elosua
4. Maria Elosua
5. Maria Elosua
6. Maria Elosua
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14. Maria Elosua
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20. Atlas de Monterrey (Reference included in Bibliography)
21. Maria Elosua
22. Maria Elosua
23. Maria Elosua
24. Maria Elosua

Figures

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2. Maria Elosua
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Introduction

I was born in Monterrey, the second largest industrial center of Mexico in the state of Nuevo Leon, and in 1988 I witnessed the most amazing and largest storm of my life. It had been raining heavily for several days, the city had issued a flood warning for the dry Santa Catarina River, and asked the squatters in the riverbed to evacuate their houses. In just a few hours an incredible quantity of water running down from the mountains overflowed the river. Its force demolished part of a highway taking with it some cars and a bus. The fast running water washed away every tree, every tennis court, every other attempt of development in the riverbed. And it washed away some human lives. I was surprised to see this transformation. It was like witnessing the sudden apparition of a ghost that had always been there, hidden.

This is what distinguish the Santa Catarina River. Every thirty years this dry scar metamorphoses into a raging and destructive river. But when not flooded, the water that the river carries runs underground and just a small stream appears on the surface, leaving the rest of the riverbed dry. This peculiarity has prevented any kind of substantial development in the riverbed.

Until now the city has made no attempt to manage the river, but simply repairs the damage the thirty year floods do to any development in the riverbed. But now the government wants to transform this dry scar and is promoting a project called Presas Rompe Picos, a plan to build two dams upstream and a channel which will manage the volume and control the path of water flow during storm seasons.

"When a child was a child he walked with its arms swinging he wanted the stream to be a river the river a torrent, and this puddle to be the sea."
The question now is: what will the nature of this channel be? should it to be a river, a park, a highway? What is the new role of the Santa Catarina River in the complex urban system of Monterrey?

The Santa Catarina River could be best identified as a dry waterfront, for it carries surface water for just a few days every thirty years. I define it as a vacant strip of land with the potential to become better integrated into the city’s system. I have study the waterfront with this bias, and found four case studies where a city had the task of redeveloping suddenly available large strip of lands: Boston Artery, Berlin’s Wall, Vienna’s Ringstrasse and Rio Salado in Arizona.

After identifying the opportunities and constraints of Monterrey City and analyzing these precedents, the thesis proposes one way to revitalize the riverbed. It posits that the river can help the city achieve densification of the downtown and can catalyze the revitalization of decaying areas. This proposal stands in contrast to the idea that the best sectors for living and recreation are outside the city.

Fig. 1. Location of Monterrey
2.1 HISTORY

Monterrey was founded on September 20th 1596 by twelve Spanish families. The site was chosen due to its strategic location between the mines and the Gulf of Mexico. The Foundation Act delimits a 60 km ratio as the jurisdiction area and describes it as a place full of fruit trees, mines, grass, rivers and springs. The Act documents the existence of Chichimecan Indians, a nomadic tribe that refused stubbornly to be controlled for 300 years.

The first layout of the city was not the definitive one; in 1611 a flood inundated the city causing extensive property damage and loss of life. The incident forced the inhabitants of Monterrey to relocate to higher land where the present city originated (Fig. 3).

The layout of the city followed the law of the Indies: a grid with a central plaza surrounded by a cathedral, a city hall (Palacio Municipal), and a convent. In 1777 the first Bishop of the city arrived and chose a small hill in the east on which to build his palace (constructed during 1786-1787). The rich people, desiring proximity to the Bishop’s Palace, extended the city grid towards the palace (west to east) between the springs and the Santa Catarina River (See fig. 2).

In the beginning Monterrey was a small Mexican town, suffering flooding and Indian attacks that hampered its growth. But it survived due to its strategic location between the mines and the Gulf of Mexico.

During 1791 the former bishop proposed a plan to extend the city northwards. He contracted the French architect Jean Crouset to develop a master plan based on a new North-South axis. This axis prevailed until the late 1800’s.

New Border for Mexico

The 17th and 18th centuries were difficult times for Monterrey, and thus, city growth was unstable. It contracted and expanded depending on the mine locations and job opportunities. However, in 1848, when Mexico lost Texas and the border moved to the Rio Bravo, Monterrey once again benefitted from its location. This time, for economic growth. The city became the trade center between the inland Mexico and the United States of America. During the American Civil War (1861-1865) Monterrey became the commercial link between the United States and Europe. This economic activity created a large amount of wealth that was later invested in the Industrialization process by the city.
Monterrey's development in history
The urban design reflected the economic situation. The city contracted its first engineer, who in 1865, designed a project which extended the grid to the north and to the south, across the river. The sector across the river was built for Indians just released from encomiendas (slavery), but during the industrialization, people migrating from other states settled there as well. The sector once called San Luisito is now known as Colonia Independencia and it houses the sanctuary for the Virgin of Guadalupe.

Industrialization of Monterrey

The expansion of the railroad in 1882 permitted the direct transportation of foreign goods to the inner-cities. Having lost its role as trading center, Monterrey's economy was hampered. This unfortunate situation, in addition to a foreign policy which prohibited continued use of Mexican minerals, forced the country to shift gears and develop its own industry. Again Monterrey's strategic location between the mines and the port saved it from decay. The city was a key to the development of Mexican industry. From 1890 on, with twenty years of stable administration and absolute support from the federal government, Monterrey flourished. Mexico's railroad expansion and concessions to industries and credit institutions attracted local and foreign capital. Four metallurgic plants, textile industries and a brewery were established in the city. From 1890 until now, the city has prospered as the second largest industrial power of the country, growing three-fold in the past forty years (see table 1).

During the industrial explosion in 1943, the city, occupying 3,022 hectares with a population density of 79.8 per hectare, grew toward the north along the railroad tracks, and low income housing developed around the new industries. The middle class was settling in the central areas abandoned by the rich families who moved to the periphery. The settlement of the rail stations and industries in this area prevented the expansion of the city grid towards the north and the urban fabric was forced to extend mostly along the east-west axis on both sides of the river.

During the 1950's, industries settled in the counties near Monterrey and popular barrios sprang up around them. In 1953 these counties (Santa Catarina, Guadalupe and San Nicolas), were integrated as part of the metropolitan area. Their lack of service and of commercial areas made them dependent on downtown.

During the 1960's, the city suffered its fastest physical expansion, expanding out to its natural barriers, the river and the mountains. Vacant land with public services in the urbanized areas provoked land speculation. Squatters constantly invaded these sites in an attempt to resolve their housing problem.

