Water Fund Feasibility Decision Support Document

Bogotá, Colombia
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Prepared for:
Latin American Water Fund Partnership

Prepared by:
anteagroup
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This Decision Support Document uses the results from the Feasibility Situation Analysis executed in August 2017 to inform the decision whether to move forward with the design of a Water Fund for Bogotá.

The methodology used to make the Go/No-Go decision was to identify problems for each relevant dimension of water security, their magnitude and how a Water Fund could help mitigate and resolve the problems.

The Feasibility Situation Analysis Report provides a greater level of detail about the current state of water security challenges in Bogotá and should be referred to for additional information.

The Strategic Plan will provide details on the Water Fund’s strategic direction and goals, and how the fund will address each problem.
1.0 EXECUTIVE SUMMARY

Based on Bogotá’s identified water security problems and the potential for a Water Fund to mitigate and resolve these problems, the recommendation is to proceed with the design of a Water Fund, contingent upon securing Critical and Key stakeholders and the appointment of a Water Fund Director. Securing Critical and Key stakeholders; including the Aqueduct Company of Bogotá (EAB), the Municipality and the Environmental Secretary of Bogotá, and the Mayor will enable the necessary support and collaboration for improvements in water security. Without the support and involvement of critical and key stakeholders, a Water Fund will have limited success in implementing long-lasting, effective water security measures. The appointment of a Director would enable the focus and attention needed to initiate a Water Fund, specifically the important task of stakeholder engagement and current commitments of the Water Fund.

While the Bogota region faces challenges in all water security dimensions, a Water Fund can chiefly impact Water Security by generating the necessary interest from stakeholders, influencing public policy and water governance, and ultimately, unlocking the potential to create significant impacts. In a general sense, a Bogotá Water Fund can contribute by:

- Closing important and relevant evidence gaps – conducting and aggregating scientific studies to provide actionable insights.
- Positively influencing water-related governance and decision making – to help create systematic change, bring new decision-making structures (e.g., provide credible ‘cases for investment’, serving as a ‘social witness’, etc.).
- Encouraging and driving implementation of natural infrastructure projects – which could include implementation and providing financial or other support for such projects.
- Convening stakeholders to enable meaningful and positive impact on scale – bringing together existing and new participants and initiatives (from PSA programs promoted by local/regional government, to conservation agreements promoted by others NGO’s and as well) in an ongoing, structured, and robust dialog that builds consensus and drives positive collaborative action.

Water Security is defined broadly with the adjacent description and diagram.
2.0 GO/NO-GO RECOMMENDATION

2.1 Recommendation

Recommendation | Proceed with the next Phase (Design) to establish a Water Fund for Bogota, contingent upon securing Critical and Key stakeholders and the appointment of a Water Fund Director.

Physical Setting and Scope Considerations

The water resource situation associated with Bogotá is complex. While the main area of study associated with this analysis is the administrative area of the Bogotá Capital (Bogotá DC), activities within this area of analysis are interrelated and include flows and discharges, to and from, other administrative and hydrogeological areas. Therefore, the Water Fund will address problems that impact the following relevant areas:

- **Water Users:** Bogotá D.C., nearby municipalities (La Calera, Chia, Cajicá, Tocancipá, Gachancipá, Sopo, Cota, Funza, Madrid and Mosquera) receiving water from EAB,
- **Areas receiving discharges:** the Bogotá river watershed
- **Water Sources:** areas providing water to Bogotá D.C. (including the Chingaza System, the North System and the South System).

The geographical relationship between these different areas is displayed in the adjacent figure.

