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THE WATER TREATMENT PLANTS OF THE BOGOTÁ RIVER: CASE STUDY

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Abstract

Since de early seventies a number of technical sanitation alternatives were proposed to clean the wastewaters of the Bogotá River. However, mainly for economic reasons, they were not implemented. It was only until the early nineties that the administration of the city of Bogotá decided to adopt a strategy for the sanitation of the River, and a concession contract for the construction and operation of a series of treatment plants was signed in 1994. However, the decision was not the result of judicious analysis and it ignored the results of previous technical studies and evaluations. The treatment plants began operations at the end of 2000. In 2003 the city's administration decided, at a high cost for the city, to terminate that concession contract. This decision was justified based on the limited benefits and high costs of the sanitation project. This case study analyses how this project which was financially and technically indefensible was eventually be implemented. For this purpose the analytical framework of the WDR 2003² is used.

Key words: water pollution, regulation, institutions, Colombia

JEL classification: N5, O13, Q20

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² World Development Report 2003 - Sustainable Development in a Dynamic World: Transforming Institutions, Growth, and Quality of Life. 2003. The World Bank. Washington.

LAS PLANTAS DE TRATAMIENTO DE AGUAS RESIDUALES DEL RÍO BOGOTÁ: ESTUDIO DE CASO

Resumen

Desde los tempranos años setenta una serie de alternativas técnicas para el saneamiento de las aguas del Río Bogotá fueron propuestas. Sin embargo, principalmente por razones económicas, ellas no se implementaron. Fue solo hasta los primeros años de la década de los noventa que la administración de Bogotá decidió implementar una estrategia para el saneamiento de las aguas del Río; y en 1994 se firmó un contrato de concesión para la construcción y operación de una serie de plantas de tratamiento. Sin embargo, la decisión no fue el resultado de evaluaciones cuidadosas e ignoró los resultados de estudios y evaluaciones anteriores. Las plantas de tratamiento comenzaron a operar hacia finales del año 2000. En el año 2003, la administración de la ciudad decidió, a un alto costo, terminar el contrato de concesión. Esta decisión se justificó con base en los limitados beneficios y altos costos del proyecto de saneamiento. Este estudio de caso analiza como este proyecto que era financiera y técnicamente inviable eventualmente fue implementado. Para este efecto se utilizó el marco analítico del Informe sobre el Desarrollo Mundial del año 2003³ del Banco Mundial.

Palabras clave: contaminación, agua, regulación, instituciones, Colombia

Clasificación JEL: N5, O13, Q20

³ World Development Report 2003 - Sustainable Development in a Dynamic World: Transforming Institutions, Growth, and Quality of Life. 2003. The World Bank. Washington.

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Introduction

During the second half of the 20th century Colombian society underwent important transformations⁴. The role of the manufacturing, transportation, communications, financing and domestic public services sectors grew from 23% in the late 40's to about 40% in the early 80's. While the urban population during the early fifties represented 39% of the total population, it had grown to nearly 70% by the mid eighties. With rapid industrialization, urbanization, and economic and demographic growth, new environmental problems emerged⁵. Among them was the pollution of the Bogotá River which drained the most densely populated region of Colombia.

During the seventies and eighties a number of alternatives were proposed to treat the wastewaters of the Bogotá River. However, mainly for economic reasons, the proposed solutions were not implemented. Only until the early nineties did the administration of the city of Bogotá decide to implement a project for the treatment of the wastewaters of the city of Bogotá. This decision was facilitated by a provision of an environmental law approved in 1993 which assigned additional economic resources to the urban environmental authorities. The decision was not the result of a more stringent environmental control. It ignored the results of previous technical studies and evaluations, and was not publicly consulted.

The wastewater treatment plants of the Bogotá River began operations at the end of 2000. In 2003, three years later, the city's administration decided to terminate the contract for the construction and operation of those plants, which had been signed in 1994. This decision was justified based on the limited benefits and high costs of the project. The cost of the decision to terminate that contract was also high. This case study analyses this sanitation project of the Bogotá River in light of the framework of the World Development Report 2003⁶

This case study illustrates how a project for the treatment of Bogotá's wastewaters, which was financially and technically indefensible, could eventually be implemented. The case study discusses how this happened in light of inadequate mechanisms for balancing legitimate social interests, and of the ineffectiveness of existing mechanisms.

⁴ Ocampo J.A., J. Bernal, M. Avella, M. Errázuriz. 1994. La Consolidación del Capitalismo Moderno en Colombia 1945 - 1986. *En* Ocampo J. A. (ed.) Historia Económica de Colombia. Bogotá.

⁵ Sánchez E., E. Uribe. 1994. Contaminación Industrial en Colombia. DNP. PNUD. Bogotá.

⁶ World Development Report 2003 - Sustainable Development in a Dynamic World: Transforming Institutions, Growth, and Quality of Life. 2003. The World Bank. Washington.

1. Description of the Case

1.1 Environmental Aspects

Bogotá is located in an Andean plateau known as the Bogotá Savanna, at an altitude of 2560 m above sea level. Nineteen percent of Colombia's population lives in this savanna where Bogotá (pop. 6'789.122)⁷, the capital city of Colombia, is located. The Bogotá Savanna houses 30% of the Colombian manufacturing industry⁸ and 15% of the country's population⁹. The city of Bogotá is Colombia's largest economic center,¹⁰ and between 1980 and 2000 contributed 22% of Colombia's Gross National Product; during that same period it produced 24.6% of the national industrial output¹¹.

The Bogotá River drains the agricultural rural and suburban areas of the Bogotá Savanna along a course of about 150 kilometers, before entering the city of Bogotá from the North. Along this course it crosses eleven small municipalities¹² with a population of 223.445¹³. When the River enters the city of Bogotá it runs along its western border and receives the polluted waters of the *Salitre*, *Fucha*, and *Tunjuelito* rivers which are the main natural drainages of the city. The Bogotá River leaves the city and crosses the municipality of Soacha (pop. 230.300)¹⁴ where it receives the polluted waters of the *Soacha* River, and continues its course over the suburban and rural areas of the southern region of the Bogotá Savanna. One hundred kilometers after the Bogotá River receives the waters of the *El Salitre* River, at its entrance to Bogotá, it begins a rapid descent to the valley of the Magdalena River at about 300 meters above sea level. (Diagram number one).

As the Bogotá River approaches the city of Bogotá from the North and population density and economic activity increase, the quality of its waters deteriorates¹⁵. The concentration of BOD₅ increases from about 10 mg/L to about 30 mg/L as the River approaches the city; attains values that vary between 60 and 130 mg/L after converging with the *El Salitre* River and maintains those high levels along its course over the plateau of the Bogotá Savanna. When the River leaves the

⁷ Proyecciones Departamentales de Población por Sexo y Edad, 1990 – 2015. 2003. DANE. Bogotá.

⁸ Ureña M. 2002. Historia de un Proceso de Planificación, Estudio de Caso: la Cuenca Alta del Río Bogotá. Tesis de Grado UNIANDES. Bogotá.

⁹ Proyecciones Departamentales de Población por Sexo y Edad, 1990 – 2015. 2003. DANE. Bogotá.

¹⁰ De Bogotá a la Región: Apuntes para un Modelo de Desarrollo Regional. 2003. Contraloría de Bogotá. Bogotá.

¹¹ Encuesta Anual Manufacturera. 2000. DANE. Bogotá

¹² Villapinzón, Chocontá, Suesca, Sesquilé, Gachancipá, Tocancipá, Zipaquirá, Cajicá, Sopó, Chía and Cota.

¹³ Based on the last census in 1993.

¹⁴ Based on the last census in 1993.

¹⁵ Universidad de los Andes 2001. Proyecto de Modelación de la Calidad del Río Bogotá. EAAB-ESP. Bogotá.