Now the city keeps expanding along the Santa Catarina River, westward towards Saltillo, southeast towards the canyon

<table>
<thead>
<tr>
<th>Year</th>
<th>Pop</th>
<th>Area (sq. km)</th>
<th>Density Pop/Km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>339,282</td>
<td>49.10</td>
<td>6,910</td>
</tr>
<tr>
<td>1960</td>
<td>601,100</td>
<td>75.96</td>
<td>7,913</td>
</tr>
<tr>
<td>1970</td>
<td>1,242,000</td>
<td>122.67</td>
<td>10,124</td>
</tr>
<tr>
<td>1980</td>
<td>1,975,740</td>
<td>243.46</td>
<td>8,462</td>
</tr>
<tr>
<td>1990</td>
<td>3,000,000</td>
<td>376.01</td>
<td>7,978</td>
</tr>
</tbody>
</table>

Table 1. Population growth
el Huajuco. At a slower pace, it grows northeast towards the airport (Fig. 2). On the south, the mountains limit the development, although informal developments have sprung up in a few areas.

Monterrey as part of an international market.

During the eighties, the city of Monterrey started a major urban renewal project: La Macroplaza. The objective was to revitalize the downtown by developing the financial district around a long open space, luring corporate headquarters downtown. The private and public sector created an association to achieve this ambitious project. During the construction of the necessary infrastructures, Mexico suffered the worst economic crisis of modern times. Even though the project was never finished and the corporations never moved to the site, the project inadvertently created an interesting civic space. Government buildings and green vacant land surround the long plaza making it popular for weekend walks and recreation (Fig. 8).

Now even though Monterrey is struggling due to another economic depression, it has the opportunity to belong to an international market, which demands programmatic changes of the urban form and a better human environment.

2.2 GEOGRAPHY

The Monterrey Metropolitan Area (MMA) is located 534 meters above the see level, covers 236,963 hectares, and is delimited in the south by the Sierra Madre Oriental, in the north by the Pesqueria River, in the east by Juarez County, and in the west by Mitras hill. This area, located in the great coastal prairie, partly surrounded by mountains is comprised of a group of minor valleys. It slopes towards the north - west.

The climate is extreme, predominantly warm with a dry season during the summer and killing frost during the short winter. The vegetation goes from rich pine forest, cedars and oaks in the Sierra Madre Oriental to small bushes in the north. The precipitation in Monterrey is low (media=60mm/year).
The humid wind coming from the Gulf of Mexico hits the Sierra Madre Oriental and causes rain during June. In the summer, cyclone winds enter the area causing stronger rain during September.

### 2.3 PHYSICAL DESCRIPTION

#### 2.3.1 Transportation

Monterrey, like many developing cities, lacks a good public transportation system, consequently intensifying the use of automobiles. The road system is concentrated on east-west traffic, and lacks sufficient north-south routes. It does not have enough capacity or a clear hierarchy and lacks good pluvial maintenance. The poor design of overpasses and the off street parking worsen the congestion during peak hours. The expansion of the city and its low density increase the commuting distances and aggravate the traffic problem.

The road system consist mainly in concentric and radial roadways:
- Four peripheral rings
- One arc that links Monterrey airport with Saltillo city
- Radial feeders
- Two main roads along each side of the river.

Public transportation consists primary of a weak system of buses. The subway transport system which started working in 1991 has not been completed which makes it inefficient. one line connects the county of Guadalupe with the sector of San Bernabe. The second line, links San Nicolas de los Garza with the downtown and will be expanded to the sector Tecnologico (Fig. 9). As we see in fig.9 there is no direct connection on the east-west axis of the city by subway.
2.3.2 Open Space

The urban fabric reaches towards the mountain's skirt like a vulnerable child that clings to its mother's dress. But the fabric can't reach the top, it can't embrace the whole mountain with its concrete arms, and the city lets these green giants rise from the built surface. And now they are Monterrey's lungs, they are Monterrey's piece of open space. (Picture 1).

Plazas, local parks, and public spaces are not part of a clear system. They are distributed randomly throughout the city. The only element strong enough to become the spinal cord of a larger system of open spaces is the abandoned Santa Catarina River. As dry and polluted as it is now, the river is the main recreation and sport center of the city. It is a longitudinal element reaching both western and eastern city limits, accessible to most of the districts.

The new project of Rompe Picos Dams establishes the river as a serious source of additional open usable space. The project underscores the potential to create landscape parks in the riverbed. This thesis proposes the river as a main spinal cord of an open space system that will benefit the entire city (See fig. 3).

2.3.2 Land Marks

The Map (fig. 4) shows the places I have recognized as significant landmarks for this project. At present some of these landmarks are hidden within the regular grid that shapes the city. The thesis proposes to reinforce their importance in the urban fabric by opening up some streets and redefining the north-south axis.
La Huasteca: A beautiful canyon with incredible desert-like landscapes and monumental mountains where outdoor sports are practiced (Pict.3).

Squatters: Informal housing in the river bed (Pict 4).
San Pedro’s downtown: A county that conserves its typical plaza (see Figure 7).

La Universidad de Monterrey: Monterrey’s university (Pict5).

Squatters: Informal housing in the riverbed (Pict. 6).
Avenida San Pedro: An important boulevard in one of the most elegant residential areas (Pict 7).

Hospital Muguerza and Hospital San Jose: The two most important hospitals of the city (Pict 8).
Bishop’s Palace: Palace for the first Bishop of the city built during the XVIII century (Pict. 9).

Valle Oriente: A new development for a financial district, and residential and commercial areas (Pict. 10).
The Flea Market and the Pope’s Bridge: A masonry structure bridge that housed a market at the beginning of the century was replaced by a steel structure where the Pope stood and talked to the people during his visit to Monterrey. Below it an informal market locates in the riverbed (Pict. 11).

11.- *La Alameda*: The first real estate development in the city. It is a forested plaza surrounded by two story buildings (see Figure 7).

*Santa Lucia* Springs: The last of the three Santa Lucia Springs where the city originated (Pict. 12).
La Purisima: A church built for the Virgin la Purisima, a shrine dedicated to the Virgin of la Purisima that is said to have once calmed the wild waters of the river (Pict. 13).

El Santuario de Guadalupe: The main sanctuary of the city (Pict. 14).
The Macroplaza: The main civic plaza in the downtown, a meeting place during weekends (pict. 15).

*El Barrio Antiguo* and the Santa Lucia Springs: One of the first residential areas, now the main nightlife center for young people. The Santa Lucia Stream was uncovered and a tourist and recreational development was built along it. This project took the river walk in San Antonio, Texas, as a model (Pict. 16 & 17).
ITESM: The main university of the city: *Instituto Tecnologico de Monterrey* (See figure 7).

*Cintermex*: The old steel factory site revitalized as a convention and recreational center (Pict. 18).

*Parque Espana*: A children's old amusement park (See Figure 7).
2.3.4 Land use

Monterrey metropolitan Area is formed by Monterrey city and four counties. At the beginning these counties depended strongly on Monterrey’s services and retail located in the center of the city. This dependency ended twenty years ago when the city started to decentralize. Commercial centers were built in the counties fulfilling their needs and replacing the downtown service. Corporate head quarters built luxurious offices in the county of San Pedro, abandoning the industrial center. At present each county has its own zoning plan with its own objectives, thus resembling small satellite cities.

If one looks at the service and industrial land uses of the city one can identify a pattern with a shape of a crescent moon of services (fig. 8). The upper part of the moon is dedicated to the industrial sector and blue collar residential areas, while the lower part offers services and commerce. The residential areas are located on the northwest and the periphery.

