Río Bogotá Environmental Recuperation and Flood Control Project

Executive Summary
Environmental and Social Impact Assessment

Draft
September 19, 2009
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ABBREVIATIONS AND ACRONYMS

BOD₅: 5-Day Biochemical Oxygen Demand
BOT: Build-Operate-Transfer
CAR: Corporación Autónoma Regional de Cundinamarca
CARs: Corporacion Autonoma Regionales
CONPES: Consejo Nacional de Política Económica y Social (National Counsel of Social and Economic Politics)
DNP: Departamento Nacional de Planeación (National Planning Department)
EA: Environmental Assessment and Management Plan
EAAB: Empresa de Agua y Alcantarillado de Bogotá (Bogotá Water and Sewerage Company)
EMGESA: Bogotá Power Company
FIAB: Fondos de Inversiones Ambientales en La Cuenca del Río Bogotá
MAVDT: Ministerio de Ambiente, Vivienda y Desarrollo Territorial (Ministry of Environment)
MWs Megawatts
PIU: Project Implementation Unit
PMAR: National Plan for Municipal Wastewater Management
PMA: Environmental Mangement Plan (Plan de Manejo Ambiental)
PSMV: Plan de Saneamiento y Manejo de Vertimientos
POT: Planes de Ordenamiento Territorial
POMCA: Plan de Ordenamiento y Manejo de la Cuenca
O&M: Operation and Maintenance
RAP: Resettlement Action Plan
TC: Total Coliform
TSS: Total Suspended Solids
SDA: District Secretary for Environment
SINA: Sistema Nacional Ambiental
SMP: Social Management Plan for Land Acquisition and Resettlement
WSS: Water and Sanitation Services
WWTP: Wastewater Treatment Plant
WTP: Water Treatment Plant
I. Introduction

The Bogotá River is located in the Cundinamarca Department of Colombia. It starts at an elevation of 3,400 meters in Villa Pinzon Municipality, and flows 370 km before joining the Magdalena River at an elevation of 280 meters in Girardot Municipality. The Basin covers 6,000 km² and includes 45 municipalities and the Bogotá Capital District, thus the environmental authorities are the Autonomous Regional Corporation of Cundinamarca (CAR) and the District Secretary for Environment (Secretaria Ambiental de Bogotá D.C., SDA). The Bogotá River is an essential river for the Cundinamarca Department, as it is a source of drinking water in the upper basin and it supports multiple uses, such as agricultural and livestock activities and electricity generation. Figure 1 indicates the river location.

Figure 1. Río Bogotá Map Location

One of the biggest problems facing the Bogota River is untreated wastewater entering the river as it flows through the west boundary of Bogotá City. In this section, Bogota City, with a population of around 6.7 million, discharges all of its wastewater into the Bogota River through three main tributaries: the Salitre, Fucha, and Tunjuelo rivers. The average river flow before entering the city is 12 m³/s, and Bogotá discharges an additional 19 m³/s of wastewater with only 20 percent receiving primary treatment at the Salitre Wastewater Treatment Plant (WWTP) in the northern side of the city. As a consequence, the river is highly polluted with zero dissolved
oxygen and high levels of pathogens. Rapid urban development since 1950, has not only resulted in the deterioration of water quality in the river, but it has also in the channelization of the river, destruction of wetlands, and growth of low-income neighborhoods along the river prone to flooding.

The CAR, the regional environmental authority for the Bogotá River Watershed, has embarked on a comprehensive urban river restoration project under the overall national government strategy to recuperate the Bogotá River, and it is currently under project preparation for World Bank financing. The proposed project development objective is to transform the Rio Bogota in its middle basin into an environmental asset for the Bogota metropolitan area by improving water quality, reducing flood risk, restoring riparian habitats, and creating multi-functional areas along the river that provide ecological habitat, public use, and enjoyment of an urban river. The main project activities include: (i) the expansion of a wastewater treatment plant to improve water quality in the river and to supplement water supply for nearby agricultural areas; (ii) enhancement of traditional flood control works through river dredging, profile shaping and flood embankment construction; (iii) environmental improvements, such as widening and protecting the riparian zone, restoring the river meanders and wetlands, landscape design, and parks to create multifunctional zones along the Río Bogota; and (iv) carrying out a program of technical assistance and planning studies to finalize long term operational plans and to enhance project investments.

This executive summary provides findings and recommendations of the environmental and social impact assessments prepared for the Río Bogotá Environmental Recuperation and Flood Control Project. It provides a brief description of the assessment process and main documents prepared; the legal and institutional framework governing the project; strategic and project specific alternatives considered; the likely environmental and social impacts; and the principal management and mitigation measures during implementation and operation proposed for addressing those issues arising from the environmental and social assessments.1

II. Project Development Objective and Component Description

Project Development

The proposed project development objective is the transform the Río Bogotá into an environmental asset for the Bogotá metropolitan region by improving water quality, reducing flood risk, and creating multi-functional areas along the river. The performance key indicators are as follows:

- The water quality in the Río Bogotá meets Class IV water quality standards, which corresponds to agricultural and livestock use;
- the Río Bogotá achieves a minimum flood control protection standard of 100 year return period; and

1 This Executive Summary is based on documents prepared by the borrower including the three Volume Environmental Assessment and Management Plan document and key references indicated in it, in particular those referring to the results of the numerical modeling of water quality for the Rio Bogota, as well as previous Environmental Impact Studies on specific works proposed for the Salitre WWTP and license issued for that plant.
• the recuperation of eight multi-functional areas along the Río Bogotá with an area of approximately 175 hectares that have the following attributes: inundation zones, ecological habitat, and public space.

Component Description

The project is divided into the following four main components:

Component 1: Upgrade and Expansion of Salitre Wastewater Treatment Plant (WWTP). This component includes the upgrading and expansion of the existing 4 m3/s primary Salitre WWTP to an 8 m3/s secondary plant with disinfection to comply with the existing environmental regulations and meet population growth projections. Figure 1 shows the location of this plant. The project will finance civil works, equipment, and services. This component includes the following activities:

Engineering preliminary design and bidding document preparation. A Phase I consultancy is being conducted by CAR to develop treatment process evaluation, engineering preliminary design and cost estimates, and preparation of bidding documents.

Detailed design and construction through a design/build project delivery system. The plant expansion will include improvements to the influent channel and pump station, additional primary clarifiers, new secondary treatment process, disinfection facility, thickening and dewatering processes, additional anaerobic digesters, cogeneration facility, odor control, monofill for biosolids disposal, and auxiliary facilities. The new facilities will be located in the existing plant site.

Program management (Phase II Consultancy). During the design build contract, a program management contractor will provide quality control, monitoring and inspection, perform contract administration, and general coordination and management activities.

Start-up and Plant Initial Operation. The design/build contractor will start-up the plant and will accompany the water company in O&M activities for a 6-month period.

Component 2: Flood Control and River Restoration Works. This component includes traditional flood control works such as river dredging and embankment construction with environmental improvements including restoration of meanders and wetlands, landscape design, and parks to create multifunctional zones along the Río Bogotá. As shown on Figure 1, this component covers a 68-km stretch of the Bogotá River from Punte La Virgen to Alicachin near Muña Lake. The component includes the following activities:

Land acquisition, resettlement, and compensations. The river works are divided into four approximately equal length sections (Sections A-D) with 223 lots along the 68 kilometer length of the river. Sections A-D are located in rural areas and involved land acquisition only, along with possible economic compensation. However there is one poor urban area in Tramo C, called Porvenir in the Mosquera Municipality, which requires the relocation of approximately 100
houses and over 200 families, most of them solid waste recyclers, most of whom do not have formal title to the land they live on.

Flood control works. To provide protection from a 100-year flood, the project will improve the existing dike system by building a new embankment in the left or right bank of the river allowing a 30 meter berm. The works will include channel excavation, earth movement, and construction of the dikes.

Landscaping and riparian habitat restoration. Along the 68-km, works will also include plantation of native species and landscaping to harmonize the embankments with adjacent areas based on land use requirements.

Recuperation of eight multifunctional areas including their ecological and hydraulic integration with the Bogotá River. Depending on their physical characteristics, the areas will restore river meanders, create and improve river wetlands, and create public spaces for the enjoyment of an urban river. Table 1 shows a summary of the multifunctional areas.

Table 1. Description of Multifunctional Areas

<table>
<thead>
<tr>
<th>Sections</th>
<th>Name</th>
<th>Type of Intervention</th>
<th>Objective</th>
<th>Area Hect.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Meandro Tequendama</td>
<td>River restoration</td>
<td>Integration of former riverbed and floodplain areas.</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>Canoas flooded lowlands</td>
<td>River restoration</td>
<td>Integration of floodplain areas to the water dynamic of the Río Bogotá.</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Canoas Lake</td>
<td>River restoration</td>
<td>Integration of the lake with the water dynamic of the Río Bogotá.</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Canoas meanders–Indumil</td>
<td>Public recreation/environmental improvement</td>
<td>Creation of flooded areas and /or lakes and areas with vegetation cover to promote ecological recovery. Improve water quality.</td>
<td>18.4</td>
</tr>
<tr>
<td>B</td>
<td>Parque Nautico Vuelta Grande</td>
<td>Public recreation/environmental improvement</td>
<td>Creation of flooded areas and /or lakes and areas with vegetation cover to promote ecological recovery.</td>
<td>18.3</td>
</tr>
<tr>
<td>C</td>
<td>Meandro del Say</td>
<td>Public recreation/environmental improvement</td>
<td>Creation of flooded lowland areas and /or lakes and areas with vegetation cover to promote ecological recovery. Improve water quality.</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Complex of meanders and wetlands</td>
<td>River restoration (Jaboque – La Florida - Juan Amarillo)</td>
<td>Integration of former riverbed and floodplain areas of the Río Bogotá. Improve water quality.</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>Suba public space</td>
<td>River restoration</td>
<td>Integration of former riverbed and floodplain areas of the Río Bogotá. Improve water quality. Integration with meandering parks</td>
<td>tbd</td>
</tr>
</tbody>
</table>
Component 3: Environmental and Water Studies. This component includes three technical assistance projects to help ensure the sustainability of the overall Río Bogotá program.