Savanna, its concentration of BOD₅ begins to decline and again reaches a value of around 30mg/L at the point where it meets with the Magdalena River.

The concentrations of other chemical and physical pollutants have similar trends. While the concentration of Total Suspended Solids (TSS) are about 150 mg / L before the river enters into Bogotá, this parameter reaches values as high as 800 in Bogotá. Then as the river leaves the city and descends to the Magdalena Valley, these parameters drop to average values close to 400 mg/ L. Inside the city of Bogotá, chromium and lead concentrations in the waters of the river register values of 0.25 mg/L and 0.10 mg/L, respectively; those values descend to 0.05 and 0.4 before the Bogotá River discharges its waters into the Magdalena River.

The Bogotá Rivers crosses several municipalities as it descends from the Bogotá Savanna to the Magdalena Valley¹⁶. The waters of the Bogotá River are used for irrigation, by the rural areas of those municipalities. High counts and concentrations of bacterial coliforms and of mercury have been detected in the milk produced in those irrigated areas^{17,18}. The concentrations of chromium and mercury detected in the tissues of irrigated crops are above those considered safe by the World Health Organization¹⁹. Additionally, the pollution of the Bogotá River increases costs of water provision of those eight municipalities. Most have been forced to transport water from watersheds located further away. One of these municipalities²⁰ treats the polluted waters of the Bogotá River for human consumption. Diagram one presents a simplified version of the main hydrologic structures of the region²¹.

¹⁶ Funza, Mosquera, Soacha, Sibaté, Tena, La Mesa, El Colegio, Anapoima, Apulo, Tocaima, Agua de Dios, Ricaurte, Girardot.

¹⁷ Instituto de Ciencia y Tecnología de Alimentos. 1984. "Datos de calidad de Leche Cruda en las Haciendas Montenegro y Veterinario". Universidad Nacional Bogotá. Bogotá.

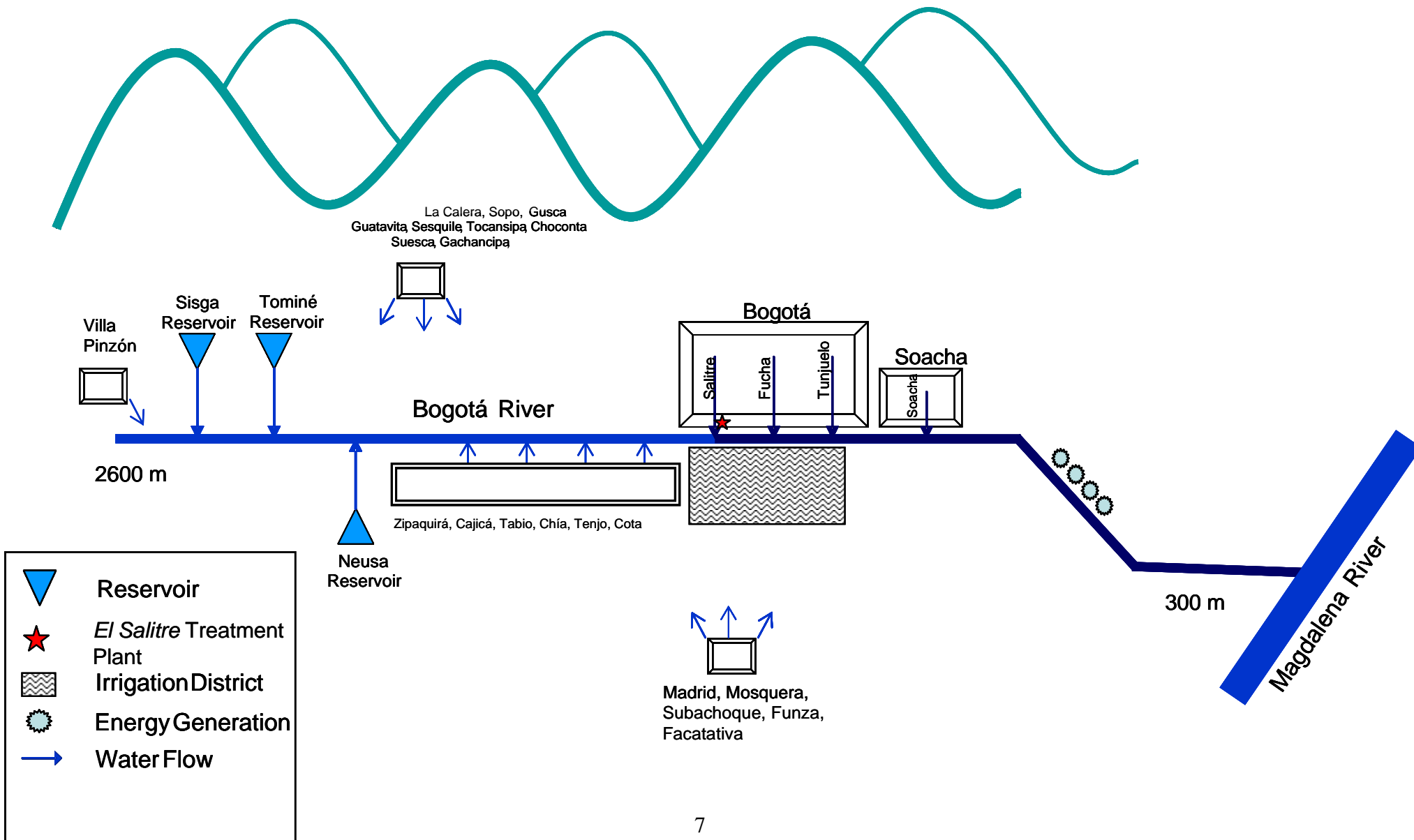
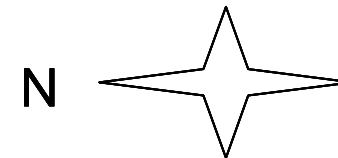
¹⁸ Estrategia de Saneamiento del Río Bogotá. Informe Final de Consultoría. EPAM. 1993. FONADE. EAAB-ESP. Bogotá.

¹⁹ Estrategia de Saneamiento del Río Bogotá. Informe Final de Consultoría. EPAM. 1993. FONADE. EAAB-ESP. Bogotá.

²⁰ Agua de Dios

²¹ Taken from the Geographic Information System of CAR.

Diagram One: Graphic representation of the Watershed of the Bogotá River



When the polluted waters of the Bogotá River converge with the waters of the Magdalena River these are diluted. Table 1 shows the effect of the polluted waters of the Bogotá River on the quality of the water of the Magdalena River.

Table 1. Parameters of water quality of the Bogotá and Magdalena Rivers

Parameter	Magdalena, before Bogotá River	Bogotá River at the Confluence	Magdalena, after Bogotá River
Flow m ³ /s	330 - 633	31.3 – 41	377 – 715
BOD ₅	6 - 11	19 – 120	9 – 32
DO* (mg/L)	6.3 – 7.6	0.4 – 1.1	4.3 – 8.9
NH ₄	N.D. - 1.4	11.3 – 18.9	0.8 – 2.77
Org.P** (mg/ L)	0.4 – 1.5	1.5 – 2	0.4 – 1.4
TC MPN***/100 ml	6.1 E4 – 5.2 E5	1.4 E6 -2.5 E7	2 E4 -4.3 E6

* Dissolved Oxygen

** Organic Phosphorus

***Most Probable Number of Total coliforms

The organic discharges of the Bogotá River can not be detected 21 km downward of its point of confluence with the Magdalena River²².

In 1993 when the decision to build a series of treatment plants for the sanitation of the Bogotá River was taken, the quality of the waters of the Bogotá River was better than it is today^{23,24}. However, the pollution levels of the river were then were also visually evident. In the report Dr. Daniel Okun wrote to the World Bank after his visit to Bogotá in 1990, he affirmed that after the Bogotá River enters the city and receives the discharges of the *El Salitre*, it becomes a “...nuisance throughout the remainder of its length...”²⁵.