The land use of the river’s edges varies even within the same county. Due to the impact the river revitalization could have on the edges the thesis recommends a creation of an overlay in the zoning plan of the river. Although the land use of the edges is important for the success of the Santa Catarina project, this thesis focuses on the riverbed itself.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>1990</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>28,074</td>
<td>41,420</td>
</tr>
<tr>
<td>Industry</td>
<td>5,955</td>
<td>10,895</td>
</tr>
<tr>
<td>Commerce</td>
<td>3,403</td>
<td>8,343</td>
</tr>
<tr>
<td>Roads</td>
<td>5,104</td>
<td>8,284</td>
</tr>
<tr>
<td>Total Urban Area</td>
<td>42,536</td>
<td>68,942</td>
</tr>
</tbody>
</table>

Table 2. Present and projected land use.

The rest of the area covered by the metropolitan area is 71% (168,641 hectares) non urban area and 10% (25,786) is potential urban land.
Figure 9 Zoning
2.3.5 Water

Water scarcity has been a main concern for the city of Monterrey since the 1950’s. Many water works have been built in an attempt to meet the demand: deep wells, galleries, springs, and three dams that produced in 1992 a total of 9,537 liter/sec. Unfortunately, these projects have not been enough, and a variety of measures had to be taken. During the summer time, the water company started cutting the supply from 6:00 PM to 6:00 AM. Poor people without a storage system had to collect water in tanks which they kept in courtyards or on roofs.

The main causes of water scarcity are population growth, the great demand of the industrial sector, and now the lack of supply sources. Unfortunately, the ground water supply has been almost depleted.

Now the State Plan for Potable Water made a deal with the neighbor state of Tamaulipas. Monterrey City will send gray treated water to Tamaulipas, which will be exchanged for potable water. With this new deal, Monterrey is expecting to supply water to all of its population without the past measures of water supply control.

The Santa Catarina river plays an important role on the water supply of the city as it carries underground water from the canyon la Huasteca. This water reaches El Cuchillo dam in Tamaulipas but some of it is used in the county of Guadalupe.

Since the 80’s a regulation prohibited any discharge on the Santa Catarina River in order to prevent water pollution. The realization of any development in the river bed should address this issue.
2.4 URBAN PLANNING AND REGULATIONS

It is difficult to summarize in a few paragraphs the development of urban planning and the creation of regulations. Monterrey, like many other cities of developing countries, has had an interrupted planning strategy.

Between 1927 and 1975 seven city planning laws (Leyes de Planificacion) and eight proposals for a master plan (Plano regulador) were conceived. Even though none of these plans resulted in an official document many of the recommendations they proposed were implemented and some guidelines and regulations were imposed. One example is the channelization of the Santa Catarina River on during the 50’s. The project was proposed by a private institute, “El Instituto de Estudios Sociales de Monterrey”, with the help of Kurt Mumm, a consultant from Harvard University. The project was realized despite the fact that it never became an official document.

The State Plan of Nuevo Leon (Plan Estatal de Desarrollo Urbano de Nuevo Leon) was the first planning document created on a legal, state and federal framework in 1980.

Eight years later, the first master plan for the metropolitan area of Monterrey was authorized by the State: “Plan Director de Desarrollo Urbano del Area Metropolitana de Monterrey 1988-2010”. At present the plan is being reviewed and improved.

This inconsistency creates uncertainty, weakens the credibility of urban planning and makes the implementation vulnerable to legal attacks.

For the successful realization of such a large project as the one proposed in this thesis, a legal framework and specific goals and principles are needed. The implementation process has to be reliable and supported by the law. The last chapter will develop some ideas of this topic.

2.5 TRENDS AND POSSIBLE IMPACTS

Due to the strong family ties of the Mexicans, the next generation always settles close to family and friends expanding the city in a concentric way. Certain elements like topographical barriers or land use changes this growth pattern which has been called the unfolding city. Monterrey has been expanding in this way for many years but the topography has forced it to unfold mostly on the east-west axis.

It is characteristic of Latin American cities to pay more attention to the realization of new developments than to the revitalization of old sectors. It is politically more attractive to create new modern developments although the expansion requires a heavy investment on infrastructure and services. The city of Monterrey is experiencing this characteristic and is expanding its limits with new developments leaving the center abandoned.

At present three urban developments are influencing the direction in which the city is growing.

1. - The Macro plaza: an urban renewal project built during the 1980’s with the objective of creating a financial district was never finished. The peso devaluation drove away the private investment. The proposed financial district resulted as a big and successful civic plaza with a lot of vacant land now used as green space.

2. - Cintermex: In 1989, the abandoned steel factory was
converted into a convention and recreation center with the expectation that the adjacent land would be developed for services related to this area. The development is slowly growing despite the unfavorable economy and the lack of demand for all the land offered.

3. - Valle Oriente: a successful project for a financial and service district is being developed in the county of San Pedro (included in Monterrey Metropolitan Area) offering more land for offices, retail and high income housing.

These three projects contribute to the oversupply of offices and retail spaces within the city. On the other hand, there is a great demand for housing. Monterrey's master plan dictates 29,824 additional hectares required to house 2,819,369 inhabitants from 1988-2010. This housing problem has provoked the unorganized expansion of the city limits.

The whole landuse definition of the city needs to be reviewed to avoid this oversupply or under-supply of uses. The Santa Catarina River project should address this problem offering coherent land uses to the existing and future needs of the city.

2.6 VISIONS FOR MONTERREY

At the beginning of this paper I asked you to imagine New York without Central park, now I ask you to imagine Monterrey with a new Santa Catarina River.

Imagine it in your mind, picture the Santa Catarina River full of life, a linear park in the middle of the city, a strip of land full of incredible urban and recreation spaces: parks, flower markets, cafes, playgrounds, sport facilities, sculpture gardens, amphitheaters, fountains, bridge like buildings, man-made lakes and so on. Imagine the edges of the River as beautiful cityscapes, great buildings raising looking at this park some of them linked to the development in the riverbed with bridges that span form one side to the other. Imagine Morones Road as a wooded boulevard, flanked by commercial and residential buildings and people crossing form one area to the other, enjoying the city.

Imagine we change the Santa Catarina River, imagine we transform Monterrey city into one of the most beautiful Mexican cities. Would Monterrey still be Monterrey?

In the recent symposium "Visions of Monterrey" presented by the Instituto Tecnologico de Monterrey in conjunction with the private sector, many citizens were polled to determine the visions for the city. The results indicated a high level of interest in the main trade, educational and hospital centers of Mexico. They envision a city that could offer a high quality of life.

The Santa Catarina River could be the site to develop all of this visions and more. It could revitalize the now decaying areas rising property values and quality of space. Monterrey has now the opportunity Vienna had when the fortification was demolished. It has the opportunity of transforming the city into better place to live.
Due to Monterrey's climate conditions—its drought and flood periods—water was the main urban determinant. The city layout was a response to the water-system and supply.