Integrated Water Management Plan for the Río Bogotá Basin. This study will assist CAR and other agencies to define environmental objectives in the Bogotá River Watershed, as well as to develop medium and long term investment programs based on existing planning and modeling instruments, new decision-making models, and studies considering environmental, technical, economic, institutional aspects.

Biosolids Master Plan in Bogotá City. The objective is to develop a sustainable biosolids management plan for Bogotá City taking into account beneficial reuse and disposal options, regulatory framework, and available and appropriate technologies.

Bogotá River Management Plan. This project includes a feasibility study and detailed design to optimize the recuperation of the multifunctional areas as ecological habitats, passive recreation, and potential natural treatment systems. Furthermore, it also includes the development of an operation and maintenance manual (O&M) for the river flood control works.

Component 4: Project Management and Administration. This component consists of project management carried out by CAR’s project implementation unit (PIU) including oversight of design and construction activities, supervision of the resettlement action plan and environmental management plan, financial audits, and public outreach. Included under this component is the administration of the PIU composed of local staff, vehicles, office equipment, and technical specialist.

Project Cost Estimate

Table 2 summarizes the estimated project total cost and loan amount by component.

Table 2. Project Cost, US $ Million

<table>
<thead>
<tr>
<th>Component</th>
<th>Total Project Cost, US $</th>
<th>Loan Amount US $</th>
<th>Borrower US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Salitre WWTP Expansion</td>
<td>335</td>
<td>202</td>
<td>133</td>
</tr>
<tr>
<td>2. Flood Control and River Restoration Works</td>
<td>140</td>
<td>41</td>
<td>99</td>
</tr>
<tr>
<td>Works</td>
<td>69</td>
<td>41</td>
<td>27</td>
</tr>
<tr>
<td>Land Acquisition and Resettlement</td>
<td>71</td>
<td>7</td>
<td>71</td>
</tr>
<tr>
<td>3. Technical Assistance</td>
<td>7</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>4. Project Management and Administration</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>487</td>
<td>250</td>
<td>237</td>
</tr>
</tbody>
</table>
III. Environmental and Social Assessment Process

Environmental Assessment Process

The environmental risks, impacts, and benefits of the project have been analyzed at two different levels using an integrated environmental assessment approach. The CAR has prepared a comprehensive three-volume Environmental Assessment and Management Plan (EA), which describes the main issues, strategies, project impacts and planned mitigation measures.

Volume I of the EA (Regional Strategy) describes the baseline conditions of the Rio Bogota Basin; the legal and institutional setting for regional water quality management; strategic objectives for the basin; the trends, operational challenges and options that underpin the choice of the specific project components and investment activities. It presents baseline data at the Rio Bogota basin level, describes the principal threats to regional water quality, and evaluates the main strategies proposed by the CAR and other authorities for addressing these concerns. Volume I of the EA was used to evaluate the proposed project under the regional strategic context and to provide a clear rationale for the project components that respond to the regional environmental objectives. Volume I corresponds to a regional, basin-wide assessment of environmental risks and benefits.

Volume II of the EA provides the project description and evaluates the potential environmental risks, benefits and impacts associated with the specific investments proposed under both Component 1 (Salitre WWTP expansion) and Component 2 (Flood control and river restoration works) of the project. It presents site-specific baseline data for the project’s direct and indirect areas of influence and evaluates the main environmental values which may be impacted by the project. Volume II indicate which project activities are thought to present significant environmental benefits, impacts and risks. The volume ends with a list summarizing the significant impacts and risks for each component.

Volume III of the EA is the Environmental Management Plan (EMP). The EMP presents a detailed description of six management programs describing the range of impacts, their principal mitigation and management measures, monitoring and supervision plans, and the institutional arrangements for implementing the plan. Volume III provides budget and human resources estimates and will be used as the basis for monitoring project implementation progress on all environmental aspects of the project.

The three volume EA has been disclosed in-country and in the World Bank’s Infoshop. The Bank has assessed the EA and found it to be acceptable and fully consistent with the requirements of World Bank safeguards policies. The EA was reviewed in public consultation meetings and was also reviewed by an independent expert group, the Bank Safeguards Advisory Team (SAT), and key stakeholder including universities and environmental NGOs through two consultation sessions and an online process housed in the CAR’s Web site.

Social Assessment Process

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2 The EA document was disclosed in the CAR Web site http://www.car.gov.co/paginas.aspx?cat_id=104&pub_id=1338 and the

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The CAR addresses social aspects of the project in Volume II of the EA and in the Social Management Plan for Land Acquisition and Resettlement (SMP). Volume II describes the social and economical characteristics of the project area of influence including demographic distribution, production systems, labor, household organizations, and standard of living. Furthermore, the EA also identifies key stakeholders and their perceptions and positions of the project, highlighting the existing communication channels, pinpointing overall social impacts, and assessing its various risks. Land acquisition and resettlement are the major negative social impact associated with the project. Therefore, a comprehensive SMP is being prepared by CAR to meet Bank’s policies for resettlement and land acquisition. The SMP includes the following elements: rural census and socioeconomic analysis of the project direct area; legal and institutional framework; valuation and compensation for losses; resettlement measures and implementation plans; consultation strategy; and monitoring and evaluation arrangement.

The summary of socioeconomic conditions included within the EA was based on available documentation and consultations with relevant stakeholders. Regarding the SMP, a more complex process was conducted to develop a proper planning and management document to be used during land acquisition and physical resettlement. Component 2 requires the land purchase of portions of 223 plots; the majority of which are located in rural areas and owned by large ranchers or government institutions. However, one urban area in Section C of the proposed river works will require physical resettlement of households. Three different strategies are being developed in the SMP to account for three types of land use (state land, ranchers, and illegal urbanization). Results from public consultations, meetings with property owners, socioeconomic surveys, land tenure studies, and rural surveys will support the SMP preparation.

IV. Environmental Assessment

Rio Bogota Water Quality and Environmental Management Strategy

Baseline conditions. This baseline summary focuses on three main environmental issues confronting the Río Bogotá: water quality degradation, urbanization and flooding, and ecological destruction. Specific details on the population size, characteristics of each municipality, and other environmental pressures are presented in the EA Volume I.

According to the 2002 Plan de Ordenamiento y Manejo de la Cuenca Río Bogota (Río Bogotá Watershed Plan, POMCA), the Río Bogota is comprised of 19 sub-basins of various sizes and importance. The physical, biological, and socioeconomic conditions of the sub-basins, which comprise the Río Bogota basin, vary widely and are characterized by a high degree of diversity with respect to key indicators such as level of development, urbanization, and land use. The main stem of the Río Bogota is approximately 370 km. in length running from the municipality of Villapinzon (3,400 masl) to the confluence with the Río Magdalena in the Girardot Municipality (280 masl). For management purposes, CAR further recognizes that the Río Bogota can be divided into three sub-basins: (i) the upper basin from Villapinzon Municipality to the hydrometeorological station in Puente la Virgen, (ii) the middle basin from Punte La Virgen to the Alicachin gates next to the Muña reservoir, and (iii) the lower basin from Alicachin to Girardot Municipality (Refer to Figure 1).
General river characteristics and water quality: The Bogotá River is an essential river for the Cundinamarca Department, as it is a source of drinking water and it supports multiple uses, such as agricultural and livestock activities, electricity generation, and many other industries of varying scale and relative importance (e.g. tanneries, textiles, chemicals, and metals). The basin is comprised of 45 municipalities and the Capital District of Bogota. The population of the basin is reported to be 8 million with the majority of about 6.7 million living in Bogota City. Approximately 3,400 industries, the 6,000-hectare La Ramada Irrigation District, the Tibitoc Water Treatment Plant (WTP), and energy generation facilities are also part of the overall basin’s dynamic. The population expansion and continued growth of the city and surrounding municipalities will continue to exert great pressure on the ability to achieving environmental sustainability goals in the basin.

The upper basin is characterized by settlement of 27 small municipalities with a total population of one million, diverse agricultural landscapes, and medium and small industrial activities, mainly tanneries. The Bogota River at its upper basin is a water source for the Tibitoc WTP, La Ramada Irrigation District, industries, and local farmers. Three artificial reservoirs (Neusa, Tomime, and Sisga) with a total capacity of 894 Mm$^3$ regulate and store water providing reliable water supply. Domestic and industrial wastewater discharges and non-point source pollution from agricultural runoff are the main factors affecting water quality. The total wastewater generated by these municipalities is around 15 percent (3.6 m$^3$/s) of the total amount generated in the Rio Bogota Basin, and the overall existing treatment rate is about 17 percent.