Descriptive statistics of 1992 suggested that the incidence of gastric diseases was high in the municipality of *El Colegio*, located in the lower basin of the Bogotá River. However, rigorous studies of the cause - effect relations between the quality of the Bogotá River and morbidity were not available during the late eighties and early nineties^{26 27}. The first rigorous statistical studies on the health effects of the pollution of the Bogotá River were conducted by graduate

²² IDEAM – CORMAGDALENA. 2001. Estudio Ambiental de la Cuenca Magdalena – Cauca y Elementos para su Ordenamiento Territorial. Informe Final. Bogotá.

²³ Estrategia de Saneamiento del Río Bogotá. Informe Final de Consultoría. EPAM. 1993. FONADE. EAAB-ESP. Bogotá.

²⁴ Universidad de los Andes 2001. Proyecto de Modelación de la Calidad del Río Bogotá. EAAB- ESP. Bogotá.

²⁵ Okun, D. 1990. Pollution Control in Bogotá. A report to the World Bank,

²⁶ Okun, D. 1990. Pollution Control in Bogotá. A report to the World Bank,

²⁷ Unión Temporal Saneamiento Río Bogotá. 2.000. Definición de los Lineamientos para Continuar con el Saneamiento del Río Bogotá. Empresa de Acueducto y Alcantarillado de Bogotá.

students of the *Universidad de los Andes* during the mid and late nineties²⁸. Biological information indicated that the pollution of the Bogotá River had extinguished all of the native species of fish, and that it threatened several native bird species²⁹. Evidence also pointed out that the irrigation of pastures and vegetables with Bogotá River water was associated with unsafe concentrations microorganisms and heavy metals in milk and vegetables³⁰. However, a solid body of scientific information related to the social and environmental costs and effects of the deterioration of the Bogotá River was not available during the late eighties and early nineties, when the decision to construct a water treatment plant system in Bogotá was taken. As a result, there were large voids regarding the social costs of the rivers' pollution, and the benefits and of its sanitation.

1.2 Institutional Aspects

The Regional Autonomous Corporation of the Bogotá Savanna (CAR) was created in 1961 as the environmental control agency for the watershed of the Bogotá River. This institution was responsible for the enforcement of the environmental regulations of the Code of Natural Resources (Decree 2811 of 1974) and of Decrees 1541 of 1978 and 1594 of 1984 related to water use and quality. None of these regulations, which are still largely in place, was the result of participatory processes³¹. Another institution with environmental responsibilities in the region was the city's Department of Health. This institution was responsible for air pollution control and for the enforcement of drinking water standards³².

During the seventies and eighties the Water and Sewage Company (*Empresa de Acueducto y Alantarillado de Bogotá*) explored technical alternatives for the treatment of the wastewaters of Bogotá. The Camp Dresser & McKee³³ study, presented in 1974, proposed the construction of an interceptor along the Bogotá River and construction of a treatment plant in the lower basin of the Bogotá River. The Black & Veatch and Hidroestudios³⁴ study updated the 1974 study and explored several new alternatives. This study which was presented in 1985

²⁸ Hernández Pineda Andrés. 1996. Incidencia de la Contaminación del Río Bogotá en la Salud Pública de los Habitantes de la Cuenca baja del Río Bogotá. Tesis de Grado UNIANDES. Mogollón Duffo y otros. 1997. Evaluación Sanitaria de y Ambiental de Preliminar de la Localidad de Bosa. Tesis de Grado UNIANDES. Bogotá.

²⁹ Estrategia de Saneamiento del Río Bogotá. Informe Final de Consultoría. EPAM. 1993. FONADE. EAAB-ESP. Bogotá.

³⁰ Estrategia de Saneamiento del Río Bogotá. Informe Final de Consultoría. EPAM. 1993. FONADE. EAAB-ESP. Bogotá.

³¹ Interview with Mr. Julio Carrisoza. INDERENA's Director from 1973 to 1978. July 2004. Bogotá.

A's director form

³² Law 02 of 1979 and Decrees 2 of 1982 and 1594 of 1984.

³³ Camp Dresser & McKee, CEI y Planhidro. 1974. Bogotá River Improvement, Flood Control, Water Resources and Waste Water Disposal. EAAB.

³⁴ Black and Veatch Internacional – Hidroestudios Ltda. 1983. Diseños Definitivos de la Adecuación Hidráulica del Río Bogotá, las extensiones del Plan maestro de Alcantarillado y los Estudios de Tratamiento de Aguas Negras de la Ciudad de Bogotá. Tomo II. Bogotá.

also recommended the construction of an interceptor along the Bogotá River and a treatment plant³⁵. Those two studies were part of the evaluations that the Water and Sewage Company conducted to prepare the financing of the company's "Master Plans"³⁶. The solutions proposed by those two studies were evaluated by the Water and Sewage Company of Bogotá and by the World Bank.³⁷ Both studies agreed that social and economic benefits of the proposed solutions were low compared to their costs, and that their implementation should be postponed.

Environmental control by CAR in the urban area of Bogotá was largely unattended³⁸. CAR did not actively enforce water regulations to the Water and Sewage Company which discharged all of the city's wastewaters to the Bogotá River³⁹. This Regional Autonomous Corporation did not have the technical tools to quantitatively assess and monitor pollution in the urban and suburban areas of this city. There is no evidence of social or institutional demands to the city's Water and Sewage Company in relation to water pollution control during the seventies and eighties. In addition, the Mayor of Bogotá was simultaneously a member of the Board of Directors of CAR and of the Board of Directors of the city's Water and Sewage Company (*Empresa de Acueducto y Alcantarillado de Bogotá*⁴⁰). Acting simultaneously as a member of the boards of directors of those two institutions, the independence of his/her interventions with relation to water pollution control could have been questionable.

On the other hand, the economic affects of the prevalent water pollution problems were largely unknown⁴¹. There is evidence that at that time other social priorities were more pressing. Bogotá's Development Plan for the 1987 – 1990⁴² which was elaborated through a process of public consultations⁴³ does reference the pollution problems of the Bogotá River.

In 1988, with the technical cooperation of the Dutch Government, CAR designed a program for the sanitation of the upper basin of the Bogotá River. The program was financed by a US \$ 50 million⁴⁴ loan from the Inter-American Development Bank⁴⁵. It included the construction of a series of 23 municipal wastewater treatment plants⁴⁶. CAR began the implementation of this program in 1992 and concluded in 2003.

³⁵ In this case the plant would be located in the municipality of *Soacha* to the South of Bogotá.

³⁶ Interview with Mr. Humberto Triana. Under Director for Technology of the Water and Sewage Company. He was a member of the consulting group of the study elaborated between 1983 and 1985.

³⁷ Empresa de Acueducto de Bogotá. Subgerencia de Planeamiento. 1990. Intercepción y Tratamiento de las Aguas Negaras de Bogotá. Bogotá.

³⁸ Sánchez E., E. Uribe. 1994. Contaminación Industrial en Colombia. DNP. PNUD. Bogotá.

³⁹ The author for this study was a member of the Board of Directors of CAR from 1989 to 1997.

⁴⁰ The current name of this institution is "*El Acueducto*".

⁴¹ At the time, the methodologies used to asses the economic impact of environmental deterioration had not been applied in Colombia.

⁴² Bogotá Para Todos 1987 – 1990. Plan de Desarrollo Social y Económico. Alcaldía Mayor de Bogotá; Cámara de Comercio de Bogotá. Bogotá.

⁴³ Eleven public forums during 1986

⁴⁴ The cost of the program was adjusted in 2001 to a total value of US \$ 38.37 million

⁴⁵ Antecedentes del Programa de Descontaminación del Río Bogotá. 2000. DAMA. Bogotá.