The first layout of the City of Monterrey was located north from the springs of Santa Lucia, the main water source. A flood in 1612 destroyed this first settlement forcing the people to move to higher lands between the Santa Lucia springs and the Santa Catarina River. Due to the new topography the city could no longer supply water from the springs and it had to be brought from a new dam built on the Santa Catarina River—which at that time carried water constantly—close to the bishop’s palace. From there a system of irrigation channels branched along the east-west axis and another main channel distributed water to the north. In this way the city continued to extend following the water supply system.

Floods (1636, 1642, 1648 and 1672) continued to hamper the city’s growth, forcing many people to leave Monterrey. The last flood of the colonial era in 1716 is the origin of the legend of the Virgin of the Purisima which tells how a simple woman reached the wild waters with a statue of the Virgin and succeeded in calming the storm. Since then a temple for this Virgin has stood in a sector named after her: Colonia la Purisima.

After 1765, supply of water was no longer an easy task anymore. Probably because of population growth and increasing water usage, the river stopped flowing on the surface within the metropolitan area rising above ground in the county of Guadalupe.

In 1783, Rafael Jose Verger, the second bishop of the city, concerned, constructed a water catchment tank to store the rain-water near his palace. He bought an aqueduct from the community of Santa Catarina and promoted the construction of channels throughout the city to supply the low-income families with water.

But the first big effort to ensure the water supply of the city was made during 1795, when Herrera y Leiva, the governor of the city constructed two dams that captured the water from the Santa Lucia Springs. A few years later these were destroyed due to sanitation problems.

1890-1910 was a period of industrial boom for Monterrey. Big industries settled in the north, close to the rail stations and water sources. The population growth and the water demand from the industries created an even greater water supply problem. In 1909, during the first industrial boom and after many epidemics, the water and sewage pipe system was built. James D. Stocker and William Walker, Canadian citizens, created the first Water and Sewage Company. The water source was the underground water from the Santa Catarina River and some springs located in La Estanzuela in the southeast of the city. In this same year, the biggest ever flood hit the city with 6,500 cubic meters of discharge per second, killing 5,000 people.

In 1945, the government of Monterrey bought the Water Company, which had left 60% of the population without water.
and sewage services. The new government owned company tried to keep up with the fast growth of the city. In 1950's big water works were built, as well catchment areas in the Huasteca and deep wells (250-600 m.) in the urban areas, that supplied the city with enough water.

During 1938, another flood hit the city motivating the government to invest in a flood control project. From 1949 to 1952, the river was channeled and rectified along 7 km of the metropolitan area to avoid new disasters. From this project, 900,000m² of land were supposed to be reclaimed from the river to provide the city with open space and a university campus. Instead the government utilized 400,000m² of this land for the construction of roads, 100,000m² for open area, and 400,000m² were urbanized and sold. The project included the construction of bridges (Zaragoza, Gonzalitos, Pino Suarez and Felix U Gomez) to link main roads of both sides of the river.

In 1956 the importance of industry in the city motivated the construction of the de la Boca Dam (40,000,000 cubic meters of capacity) with a concession to supply water to agricultural land near by. During 1960's the scarcity of the vital liquid in the city forced the government to cancel the concession. The potable water was now to be sent to the residential areas and as a trade the gray water was confined to industrial uses. Many other deep holes and galleries where constructed but none of this was enough to keep up with the growing population.

Today, Monterrey exchanges gray water for potable water with its neighbor state of Tamaulipas hoping to meet the present water demand for now.

Storms still threaten to flood the city and the river still lies dry and abandoned, like a big scar blemishing the urban area around it. Monterrey has turned its back on the river, neglecting to accept the past catastrophes and failing to confront the challenge of Mother Nature. The Rompe Picos Project will permit the inclusion of the River to the city fabric, recognizing it as a positive element of the civic realm.

3.2. ROMPE PICOS DAMS

The floods in the Santa Catarina River have taken many human lives in addition to causing physical damage to the city. The capacity of the bridges and the river channel are the consequence of these disasters.

Actually, the riverbed houses important infrastructure, informal housing developments and sport facilities of the city. These represent a big expenditure of economic and social resources for the government, which concerned about this issues has proposed the following measures:

- The construction of two break water vertical walls to regulate the maximum discharge of 8,000 m³/sec corresponding to a 10,000 year period, releasing just 1,595 m³/sec to the river.
- Rectification and channelization of the Santa Catarina River from the dams to the confluence with the Rio San Juan (Aprox. 70Km). The channel width will be approximately 70m by 7 m high (See fig. 11).

These dams are located in the Huasteca canyon on the sites known as Corral de Palmas and Los Garcia (See fig. 12). Due to the structural characteristics of the site the construction of storage dams is impossible. Instead the proposed are control dams, which will hold the water and will release it slowly through the channel on the riverbank. They are design to control 8,001.34 m³/sec releasing just 1,595
m3/sec. The water discharge from the last storm in 1988 was 4,400 m3/sec although the maximum existing record is of 6650 m3/sec in 1909.  

3.3 SITE DESCRIPTION

As dry as it is, the Santa Catarina River is still a natural corridor, but it can best be identified as an infrastructure corridor; dirty and decaying, a strong but negative urban element on which the city has turned its back to. The whole flood plain measures an average of 250m wide. Water runs underground but a small stream with an irregular discharge runs along one side of it emitting a bad odor. A bike path runs parallel to it. On the other side, the rest of the riverbed is covered by several soccer and baseball fields, which are popular on the weekend. The river base is composed of gravel and dirt, which pollutes the city on windy days. Old infrastructure still in use is buried in the riverbed. Some new electrical towers and roads are located inside the flood plain. The last flood in 1988 left the riverbed littered with a lot of gravel and sediments. This material was piled up to build a bank as a base for a new road. This reduction of area in the river channel will produce a greater speed of water in the next storm, probably causing the expansion of the flood plain inside the city and increasing the risk to life.
Picture 20. Soccer fields in the river bed

Picture 21
Market on the Riverbed

Picture 22
Monday traces of the market which takes place during weekends

Picture 23
Bike Path on the Riverbed
3.4 VISIONS (Facing the river)

"The sun
The bread and wine...
The veins of the leaves
The blowing grass
The color of stones
The pebbles on the stream's bed
The white table cloth outdoor
The dream of the house inside the house
The loved one asleep in the next room
The peaceful Sundays
The horizon
The light from the room shining in the garden
The night flight
Riding a bicycle with no hands
The beautiful stranger
My father, my mother, my wife, my child".5

Wim Wenders monologue is a list of the thoughts of a man wondering in the city of Berlin. It is a description of various views in the city from a pedestrian point of view, a compound of events that touch him. In this short trip he experiences nature, architecture, social encounters and technology. And from the way he expresses himself we imagine he is experiencing a pleasant walk. Beautiful or not, the city offers him, in a short trip, many different environments that cover many of the human needs.

The Santa Catarina River as a path could offer this variety of events. In the middle of the city we could be able to see a green corridor a large strip of amenities within a busy world. It could now stand out from the urban fabric as a positive element, no longer ignored by the city.