See Section 2.1 of the Situation Analysis for more information about each area and Appendix 1, Figures 1 - 5 for detailed graphic representations. See Section 2.4 of the Situation Analysis for the detailed Water Balance.
<table>
<thead>
<tr>
<th>Arguments</th>
<th>The region encompassing the Bogotá D.C. faces significant challenges in all dimensions of water security. Specifically, the primary challenges identified include:</th>
</tr>
</thead>
</table>
| Domestic Water Security Problems | ▪ Lack of potable piped water to 18% of the residents of Bogotá.  
▪ Sanitation services are not available in some areas of the city, including sewage treatment. |
| Economic Water Security Problems | ▪ Availability of quality and quantity of water in the future. In accordance with the EAB Master Plan drawn up in 2006, the current concession system volume will be exceeded in 2022 and could impact water availability for domestic and economic uses.  
▪ There are problems in water quality (suspended solids, organic matter and other pollutants) in the sources used by the productive sectors.  
▪ Conflicts in water use, availability and pollution control challenge the sustainability of water supply.  
▪ Increased water treatment costs for water for consumption due to the deterioration of strategic ecosystems.  
▪ Demand for water is expected to increase for domestic and economic uses.  
▪ Contamination problems downstream, including untreated sewage discharge. According to the Ministry of Environment, Housing and Sustainable Development, the Bogotá River at the height of Bogotá D.C. has its highest rate of pollution.  
▪ Risks to industrial, commercial and agricultural production due to contamination of water sources (in the areas that supply water and the areas that receive wastewater).  
▪ The alteration of surface and groundwater reduces availability for agriculture in the Middle and Lower basin of the Bogotá river. |
| Urban Water Security Problems  | ▪ Erosion generated in the upstream areas of the water supply systems affects the storage capacity of the reservoirs.  
▪ The high amount of unaccounted water contributes to increased costs and waste of water.  
▪ Increased possibility of flooding due to blockage of wastewater and rainwater channels.  
▪ The lack of an effective and sufficient rainwater and wastewater treatment infrastructure in the urban area of Bogotá increases pollution downstream. |
| Environmental Water Management Problems | ▪ Deterioration of strategic ecosystems affects the natural water cycle.  
▪ Changes in land use affect the quality and quantity surface water and of groundwater recharge.  
▪ Some land uses cause loss of vegetative coverage, which directly affects river flows and their biodiversity.  
▪ Lack of integration between water security policies, environmental management and spatial planning. |
### Resilience to Water-Related Natural Problems

- Climate change can have significant impacts on the quality and quantity of the water supply if it generates increased landslides, floods and irregularities in the water flow.
- The influence of La Niña (increased rainfall) and El Niño (drought phenomenon) increases the possibility of increased erosion, floods and droughts that affect water quality and water supply. The loss of vegetation cover affects the provision of ecosystem services and water regulation.

### Challenges of Participation of Critical Actors in the Water Fund

- The Aqueduct Company of Bogotá (EAB) did not renew the agreement with the Water Fund. This is a critical factor, because without the participation of EAB the functions of the Water Fund will not be effective. An important factor that has made the engagement harder is the high rotation of key EAB staff in charge of environmental offices due to changes in management teams.

While there are some existing initiatives underway (PSA-Gobernación de Cundinamarca and BANCO2 CAR schemes, Compensation projects for loss of biodiversity, Conservation International Paramos Project and EAB Páramos Project), there is no entity with a regional vision that aims to promote water security in the basin and bring relevant stakeholders together to address water security problems/concerns in a coordinated fashion.

Agua Somos, the existing Water Fund effort has already made progress to conserve and protect natural infrastructure, and increase awareness and engagement on water security issues. For example, currently Agua Somos has secured 65 conservation agreements in the three supply systems, ranging from three to 10 years. With the implementation of these conservation agreements a total of 1,800 ha of important ecosystems are being protected and restored. Therefore, continuing Agua Somos with an expanded water security vision would serve an important convening role and act as a central platform to help close evidence gaps, influence water-related governance and decision-making, continue to drive implementation of natural infrastructure projects and convene stakeholders to enable impact on scale. The potential contributions/interventions identified in Section 3.0, clearly show that a Water Fund could improve Water Security for Bogotá.