⁴⁶ The program also included the construction of 7 sanitary landfills and of 8 systems for the management and treatment of the wastes generated by municipal slaughterhouses.

Decisions for the implementation of the sanitation project of the Bogotá River were made between 1992 and 1994. It was precisely during this period that Colombia's environmental framework was transformed. Several events lead to that transformation. A special Assembly approved a new Constitution in June 1991. The new Constitution included the principle of Sustainable Development as a pivotal element of the economic and social life of the country⁴⁷ and mandated the state to prevent and control factors that could cause environmental degradation⁴⁸. In the presence of a new constitutional framework, the national government adopted a new environmental policy in August 1991. In order to implement this environmental policy, the government needed to propose legal reforms to the National Congress.

In accordance with the basic elements of the Environmental Policy of 1991 and after wide public consultations, the National Congress approved Law 99 in December of 1993. This law created a new legal framework for environmental institutions and regulations. Law 99 of 1993 created the Ministry of the Environment with the primary responsibility to enact environmental regulations, and to design and coordinate the implementation of environmental policies throughout the country⁴⁹.

In addition, Law 99 of 1993 ordered the creation of specialized environmental authorities in urban centers with more than one million inhabitants⁵⁰. The Mayor of Bogotá⁵¹ participated actively in the debates in Congress and his participation contributed to ensure that 15% of local property taxes were dedicated to the financing of investment projects by the urban environmental authorities created by this Law⁵². Law 99 of 1993 also strengthened the environmental impact evaluation processes⁵³, defined the cases in which EIAs are required and the steps which are part the process of impact evaluation, including public meetings.

However, as will be discussed in section 2, Law 99 of 1993 did not include provisions to prevent the conflicts of interests related to the administration of regional environmental authorities. After Law 99 of 1993 came into effect, the regional corporations could continue acting as control agencies while simultaneously implementing development projects; mainly sanitation projects. In fact, as will be discussed in the same section, Law 99 of 1993 may have aggravated those conflicts in the case of urban environmental authorities. In addition, Law 99 of 1993 did not change regulations related to water pollution. In fact, regulations such as Decree 1594 of 1984 which contain water ambient and effluent standards are still in effect.

In February of 1994, the Ministry of the Environment was created. However, the main environmental institutional and legal reforms approved by Law 99 were not immediately implemented. Between 1994 and 1998 a period of institutional reform and capacity building took place. During this period the Government created urban environmental authorities in various cities. In the case of Bogotá

⁴⁷ Article 80 of the Political Constitution

⁴⁸ Article 80 of the Political Constitution.

⁴⁹ Article 2, Law 99 of 1993.

⁵⁰ Article 66, law 99 of 1993

⁵¹ Jaime Castro (*Partido Liberal*)

⁵² Article 44; Paragraph 2.

⁵³ Title VIII (articles 49- 62), Law 99 of 1993.

the Environmental Department - DAMA (*Departamento Administrativo del Medio Ambiente*) was created as a part of the administration of the city. Its director is appointed and can be removed by the city's Mayor. DAMA was given the responsibilities of environmental control inside the urban area of the city of Bogotá. Consequently, the city of Bogotá was excluded from the jurisdiction of the Regional Autonomous Corporation of the Bogotá Savanna. This institution, which was renamed the Regional Autonomous Corporation of Cundinamarca (CAR), maintained jurisdiction over the rural areas and municipalities of the region.

Between 1994 and 1998 the new Ministry of the Environment placed a large emphasis in developing the regulations needed for the institutional transition of the old environmental framework into the new system. Perhaps one of the most relevant regulations approved during that period was that related to environmental licensing⁵⁴. In addition, between 1994 and 1998 the national government approved a series of environmental policy documents⁵⁵. During the first years of existence the new Ministry of the Environment (1994 – 1998), its involvement, and in fact the participation of the national government in matters of urban environmental policies and regulations was marginal⁵⁶.

1.3 The Decision Making Process

Between 1988 and 1990 several international firms⁵⁷ made proposals to the city's administration for the construction of a system of plants for the treatments of its wastewater⁵⁸. Those proposals included the construction of a series of treatment plants located at the points where the Bogotá River converges with the rivers that drain the City.

During the first semester of 1990, the World Bank sent a mission to Bogotá to analyze all the strategies that had been proposed to clean the Bogotá River. The mission was integrated by bank officials and by Dr. Daniel Okun an internationally recognized expert wastewater treatment. After the visit, Dr. Okun wrote a report to the World Bank⁵⁹, indicating that “the highest priority for pollution control in the Bogotá region, after the completion of the tributary

⁵⁴ Decree 1753 of 1994. This regulation which was approved in August of 1994 defined in greater precision the cases in which EIAs were required, the content of those assessments, the procedures to obtain environmental licenses, the responsibilities of the holders of those licenses, amongst other issues

⁵⁵ The Biodiversity Policy; Policy Guidelines for the Environmental zoning of the Territory; Policy Guidelines for Social Participation in Environmental Management; Policy for Environmental Education; Policy for the Management of Wild Fauna; Policy Guidelines for the Integral Management of Water Resources; Strategies for the National System of Protected Areas; Policy for the Integrated Ecological Zoning and Sustainable Development of Coastal areas; Guidelines for a Population and Environment policy; Policy for Pesticide Use and Management; Policy for the Integrated Management of Solid Wastes; Forest Policy; Strategic Plan for the Restoration and Establishment of Forests; Clean Production Policy; Financial Sustainability Strategy for the National Environmental System.

⁵⁶ The author of this study was the first vice-minister of the environment in 1994 and DAMA's director from 1995 to 1997.

⁵⁷ Bihwater, (England); *Degremont* (France) and *Dragados y Construcciones* (Spain).

⁵⁸ Empresa de Acueducto de Bogotá. Subgerencia de Planeamiento. 1990. Intercepción y Tratamiento de las Aguas Negras de Bogotá. Bogotá.

⁵⁹ Okun, D. 1990. Pollution Control in Bogotá. A report to the World Bank,

interceptors, is the cleansing of the Rio Bogotá in the vicinity of the city. The most effective approach is the construction of an interceptor along the river for the final treatment of the collected wastewaters in a plant on the savanna further down stream. This interceptor (costing US \$200 – 300 million) is of higher importance than treatment (costing about \$ US 1.500 million)". His recommendation was similar to those made in 1974 and in 1985 by Camp Dresser & McKee and by the Black & Veatch and Hidroestudios, respectively. Mr. Okun indicated that given the nature of the Bogotá River, the climatic conditions of the region and the large number of illicit sewer connections, the construction of a series of treatment plants along its course, as proposed by international firms, would not render significant benefits. He also emphasized the need for a regional approach to the river's sanitation, including an industrial pollution control program and an adequate institutional framework for the development of the project.

As a result of the mission, the World Bank indicated that the project should not be undertaken⁶⁰. The Bank indicated that Colombia did not have a national policy for wastewater treatment, that the quality objectives of the rivers had not been established, and that the Waterworks of Bogotá⁶¹ did not have the financial capacity to embark on such project. Instead, the Bank recommended the construction of a series of interceptors for the collection and drainage of wastewater to improve the sanitary conditions along the rivers and its tributaries.

Mr. Jaime Castro was elected Mayor of Bogotá for the 1992 – 1994 period. As indicated in section 1.2, at that time the country's environmental framework was under discussion in Congress. The Mayor initiated a series of conversations with the national government to explore mechanisms to finance the implementation of solutions for the treatment of the city's wastewaters. His administration presented the proposals made by international firms to the Department of National Planning – DNP (*Departamento Nacional del Planeación*). The Mayor requested support from the National Government to finance the project and proposed that the investments be financed by a loan from a multilateral agency. However, the National Government, represented by DNP⁶², did not support the Mayor's proposal. The National Government based its negative response with the following arguments⁶³:

- i. A sound financial strategy for the financing of the project was lacking.
- ii. The city of Bogotá and its Waterworks⁶⁴ were experiencing a difficult financial situation and were not in the capacity to undertake the project.