Until now, every attempt to build a landscape park in the Santa Catarina River has been frustrated by floods. The storm water uproots trees and carries them downstream. The trees lodge between the bridges-structure forming several dams that prevent the water from running fast, worsening the overflow. Building two dams upstream to control these floods creates for the first time the opportunity to built landscape in the riverbed without endangering the city. The river could become the main element, a system of parks, sport facilities and buildings offering a better quality of life to the citizens.
It would seem logical to study some cases of river developments to understand the Santa Catarina River situation. But the truth is that the Santa Catarina River carries surface water for just a few weeks every thirty year. Assuming that this periodic flooding can be controlled, the problem becomes one of what to do with the dry riverbed. If for instance the storm water could run downstream through a smaller channel and with less strength, then the city could reclaim the rest of the riverbed, integrating it into the urban fabric. Thus what we have left is a vacant strip of land in the middle of the city not unlike Vienna’s Ringstrasse, Berlin’s wall or the Boston Artery. Nevertheless, I decided to study one river case: the case of Rio Salado, in Tempe Arizona, where the flooding plain was converted into a flowing river. Following, I will explain each case study and its relevance to Monterrey.

4.1 VIENNA

As a Roman colony, Vienna was surrounded by a fortification to protect the city against Germanic tribes. In 1857 Emperor Francis Joseph ordered the demolition of these walls, replacing them with the Ringstrasse: a semicircular boulevard with service roads running alongside it, which divides the inner city or Stadt from the suburbs or Vorstadt, and houses a large complex of institutions, open spaces and residences.

It was due to the permanence of the upper class in the downtown and their need for luxurious recreational areas, that the vacant strip of land, where the fortifications once stood, became a ring of important public and cultural buildings.

It became a place where the aristocracy lived, worked and recreated. This ring houses: an opera house, the city hall (Rathause), a gothic church (Votivkirche), a university, a museum and a theater (hofburgtheater), as well as the houses of parliament.
No other city at that time, had such concentration of power, wealth and prestige. By 1890, he continues, “the Ringstrasse had nearly achieved its modern appearance, making the suburbs beyond look drab and commonplace by comparison.”

Projects are made possible by several factors. In this case, the Ringstrasse resulted from “the initiative of the central government; depended for its success on the attraction of private investment by speculative builders and developers; was intended to make royal or imperial residences more prominent; created public parks; mixed public and private building, ecclesiastical and secular purposes, residential and commercial uses;…built wide streets both to facilitate traffic and to serve as fashionable promenades; and combined aesthetic with social and sanitary motives.”

The concentration of activities transformed the city into a more coherent system which motivated pedestrian traffic. The two roads flanking the strip of parks and buildings achieved a real perception of the street. The pedestrian does not see the buildings from far away like in the Baroque style of Paris with long avenues that frame the view to an important building. On the contrary in Vienna, he goes through a process of rhythm, and surprises that break this rhythm. The mixing of residential, cultural and social land uses develops a feeling of extension from the residence. The public space became an extension of the house of the Viennese.

4.2 RIO SALADO

Rio Salado’s problem is probably the closest to the Santa Catarina case. The river (Rio Salado) runs dry through the middle of the Phoenix metropolitan area, but undergoes periodic flooding, preventing the productive use of its shores.

I studied the city of Tempe’s portion of the river which is approximately 8.86km in length and 1.6km wide. Their proposal was similar to Monterrey’s proposal: they reduced the volume of the 100 year flood event (to 160,000cfs) by improving the Roosevelt dam and constructing a 300m wide channel through the riverbed. This solution allow the city to recover 838 acres of land from the existing flood plain. The Tempe Rio Salado Master Plan, adopted in March of 1989, proposed the transformation of the riverbed into a continuous regional park along a flowing river. It provided areas for the development of light industry, housing, recreation, tourism, and education.

Some of the issues raised by the project were: the resolution of flooding problems, the preservation of riparian and wildlife areas, and the protection of the ground water quality. The plan proposed to mitigate the effects of the construction of the channel. A wildlife masterplan was developed which recognizes the existing plant species and utilizes them as part of the landscape. The channel walls built of soil cement are covered with soil to allow for landscape, and a low flow channel was installed throughout the man-made floodway to accommodate standard salt river Project Releases (up to 5,000 cfs.) without damaging the established vegetation of amenities.

The main thrust of the Rio Salado project in Tempe was the transformation of the 300m man-made channel into a flowing river. Water brought from the Colorado river and a system of rubber dams will allow the creation of lakes and streams. The water is re-introduced into a ground canal after passing through the parks. These rubber dams can be deflated in the event of flooding and inflated again. It takes just twenty minutes to deflate and inflate the dams.
It is definitely tempting to transform the Santa Catarina channel into a flowing river, but unfortunately, water supply is a problem in Monterrey, plus, due to the climate, a large quantity of water would evaporate. What is probably feasible is the transformation of just a small section of the flood channel. Water can be pumped from the underground canal and re-introduced again downstream.

In Tempe as in Vienna, the local government's initiative in conjunction with the private sector, will help to realize the project. To impose higher standards on new developments and to control undesirable land use a tempe Rio Salado Overlay district was established.

The majority of the project and maintenance cost will be covered by land leases to the private sector, and by sales and bed taxes from purchases made within the commercial developments.

The construction of Roosevelt Dam in 1911 and the subsequent diversion of water in the 1930's transformed the Rio Salado from a navigable waterway into a dry channel with flooding problems. It isolated the river from the urban structure. The proposal to transform the man-made channel into a flowing river is a way to incorporate the river back into the city and bringing life back to this area.

4.3 BERLIN

Berlin, once a lively center was kept on hold for almost half a century. The political division of the city took no regard for the historical development of the districts and urban structures and truncated streets and axes, squares, green parks and transport links. It pushed central areas into a marginal position.

Berlin’s wall, built in 1961 and demolished on November
9, 1989 left, the city with a wound in its urban structure, a huge strip of no man’s land that swirls across the city. Many adjacent plots had either remained undeveloped or kept in a state of decay.

Berlin is still the biggest industrial city in Germany and it has a production potential that needs support and development. Today’s challenge involves the restructuring of this capital city and international metropolis, repairing the urban fabric between east and west. Berlin planners have developed a master plan considering a ring along the S-Bahn. A ring of nine high-quality focal areas will be created to avoid the city center abandonment.

Half of the land in Berlin is publicly owned which facilitates the implementation of any government plan.

Concerned for the future of Berlin, the Deutsches Architektur-Museum and the Frankfurter Allgemeine Zeitung invited 25 prominent architects to participate in a competition to create a vision. One of the invited architects was Norman Foster who proposed a strategy to develop the vacant land left after the demolition of the wall.

The idea of Foster’s master plan is to rejoin the two halves of the city by transforming the existing wall zone into public park and restoring the street pattern across it. The transformation of the vacant strip of land into a park benefits the adjacent land raising its value as Central Park did for New York, and creates special places for recreation. It creates the feeling of extending the private space into the public realm.