While there is currently enough water supply for the area, future increase in demand, the low level of wastewater treatment/high pollution levels, unknown water use/efficiency in most sectors, high sediment losses impacting steams and reservoir capacity, and the high number of citizens lacking piped water create a compelling argument for a Bogotá Water Fund. In addition, and equally important for the region is to take proactive measures to address water security problems and concerns to mitigate current problems and prevent future issues. For example, while the current water balance is positive, it is predicted to be in deficit after 2022 without additional expansion measures, potentially impacting 32% of the GDP and 21% of the Colombian population (Agua Somos Operating Manual Document). In this instance, the Water Fund would serve a significant role to both mitigate and prevent water security issues.

In order for a Water Fund to have maximum impact in the Bogotá region, critical and key stakeholders must be interested, have influence and be willing to work together with the Fund to help improve Water Security.
See Section 3.0 below for data and details about the magnitude of the water security problems listed above and potential Water Fund contributions/interventions to mitigate their negative impacts.

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>The following primary assumptions underlay the recommendation:</th>
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<tr>
<td></td>
<td>▪ Not applicable.</td>
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</table>
### 2.2 SWOT Analysis

#### STRENGTHS

1. The Agua Somos Water Fund has been in place since 2008 and is well established, making substantial progress towards increasing awareness about water security issues, specifically the conservation and restoration of key water producing areas. It has already engaged several stakeholders on water security issues and has a steering committee and governance structure in place.

2. The potential areas of intervention are mostly within the scope of a Water Funds’ operation, notably by:
   a. Closing important and relevant evidence gaps – conducting and aggregating scientific studies to provide actionable insights.
   b. Positively influencing water-related governance and decision making – to help create systematic change, bring new decision-making structures (e.g., provide credible ‘cases for investment’, serving as a ‘social witness’, etc.).
   c. Encouraging and driving implementation of natural infrastructure projects – which could include implementation and providing financial or other support for such projects.
   d. Convening stakeholders to enable meaningful and positive impact on scale – bringing together existing and new participants in an ongoing, structured, and robust dialog that builds consensus and drives positive collaborative action.

3. The Water Fund’s potential contributions could affect all dimensions of water security, increasing the chances of success and demonstrating a model of both solving and preventing water security problems.

#### WEAKNESSES

1. Agua Somos and its board: TNC, Bavaria, Patrimonio Natural, Parques Nacionales (and until 2013 EAB) have been working since 2008 with limited effectiveness. Future success will depend on clear leadership through the appointment of a capable Water Fund Director, improved efficiency and management, and accountability for results. The Fund must position itself as the convener of key stakeholders and facilitate collaboration and activation under the new context of Water Security and the Desired State.

2. The Aguedt Company of Bogotá (EAB) is a critical water security stakeholder and not currently an active partner of the Water Fund. This must be resolved along with securing other Critical and Key stakeholders.

3. The stakeholder landscape is fragmented with multiple municipal and state authorities governing the areas of potential intervention. Some existing interventions, policies, and plans are already being implemented by some actors, but lack synergy and coordination.

4. The problems are large and complex – addressing the entire water security situation with all its dimensions could overwhelm any single organization.

#### OPPORTUNITIES

1. Bogotá’s water security problems, although very serious and requiring attention, are less complex than other cities in Latin America, allowing a Water Fund to focus on mitigation and prevention at the same time.

2. Sanitation and access to clean drinking water is aligned with the United Nation’s Sustainable Development Goals (SDG) and is attracting a great deal of attention from corporations, multilateral funding organizations and NGOs. Other SDG’s will benefit by the Water Funds actions.

3. Reduction in consumption and pollution, as well as sedimentation, has an immediate payback/benefit in the avoidance of water and wastewater investments and other economic and social impacts. There is likely low hanging fruit and quick wins that could give the fund immediate credibility.