The upper basin has the best water quality in the river as indicated in Table 3 due to relatively low pollution coupled with the river’s natural assimilative capacity and the artificial water reservoirs’ contribution. Heavy metal concentrations are not at critical levels in this area. Chromium contamination from tanneries places the area at risk to heavy metal contamination however, typical concentrations (0.021 mg/L) are currently lower that the limit established for drinking water supply.3

Water quality in the middle reaches of the Rio Bogota basin is strongly influenced by the river’s proximity to the sprawling urban center of Bogota City, several of small towns, and diverse agricultural landscapes including La Ramada Irrigation District. One of the biggest problems facing the Bogota River is untreated domestic wastewater entering the river as it flows through the middle basin. In this section, Bogota City discharges all of its wastewater into the Bogota River through three main urban rivers: Salitre, Fucha, and Tunjuelo. The average flow of the Bogota River before it enters the city is 12 m$^3$/s. Bogotá city discharges an additional 19 m$^3$/s of wastewater with only 20 percent receiving primary treatment at the Salitre WWTP located in the northern side of the city. As a consequence, the river is highly polluted with zero dissolved oxygen (DO) and high levels of total coliforms and Biochemical Oxygen Demand (BOD$_5$) (refer to Table 3).

Other important sources of water pollution include storm-water channels contaminated from illegal sewer connections; direct and indirect industrial discharges; and non-point source pollution from urban and agricultural runoff, as well as sediment runoff from erosion of the

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3 Drinking water supply designated use refers to waterbodies that can supply safe drinking water with conventional treatment. Limit established by CAR Acuerdo No 43, 2006.
oriental mountain. Heavy metal concentrations are not critical in this section of the river as Cadmium, Chromium, and Lead are at concentrations lower than the drinking water supply limits and Nickel is lower than the agricultural use limits. As the river crosses 68-km of the Bogota Savannah, it follows a calm and gentle slope course which reduces its re-aeration capacity. These physical characteristics coupled with water extractions in the upper and middle basins contribute to the severe contamination problem in this part of the river.

After leaving Bogotá, the river plunges off the savannah at the spectacular Tequendama Falls to begin its course through the lower basin. At this point, the river then follows a steep course, falling 2,000 meters in 50 km, to join the Magdalena River at the town of Girardot. The Bogotá power company (EMGESA) has constructed a 1,124 MW (installed capacity) hydropower facility upstream of the Tequendama Falls starting at the Alicachin gates to take advantage of the river flow and elevation drop. The holding reservoir for the EMGESA power complex is the 853 ha Muña reservoir which is also highly contaminated. Improvements in water quality appear in the lower basin as a result of an increase in reaeration capacity as the river flows through its steep natural course, or when it is diverted to the electricity generation chain.

After the drop, the river continues a gentle slope course again decreasing its re-aeration capacity. This leads to further water quality deterioration, which is also affected, to a lesser extent, by domestic wastewater discharges from 16 municipalities and agricultural runoff. Wastewater generation is the lowest in the lower basin, representing only three percent of the total basin generation. The lower basin is sparsely populated and is insignificant in terms of water use. The Río Bogotá discharges into the Río Magdalena, which is Colombia’s largest river (7100 m3/s), and the pollution is dramatically diluted.

The water quality profile of the Bogotá River is shown in Table 3. Table 4 shows population, water demand, and wastewater generation in the Basin. As indicated, the metropolitan area of Bogotá City dominates both water use and wastewater generation.

### Table 3. Bogotá River Existing Water Quality Profile

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Upper Basin</th>
<th>Middle Basin</th>
<th>Lower Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD₅, mg/L</td>
<td>20-70</td>
<td>70-150</td>
<td>200-270</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS), mg/L</td>
<td>20-100</td>
<td>20-100</td>
<td>100-200</td>
</tr>
<tr>
<td>DO (mg/L)</td>
<td>+6</td>
<td>2-6</td>
<td>0-2</td>
</tr>
<tr>
<td>Total Coliforms (NMP/100 ml)</td>
<td>$10^3 - 10^5$</td>
<td>$10^3 - 10^5$</td>
<td>$10^5 - 10^6$</td>
</tr>
<tr>
<td>Cadmium (mg/L)</td>
<td>0.003</td>
<td>0.000</td>
<td>0.003</td>
</tr>
<tr>
<td>Chromium (mg/L)</td>
<td>0.021</td>
<td>0.005</td>
<td>0.041</td>
</tr>
<tr>
<td>Nickel (mg/L)</td>
<td>0.016</td>
<td>0.016</td>
<td>0.029</td>
</tr>
<tr>
<td>Lead (mg/L)</td>
<td>0.025</td>
<td>0.019</td>
<td>0.032</td>
</tr>
</tbody>
</table>

Source: Objetivos de Calidad del Agua para la Cuenca de Río Bogotá a lograr en el año 2020 (Acuerdo 43 de 2006)
Table 4. Population, Wastewater Generation, Water Use in the Bogotá River Basin

<table>
<thead>
<tr>
<th></th>
<th>Upper Basin and Middle Basin (w/out Bogota)</th>
<th>Middle Basin Bogotá Only</th>
<th>Upper Basin</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>1,001,728</td>
<td>6,719,619</td>
<td>323,462</td>
<td>8,044,809</td>
</tr>
<tr>
<td>Number of Municipalities</td>
<td>28</td>
<td>1</td>
<td>16</td>
<td>45</td>
</tr>
<tr>
<td>Total Water Demand, m³/s</td>
<td>14.3</td>
<td>16.83</td>
<td>2.1</td>
<td>33.23</td>
</tr>
<tr>
<td>Domestic Use, m³/s</td>
<td>2.8</td>
<td>13.3 (1)</td>
<td>0.9</td>
<td>17.0</td>
</tr>
<tr>
<td>Agricultural and Livestock, m³/s</td>
<td>8.4</td>
<td>2.0</td>
<td>0.5</td>
<td>10.9</td>
</tr>
<tr>
<td>Industrial and Commercial, m³/s</td>
<td>2.5</td>
<td>1.5</td>
<td>0.7</td>
<td>4.7</td>
</tr>
<tr>
<td>La Ramada, m³/s</td>
<td>0.6 (2)</td>
<td></td>
<td></td>
<td>0.6</td>
</tr>
<tr>
<td>Wastewater Production, m³/s</td>
<td>3.6</td>
<td>19</td>
<td>0.75</td>
<td>23.4</td>
</tr>
<tr>
<td>Wastewater Coverage, %</td>
<td>17</td>
<td>21</td>
<td>7</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Source: CONPES 3320, December 2004

1. Bogota water demand refers to the total demand of the City and Soacha Municipality. Approximately 11 m³/s comes from the Chingaza water system that takes water outside the Bogotá watershed.

2. The annual average water use for La Ramada in the last 10 years is 0.6 m³/s, with maximum values of 2.0 m³/s in the dry season.

Rapid Urbanization and Flood Control Risks: The population of the Río Bogota Basin is expected to increase from around 8 million in 2002 to over 12 million by 2020, with most of the growth taking place in the Bogotá metropolitan area. Historically, the Río Bogotá has been the western boundary of the city, and the urban growth has been channeled primarily to the north and south of Bogotá. The mountains to the east of Bogotá have formed a natural physical barrier; although, the development of squatter communities on the mountain slopes is widespread.

Given the development pressures in Bogotá, the urban area is expanding to the edge of the Río Bogotá (which is the boundary of the Bogotá District Capital) and in many cases leaping over the river into adjacent municipalities. Due to the poor environmental conditions along the river, and its natural transportation barrier due to a limited number of bridges, the development along the river has naturally been restricted to high density low-income neighborhoods and industrial zones.

Flood control works along the river were originally designed for rural areas and only offer protection against floods with a return frequency of 20 years or less, while the urban design standard for Bogotá is 100 years. The combination of high rainfall, high groundwater tables, confined run-off in the Bogota region, and poor flood control measures has resulted in many areas subject to repeated and serious flooding, especially in the localities of Suba, Kennedy, and Engativa. There is an urgent need to upgrade flood control works to reflect the new reality of urbanization along the river. Volume 1 of the EA provides additional information regarding the areas prone to flooding.

Wetlands and Parks: In the past, the rapid runoff from the mountains combined with the relatively flat plains around Bogotá created a widespread network of wetlands along the Río Bogotá. Pre-hispanic societies constructed extensive hydraulic works to manage irrigation water in the wetlands. Over the past forty years, the wetland areas around Bogotá have decreased from
50,000 hectares to 1,000 hectares due to urban expansion and conversion of wetlands to agricultural and pasture land. The few remaining wetlands are generally polluted with sewage and storm-water and provide less than optimum habitat for wildlife. A strong environmental movement has emerged in Bogotá that actively promotes the protection and expansion of wetland areas. In 2006, the Bogotá District government passed a comprehensive wetlands management policy, and today, the District government, EAAB, and CAR are working to protect the river’s wetlands.

Volume I of the EA identifies 11 wetland areas of regional importance (shown in Figure 1). Using ecological engineering principles, these wetlands have the potential to provide ecological habitat, passive recreation, and additional treatment.

In spite of its intense development, the basin as a whole continues to offer environmental values and many recreational opportunities as there are parks and recreational sites near the river. There are areas of scenic value and it is common to see individuals taking advantage of recreational opportunities available in the urban parks such as walking, cycling and other sports.

**Water Quality Standards.** In 2006, the CAR published a watershed basin plan for the Río Bogotá (POMCA). Based on the POMCA the CAR has issued water quality standards for the river basin until the year 2020, which designates water uses through river segments and sets ambient water quality criteria of approximately 25 pollutants in order to meet the designated uses.\(^4\) Table 5 provides a summary of the 2020 water quality standards focusing on key pollutants. The Project objective is to achieve Class IV water quality standards, suitable for agricultural use, for the section within Punta La Virgen to Alicachin; this same section is currently classified as Class VIII.