The basic structure of the city that survived the war has a strong urban street pattern which Foster’s plan proposes as the framework for future development. A new public open space network for the city which integrates existing city spaces, revitalizes river locations and provides attractive
areas for new development will establish a strong strategic structure for the future progress of the city as a whole.

The street pattern will be reinforced, severed east-west road links will be reconnected and the existing fabric of Friedrichstrasse will be repaired. Individual sites would be developed with strong planning guidelines establishing height limits and other regulations.

The Berlin Wall was built over an existing fabric and it destroyed the urban structure. Now traces of the previous cross roads and public spaces developed before the wall have resurfaced. There is a pattern that could be followed. This is a peculiarity that Monterrey's case does not have. The cross roads in the Santa Catarina River would have to be determined by different criteria. But in both cases there is the option to develop and build over the vacant strip of land or leave it as open space. Norman Foster proposes to create a park in this area and this park would raise the value of adjacent land. Again we see the how the project is developed by the government initiative in conjunction of private sectors.

4.4 BOSTON ARTERY

The depression of the Boston Artery, an elevated highway, will make available approximately twenty three acres of priceless land in the center of Boston. Planning the reuse of this land has required a tripartite process involving City, State and community. The plan published in 1991 proposed a mix of civic and open space (75%) and commercial and housing (25%) uses for the corridor. The main goals are:

- The creation of a park system and public facilities adjacent to the financial district and downtown.

The construction of surface road and sidewalk network that extends the city street pattern and reinforces pedestrian access to the harbor

- The transformation of the surface roadways into a tree-lined boulevards
- Provide opportunities for economic developments
- Restore the historic cross streets
- Create up to 1,000 units of new housing
- Build neighborhood parks

The land use decision process for each parcel was directly influenced by several issues: The adjacent neighborhood needs, the load-bearing capacity of the tunnel, existing views and transportation impacts.

In order to achieve a master plan for the corridor a special organization had to be created. The Boston 2000 Working Group was on top of the hierarchy as the organization responsible for the formulation of a Boston 2000 Plan implementation strategy. This group was subdivided into three issue oriented task forces:

- Land Use & Urban Design Task Force: Verification of the relevance and validity of the basic urban design and development principles.
- Disposition & Open Space Management Task Force: Organizational and institutional aspects like ownership and governance issues related to management of the proposed park system.

Boston Artery, as Berlin wall, is an element that fractured in the past an existing urban structure. Now both cities, Boston and Berlin, have the opportunity to restore the old structure.
Figure 17. Figure ground of Boston before the artery was built, with the artery, and after its demolition.
And the solution in both cities is very similar: they decided to restore the crossroads and reserve most of the land for open space.

An important peculiarity of Boston project is the recognition of adjacent district’s.* With this now available land they are trying to fulfill the needs of the city and the neighborhoods once fragmented by the artery.

The system and organization used by Boston Artery project are worth looking at. Many years of work with many parties have been necessary: A consultant company, a group of professionals, the city and Boston citizens. The goals of the project were defined since the beginning followed by a set of planning policies and design guidelines. The way they are set is so clear and simple that I decided to followed them for the Monterrey case.

It must also be noted that the artery project carefully studied the traffic and environmental problems. Due to the problem of depressing such an important artery, the transit and circulation system had to be studied in detail. Included in the study was a plan for pedestrian paths and accessibility.

This is a good case study to understand the process and constraints a project this size bring. It shows the amount of time and effort necessary to realize a comprehensive vision. It demonstrates the complexity of the planning process and the kind of organization required. We have to recognize that is always simpler to develop a vision than to implement it.

* I am not certain if Berlin followed this principle or not. For this reason I develop this topic just in Boston Case.
The Santa Catarina River has always been a topographical border, a line where the city stops. Not unlike a fortification it has divided the city into two areas, and the two highways aligned along each of its sides reinforce the border effect. The river, as a topographical limit, has had a strong influence on city growth and the urban fabric. It has become the strongest east-west axis for the city and an important part of the image of the city.

Kevin Lynch developed a way to classify these elements that shaped the city. He called them the contents of the image of the city and divided them into five categories: paths, edges, districts, nodes, and landmarks. These elements, he explains, are determinants of a clear mental mapping of our environment.

Through an analysis of Monterrey I found that the Santa Catarina River is a strong orientation element of my image of the city. Although it physically fragments the environment it still keeps the visual relationship of both sides. It works as a clear path, an east-west axis of movement and as a boundary within the city. The two highways aligned on both its sides reinforce its significance and visual impact. But due to the lack of infrastructure in the riverbed, the Santa Catarina becomes an invisible orientation element.

While I was identifying the landmarks near the River on a map, I found that there was a visual relationship between some of them and the river. While I could draw a line from the landmark perpendicular to the river in the map, I could not remember it that way: the even grid that shapes the city hides this relationships between one space and the other.

The 18km of riverbed crosses 4 counties with different characteristics and environment: Santa Catarina, an industrial area; San Pedro mostly residential, Monterrey housing the main service activities of the city and Guadalupe, a middle income residential area.

The bridges that cross the river work as nodes, and are very clear transportation junctions.

Even though the river has not been addressed as an important space by the city, it is a strong element in the city image. But it seems as if the north-south axis is on a different layer than the east-west axis and the river has no relation to the streets that run perpendicular to it. I imagine that if we group these two layers into one and let the Santa Catarina river branch out into the inner city we could have a clearer, more extensive structure that would allow a better understanding of the system.
Figure 18: Ground of the river's edges

Figure 19: Site Analysis
5.2 MASTER PLAN

Due to the length of the river, it becomes difficult to address the problem as a linear and continuous strip. For that reason the basic strategy I used was to divide the riverbed into twelve sections. This sections fall into three categories: park, sport facilities and built nodes. The criteria I used to categorize each section are directly related to the land use of the adjacent areas and its needs. Figure 20 illustrates these criteria. For example, I propose a park in between downtown and the colonia Independencia which houses the main sanctuary of the city. A park links both the civic and religious centers of Monterrey and at the same time addresses the need to raise land values and the high density of these areas. I suggest to locate urban concentrations or built nodes where both sides of the river have similar or complementary land use. Therefore the buildings in the riverbed can work as physical links between these two areas. An example would be section No. 7 in the diagram which links the two main medical centers of the city. And finally the sport facilities are located strategically between the other sections so that they become accessible to every sector along the river.

Figures 22, 23 and 24 show the various cross sections of the riverbed with the interventions that this plan proposes. These interventions on the riverbed create three different spaces: The area between the existing buildings in Morones road and the new buildings on the riverbed, the area between the buildings flanking Constitucion road and the proposed buildings on the riverbed, and the area within the riverbed itself. The character and scale of these areas should be carefully planned taking into account the existing scale and the new vision of the city.

There would be more traffic and pedestrian bridges linking both sides but the riverbed won't be totally developed. A continuous green way should be maintained from one extreme of the river to the other. This green way would narrow when passing through the built nodes and expand again when passing through the park sections.