4. Bogotá’s problem is not unique, several large cities in the world are facing and addressing similar issues related to urban and rural development impacts on water security (e.g., Johannesburg, Manila, Mexico City, Jakarta, and New Delhi). Knowledge-sharing and adoption of best practices offer less costly alternatives to inventing new solutions independently.

5. The most important water producing and recharge areas for Bogotá have already been identified by Agua Somos. Continued and new natural infrastructure initiatives (including protection and policy enhancements, and incentives for conservation) in these areas represent a significant opportunity to further protect surface and groundwater.

6. Gaining commitment of government organizations during the current period of government transition.

#### THREATS

1. The Aqueduct Company of Bogotá (EAB) is a key water security stakeholder and is not currently an active partner. Without their active support and participation, a Water Fund will have limited effectiveness. In fact, they can be a threat if they take a stance against the fund.

2. Corruption and non-enforcement could become considerations worth watching, particularly when dealing with licensing and permitting-related issues and in dealing with certain stakeholders.

3. Considering the complexity of the challenges in Bogotá, the potential for distraction will be great. It is essential that the Design Phase clearly outlines the areas of intervention and focus.
2.3 Conditions

To address the aforementioned weaknesses and threats the Water Fund’s Design Phase needs to consider the conditions below to ensure the Water Fund remains feasible and sustainable.

<table>
<thead>
<tr>
<th>Conditions</th>
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<tbody>
<tr>
<td>1. The Water Fund needs to put in place an effective continuing stakeholder engagement program to ensure the various stakeholders remain aligned with the Water Fund’s mission, goals, and objectives. This includes securing critical and key stakeholders from the onset (such as EAB, the Municipality and the Environmental Secretary of Bogotá, and the Mayor) without which the Fund will have limited effectiveness.</td>
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<td>2. A Water Fund Director must be appointed in order to lead and advance the stakeholder engagement program, and other activities.</td>
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<td>3. The Water Fund needs to have a sound anti-corruption policy to maintain credibility and effectiveness.</td>
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<td>4. Upon the approval of the Water Fund, sustainable sources of funding must be sought to ensure the long-term success of the Fund.</td>
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<tr>
<td>5. Some of the assumptions in this analysis will need to be verified to withstand scrutiny by experts and academia. Such verification should only be done if and when necessary (e.g., when decisions are required, for publication or dissemination). We recommend the following studies per category:</td>
</tr>
<tr>
<td>a. Optimum intervention portfolio</td>
</tr>
<tr>
<td>▪ Perform a Robust Decision Making Model Analysis to decide on the most optimal portfolio of solutions</td>
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<tr>
<td>▪ Additional supporting studies to be determined using the science governance process for the Design Phase, to provide crucial data for further decisions. Common sense and re-use of existing studies will always be preferable over new and expensive studies. Some examples could be:</td>
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<tr>
<td>  - Water use study to determine how much each sector is using and what efficiency opportunities exist, especially for agriculture where improved practices could impact water consumption, production, nonpoint source pollution and sediment loss, and other parameters.</td>
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<tr>
<td>  - Study of the extent and economic impact of high pollution levels (related to untreated wastewater), in surface water, groundwater and recharge areas.</td>
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<td>  - Hydrological study to define: the benefits of natural infrastructure projects on surface water. This study could provide justification for public and private funding and create a sense of urgency for stakeholders by showing reduced sediment losses and improved the capacity of water storage reservoirs and groundwater-surface water dynamics, among other benefits. Assessment of the profitability of conservation in key areas that contribute to surface and ground water capacity.</td>
</tr>
<tr>
<td>  - Study to understand the impact of urban green infrastructure in absorbing and reducing peak flow of storm water and increasing water quality;</td>
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<tr>
<td>  - Risk impact assessment of water quality, and benefits of green infrastructure preventing water pollution;</td>
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<td>b. Mechanisms for influencing public policy</td>
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<tr>
<td>▪ Monetization of the effects of domestic water security problem elements, including additional work on:</td>
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<tr>
<td>  - Business case for EAB on the cost of reducing non-revenue water;</td>
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<tr>
<td>  - Economic impact of maintaining and improve hydrological services; including industrial/commercial production at risk due to future water scarcity and the current pollution levels;</td>
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<tr>
<td>  - Financial impacts of flooding and other water-related disasters in Bogota D.C. would be crucial to the development of the Water Fund.</td>
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<td>  The above includes the cost of no action.</td>
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<tr>
<td>▪ Treated wastewater study, including:</td>
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<tr>
<td>  - Economic and health effects of untreated water on all sectors in Bogota D.C. - agricultural activities, on business, residential, institutions</td>
</tr>
<tr>
<td>6. Stakeholder Engagement – from very early on – The Aqueduct Company of Bogotá (EAB) did not renew the agreement with the Water Fund. This is a critical factor, because without the participation of EAB the function of the Water Fund will not be effective.</td>
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### 3.0 PROBLEM STATEMENTS, MAGNITUDE AND POTENTIAL WATER FUND CONTRIBUTIONS/INTERVENTIONS