⁶⁰ Empresa de Acueducto de Bogotá. Subgerencia de Planeamiento. 1990. Intercepción y Tratamiento de las Aguas Negras de Bogotá. Bogotá.

⁶¹ *Empresa de Acueducto y Alcantarillado de Bogotá*

⁶² *Departamento Nacional del Planeación*; Department of National Planning.

⁶³ The author of this case study who was then the Head of the Environmental Unit of the Department of National Planning (DNP) and Mr. Pablo Roda who was then Head of the Unit of Urban Development were assigned by the Director of DNP (Mr. Armando Montenegro) the responsibility to personally explain these reasons to the Mayor.

⁶⁴ *Empresa de Acueducto y Alcantarillado de Bogotá*

- iii. The information provided to DNP⁶⁵ related to the financial and the social costs and benefits of the project was precarious.
- iv. The proposed sanitation strategy was local, and it did not take into consideration the regional dimension of the pollution problems of the watershed of the Bogotá River.
- v. The proposed technical strategy did not approach the issues of industrial pollution inside the city which, at the time, were largely uncontrolled.

At the time the Mayor's proposal was turned down by the National Government in 1993, the National Congress was discussing the creation of environmental urban authorities in the largest cities of the country; including Bogotá. As indicated in section 1.2 Law 99 of 1993 earmarked 7.5% of local property taxes for urban environmental authorities. In the case of Bogotá this authority would be the Administrative Department of the Environment –DAMA.

In 1993, the national government⁶⁶ and the city's Water and Sewage Company⁶⁷ contracted a local consulting firm (EPAM) to evaluate the previous studies as well as the proposals made by the international firms for the treatment of the city's wastewaters. EPAM recommended the alternative proposed by the international firms. That is, the construction of a series of treatment plants at the confluence of the Bogotá River with each of its three main tributaries⁶⁸. At each of these sites, two phases would be undertaken: the first phase would be the construction of primary treatment plants, and the second phase called for the construction of secondary treatment plants.

The city's administration decided that with the resources earmarked by Law 99 of 1993⁶⁹, the environmental agency of Bogotá -DAMA would finance the alternative recommended by EPAM. Therefore, the financial support and approval of the by the central government were no longer necessary. However, the financial resources earmarked by Law 99 would not be sufficient to build and to operate the complete strategy recommended by EPAM. Given the limited resources, only the construction and operation of the first of six phases⁷⁰ (the *El Salitre* Treatment Plant) could be contracted. During the first months of 1994, after Law 99 had been approved and during the last year of Mayor Castro's mandate, the contracting process began. DAMA undertook the contracting process.

At the time, water treatment projects of such dimensions had not been built in Colombia by national companies, and, as indicated before, three international firms had made offers. An international bidding process was thus opened. The firms that had previously made offers presented their proposals.

⁶⁵ *Departamento Nacional de Planeación*; Department of National Planning.

⁶⁶ FONADE (Fondo Financiero de Proyectos de Desarrollo)

⁶⁷ *Empresa de Acueducto y Alcantarillado de Bogotá*- Today known as "*El Acueducto*".

⁶⁸ From North to South those rivers are: *Salitre*, *Fucha*, and *Tunjuelito*.

⁶⁹ Article 44; Paragraph 2. This article of Law 99 of 1993 was later developed by Decree 673 of 1995.

⁷⁰ the primary treatment plant of the *El Salitre* River.

In September of 1994, a few months from ending his mandate, Mayor Castro signed a BOT⁷¹ contract with a consortium integrated by the French firms *Lyonnais des Eaux* and *Degremont*. According to the terms of the contract⁷² the *El Salitre* treatment plant would be designed, built and operated by the contractor. The contractor should begin to operate the treatment plant three years after signing the contract, and would transfer it to the administration of Bogotá 30 years later. The *El Salitre* plant was designed to remove 40% of the organic load and 60% of the suspended solids.

According to the contract, the administration would pay a monthly tariff of US \$ 0.255 to the contractor per cubic meter of treated water. The city would not have to make payments until the treatment plant begun operations; that is three years after signing of contract. The tariff would be periodically adjusted according to changes in macroeconomic variables. The *El Salitre* Treatment Plant was designed to treat an average effluent of 4 m³ per second.

Although the expected construction costs of the *El Salitre* Treatment Plant were large (US \$ 90 million) and required the use of 7.5% of the Bogotá's property taxes during a period of nearly 30 years, Mayor Castro did not consult the decision to undertake the project with the City Council, the National Government or the general public. As it will be discussed in section 2, under the existing circumstances the Mayor was not legally obliged to conduct such consultations.

The project was not submitted to an external independent evaluation. The only external concept which existed was that of Dr. Daniel Okun's in 1990. As mentioned previously, Dr. Okun had criticized the technical proposal made by the private firms which recommended the construction of a series of treatment plants. Dr. Okun then affirmed that "...the primary treatment would result in no perceptible improvement of the river"⁷³.. He then added "... a first stage with secondary treatment at one point on the river would also be costly and would generate little perceptible improvements on the river".

On the other hand, as indicated in section 1.2, the Regional Autonomous Corporation -CAR had also begun the construction a series of plants during the late eighties. However, this sanitation processes undertaken by CAR upstream of Bogotá and the water treatment project undertaken by DAMA were uncoordinated⁷⁴.

Mayor Antanas Mockus was elected for the 1995 - 1997 period. During this period, as agreed with the contractor, the administration bought the areas for the construction of the first treatment plant. Meanwhile, the contractor designed the plant, conducted the financial structuring of the project and conducted the

⁷¹ Build Operate and Transfer

⁷² Contrato de Concesión 015 para el tratamiento de las aguas residuales de la ciudad de Santa fe de Bogotá. Septiembre 20. 1994.

⁷³ Okun, D. 1990. Pollution Control in Bogotá. A report to the World Bank,

⁷⁴ Between 1990 and 1994, the author of this case study represented DNP and the Ministry of the Environment at the Board of Directors of CAR, and between 1995 and 1997, acting as DAMA's Director, he represented the Mayor of Bogotá (Mr. Antanas Mockus) in the same board.

Environmental Impact Assessment. This EIA was needed to obtain the Environmental License by the Ministry of the Environment⁷⁵. The Ministry of the Environment granted the Environmental License in 1995. This was one of the first environmental licenses granted by the new Ministry of the Environment and one of the first which was granted after the relevant regulations⁷⁶ had been approved in August of 1994. The construction of the project began in January of 1998.

The process of public participation during EIA which had been approved by law 99 of 1993 had not been regulated. Therefore there were not public meetings in the process of EIA. In addition, the new Ministry of the Environment and the national government elected for the 1994 - 1998 period had not participated in the previous discussions and evaluations of the sanitation program. The DNP⁷⁷, which had opposed the project in 1993, does not participate in processes of Environmental Impact Evaluation. Therefore it did not participate in the decision to grant the environmental license for this project.

Mayor Antanas Mockus' administration (1995-1997) did not question the sanitation program contracted by the previous city's administration. He considered that the cost of an eventual unilateral termination of the recently signed concession contract would be extremely high in terms of the international credibility of the city⁷⁸. In addition, at this point the treatment plant had not been built and their limited benefits had therefore not been observed.

Mr. Enrique Peñalosa was elected Mayor of Bogotá for the 1998- 2000 period. The *El Salitre* treatment plant began operations in December of 2000 during the last days of Mayor Peñalosa's administration. During the inauguration ceremony of the *El Salitre* treatment plant in September of 2000, Mayor Peñalosa publicly protested and expressed his discontent with the project's large costs and imperceptible benefits. He indicated that the project was inconvenient, and that it diverted resources that could be dedicated to more defensible social purposes, such as the construction of sewage and drainage systems in the poor areas of the city⁷⁹.