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Upper Basin</th>
<th>Middle Basin</th>
<th>Upper Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Villapinzon – Tibitoc</td>
<td>Tibitoc – Punte La Virgen (PLV)</td>
<td>PLV–Alicachin</td>
</tr>
<tr>
<td>BOD(_5), mg/L</td>
<td>7</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>DO, mg/L</td>
<td>&gt;4</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Total Coliforms, MPN/100 ml</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>TSS, mg/L</td>
<td>10</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Classification and Designated Use</td>
<td>Class II Drinking Water Supply with Conventional Treatment; Agricultural</td>
<td>Class IV Agricultural</td>
<td>Class IV Agricultural</td>
</tr>
</tbody>
</table>

1. Maximum values based on average flow conditions; Total Coliform is based on agricultural restricted uses. For unrestricted uses, TC could not exceed 5,000 MPN/100 ml

\(^4\) Objetivos de Calidad del Agua para la Cuenca de Río Bogotá a lograr en el año 2020 (Acuerdo 43 de 2006)
**Rio Bogota Environmental Management Strategy.** To meet the river water quality standards, CAR and the SDA, have developed various policy instruments and programs that through the support of the national government, the Bogotá water company (EAAB), and local governments are currently under planning or implementation stages.

**Small Municipalities Wastewater Management Program.** The CAR is currently working with 36 small municipalities on a comprehensive wastewater management program that will increase overall treatment from around 40 percent to over 80 percent by 2015 by upgrading existing wastewater systems and building new plants. Under this program, CAR assisted municipalities in the development of water and wastewater master plans and wastewater discharge plans (*Plan de Saneamiento y Manejo de Vertimientos, PSMV*) required by national wastewater regulations.\(^5\) Program implementation is important to meet the designated use (Class II and Class IV) in the upper basin; however, it is not a major factor influencing water quality within the middle basin. Water quality modeling results indicate that if the current situation is maintained (i.e. 40 percent wastewater treatment coverage) the Project will still be able to meet its water quality objectives in Bogota City (Class IV).

**Rio Bogota Middle Basin Strategy.** In the early 1990s, the District government embarked upon a scheme that envisioned the construction of 3 medium-sized secondary wastewater treatment plants, one for each of the three micro-basins in Bogotá. The plan was to construct each wastewater plant in two phases, a first phase primary treatment with removal rates of 60 percent TSS and 40 percent BOD\(_5\) and a second phase with secondary treatment to produce an effluent quality of 30 mg/L BOD\(_5\) and TSS. The city entered into a Build-Operate-Transfer (BOT) concession contract in 1994 with a French consortium for a 4 m\(^3\)/s primary WWTP called Salitre, located in the northern part of Bogotá. The plant started operations in 2000, and in December 2003 the District cancelled the contract, purchased the plant from the consortium and turned over its operation to EAAB.

In December 2004, the National Planning Department (*Departamento Nacional de Planeacion, DNP*) issued a strategic planning document (CONPES 3320) for the Río Bogotá, which called for the Salitre WWTP expansion to an 8 m\(^3\)/s plant to treat wastewater from the Salitre micro-basin, and the construction of interceptors and a large plant (14 m\(^3\)/s) downstream of Bogotá called Canoas to treat wastewater from the Fucha and Tunjuelo microbasins (*Figure 2*). The DNP document was based partly on a 2003 study by EAAB, which concluded that a two plant approach was the superior alternative.\(^6\) CONPES 3320 concluded that the Salitre WWTP will treat wastewater to secondary effluent levels from the northern part of Bogotá and will provide treated water to maintain the Río Bogotá and supplement the water supply for the nearby La Ramada District. In 2007, the Ministry of Environment, Housing, and Regional Development

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\(^5\) The PSMV is a policy instrument prepared by service providers and approved by the environmental authorities in where providers indicate programs, projects and activities following an implementation schedule and investment plan aimed at reducing pollution loads in receiving waters and improving wastewater collection and disposal in municipal sewer systems.

(MAVDT) modified the EAAB environmental license for Salitre WWTP (Resolution 1929) requiring a treated secondary effluent to achieve Class IV ambient water quality criteria.\(^7\)

**Figure 2. Rio Bogota Middle Basin Strategy for Wastewater Management**

This strategy is now embedded in a complex legal and regulatory framework in Colombia. In 2007, the CAR, EAAB, and the District signed Convenio 171 which called for the CAR to finance the Salitre WWTP expansion and river works improvement in Bogotá. The CAR created a special account for Bogotá wastewater program called *Fondos Para Inversiones Ambientales en Bogotá* (FIAB), which is a dedicated account funded by half of the property tax revenues transferred from the District to CAR; i.e., half of the 15 percent of Bogotá’s property tax revenues that are transferred to CAR. The EAAB agreed to take responsibility for the construction of the large interceptors to Canoas, which are currently under construction and are planned to be completed in 2013.

In 2009, the CAR, MADVT, and DNP reached an accord whereby it was agreed that the EAAB/District and the national government would finance Phase 1 of the Canoas plant. After CAR has completed its financial obligations under Convenio 171, FIAB funds will be used to help finance Phase 2 of Canoas. The technical solution for Canoas has still not been defined, but Phase 1 (probably primary treatment) is expected to begin operations around 2014, and Phase 2 (probably secondary treatment) is expected to start around 2025.

In addition to improving water quality in the Rio Bogotá, the CAR has an ambitious program to revive the river’s ecosystem and reduce the risk of floods. Prior to 1950, in the middle section of the basin, the Rio Bogotá was a meandering river with a wide riparian area, extensive flood plains and a magnificent ecosystem. Rapid urban development has since resulted in the deterioration of water quality in the river, channelization of the river, destruction of wetlands and

\[^7\] License effluent criteria: 30mg/L BOD5 and 30 mg/L TSS on a monthly average basis.
growth of low-income neighborhoods along the river prone to flooding. The CAR is currently incorporating environmental objectives in the flood works program by widening and protecting the riparian zone, restoring the river meanders and hydraulically connecting the river with flood plains. Meanwhile, the EAAB, which is responsible for wetlands inside the city, has an active program to restore wetlands alongside the river, and the CAR also has a restoration program for wetlands within its jurisdiction.

**Industry Pollution Control.** To control industrial pollution, users who discharge wastewater to water bodies are required to have a discharge license and an implementation plan to reduce pollution based on agreed objectives. When industries are connected to the sewerage system, the control and regulation takes place through the municipality or District’s PSMVs. The CAR is conducting a strong campaign to work with industries and producers to legalize wastewater discharges. In the Bogotá District, industrial discharges are controlled and monitored by SDA through a similar model. In addition to mandatory regulations, both environmental authorities are promoting voluntary measures, such as cleaner production programs to reduce water, energy and raw material consumptions in industries.

**Illegal wastewater connections (conexiones erradas).** The EAAB has embarked on a comprehensive program to reduce illegal wastewater connections to storm water channels in order to comply with the SDA water quality criteria for urban rivers. This program, which is included in the EAAB’s PSMV, includes sewer line rehabilitation and connection improvements, control and monitoring and public campaigns.

**Legal and Institutional Framework and Arrangements.** The legal and institutional context for the management of the Rio Bogota Basin is complex and involves multiple jurisdictions. There are numerous relevant government agencies that co-exist within the Rio Bogota watershed at the national, regional and local levels. These are further complicated by a variety of laws and government orders that make-up the overall institutional framework for water and water quality management.

Colombia has applied a decentralized framework to the provision of public services and in the administration of resources. The provision of water and sanitation services (WSS) has been highly decentralized since the 1986 Decentralization Law, which transferred the responsibility for operating and managing the water and sewerage systems to the municipalities. In the environment sector, Law 99 (1993) created a decentralized National Environmental System (Sistema Nacional Ambiental, SINA) composed of 33 CARs and six Urban Environmental Authorities in cities with more than one million inhabitants.

These environmental authorities manage natural resources within their territories and promote sustainable development according to policies established by the MAVDT. Law 99 also provides CARs with a variety of independent sources of revenue, including economic instruments, taxes, fees, fines and environmental funds. The most significant source comes from a fixed percentage of property taxes collected by municipal governments. CARs receive between 15 to 26 percent of municipal property taxes to fund their environmental management activities. For CARs in urban areas with more than one million inhabitants, half of the revenues from property taxes must be spent on environmental investments inside the urban zone.
At the national level, the MAVDT and DNP are involved in the development of policies and coordination efforts to facilitate and ensure the implementation of national polices. Policy documents, such as CONPES 3177/2002, and CONPES 3320/2004 and the 2004 National Plan for Municipal Wastewater Management (PMAR) 2004, are key instruments under the institutional framework of the overall Rio Bogota environmental strategy.

As mentioned before, the Corporacion Autonoma de Cundinamarca (CAR) is the regional environmental authority for the Rio Bogotá basin. In the urban section of Bogota, the environmental authority is the SDA, which formulates environmental policies and regulates their implementation within its urban perimeter.

At the local level, the Bogotá Capital District is the territorial entity that contributes the highest level of organic pollution to the Rio Bogotá. The District also owns EAAB, which provides water and sewerage services to the city. The SDA and EAAB are the representatives of the District in interagency discussion of the Rio Bogotá Environmental Strategy. In addition, there are 45 municipalities under the Rio Bogotá watershed represented by their local governments. At this level, key management and policy instruments include the PSMVs and water and wastewater master plans developed by service provides and approved by the environmental authorities.