Considering the identified problems below and their magnitude, the establishment of a Water Fund will contribute by closing evidence gaps, influencing decision-making, supporting/providing green projects and bringing new stakeholders to the table to have impact on scale. The formation of a Water Fund will positively impact all dimensions of water security.

### 3.1 Problem 1 - STRESSED GREY AND GREEN INFRASTRUCTURE

<table>
<thead>
<tr>
<th>PROBLEM 1</th>
<th>Water Security Dimension</th>
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<tbody>
<tr>
<td>Urban and rural development have: stressed water supply and sanitation services, harmed natural infrastructure and systems, and increased the likelihood of flooding in and around Bogotá. (Closely related to problem 2 – Pollution)</td>
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</table>

**MAGNITUDE OF PROBLEM**

- The water supply system covers 82% of the urban population of Bogotá, meaning about 1.4 million residents or 18% (SUI and DANE) are unserved, receiving water directly from springs, illegal connections and groundwater wells.
- According to the 2006 Master Bogota Water and Sewer Plan, water demand will exceed the current concession in 2022.
- The development of agricultural and livestock activities has caused land degradation and erosion in the basins that supply water to Bogotá. These activities have increased sediment loss and harmed natural water regulation, which threatens the water supply for Bogotá. Likewise, this situation leads to rapid silation of reservoirs, degradation of aquatic ecosystems and loss of biodiversity of these high Andean ecosystems.
- According to the Environmental Management Plan for Land owned by the Water Company of Bogotá (Ponce de León, 2003), sedimentation rate (lost capacity) predicted in several dams for the South System in the coming years is: Chisacá 65,000 m³/year, Mugroso 40,000 m³/year and Curubital 100,000 m³/year.
- There is an increased possibility of flooding, it is estimated that 6,170 hectares of Bogotá correspond to areas where there is likelihood of flooding by overflow of natural waterways and/or other bodies of water. It is estimated that 295,000 people (about 4% of the population) are located in areas of high flood threat.
- Bogotá has abundant water resources, however, pollution, sedimentation, inadequate infrastructure, lack of sewage treatment and the extreme variability of annual rainfall increase the likelihood of water stress conditions.

See the Situation Analysis for additional information on the magnitude of this problem. Also see the Magnitude Sections of the other problems in this document because they are related and overlap.