Since the inauguration of the *El Salitre* treatment Plant the city of Bogotá paid the contractor a monthly charge that amounts to close to US \$ 2 million⁸⁰. This amount includes all the costs associated with the contract, including the administrative, financial, operational, labor and fiscal costs. Although for the most part, the Plant has removed the pollutants agreed in the contract⁸¹, the monitoring measurements of the river indicate that the primary treatment of the

⁷⁵ An environmental License is granted by Colombian environmental authorities after the approval of the EIA.

⁷⁶ Decree 1754 of 1994

⁷⁷ The Department of National Planning.

⁷⁸ The author of this case study was DAMA's director during Mr Mockus's administration.

⁷⁹ The author of this case study attended that inauguration ceremony.

⁸⁰ Interview with Mrs. Julia Miranda DAMA's Director from 2001 to 2003. December 2003. Bogotá.

⁸¹ Interview with Mr. Mauricio Bayona DAMA's official responsible for the monitoring and control of the contractor's activities and performance. December 2003. Bogotá.

Salitre River has had no significant effect on the quality of the Bogotá River⁸². This situation coincides with Dr. Okun's prediction in 1990 when he indicated that "...the primary treatment would result in no perceptible improvement of the river."⁸³

Mayor Antanas Mockus was re-elected for the 2001 – 2003 period. In accordance with the terms of the concession contract signed with the French company, the Administration of the city evaluated the performance of the project one year after the *El Salitre* Treatment plant began operations. Between 2001 and 2002 the administration undertook a series of financial, technical and legal evaluations with national and international firms and consultants⁸⁴. Based on those studies Mayor Mockus modified the sanitation strategy for the Bogotá River. The new strategy is similar to that originally proposed by Black & Veatch and Hidrestudios in 1985 and recommended by Dr. Daniel Okun during his World Bank visit to Bogotá in 1990. The main difference is that it includes the *El Salitre* plant, presently in operation. The detailed designs of the financial and of the technical aspects of the project have not yet been undertaken. The basic concept of the new sanitation program is included in the city's zoning plan -POT (*Plan de Ordenamiento Territorial*), approved by Mayor Mockus in December of 2003⁸⁵.

Based on the information provided by the previously mentioned financial, technical and legal studies and taking into account the fact that the POT⁸⁶ of the city had included a new sanitation strategy, Major Mockus ordered the Director of DAMA⁸⁷ to unilaterally terminate the contract for the construction and operation of the *El Salitre* Treatment Plant. The Director of DAMA terminated the contract on the last day of the governmental period, through *Resolution* 2036 of the 31 of December of 2003. Among the reasons presented by the *Resolution* for terminating the contract are the following:

- i. The project does not produce social benefits and its cost is onerous⁸⁸.
- ii. The plant generates limited benefits in terms of river quality.
- iii. The contract is economically disadvantageous for the city and the unilateral termination would be financially beneficial.
- iv. The capacity of the plant is insufficient to treat the flow of the *El Salitre* watershed's polluted waters.
- v. The plant has design problems related to its limited capacity to drain the waters of the sewer systems.

⁸² Unión Temporal Saneamiento Río Bogotá. 2003. Programa de Saneamiento del Río Bogotá. Definición de la Alternativa a Seguir. Acueducto Agua y Alcantarillado de Bogotá

⁸³ Okun, D. 1990. Pollution Control in Bogotá. A report to the World Bank,

⁸⁴ *Taller de Estrategia* conducted financial evaluations. The *Instituto Quinaxi*, Carlos Alberto Giraldo, the Water Research Center of England (WRC) and the *Union Temporal Saneamiento Río Bogotá* conducted technical evaluations. The firm *Arodríguez- Azuero* conducted the legal analysis.

⁸⁵ Decree 469 of 2003

⁸⁶ *Plan de Ordenamiento Territorial*; The City's Zoning Plan.

⁸⁷ Mrs. Julia Miranda

⁸⁸ Its total cost would have been US \$ 397 million (US \$ 195 million of investment costs and US \$ 202 million of operational costs).

- vi. The plant lacks adequate infrastructure for the evacuation of the untreated inflow and the application of chemicals.
- vii. The efficiency of the plant is lower in periods of high rainfall.
- viii. The sanitation strategy approved by the new *Plan de Ordenamiento Territorial* in December of 2003 required important technological adaptations and modifications.

In accordance with the terms of the contract, the administration also ordered to pay the concessionary the value of the infrastructure and an economic compensation. Provisions were made by the Administration to pay the contractor a total amount of about US \$ 75 million⁸⁹. The infrastructure is presently being transferred by the concessionary to the Administration of the city.

2. Analysis of the Case

In this section the case of the water treatments plants of the Bogotá River is discussed and analyzed following the framework of the WDR 2003. The following aspects are discussed and analyzed:

1. How, and to what extent, society became aware of the pollution problem of the Bogotá River.
2. The mechanisms that generated the decision to undertake the treatment of the waters of the Bogotá River.
3. The mechanisms that in place to balance legitimate, compelling social interests.
4. The means by which the adopted solution was executed as well as the sustainable (long term) nature of the commitment.

2.1 How, and to What Extent, Society Became Aware of the Problem

By 1990, it was visually evident that the Bogotá River was very polluted⁹⁰. However, quantitative information relative to the economic and health effects of the pollution of the Bogotá River had not been collected, and the economic benefits of wastewater treatment had not been measured⁹¹. By the late eighties other social priorities seemed more pressing⁹². The Bogotá's Development Plan for the 1987 – 1990⁹³, which was elaborated through a process of public consultations⁹⁴, includes entire chapters dedicated to priorities, such as public

⁸⁹ Col \$ 216.382.820

⁹⁰ Okun, D. 1990. Pollution Control in Bogotá. A report to the World Bank,

⁹¹ Empresa de Acueducto de Bogotá. Subgerencia de Planeamiento. 1990. Intercepción y Tratamiento de las Aguas Negaras de Bogotá. Bogotá.

⁹² Empresa de Acueducto de Bogotá. Subgerencia de Planeamiento. 1990. Intercepción y Tratamiento de las Aguas Negaras de Bogotá. Bogotá.

⁹³ Bogotá Para Todos 1987 – 1990. Plan de Desarrollo Social y Económico. Alcaldía Mayor de Bogotá; Cámara de Comercio de Bogotá. Bogotá.

⁹⁴ Eleven public forums during 1986

transportation, security, education, employment, health, the maintenance of roads and public areas, water and sewage systems, low income housing and the collection and disposal of solid wastes. That Plan did not mention the pollution of the Bogotá River.

However, during the seventies and eighties the Water and Sewage Company of Bogotá conducted two studies to explore possible solutions for the treatment of the city's wastewaters^{95,96}. These were part of a series of studies that the company conducted to structure the financing of its long term "Master Plan"⁹⁷. The recommendations of those studies were known and evaluated by the city's administration⁹⁸ and by the World Bank⁹⁹. They agreed that the solutions proposed by those studies were not viable. Their conclusions were based on the analysis of the costs and benefits of the proposed water treatment projects and on the financial situation of the water company. In addition, the World Bank was of the opinion that before such a proposal was implemented, Colombia should have a national policy for wastewater treatment and that the quality objectives of the rivers should be established.

There is no evidence that the studies conducted during the seventies and eighties by Water and Sewage Company of Bogotá resulted from the enforcement of environmental regulations by CAR. In fact, according to relevant water pollution regulations of the time¹⁰⁰, as a government agency, the city's water company did not have to pay pollution fees. Therefore, it did not have economic incentives to treat the city's wastewaters. In addition, it is important to note that the city's Mayor was, and still is, a member of the Board, and as such pressured this Corporation to strongly enforce the environmental standards of Decree 1594 of 1984 to the city's water and sewage company. In addition, as indicated previously, there is evidence that the solution of the water pollution problems of the Bogotá river was not considered a social priority¹⁰¹.