The EA provides a detailed description of this institutional framework for the Rio Bogota basin and evaluates the strengths and weaknesses of the overall institutional setting.

Project Institutional and implementation arrangements. The CAR will be the borrower for the proposed Project and will be responsible for all aspects of project implementation. Since the EAAB will continue to operate the Salitre WWTP in the future, the CAR and EAAB have established a Technical Committee to oversee all aspects of design, construction, and commissioning of the Salitre WWTP expansion. After the Salitre expansion is commissioned, the EAAB will take responsibility for the operation and maintenance of the plant. This arrangement was agreed upon in Convenio 171, which was signed in 2007.

A number of the proposed technical assistance programs under Component 3 of the Project, in particular the Integrated Basin Water Management Plan and the Biosolids Master Plan directly impact the EAAB. The CAR will be the employer for these consultant contracts but will work in close coordination with the EAAB through the Technical Committee. In addition, other stakeholders will be involved in the process, including the Ministry of Environment, Housing, and Regional Development (MAVDT).

The CAR will be responsible for the construction and operation of the river works under Component 2. The responsibility for river works and flood control along the river was formally transferred from CAR to EAAB through Convenio 171. The Río Bogotá forms the border between the Bogotá Capital District and five municipalities, and the EAAB only had formal jurisdiction over the left embankment of the river. In order to avoid inter-jurisdictional complications, it was agreed by the parties that the CAR would own and maintain the river works in an integrated manner.

Potential Regional and Cumulative Impacts.
**Overall Río Bogotá Environmental Strategy.** The likelihood of the overall Río Bogota Environmental Strategy meeting its long term objectives will depend on the combined effectiveness of the all the various programs. This includes the construction, operation and maintenance of municipal wastewater treatment plants in the upper reach, the construction of Canoas WWTP, as well as other point and non-point source pollution control efforts. The success of the strategy will also partly depend on growth and development trends in the basin as well as other large development projects currently being developed or planned. The complex interaction of these various factors may have an important regional or cumulative impact, which cannot be addressed by a single project entity.

**Río Bogota Middle Basin Strategy.** As mentioned previously, the Project is expected to contribute to significant improvements in the water quality of the middle basin and quality of life for those living in Río Bogotá. One of the project’s key performance indicators is to provide the Río Bogotá in the middle basin with a Class IV water quality classification, which corresponds to agricultural and livestock use. To determine whether this is achievable with the proposed improvements and how other wastewater programs could potentially affect the expected results, a water quality simulation was undertaken based on wastewater flows forecast for the next 20 years.

Water quality modeling results indicate the following:

- Salitre WWTP expansion to a design capacity of 8m³/s with secondary treatment and disinfection and completion of the EAAB interceptors are required to comply with Class IV in the middle basin.

- Even though the small municipalities wastewater program is needed to meet Classes II and IV in the upper basin, the Project will still be able to meet its water quality objectives in Bogota City (Class IV) if current treatment level is maintained.

- Urban wastewater programs, such as industrial pollution control and reduction of illegal sewer connections to the stormwater system, are critical to improve water quality in urban rivers ending in the Bogotá River. According to the model, Total Coliforms from urban rivers could be limiting Class IV objectives if contamination is not managed appropriately. Therefore, a strong collaboration between SDA and CAR is required to guarantee that existing plans are implemented and aligned to the river Class IV objective.

**Analysis of Alternatives**

**Approach to Alternatives Analysis.** The analysis of alternatives carried out for the Project has taken place both at the strategic level and at the site-specific level through the evaluation of alternatives for each of the proposed civil works. At the strategic level, in addition to the no-project alternative, the EA Volume I evaluates the risks of not achieving Class IV in the middle basin through various scenarios including wastewater treatment levels and the operation of other wastewater programs outside the Project scope. In addition, the three wastewater treatment schemes for Bogota City, one-plant, two-plants, and three plants, developed in various technical documents were reviewed, analyzed and the results summarized in the EA. At the Project level, alternatives were discussed for each of the specific civil works investments under Component 1.
Alternatives Considered. Strategic alternatives for the Rio Bogota have been developed through a long history of debate and discussion among key stakeholders. Options considered included the proposed construction of one plant and three treatment plants, as well as the selected option of constructing two plants. Specific alternatives have been discussed in the context of regional and water resources planning and options were assessed at the level of the treatment plant and flood control works. CAR through the EA process for Components 1 and 2 described plant site-specific and river alignments alternatives. Treatment alternatives for Salitre WWTP included i) secondary treatment with activated sludge process and ii) enhanced primary treatment with chemicals (CEPT).

For flood control works, protection alternatives were evaluated for a current situation (10-25 years) and for a 100-year flood protection. The EA has also evaluated two flood control design approaches: i) a typical urban flood control works focusing only on deepening the channel and constructing the embankment and ii) an integrated urban river restoration approach incorporating ecological design into flood control works to create riparian zones and maintain hydraulic connection with adjoining wetland areas. These alternatives and their environmental implications are discussed in detail in the EA Volume II.

The Selected Alternative. The Colombian government decided that the preferred option was to have two wastewater treatment plants (one at Salitre and the other at Canoas) to serve the wastewater treatment needs of Bogotá City based mainly from a technical study conducted in 2003 by EAAB. This plan was later supported by DNP and MAVDT in the CONPES 3320 document. The EA team reviewed existing technical considerations for the two-plant decision and concluded that this was the best approach based on economic, environmental, and policy and regulatory issues. Regarding the plant treatment level, EA water quality modeling results support the environmental license decisions of expanding the plant to a secondary treatment level to meet water quality objectives. It was also determined that activated sludge process is the most likely option for a plant this size. The selected river alignment results in the least impact on involuntary resettlement, and the selection of the 100 year flood design provides the necessary protection for vulnerable areas. Furthermore, the selected river design applies an integrated urban river restoration approach without increasing cost significantly, but gaining environmental benefits.

Environmental and Social Baseline Conditions in the Project Area of Influence

General. Throughout its middle reaches the Rio Bogota presents the most visible water quality problems in the greater Bogotá region if not the entire country. In a 2008 survey of Bogotá residents, the contamination of the Río Bogotá was rated the second most pressing environmental problem in the city after traffic congestion. For many years, the Rio Bogota has served as an open sewer for a large portion of the city of Bogota. Rapid urban development since 1950 has not only resulted in the deterioration of water quality in the river, but it has also in the channelization of the river, destruction of wetlands, and growth of low-income neighborhoods.
along the river prone to flooding, especially in the localities of Kennedy, Bosa, Engativa, and Suba.

**Project Area of Influence.** In the broadest strategic sense the area of influence is the Rio Bogota basin. The EA defines the project’s direct area of influence as the site of the Salitre WWTP expansion, the floodplain area defined by the 100 flood protection works along the river 68 kms between Puente La Virgen and Alicachin, and the properties affected by land acquisition and/or physical relocation. The indirect area of influence includes any municipality where works are to take place. While Volume I of the EA addresses issues at the regional scale, Volume II addresses those benefits, risks, and impacts which are expected to occur within the project’s direct area of influence.

**Population and Development Context.** The middle reach of the Rio Bogota basin is home to a large concentration of dense urban areas, mixed intensive and extensive agricultural areas, recreational areas, and many industrial sites. In the middle area there are four municipalities and the Bogota City with an estimated population of 7 million, which is expected to grow by 50 percent in 2020. The distribution of population in the basin has developed more as result of an organic evolution of the location of settlements, businesses and industry and not as a result of a logical distribution or careful planning of urban land uses and services. The direct project of influence has an estimated population is 3,936,597 and includes four municipalities (Soacha, Mosquera, Funza, and Cota) and five localities within the Bogota Capital District.

**Water Quality.** The significant deterioration of surface water quality in the Rio Bogota basin and most of the tributaries in the middle reaches of the river is a result of decades of poorly treated or uncontrolled pollutant discharges. The 68-km stem of the Rio Bogota and its tributaries have received domestic sewage, organic discharges, mineral and inorganic substances, heavy metals, pesticides, fungicides, herbicides, and sediments at levels far exceeding the river’s capacity for dilution and self-purification. Residents along the course of the river must endure both the serious health risks and aesthetic impacts of the water pollution. In some sections, the odor and poor aesthetic quality of the river can be significant.

**Land use.** Land use on the left side of Rio Bogotá middle basin (basically Bogotá Capital District) is predominantly urban, including residential, commercial, and industrial development, recreational areas, and some illegal settlement in the riparian zone. The right side is predominantly rural and includes the Ramada irrigation district and other agricultural land uses. While the Rio Bogota itself does not flow through the center of Bogota many of the tributary streams feeding into the river are highly contaminated as result of the discharges flowing from the dense urban areas. The composition of industries is highly varied with many different types of activities and industrial processes. Agriculture varies considerably as well ranging from extensive grazing and cattle rearing to more intensive commercial flower production. In many parts of the outlying areas new housing developments catering to all classes of residential dwellers are growing rapidly.

**Critical Natural Habitats and Biological Diversity.** The project’s area of influence covers a large geographic area that includes a number of potentially sensitive wetland areas with local and regional biodiversity importance. While the area as a whole has been subject to a number of threats and impacts from a wide range of development pressures, there remain some areas of
high biological interest. Of particular interest, of course, are the remaining wetland areas which are of high interest. These areas will not be adversely affected by project activities but will be the target of interventions to improve their overall quality, protection and long term management.