**POTENTIAL WATER FUND CONTRIBUTIONS / INTERVENTIONS**

- Conduct studies (as listed in the previous section) to determine the water use in each sector and appropriate conservation measures, along with enhanced policies to safeguard recovered volumes and protect water sources.
- Promote water-use efficiency along with water/wastewater reuse in all sectors (residential, business, agriculture, institutions) and policies to safeguard recovered volumes and protect water sources. Reduce demand through public campaigning, educational programs at all levels, providing incentives, water reduction clubs for small and medium-sized enterprises, water recycling schemes, promoting water reuse and water use efficiency, etc.
- Increase and strengthen conservation and restoration projects in water sources areas and raise awareness to maintain and/or increase surface water and groundwater recharge for urban and other areas (includes policy enhancements).
- Bring key stakeholders together to enhance the integration of water policies for water security, environmental management and spatial planning.
- Monetization study to determine cases for investment of various remedies and comparison of preserving watershed health vs grey infrastructure, and the cost of doing nothing (See proposed studies in previous section).
- Improve, increase and strengthen agricultural practices and develop best management practices (BMPs), including: soil health, conservation agriculture, irrigation efficiency, nitrogen and other agro chemical optimization, and riparian restoration.
- Help improve urban and rural development policies
- Water source activities
  - Targeted land protection (forest, paramo, wetlands)
  - Restoration/revegetation of natural ecosystems (forest, paramo, wetlands)
  - Riparian protection and restoration to address water quality (nutrients and sediments)

<table>
<thead>
<tr>
<th>Water Funds Support Category</th>
<th>Close Evidence Gap</th>
<th>Influence Decision-Making</th>
<th>Implementing / Supporting Green Projects</th>
<th>Bringing New Stakeholders</th>
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<td>X</td>
<td>X</td>
<td>X</td>
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</table>
3.2 Problem 2 – HIGH POLLUTION LEVELS