2.2 The Mechanisms that Generated the Decision

As discussed in the previous section, before Law 99 of 1993 was approved, the different proposals to treat the wastewaters of the Bogotá River could not be implemented. However, less than a year after Law 99 of 1993 was approved,

⁹⁵ Camp Dresser & McKee, CEI y Planhidro. 1974. Bogotá River Improvement, Flood Control, Water Resources and Waste Water Disposal. EAAB.

⁹⁶ Black and Veath Internacional – Hidroestudios Ltda. 1983. Diseños Definitivos de la Adecuación Hidráulica del Río Bogotá, las extensiones del Plan maestro de Alcantarillado y los Estudios de Tratamiento de Aguas Negras de la Ciudad de Bogotá. Tomo II. Bogotá.

⁹⁷ Interview with Mr. Humberto Triana. Under Director for Technology of the Water and Sewage Company. He was a member of the consulting group of the study elaborated between 1983 and 1985.

⁹⁸ Empresa de Acueducto de Bogotá. Subgerencia de Planeamiento. 1990. Intercepción y Tratamiento de las Aguas Negras de Bogotá. Bogotá.

⁹⁹ Okun, D. 1990. Pollution Control in Bogotá. A report to the World Bank,

¹⁰⁰ Article 18 of the Code of Natural Resources (Decree 2811 of 1974); and article 142 of Decree 1594 of 1984.

¹⁰¹ Bogotá Para Todos 1987 – 1990. Plan de Desarrollo Social y Económico. Alcaldía Mayor de Bogotá; Cámara de Comercio de Bogotá. Bogotá.

the Mayor of Bogotá contracted the construction and operation of the first phase of a long term plan for the treatment of the Bogotá's wastewaters. The City Council and the citizens who would eventually have to pay for the treatments of the city's wastewaters had not been consulted. This decision was not the result of public demand, and it was not the response to the enforcement actions of CAR. That decision disregarded previous concepts of the city's Water Company, the World Bank and the Department of National Planning. It was not based on sufficient technical information related to the social costs of the pollution of the Bogotá River and to the benefits of its control.

The fact that this project could not progress before Law 99 of 1993, and that in contrast it was approved right after this Law came into effect merits some further analysis. It could be initially argued that after Law 99 of 1993 was approved, environmental regulations and control became stricter and that the water and sewage company was enforced to implement solutions for the treatment of the city's wastewaters. However, several facts undermine this assertion: (i.) the Mayor began exploring financial alternatives for the implementation of the project almost two years before Law 99 was approved; (ii) Law 99 of 1993 did not change the water standards of Decree 1594 of 1984, in fact they are still in place; (iii.) the implementation of Law 99 of 1993 was not immediate. There was a transition period of about four years (1994-1998). During this period environmental institutions, particularly DAMA, were being created or adapting to the new framework and had limited capacity to enforce environmental regulations; (iv) after Law 99 of 1993 was approved the environmental control agency inside Bogotá was DAMA. This institution was and still is under the complete control of the city's administration.

However, it was Law 99 of 1993 which removed the financial constraints that had impeded the implementation of a project to treat Bogotá's wastewaters. The resources earmarked by Law 99 of 1993¹⁰² for the financing of the urban environmental authorities were sufficient for the construction and operation of the first phase of the *El Salitre* treatment Plant, the first of the six phases of the strategy recommended by the private international firms and latter by EPAM. Consequently, Law 99 of 1993 contributed to provide the legal setting for the project, as it secured financial resources to begin its implementation.

Consultations with the National Government were not legally required because the city did not need its financial support. The City Council did not have to be consulted because payments would only be required once the treatment plant would begin operations. Therefore the Mayor's decision to contract the first phase of the strategy would not affect the budget approved by the City Council. In fact, nearly ten years have past since the contract was signed and no one has legally questioned or challenged the Mayor's legal capacity to undertake this project without consultation.

It is also worth noting that CAR¹⁰³ could have contributed to a better decision. Since the early nineties, this Corporation had initiated the construction of a

¹⁰² Article 44; Paragraph 2.

¹⁰³ *Corporación Autónoma Regional de Cundinamarca*; Regional Autonomous Corporation of Cundinamarca.

series of wastewater treatment plants for the municipalities located to the North and West of Bogotá, upstream of the city. The Mayor of the City, who was a member of CAR's board of directors, could have used this mechanism to coordinate a regional sanitation strategy for the watershed. However, he did not use it¹⁰⁴. Like in the case of other previously mentioned mechanisms, he was not legally bonded to do so. It is possible that the Mayor did not have the required technical background or advise to see the benefits of a more regional strategy.

According to Law 99 of 1993, public consultations may be requested during the EIA process of projects such as the construction of the *El Salitre* treatment Plant¹⁰⁵. However, the processes of public consultations had not been regulated when the EIA was conducted and opportune public consultations were not conducted. In addition, when the EIA for the construction of the *El Salitre* Plant was evaluated by the Ministry of the Environment during 1995, the contract had already been signed.

In sum, Law 99 of 1993 removed the financial constraints that had impeded the implementation of a project for the treatments of Bogotá's wastewaters, and created the conditions that allowed the Mayor to circumvent existing political and technical control institutional mechanisms such as the City Council and the Department of National Planning. Having bypassed those control mechanisms, the viability of the financial, technical and institutional terms and conditions of the project could not be guaranteed.

2.3 The Mechanisms in Place to Balance Competing Interests

Conflicts of interest and the absence of check and balance mechanisms have prevailed in the history of Colombian environmental institutions. While regulated agents have actively participated in decisions of environmental policy, other stakeholders have been underrepresented or have had ineffective representations. Those conflicts of interest and the lack of sufficient and effective check and balance mechanisms were not always solved by Law 99 of 1993. Moreover, in some cases they were aggravated. Before Law 99 of 1993 was approved, the Regional Corporations implemented infrastructure projects with environmental implications, and invested their resources in the solution of the pollution problems caused by their own regulated agents. In addition, in the absence of effective check and balance mechanisms, the Corporations were, and still are, under the direction of their regulated agents.

In the case of CAR, this institution began to build a series of 23 municipal wastewater treatment plants during the early nineties and therefore became the environmental controller of its own investments. In addition, those plants where

¹⁰⁴ The author of this case study was a member of that board of directors between 1991 and 1994 in representation of the Department of National Planning.

¹⁰⁵ According to Title VIII of 99 of 1993, during the evaluation process of EIAs, public audiences for the presentation and discussion of the project can be requested to the environmental authorities by groups of citizens, NGO's, local majors, the General Attorney and the People's Ombudsman.

built and financed by the CAR to control the pollution problems caused by an important group of its own regulated agents: the municipalities. By doing so it exempted them from their water pollution control responsibilities. To this day, the CAR still operates those wastewater treatment plants and the municipalities have been reluctant to accept the financing of their operation¹⁰⁶. By investing in the implementation of those pollution control projects, the Corporation diverted resources that could have been used for its functions as an environmental control agency.

On the other hand, the Mayor of Bogotá who was also the President of the Board of Directors of the city's Water and Sewage Company, the main water polluter of the region, was also a member of the board of directors of CAR. In those two capacities he/she was simultaneously responsible for the protection of the region's environmental quality and of the Water and Sewage Company's financial performance. Probably, the public's evaluation of his/her performance as a Mayor would be more affected by the results of the Water and Sewage Company, than by that of the environmental quality of the Bogotá Savanna beyond the city's limits.