**Expected Environmental and Social Risks Associated with Component 1 (Salitre Expansion)**

**Component 1: Construction Phase**

**General.** The environmental and social impacts and risks associated with this component will be different during the construction and operational phases of the project. During construction the main environmental impacts relate to the temporary construction impacts associated with the large-scale civil works of the Salitre WWTP expansion. Possible impacts and risks include the temporary disruption to local traffic flows; temporary loss of access to recreational, residential, and commercial areas; dust and noise control; handling and management of hazardous construction materials; occupational emergency response planning; erosion and sediment control; disposal of construction debris; and change archeological finds. Impacts during construction stem from such activities as excavation for the plant expansion, transportation of sand, concrete and construction materials, earth compacting, concrete pouring, and operation of heavy construction equipment.

With appropriate mitigation measures and supervision the majority of the impacts are considered manageable and impacts will be moderate and temporary. All construction management controls will be the responsibility of contractors and specific environmental measures will be specified within construction contract.

Some of the specific impacts from the Salitre WWTP, based on CAR’s EA, are discussed below.

**Air quality and odors.** During the construction stage, local air quality may be affected by an increased concentration of suspended particles and carbon monoxide as a consequence of earth moving and machinery operation. Bothersome odors may be expected from the removal of earth movement and disposal of landfill material as a result of direct excavations. Another action that may generate odors is the temporary storage and disposal of construction waste. These impacts are generally characterized as negative but with a low risk of long-term environmental impacts. They are expected to be of medium or low intensity, brief in duration, and highly localized. While these impacts appear immediately, and may have a direct effect, they only last while the operation that produces them lasts. These impacts are not expected to be significant and they will be addressed through the contractor’s site-specific management plans.

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8 The methodology used to evaluate risks, impacts and benefits was systematic and followed recognized good practice. The scoping and evaluation of risks included the use of a detailed Leopold matrix, checklists, independent peer reviews, public consultations, and expert opinion.
Noise. Elevation in noise levels in the construction areas are expected as a result of the movement and operation of trucks and heavy mechanical equipment. The main sources of noise and vibrations will be (i) operation of heavy equipment and manual tools; (ii) movement of personnel and light vehicles, and (iii) mobile equipment and machinery such as electric generators. Noise impacts are likely to be negative but will have a medium to moderate effect due to their low to medium intensity and the fact that they will be of short duration, localized and of intermittent occurrence while the works that generate them continue. The contractor’s site specific management plan will include measures to address these effects.

Soil quality and stability. Soil quality may be affected by leaching, dumping, and hauling of solid or liquid materials that are in temporary use or transported to their final disposal site. Possible impacts on soil quality in these cases could be of medium or high intensity depending on the type of material involved and the local context. Overall, direct effect and will be temporary in duration and strict controls on dumping will be included as part of the contractors site specific management plans.

Compacting and/or settling of soils around construction sites may result from a variety of project construction activities. These include excavation, movement of heavy machinery, temporary disposal of large volumes of materials, residues, and debris, large-scale, heavy installations, and demolition. The impacts that may occur in these cases will be negative, of medium to high intensity but local in scope. Direct negative effects, if they occur, are expected to be of a temporary nature. Although such impacts are highly unlikely if the works are properly designed and executed, all necessary measures to avoid these risks must be taken into account. The contractor’s site specific management plans will include specific references to contingency measures in the event of unexpected construction accidents.

One specific concern at the Salitre WWTP relates to its former use as a landfill site, which could create a potential risk to construction stability and to increase leaching of contaminants at the site. To assess this risk and provide appropriate mitigation efforts during design, construction, and operation, CAR will contract a consulting engineering firm to conduct a geotechnical study this fall to evaluate the site conditions. The study results will be considered in the engineering plant design and the Project environmental management plan.

Surface Water Quality. Construction activities that may affect the quality of water resources during the construction stage include (i) hauling of solids and/or liquids during the clearing of work sites, (ii) leaching, dumping, and hauling of solids that have been in temporary use or are transported to their final disposal site, and (iii) sediments from earth movement may reach surface waters. The negative impacts that these activities may generate will be direct, of low to medium intensity, of short duration, of local scope, and occasional. No long-term negative impacts were identified in this aspect, taking into account the current baseline conditions of the water bodies in the project area. The contractor’s site specific management plan will include measures to address these effects.

Impacts on flora and fauna. No significant construction impacts on terrestrial flora or fauna are expected during the construction phases of the Salitre WWTP expansion. Project construction works will not directly affect any known sensitive or critical terrestrial natural habitats in the project’s area of influence. All project works are located on the land owned by Salitre which is
partially vegetated but is an old landfill site. Sensitive wetland areas are located within the plant’s area of influence, but these areas will not be significantly affected by project construction. Plant cover, some trees and small shrubs may be affected by the establishment of work staging and materials storage areas, the temporary disposal of surplus earth and work debris, and the movement of vehicles and heavy machinery. These impacts are considered to be both temporary and not significant.

Based on the EA -- and confirmed by field site visits by the Bank team -- the expansion area for the Salitre plant is somewhat degraded and has been heavily impacted by the fact that it was once a landfill for the city of Bogota. The Salitre plant is in close proximity to recreational areas, residential neighborhoods and a large regional park. It is possible that construction site accidents could lead to some unexpected impacts on vegetated areas or urban parks. The increased volume of truck and construction equipments may have impacts on these residential and recreational areas and special care will need to be taken for the protection of these sites. Special care will be taken to avoid spilling construction site contaminants that may be harmful to vegetation. The impacts resulting from such accidents, though negative, would be likely be localized as no construction site is near any important vegetated areas.

Occupational health and public safety. Because of the magnitude and extent of civil works, a large number of skilled and unskilled workers will be employed during project construction. Strict occupational health and safety measures will be applied to avoid accidents affecting workers and people living in the project construction areas. The movement of heavy equipment may pose some risk to local residents and all construction contractors’ site management plans will include specific reference to public safety concerns.

Component 2: Operational Phase

General. During the operational phase of the Salitre WWTP the principal environmental impacts and risks relate to (i) the potential environmental and human health effects of long-term discharges of wastewater effluent into the Rio Bogota; (ii) the potential environmental and human health risks associated with management and disposal of continuously generated biosolids from the Salitre treatment plant; (iii) localized nuisance issues relating to operations at the Salitre plant such as odor and noise; and iv) the risk of industrial accidents from chlorine gas release or methane gas explosion from digesters. Some of the specific impacts during the operational phase from the Salitre WWTP are discussed below.

Impacts on Critical Natural Habitats and Aquatic Biodiversity. The project’s area of influence has been highly affected by human settlements, agricultural and industrial activities. Still there are important wetland areas in the project area. A comprehensive assessment of project’s incremental impacts on critical natural habitats and on the aquatic biodiversity of Rio Bogota has been carried out as part of the EA. Impacts on flora and fauna are expected to be positive overall as a result of direct investments in wetland recuperation.

Nuisance impacts associated with treatment plant operations. Operation of the Salitre preliminary treatment plant may generate odor and noise problems. Of particular concerns are the potential impacts and risks for the residents of Suba – a densely populated urban area next to the Salitre plant. Under certain weather conditions, odors may become quite serious since the plant is
located in an area quite close to residential neighborhoods. During the detailed engineering design phase of the plant expansion, various options will be considered for noise and odor problems such as use of appropriate technologies for collection and treatment of odor generating gases, isolation of noise-generating equipment.

**Impacts Associated with disposal of biosolids generated in the treatment plants.** The total biosolids generated by the expanded Salitre WWTP has been estimated to be about 102 tons/day based on dry weight (25 percent TS). This considerable quantity of biosolids will require a carefully conceived biosolids management plan to guide overall operations. At the moment, biosolids are transported to the landfill El Corzo dedicated only for biosolids and construction spoils. The existing disposal site is not sufficient to handle future biosolids production; therefore, EAAB and CAR are currently conducting studies to provide a short term solution. Among the options being considered are i) to transport biosolids to the city landfill (Dona Juana) to be used as final cover material and ii) to construct a monofill in the Canoas property and/or other areas currently being considered.

Clearly, handling and transporting such large quantities of biosolids presents potential environmental risks and possibly for land acquisition for the construction of disposal sites. The project will be required to take adequate precautions to handle the Salitre biosolids according to acceptable technical standards and as defined in the EA. In addition to the studies conducted by CAR and EAAB on the short term solution for biosolids management, during project implementation, and as part of the loan technical assistance, a biosolids master plan will be conducted to develop a sustainable long term biosolids management plan for Bogotá city taking into account disposal and beneficial reuse options, regulatory framework, and available and appropriate technologies.

**Environmental benefits of the component.** Consideration of the potential adverse operational risks should be balanced with a consideration of the very important potential environmental and human health benefits of the project which include the following (i) reduced exposures to existing high-levels contaminants in the Rio Bogota; (ii) improved environmental conditions on the Rio Bogota’s riparian zone including the interface with wetland conservation areas; (iii) reduced flood risks to property and communities living along the Rio Bogota; and (iv) creation of multi-purpose wetland parks and recreational areas. In addition to the health benefits of the project, significant quality of life benefits are expected to result over the long term including improvements in recreational value of the basin and improved livability in the impact zones.