This proposal aims to reinforce the sense of the city as a whole using the river as a seam in the urban structure.

5.2.1 Big Moves

In order to realize the proposed plan, some infrastructure changes have to be implemented (See Fig. 21). Gonzalitos overpass has to be redesigned to avoid the actual traffic problems and new parking structures have to be supplied. In this thesis I propose the buildings to be constructed as bridge like buildings raised from the riverbed to street level so that the two first levels could be left as parking structures or shadowed areas. Cars could access the parking structures from morones Boulevard. These particular characteristic of the buildings (open areas on lower levels) will lower the insurance value related to flood or natural catastrophes.

A new subway line is proposed as a requirement to realize the plan. The line should run parallel to Morones Road from the Canyon la Huasteca to meet the line coming from downtown. And finally Morones Road should be transformed into a Boulevard.
RIVERBED LAND USE

Figure 20
Sections of the riverbed with proposed interventions

Figure 22
Sections of the riverbed with proposed interventions

Figure 23
Sections of the riverbed with proposed interventions
Figure 24
5.2.2 Planning Objectives:
Various developments are now stretching Monterrey’s Metropolitan Area in different directions, with their own objectives. These events are exacerbating the abandonment of central areas. This plan creates a spinal cord of open space, sport facilities, residential and economic development in the middle of the city in order to reinforce Monterrey’s coherent structure.

The thesis offers the opportunity to:
- Create a chain, along the riverbed, with three types of links: park land, sport facilities and urban development. They will be distributed evenly to allow easy access from every adjacent area of the river.
- Transform Morones road into a pedestrian friendly boulevard.
- Create three economic developments: A residential and commercial area in front of the Universidad de Monterrey, a medical center linking the three major hospitals (Hospital Muguerza, San Jose and civil.), and a Research and development center in front of the convention center.
- Transform the north-south axis.
- Construct a bike and pedestrian path from La Huasteca to Cintermex.
- Promote the revitalization of the river edge and the downtown.
- Create more housing units.

5.2.3 Planning Outcomes
- Improvement of the Environment: With the creation of the two dams, the river could become a new lung for the city, utilizing landscape and preventing the erosion and destruction of the river channel. The rain water will still permeate to the underground canal and the dust pollution will end.
- An Open Space System: The river could become the main element of a larger system of parks expanding from the river to the inner city. It will provide better recreation and sport facilities than what we have today.
- Economic Development: The plan promotes on part of the reclaimed land three urban developments: a research and development center in front of the Universidad de Monterrey, a medical center linking the three major hospitals of the city, and a hotel and tourist development in front of the convention center.
- The Larger Planning vision: The plan proposes to link past projects with present needs and future visions.

5.2.4 Program for the river sections
1. - Ecological Park La Huasteca:
   At the entrance of the federal park La Huasteca, an ecological park that will introduce and promote this forgotten incredible natural place is planned. Its program includes an amphitheatre, cactus garden a colorful church as the starting point of the famous peregrination to the temple of the Virgin Guadalupe; a park and recreation information center to promote hiking and rock climbing. The park could house a small camping and trailer park.

2. - University Sport park:
   This sport facilities is a private and public partnership. It could be used by the university and the general public.
Rules and policies for effective use should be prepared. At least two soccer fields and one softball field should be located here.

3. - R&D:
Linking industry and the university, the plan proposes a research and development institution that will reinforce Monterrey as the leading centers of technology in Mexico.

4. - Public Sport Facilities:
An area between two residential areas and the mountain will have to offer sport facilities like soccer fields, a track, and tennis and basketball courts. An American football field for children could be located here to solve actual pressures of this landuse in existing residential areas.

5. - Sculpture Garden:
Linking the new office developments and the high income residential area this park could be offer a very original version of a public park. The program will include cafes and bars for young people as well as a family environment, a sculptural interactive park and playgrounds for kids, an amphitheater and a plaza.

6. - Sport Facilities Loma Larga:
The purpose of this park is to motivate the buildings on the river edge to open up and face the river. It will offer a putting green, tennis courts, a sand volleyball court, a roller skate rink and a gymnasium.

7. - Medical Center:
The idea here is to link the hospitals on both sides of the river and to create a large medical center. A major redesign of the overpass in this node and a new local bridge are important for the realization of this project.

The buildings will be mostly on the Morones St. side to create the scale and spatial characteristics of the boulevard. Plazas, gardens, a rehabilitation gym for the hospital and some courts are included in the program.

8. - Hospital Sport Facilities:
This area located between commercial areas, would include soccer and softball fields, and basketball, volleyball and tennis courts. Due to the construction of the channel the North-South alignment of the soccer fields is possible only if they are floodable courts. They will be depressed one meter above the channel bed level. In this way courts could be used when the channel is not flooded and when flooded they would become lakes.

9. - The Main Park:
This is the main park and civic space of the three proposed, and the last stop of the peregrination to the temple. The park links the Macroplaza and the Temple of the Virgin Guadalupe with a main plaza in the riverbed. This is the only area where storm channel is proposed as flowing river. A flower market under the Pope’s bridge will to replace the existing flea market. A classical green area will be located near the central plaza.

10. - Central Sport facilities:
This area links an important public hospital with a mixed use area. Thus the proposal is similar to the section 8 (hospital sport facilities).

11. - Fundidora Park:
A hotel and tourist center is proposed in this area close to the convention and recreation center.
(Fundidora). The program includes hotels, office parks, a children museum and media museum.

12.- Convention Sport Facilities:
This section should offer sport facilities related to tourism. It could also be an extension of the hotels located in the area and related to the children’s amusement park. It could integrate sport areas for children’s competitions.

5.2.5 Urban Design Objectives
The thesis proposes to structure the city in a hierarchical manner by incorporating the river into the urban fabric as the main element of the system. It explores the possibility of developing a suddenly available vacant land within a dense built environment. Addressing the planning objectives of this study, I propose some design guidelines to create the new places in the river.

City Fabric:
- Create a hierarchical system of civic spaces within the urban fabric. The river will be the main element of this system, knotting together the existing sectors.
- Create an urban identity by defining the river’s image as a particular element of the city.
- Transform Morones road into a boulevard with a system of parking spaces under it.

Road System:
- Redefine the street character to create a pleasant environment for the pedestrian. Morones road will be transformed into a pedestrian friendly boulevard, problematic overpasses should be improved and new pedestrian bridges should be built.
- Promote the creation of a stronger north-south axis by linking specific landmarks in the inner city to the river. This could be done by changing the streets’ widths to reorganize the system through a hierarchy.
- Provide alternative modes of transportation. A new subway line under Morones Street is proposed and the existing bike path will be improved.
- Provide parking structures within the development.

Civic Spaces, Parks and Sport facilities:
- Improve the river as a recreational and sport facilities area.
- Create three main civic parks, each with distinctive identity.
- Accessibility. Create a continuous public pathway from one extreme of the river to the other and provide public access to the river from existing sectors.
- Address the water problem. Utilize riparian vegetation, cactus and other spices that do not require much water.
- Address the history and important landmarks by the creation of special plazas along the development.