<table>
<thead>
<tr>
<th>PROBLEM 2</th>
<th>MAGNITUDE OF PROBLEM</th>
<th>POTENTIAL WATER FUND CONTRIBUTIONS / INTERVENTIONS</th>
</tr>
</thead>
</table>
| High pollution levels pose a threat to the environmental, social and economic health of the Bogotá region. (Closely related to Problem 1 – Stressed Grey and Green Infrastructure) | Bogotá discharges wastewater directly into Bogota River with only 27% of it being treated. Pollution in the river causes problems with hygiene and increases the risk of water-related diseases | Promote a study on the current financial situation associated with sanitation/wastewater treatment issues:  
- Define how the Water Fund can contribute with to implement the Bogotá river sentence, which promotes tools, engagement mechanisms, timeframes, responsibilities and funds to several intuitions involved with the Bogotá river to jointly work for its decontamination.  
- Define affected stakeholders and the impacts (financial-economic, social, health) on each;  
- Monetize the impacts of water sanitation/wastewater/pollution treatment problems;  
- Use data to define most appropriate sources of funding, create a sense of urgency to justify investment to lower pollution levels, and enhance wastewater treatment policies and enforcement |
| | Water supply and sanitation in Colombia has improved in many ways over the past decades but rural and outlying areas of the city of Bogotá are vulnerable with a lack of sanitation services. | Encourage and/or implement green infrastructure interventions (e.g., polishing wetlands for treatment). |
| | According to calculations by the Mayor of Bogota, losses due to Bogota River water pollution related to the health of the exposed population in 2000 were COP $ 9,420 million (Institute of Urban Studies, 2017). | Promote improved wastewater treatment in all sectors through an awareness campaign and benchmarking program where champions serve as examples. |
| | According to calculations made for the Mayor of Bogota, losses due to Bogota River water pollution related to agriculture and fishing production in 2000 were COP$ 80,622 million and COP$ 51 million respectively (Bravo Borda, 2012). | Work to enhance policies to increase spending on treatment infrastructure and enforcement. |
| | It is estimated that the monetary value of losses from Bogotá River pollution for the region was more than COP $ 330,000 million annually in 2001 (Foster Engineering Ltda, 2001, Scenarios for future financing and project development decontamination of the Bogota River " BAS-Mayor of Bogota.) | Bring stakeholders together to bridge the gap and drive towards a private-public solution through an action plan. |
| | Increasing pollution in the High basin of the Bogotá River (North System) has deteriorated water supply feeds, increasing treatment costs and creating a risk of rationing. In the near future, erosion and contamination are expected to elevate levels of manganese and organic matter in raw water above 0.075 mg/l and 5 mg/l respectively (Bravo Borda, 2012). | Create awareness and implement education programs with key stakeholders using reporting and data on impacts. |
| | The Muña reservoir receives water from the Bogotá River (average flow 28.48 m³/s) downstream of Bogotá D.C. urban area. The reservoir has a total hydraulic capacity of 75 m³/s, and can | Establish and implement a performance and recognition program that includes assessing, reporting and rewarding performance. |
| | - Ranching BMPs  
| | - Fire risk management in water sources  
| | - Activities to reduce water quality problems in mid-watershed:  
| | - Ranching BMPs  
| | - Incorporate green/grey infrastructure solutions in the urban area to reduce flooding problems  
| | - Small recharge areas throughout the city to absorb excess water  
| | - Advocate mandatory permeabilization of large-paved surfaces  
| | - Replacement of storm water drains.  
<p>| | - Advocate or promote modifications to gray infrastructure that maximizes the reuse of rainwater and/or storage in the aquifer or lake. | Create a program to encourage the application of innovative treatment and reuse technologies (with an emphasis on natural infrastructure). |</p>
<table>
<thead>
<tr>
<th>Water Fund Feasibility Decision Support Document</th>
<th>Bogotá, Colombia</th>
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</thead>
<tbody>
<tr>
<td><strong>generate 1,150 MW (UPME, 2016). Discharge of polluted water from the Bogotá River affects the storage volume of the reservoir and may affect operating conditions and electricity generation.</strong></td>
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<tr>
<td>• The high pollution levels in the water sources has harmed the treatment capacity of the Wiesner and Tibitoc water treatment plants, which treat more than 98% of the water consumed by Bogotá. In 2011, the Tibitoc plant had 103 days of moderate to high water quality risk due to high incoming pollution levels, including 9 days in which it could not treat water at all (Bravo Borda, 2012)</td>
<td>• Influence the implementation new and enhanced wastewater treatment capacity and improve existing facilities.</td>
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<tr>
<td>• Urbanization in the upper basin of the Teusacá River in La Calera has contaminated the San Rafael reservoir, which mixes its waters with the Chingaza System. This pollution raises the cost of treatment at the Wiesner Plant. If this situation continues, it will be necessary to build a tunnel bypass to prevent water from the Teusacá from reaching the reservoir (Bravo Borda, 2012).</td>
<td>• Explore development of water treatment systems with farmers in the upper watershed</td>
</tr>
<tr>
<td>• One of the most serious health problems of the Middle Bogotá River basin is the irrigation of pasture and crops with contaminated water. For example, high pollution generated in the Middle Basin prevented the CAR from building the Tocaima-Girardot Irrigation District project in the Lower Basin (Bravo Borda, 2012).</td>
<td>• Set-up an exchange with other cities with similar problems and exchange best practices.</td>
</tr>
<tr>
<td>• Pollution in the Bogotá River and its tributaries has been growing as a result of increasing discharges from municipalities in the High and Middle Basins (Bravo Borda, 2012).</td>
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<tr>
<td>• Bogotá discharges all wastewater into the Bogotá River through three main tributaries: Salitre, Fucha and Tunjuelo. The average flow of the Bogotá River in the dry season before entering the city is 12 m³/s, and Bogotá discharges from 22 m³ into it, of which only 27% receives primary treatment (ACUEDUCTO, 2017). As a result, the river is highly contaminated with zero dissolved oxygen and high levels of BOD₅, TSS and fecal coliform. This poses serious health risks to people living along the banks of the river.</td>
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See the Situation Analysis for additional information on the magnitude of this problem. Also see the Magnitude Sections of the other problems in this document because they are related and overlap.