This project will allow a reduction in water pollution in the middle reach resulting in improved water quality for irrigation and river ecology. The Salitre WWTP expansion and the interceptors will contribute to a considerable reduction of organic and pathogen contamination in the river reducing public health risks in Bogota and contributing to the restoration of river ecosystems. BOD5, SST and Total Coliform concentrations in the river were forecast to predict concentrations during the average flow period after project implementation. Modeling results presented in Volume I of the EA indicated that Class IV can be obtained with Project. The BOD5 simulation indicates that BOD5 of 50 mg/L can be expected in the middle sections of the basin. **Figure 3** shows expected BOD5 concentrations in specific sections of the Rio Bogota for three scenarios.
Impacts Associated with Component 2 (Flood Control and River Works)

Component 2: Construction Phase

General. The principal impacts associated with Component 2 are related to the construction phase activities of river dredging and embankment construction. The construction of the flood protection works will require large volumes of earth movement, mostly from improving the existing dike system by building a new embankment in the left or right bank of the river allowing a 30 meter berm. The works will include channel excavation, earth movement, and construction of the dikes. Most of the impacts associated with these civil works will be temporary in nature and are similar to those found in any large construction sites such as nuisance dust and noise control, transportation and disposal of excavated material, access to construction sites, construction staging areas and so on. Two specific negative impacts of this component are included below.

Chance Archeological Finds. Given the long history of human activity along the river there is a significant probability of encountering high value archeological items during the implementation of this component. Procedures for identifying and responding to potential archeological artifacts will be included in the construction contracts, and it will be closely supervised as indicated by the EMP.

Pest management. Large scale excavation and earth works along and within the river could lead to increase exposure to vermin and other disease vectors throughout the project area. As part of the EMP an pest management strategy has been developed to guide the implementation of this component. The plan will be fully consistent with the requirements of the Bank with respect to procurement, storage, handling and application of pesticides and rodenticides.
Resettlement and Land Acquisition. Land acquisition and resettlement are requirement under this Project. Section V of this executive summary discusses the social management plan being developed by CAR.

Component 2: Operations Phase

General. The EA identified the following impacts and risks related to the operation phase: i) possibility of dike rupture leading to property damage and potential loss of life, ii) public health risk from recreational activities in the river (fishing and swimming) and from use of chemicals to control rodent infestation along dikes; and iii) reduction of flood risk and improved environment may induce unwanted urban development, particularly illegal occupation, in rural areas. Mitigation efforts were addressed in Volume III of the EA.

Environmental benefits of the component. The main benefit to the population is the increase flood protection standard to 100 years along the entire 68-km length of the river and reduce risk of tributary flooding in Bogota City due to lowered water levels in the Rio Bogota. Important ecological benefits include restoration of riparian habitat along the river banks, as well as meanders and wetland areas that will support an enhanced environment for birds and animals, and potentially improve water quality. Furthermore, improved landscapes and recreational areas will improve environmental aesthetics and create public spaces for the enjoyment of an urban river.

Stakeholder Consultation and Information Disclosure.

The EA process solicited a wide range of stakeholder concerns and ensured an open process of debate and discussion about project objectives and goals. As part of project preparation, extensive stakeholder consultations were carried out using formal as well as informal methodologies. Information on the project was made available to the public through a series of public disclosure events and workshops. Informal focus groups discussions were conducted with nongovernmental organizations (NGOs), local government, affected people, and beneficiaries at various points during preparation and appraisal.

CAR sponsored a public consultation event in Bogota in March 2009 to present and discuss the detailed scope of work and terms of reference developed for the EAs proposed for the project. This formal workshop built on informal dialogue and discussion with various partners and stakeholders, including CAR, the Bank, technical specialists, and local government. This scoping workshop was attended by about 60 participants representing a wide range of public and private stakeholders, including the MAVDT, municipal governments, national and local environmental NGOs, national government agencies, community organizations, and professional associations. The terms of reference and proposed scope of work for the EAs were discussed in a thorough manner by the workshop participants.  

During the workshop many questions were raised by participants and briefly addressed by CAR. Important questions were raised relating to the project alternatives, specifically the level of

9 The EA terms of reference are included in the CAR Web site: http://www.car.gov.co/documentos/2_27_2009_4_56_59_PM_Evaluacion%20Ambiental%20Preliminar.pdf
wastewater treatment proposed, and the overall water quality strategy for the basin, including concerns about the relationship among the proposed project and other projects of regional importance and whether the project was sufficient to meet long term water quality goals at the regional level.

On August 21, 2009, the three volumes of the EA were published in the CAR Web-site and a second public consultation workshop was conducted on September 16, 2009 to present the draft EA documents and to solicit stakeholder feedback on the findings, issues, and recommendations of the report. During this workshop a number of issues were raised relating to strategic vision for the basin, wetlands management, management of biosolids, modeling results on water quality, pest management the technical scope of the project internal review and clearance procedures, and the importance of continued communications with stakeholders.

Additional informal consultations and project information dissemination campaigns were carried out as part of the preparation of the economic evaluation study, resettlement planning and the Social Management Plan. Household survey data were collected from 1,000 households and a large number of community meetings were held with focus groups to collect information on socioeconomic conditions and a range of project design issues, including willingness to pay and perceptions and valuation of expected benefits. During this study, important project information on the project design, expected benefits, and potential risks was shared with the sample populations selected for the survey. This process was a tool for information disclosure, dissemination, and stakeholder feedback.

In addition to the project-specific consultation and disclosure efforts, CAR has established a social outreach unit within their organizational structures. This team has been established to liaise continuously with the local communities and facilitate communication tools. A Communication Strategy has been designed with CAR, in order to inform key actors and stakeholder groups in the basin about the project in a transparent manner, strengthen the credibility of and support for the project, and to contribute to the overall consultation, participation and empowerment framework for the project. The Communication Program includes the creation of a Communication Unit in CAR, which would be responsible for (i) providing adequate and timely information prior to consultation events; (ii) maintaining documentation on consultation processes and decisions taken; and (iii) providing feedback to concerned stakeholders.

In addition to general public disclosure, feedback on the EA was solicited from leading national environmental experts. These high-level experts have provided technical reviews in the fields of environmental engineering, sanitation, and environmental impact assessments. The project EA was posted on the Bank’s InfoShop on August 28, 2009. Additional consultations and information-sharing workshops are planned as part of the project communication strategy and will be conducted at different project stages, including during project implementation.

Environmental Management Plan (EMP)

Key Elements of the EMP. As part of the EA process, CAR and EAAB have developed an EMP that includes measures to avoid, minimize, mitigate, and monitor potential project impacts during construction and operational phases of the project. The core programs of the EMP
include: (i) Management of impacts during the construction phase; (ii) Management of impacts during the operational phase (iii) Monitoring in the project’s area of influence; (iv) Contingency planning and management; (v) Consultation, communications and disclosure; and (vi) Capacity building, training and research.

**Overall Institutional Responsibilities.** CAR will be responsible for overall project adherence to required environmental measures under all components of the project during the construction phase. CAR will assign specific qualified staff dedicated to the management and supervision of all aspects of the EMP during project implementation and will be responsible for ensuring periodic audits, and supervision of environmental performance. Furthermore, CAR will take the lead in coordinating information disclosure and consultations. In the specific case of Component 1, CAR will work in close collaboration with EAAB to ensure that all construction contracts include adequate environmental management provisions to avoid construction-related impacts and that compliance of contractual obligations are taking place during supervision.

All construction contractors will be required to follow site-specific EMP that describes various measures to follow at each site. Each contractor will be required to assign an environmental engineer or other suitably qualified staff to oversee compliance with the site-specific plans on a day-to-day basis. The specific requirements for environmental and social mitigation will be included in bid-documents and included as part of the standard construction contract language.

During operational phase, EAAB will have specific institutional responsibilities to ensure minimization and avoidance of all operational-related impacts. Through its existing environmental unit and plant personnel, EAAB will ensure that competent core staff will be available at all times to supervise the implementation of environmental management measures directly under its control and to ensure compliance of the agreed EMP and environmental license obligations.

**Monitoring.** The monitoring program will be implemented to track indicators related to the Project Development Objective and other medium and long term indicators established under CAR’s planning instruments at the regional level. In addition, specific environmental compliance monitoring will be required for each component during both the construction and operational phases with associated costs incorporated in the relevant contracts when applicable. CAR and EAAB will have the primary responsibility for establishing baselines and monitoring specific activities under construction and plant operations of Component 1. Furthermore, CAR will be responsible for establishing baseline and monitoring programs associated with Component 2. These monitoring programs will be mutually supportive, and a large degree of coordination and cooperation is expected between project’s implementing authorities and the various stakeholders.

**Disclosure of Information.** A high degree of public interest is expected in the progress of the project and the results of monitoring activities, especially during project operations. CAR and EAAB will work together to ensure close collaboration related to public disclosure of monitoring reports and data throughout the life of the project. CAR will establish a public web site where periodic status reports, monitoring data, and information will be available. Stakeholders will also be able to obtain information through the environment units of both CAR and EAAB.
Information will be made available to local government and local stakeholders through a comprehensive communications and outreach strategy, which will provide regular project updates and organize media events and other information campaigns at the local level. Both CAR and EAAB will establish communications links with concerned stakeholders including local government and NGOs working in the project area.

**Institutional Capacity Building.** The institutional capacity within CAR and EAAB to implement an EMP for a project of this type can be considered limited. EAAB has a small technical unit with some experience in overseeing operations but lack sufficient technical skills to oversee a complex project of the scale envisaged under the proposed project. For this reason, EAAB tends to outsource technical studies. At this time CAR has no equivalent unit and in many respects will be executing the operational aspects of this project for the first time.

Because some of these activities will be new to both CAR and EAAB, the project will support specific activities to enhance their capacity to plan and execute the monitoring and information disclosure aspects of the project. The project will support specific training to enhance organization, staffing, and other resources to assist in building core capabilities in monitoring, communications, and outreach, as well as workshops, seminars and public information events. EMP activities, scope of work, institutional responsibilities and further details are available in the project file and in the EIA reports prepared by EAAB and CAR.