Scale, Character and Form:
- Control building and bridges height to preserve important views and character.
- Control FAR to achieve the right proportion of built and green areas.
- Create an edge in Morones boulevard by proposing a built to line.
- Build bridges like buildings to link both sides of the river.
- Address the three primary of modes of transportation of the users: Car, bike and pedestrian.
5.2.6 Design Guidelines:

The goal and objectives of the master plan focus on the overall policy issues, however, more emphasis needs to be given to the actual implementation of the river project. The following guidelines would help define and implement the plan. The three main principles that are considered are based on landscape, circulation and buildings.

Landscape:
The vegetation used in the river should be similar to the existing types. At the beginning of the river which is on the east side, the environment is more desert like; at the end of the river, the west side, it becomes more wooded or green.

The proposed landscape will follow this east-west pattern. Cactus and desert plants will prevail in the landscape on the east side near la Huasteca Canyon and it will slowly become more green until it reaches the end of the project.

The same would be true for the material covering the riverbed. Pebbles will prevail on the east and grass will prevail on the west.

Even though the plan divides the river into sections of parks, sport facilities and build areas, a continuous greenway will run from one extreme of the river to the other. This greenway includes the bike and pedestrian paths. These paths can run straight in some areas and curve in others shifting sides and crossing the storm channel several times never breaking the continuity.

It is important to create several shadowed areas with vegetation so that pedestrians can stop to enjoy the whole park. The pedestrian and bike paths should be flanked by trees to create shadows.
Circulation:

An important objective of this plan is to offer accessibility to the park from various points within the city and an easy circulation within the riverbed. For that reason, the different sections of the riverbed should provide public access from both sides of the river. Access should be provided at least every 500m, which includes the buildable areas.

There would be three types of bridges that will provide the linkages:

1. Pedestrian Bridge: It is a standard pedestrian bridge that crosses from Morones Road to Constitucion Ave. It should have stairs that go down to the riverbed. There should be one in every section of the riverbed (at least one every 2.5m).

2. Building Bridge: These bridges span from the buildings in the riverbed to the buildings on the other side of Morones Rd. or Constitucion Avenue. The location of these bridges depend on the land use relationship of the buildings and the need to link them in certain places. Their location should be approved by the implementation board.

3. Park Bridge: These bridges are small and that link both sides of the storm channel within the riverbed. There should be one every 500m coinciding with the public access from Morones Rd. or Constitucion Avenue.

Tracks that go down to the storm channel bed should be provided every 500m so that runners or mountain bikers can cross on the channel bed surface.

Buildings:

The two first levels of the building in the riverbed should be allocated for parking structures. These two levels would have to be open on the sides so that in case of a natural catastrophe the water can run through them without damaging the structure.

The buildings should provide public spaces and public access that can be used twenty-four hours per day.
Figure 29
Vision is the main force needed to realize a project. It is the target where all involved minds should aim. Knowing what the result should look like makes the whole process easier. It is the reasons why I propose to develop a vision as the first step to implementing the revitalization of the river. Because all of the institutions involved in the project should agree with this vision, it is important to create a new institution or a board composed of representatives from each party; the private sector, the government and the community as explained below.

Government: The governor or his representative
The mayors from each county involved

Private Sector: Industry Association, (Asociacion de transformacion)
Commerce Association, (Camara de Comercio)
Bank Association (Asociacion Bancaria)
Developers Association (ADIVAC)

Community: A representative of each county.

I am identifying this board as the Management Board (Consejo Directivo) which together with an external consultant would coordinate the project through the whole process.

The second part of the hierarchy would be the Implementation Board composed by an elected General Director who will coordinate four support groups: Technical, Finance, Legal and Promotion. This board would coordinate external consultants and companies to finish the whole plan and construct the infrastructure required. The implementation board would prepare competitions or other democratic processes to choose the right external companies and consultants. The results would be presented to the Board of directors who will decide which company is the best for the project. It is at the beginning of this stage of the process where the design guidelines and technical regulations of the plan have to be developed. These guidelines and regulations are the tools that shape the physical appearance of the plan, while the ideas for general design guidelines have been proposed in this thesis.

After defining the vision and the guidelines the implementation stage could start. The government issues legislation, to be approved by the national congress. In this legislation the state government presents the project with its requirements and benefits. This legislation includes the transfer of land ownership from federal to state, the permission to tax for this project and so on. If this legislation is approved, the process can start. The State can request a credit to an institution like the World Bank to build the dams upstream and the infrastructure needed to serve the development. Then the land would be ready to sell or lease and the credit can be transferred to the new owners and benefited parties through tax called impuesto las mejoras especificas.
There would be two types of income, the one collected by taxes and the one collected from the leases or sales of the land. The lease and sales of land could be managed and collected by promotion group on the implementation board and the taxes should be collected by each county which has the infrastructure to do it. The income collected by the different institutions should go to a trust or foundation of the project created at the beginning of the process.

There are other ways of implementing a project like this one but this specific implementation process is based on precedents of the City of Monterrey like Fidevalle, which is the organization that realized the infrastructure required for Valle Oriente, the new financial district of the city.
Cities are complicated and dynamic systems. They are the natural environment modified by the human being in order to fulfill his/her needs. The flow of the people, time and advances in technology change the meaning of the elements that configure the city. In order to survive these elements metamorphose fulfilling new needs, adapting to the ever changing world.

An element like the Santa Catarina river has a powerful effect in the city. It can modify the population’s daily journey, the street configuration, land use pattern, development direction, urban infrastructure and natural environment. Therefore the new vision for this element should understand the city’s growth, the forces working with or against it and point to a coherent future. This thesis suggests certain principles to be addressed by the new vision which are defined as planning outcomes and design guidelines. These principles work as a checklist of issues impacted by the revitalization of the vacant strip of land which have to be integrated to the new vision. Although they can be implemented in any similar case they must be adapted to specific issues.

Projects like the Boston Artery, the Berlin Wall, the Ringstrasse and the Santa Catarina River, while developing a large strip of land that fractures the city, are confronted with the choice between unifying or dividing. This option is actually less radical than a link or a border. There is a range of possibilities between these extremes. For instance, two dense areas as the two medical centers in Monterrey’s case could have several possibilities. The strip of land between them could be densely developed as urban concentration erasing the former pattern of the river. Or it could be developed as an open space that work as pressure release form built areas. Another possibility is the one this thesis suggested for the area; the development of an urban concentration within a park. The best option in each case depends on specific issues and visions of the site.

Although this thesis did not grow into a single comprehensive master plan, it has examined a variety of relevant case studies and laid out the framework in which any master plan must operate in order to be successful. Moreover, this document brings to life an often overlooked and undervalued element - the dry riverbed and suggests a new role for it within the city.
Footnotes

1 Wim Wenders, from the movie: wings of desire.
2 Jose Chavez Gutierrez, Atlas de Monterrey, Chapter 5.2
3 Conway, Engineering News.
4 Conway, Engineering News.
5 Wim Wenders, from the movie: wings of desire

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