Before 1993, technical evaluations conducted by the World Bank and the Department of National Planning had prevented the implementation of wastewater treatment systems for Bogotá. Once Law 99 of 1993 secured financial resources for the city's environmental agency and multilateral financing was not deemed necessary, the project selected by the Mayor did not have to pass through the technical filters or evaluations of those institutions. In addition the financial nature of the contract, which only required payments several years after its signing, allowed the Mayor to circumvent consultations with the City Council.

In addition, given the fact that the mechanisms of public participation created by law 99 of 1993 during the process of EIA evaluation¹⁰⁷ had not been regulated, public consultations were not conducted. Important stakeholders such as tax payers were not informed about the costs and potential benefits of the project. The local government did not analyze the population's willingness to pay to construct a primary treatment plant for the waters of the *El Salitre* River.

Law 99 of 1993 did not remove all the existing conflicts of interest in the environmental institutions and created additional ones. The conflicts that derive from the participation of the regulated agents in the direction of environmental authorities remain. The local mayors and other regulated sectors (for example: associations of the industrial mining agriculture sectors etc) are members of the Board of Directors of the Corporations. Moreover, today they participate in the selection of their directors, and can remove them¹⁰⁸. Although other stakeholders such as NGO's and minorities are also members of those boards of directors, their capacity to adequately balance interests is not always

¹⁰⁶ Interview with Mrs. Gloria Lucía Álvares. Director of CAR. July 2004.

¹⁰⁷ Title X Law 99 of 1993.

¹⁰⁸ Articles 26 and 27 of Law 99 of 1993.

effective¹⁰⁹. According to law 99 of 1993¹¹⁰ CAR can continue to finance and operate projects such as the water treatment plants of the municipalities of the Bogotá Savanna.

In the case of Bogotá, additional conflicts of interest were created by Law 99 of 1993. Under the new institutional framework, the environmental authority of the city -DAMA is under the complete control of the city's administration. DAMA's Director is appointed and can be removed by the city's Mayor. Mechanisms to balance DAMA's decisions regarding the environmental control of the administration's projects are lacking. In addition DAMA has the legal capacity to implement infrastructure projects for the pollution control of its regulated agents, as was the case of the CAR before 1993. As has been discussed throughout this text, with resources assigned by Law 99 of 1993, DAMA financed the implementation of the first phase of the waste waters generated by the city's Water and Sewage Company. Acting as a developer and as a regulator DAMA has not had a free capacity to question the benefits of a project that was promoted by the Administration. This is interesting as it evidences the type of conflicts of interests that could rise when the autonomy of environmental authorities is not complete.

Finally, having the city's environmental authority finance the treatment of the wastewaters generated by one of its regulated agents has had two consequences. On the one hand, economic resources that could be used for environmental control have been directed entirely towards this project, and confusing signals have been sent to the public regarding the mission, functions and responsibilities of environmental authorities and of polluters. Under a more clear arrangement those who pollute would bear the cost of pollution control, while the environmental authorities would control their environmental performance.

2.4 The Means by Which the Adopted Solution Was Executed

The strategy to build the *El Salitre* treatment plant, the first of six phases, was recommended by a consulting firm¹¹¹ that evaluated all the studies and proposals which had been made to the Administration. The Mayor accepted that firm's recommendation and decided to implement the project. The project was implemented by the city's DAMA with the resources assigned by Law 99 of 1993. As has been previously discussed, DAMA, which is part of the central administration, played the simultaneous role of environmental authority and of

¹⁰⁹ This is the opinion of the author of this case study. The lack of effectiveness of the check and balance mechanisms within the boards of directors of the Regional Autonomous Corporations may be related to several factors: (i) the capacity of the Directors of the corporations to bribe the members of the board; (ii) the differences of the members of the board in terms of their experience, level of education and political influence; (iii) the frequent coincidence of interest between the private sector and the local majors (location of industry); (iv) the frequently yielding position of the environmental authorities (Ministry of the Environment and Corporations) in front of the regulated sector.

¹¹⁰ Article 31 (numeral 20) of Law 99 of 1993.

¹¹¹ Estrategia de Saneamiento del Río Bogotá. Informe Final de Consultoría. EPAM. 1993. FONADE. EAAB-ESP. Bogotá.

developer of a large infrastructure project. This institution dedicated resources to this project that could have been used for environmental control.

As indicated in section 1.3, on the 31 of December of 2003 the last day of Mayor Mockus's government (2001- 2003) and after the Plant had been in operation for nearly three years, the city's administration terminated the contract and made provisions to pay US \$ 75 million to the contractor¹¹². This sum included the value of the infrastructure and compensations.

The Mayor's decision to terminate the contract was supported by a range of financial, legal and technical studies and evaluations,¹¹³ conducted during 2002 and 2003¹¹⁴. In essence those evaluations found that the project did not produce social benefits, that the contract was economically disadvantageous for the city, and that the plant had technical deficiencies.

Following the recommendations of those evaluations, the administration adopted a new strategy for the management of the city's wastewaters. The strategy is similar to that originally proposed by Black & Veatch and Hidrestudios in 1985, and recommended by Dr. Daniel Okun during his World Bank visit to Bogotá in 1990. The detailed designs of the financial and of the technical aspects of the project have not been undertaken.

3. Lessons and Recommendations

The following are the main lessons and recommendations that can be derived from this case study:

- The fact that DAMA¹¹⁵, which is in essence an environmental control agency, had the financial and institutional responsibility to implement the selected sanitation program of the Bogotá River generated conflicts of interests. This institution acted as a developer and as a regulator and, in consequence, its capacity to question the benefits of the sanitation project were limited. In addition, as a part of the administration of the city of Bogotá, DAMA could not autonomously question the decision taken by its Mayor. These two situations show the importance of separating development and environmental responsibilities in environmental agencies in order to prevent internal conflicts of interests. This case also highlights the need to have environmental authorities which can act with independence from the interests of local governments.

¹¹² Resolution 2036 of the 31 of December of 2003

¹¹³ Taller de Estrategia conducted financial evaluations. The Instituto Quinaxi, Carlos Alberto Giraldo, the Water Research Center of England (WRC) and the Union Temporal Saneamiento Río Bogotá conducted technical evaluations. The firm Arodríguez- Azuero conducted the legal analysis.

¹¹⁴ Taller de Estrategia conducted financial evaluations. The Instituto Quinaxi, Carlos Alberto Giraldo, the Water Research Center of England (WRC) and the Union Temporal Saneamiento Río Bogotá conducted technical evaluations. The firm Arodríguez- Azuero conducted the legal analysis.

¹¹⁵ Mrs. Julia Miranda

- The existence of technical studies and evaluations are not always a sufficient condition to ensure that public decisions are objectively defensible. In the absence of effective mechanisms for the check and balance of interests, political considerations and interests could override objective reasons.
- Governmental decisions, particularly those which could limit the availability of public resources for the solution of the pressing needs of the poorer and more vulnerable communities, require more open decision making mechanisms. Those mechanisms should ensure the effective participation of these communities.
- The Bogotá River watershed is located in the most densely populated and industrialized region of the country. Decisions in this region are complex, as several institutional, economic and social actors interact at the local, regional and national levels. The design, financing and implementation of a sanitation strategy within a watershed, such as the Bogotá River, requires the participation of all relevant stakeholders from the earliest planning phases. It also requires the legal definition of responsibilities among the related actors. This would contribute to ensure the long term sustainability of the actions which are implemented.
- During the EIA evaluation process of the Bogotá wastewater treatment project, the new legal and environmental framework approved by Law 99 of 1993 was in the process of implementation. During that period, regulations regarding public consultations during EIA evaluation had not been approved, and public consultations were not conducted. In addition, the Ministry of the Environment and DAMA were new institutions with limited institutional capacities to evaluate and question the economic and environmental benefits of the selected project. This case illustrates the importance of generating institutional capacities for EIA evaluation, as well as public participation mechanisms that contribute to an effective balancing of interests.