V. **Social Assessment**

**General.** Component 2 requires the land purchase of portions of 223 plots; the majority of the plots are located in rural areas and owned by large ranches or government institutions. Most plots will lose less than 25 percent of their total area with no physical resettlement, and will be compensated through standard land and asset acquisition procedures. However, one urban area along the river will require physical resettlement of households in the low-income community of Porvenir in Mosquera municipality. The section provides a summary of the SMP being developed by CAR. The SMP will be comprised of three sections to reflect properly the requirements and procedures to purchase land and resettle displaced population, and it will comply with the OP4.12 requirements.

**Classification of Affected Properties.** The river works are divided into Sections A, B, C and D along the Bogota District and the Municipalities of Soacha, Mosquera, Cota, and Funza. The number of affected properties by segment is presented in the Table 6.

<table>
<thead>
<tr>
<th>Sections</th>
<th>Private Properties</th>
<th>State Properties</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td>38</td>
<td>5</td>
<td>43</td>
</tr>
<tr>
<td>Section B</td>
<td>17</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>Section C</td>
<td>78</td>
<td>27</td>
<td>105</td>
</tr>
<tr>
<td>Section D</td>
<td>39</td>
<td>7</td>
<td>46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>172</strong></td>
<td><strong>51</strong></td>
<td><strong>223</strong></td>
</tr>
</tbody>
</table>

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Draft, September 19, 2009
All the properties are located in rural areas and medium and large ranches which will be affected partially. These ranches belong to high income families who do not live in the affected properties. However, in Section C there is an illegal urbanization called El Porvenir in the Mosquera Municipality. There are approximately 100 lots and 200 families living in this urbanization. Most of them do not have legal titles and are solid waste recyclers.

Based on the above characteristics, affected properties were grouped into three different categories: (i) state land, (ii) rural properties partially affected, and (iii) illegal urbanization that implies involuntary displacement. Each category requires a different strategy for land acquisition and entails different socioeconomic impacts as it is described below:

**State land.** CAR does not have to acquire the land. Only institutional agreements between CAR and other institutions are required. The use of this land does not involve any physical displacement.

**Rural properties.** They will be partially affected and do not involve physical displacement. A census of economic activities in affected properties and an assessment of the impact caused by the lost of the fraction of land are being conducted. According to the result of this assessment, additional compensation measures will be design if needed. The cost of the land will be paid at replacement cost. Additionally, the value of the land along the river should increase significantly due the higher level of flood protection and river improvements, thus generating overall positive impacts for most landowners.

**Illegal urbanization.** It is necessary to acquire the land from the legal owner and resettle the families that will be displaced. The Municipality of Mosquera is participating actively in the formulation of the SMP. This Municipality has offered to develop a nearby suitable lot for the solid waste recyclers, and an agreement between the CAR and the Municipality is being prepared to prepare and implement the resettlement plan. A census and a socioeconomic diagnosis will be conducted, and the resettlement alternatives will be designed based on the results if this study. All this process will be participatory.

**Institutional capacity.** The CAR does not have experience in preparing and implementing land acquisition and resettlement plans. Based in the magnitude of the affected properties and involuntary resettlement, the CAR set up an interdisciplinary team composed of eight professionals (two lawyers, three social scientists, one cadastral engineer, one communication specialist and one agronomist). This team has the support of other CAR professionals and a Bank consultant with experience in resettlement in Bank-financed projects for the development of these plans.

**VI. Summary of compliance with World Bank Safeguard Policies**

The proposed project is categorized as an environmental risk category “A” based on the potential impacts of the large-scale sanitation, flood control and river enhancement investments under Components 1 and 2. Table 7 indicates which of the World Bank policies are expected to be triggered under the proposed operation. A description of the rationale and the works completed to comply with these policies is described below.
Environmental Assessment (OP/BP/GP 4.01). A three volume Environmental Assessment has been prepared for the project at two levels of analysis. At the river basin level, the EA describes the regional and strategic water quality issues facing the Rio Bogota basin, the baseline environmental situation, the applicable legal and institutional framework guiding the management of the basin, the principal management strategies considered, and alternatives evaluated for different basin management approaches. Volume II of the EA for Components 1 and 2 describes CAR strategic vision as expressed through various plans, the baseline environmental conditions in the project’s area of influence, and the applicable legal and institutional framework guiding CAR and EAAB’s sanitation works. The EA report considers realistic alternatives to each proposed work and evaluates the proposed works in the context of various investment plans. In addition, the EA provides a comprehensive description of the overall project components, their main environmental risks and benefits, and the measures to be employed during project implementation to ensure management of adverse environmental risks.

Volume II of the EA presents a comprehensive Environmental management Plan (EMP) spelling out institutional responsibilities for implementation of mitigation actions as well as supervision and monitoring of compliance with agreed mitigation measures. For example, all construction contractors will be required to follow site-specific management plans agreed on and incorporated into all construction contracts.

As part of the overall quality assurance review and to ensure independent quality check, two independent experts\(^\text{10}\) were hired to review the draft EA reports and to provide comments and recommendations to CAR and the World Bank in order to improve the quality of their EA report. The draft reports of the panel of experts were shared with the EA authors and were used to improve the final version of the EA.

The EA considers realistic alternatives to each proposed work and evaluates the proposed works in the context of CAR investment plan. A comprehensive EMP has been developed, spelling out institutional responsibilities for implementation of mitigation actions as well as supervision and monitoring of compliance with agreed mitigation measures. For example, all construction contractors will be required to follow site-specific management plans agreed on and incorporated

\(^{10}\) Carlos Sanchez, environmental engineer with a master in water use
into all construction contracts. Mitigation for works will be guided by an environmental construction manual, which describes best practice methods for common environmental issues such as sediment and erosion control, solid waste management, and noise and safety concerns.

The EA documentation has been made available for public review and comment. During project implementation, CAR will develop a strategic communications plan for the project that will define the methods for public disclosure of all relevant documents, including monitoring reports during implementation.

**Natural Habitats (OP/BP 4.04).** Within the project’s area of influence, there are no known terrestrial ecological reserves and no existing aquatic reserves. Because the project aims to contribute to the significant improvement of water quality conditions in the R-B Basin it is expected to have significant positive impacts for the natural riparian habitats found in the project area. The project has specific goals to enhance the quality and condition of wetland areas which are known to be of ecological value as habitat and for their landscape, recreational and tourism potential.

**Pest Management (OP 4.09).** As part of the river flood control and river works it is possible that large scale earthworks could lead to an increase exposure to health risks from vermin and other disease vectors. As part of the EMP the project has developed a pest management strategy which will guide construction operations.

**Forests (OP 4.36).** There are no forests affected by the project and there are no activities proposed which would promote improved forest management. Therefore no action is required under this policy.

**Safety of Dams (OP 4.37).** The project does not finance the construction or rehabilitation of dams therefore no action is required under the policy.

**Physical Cultural Resources (OP 4.11).** Preliminary site evaluations for proposed civil works construction do not show any evidence of important cultural property that will require mitigation or management measures. However, since many of the proposed works are underground or will require extensive excavation, it is possible that significant areas may be discovered as construction progresses. All construction contracts will include a “chance finds” clause that will require contractors to halt construction if any underground cultural property sites are encountered during construction. Site specific management plans for any cultural property identified by chance finds procedures will be developed before construction can start up again.

**Involuntary Resettlement (OP 4.12).** The project will need to acquire substantial amounts of land for the construction of the flood control and river training works. A Resettlement Action Plan has been developed which includes a full accounting of the land to be acquired, the census of affected properties, the valuation methods to be used as well as the applicable disputes resolution mechanism that will apply during implementation. No land acquisition will be required for the expansion of the Salitre plant under Component 1.

**Indigenous People (OP 4.10).** There are no indigenous people affected by this project as defined under the World Bank’s policy. Therefore, no action is required under this policy.
Projects in Disputed Areas (OP/BP/GP 7.60). The project is not being implemented in any area known to be the subject of international dispute as defined under the policy. Therefore, no action is required under the policy.

Projects on International Waterways (OP/BP/GP 7.50). The Rio Bogota is not considered an international waterway under the definition of the policy and therefore no additional action is required at this time.

Disclosure. As part of the project preparation process, a series of public disclosures, workshops, and focus group meetings were conducted to solicit feedback on the EA and project goals and objectives. Others consultation events and disclosure of project information will be conducted during implementation in order to disseminate information on the project, solicit stakeholder concerns, and ensure an open process of debate and discussion about project objectives and goals.

VII. Next Steps

Before project appraisal, CAR will continue working on project preparation activities with the goal of having final drafts of the EA and SMP completed by appraisal. All efforts are being made to negotiate the project in 2009 and present to the Board in early 2010. From now until project appraisal, the CAR and Bank will work on the following activities:

Environmental Assessment. After receiving comments from the second consultation process, independent expert reviewers, and Bank staff, CAR will revise and update the EA taking in consideration all comments received. An advanced draft will be sent to the Bank for final approval as part of the appraisal process. The advanced draft will be again disclosed in the CAR Web-site and Infoshop. Furthermore, CAR will prepare a report summarizing the second consultation process focusing on the discussion period with the participants.

SMP. During this period, CAR will complete the Porvernir socioeconomic study, the economic survey in rural areas, and a draft SMP before appraisal. The draft SMP will be disclosed at the CAR Web-site and Infoshop, and CAR will conduct various consultation meetings with the affected population to discuss and debate the content of the SMP.