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Document of
The World Bank

Report No: ICR00002952

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IBRD-73650)

ON A

CREDIT

IN THE AMOUNT OF US$ 80 MILLION

TO THE

CAPITAL DISTRICT OF BOGOTA

WITH THE GUARANTEE OF THE REPUBLIC OF COLOMBIA

FOR A

BOGOTA DISASTER VULNERABILITY REDUCTION PROJECT

IN SUPPORT OF THE SECOND PHASE OF THE

DISASTER VULNERABILITY REDUCTION PROGRAM

July 17, 2014

Sustainable Development Department
Mexico and Colombia Country Management Unit
Latin America and the Caribbean Regions

CURRENCY EQUIVALENTS

(Exchange Rate Effective July 17, 2014)

Currency Unit = Colombian Peso
US$ 1.00 = COP$ 1,868.41

FISCAL YEAR

January 1 - December 31

ABBREVIATIONS AND ACRONYMS

APL	Adaptable Program Loan
BUS	Bogota Urban Services
CAS	Country Assistance Strategy
CVP	Social Housing Fund
DABS	Department of Social Welfare
DAMA	District Environmental Management Agency
DPAD	National Directorate for Disaster Prevention and Response
DPAE	Directorate for Prevention and Emergency Response
DVRP	Disaster Vulnerability Reduction Project
FFDS	District Health Fiduciary Fund
FOPAE	Fund for Prevention and Response to Emergencies
FOREC	Coffee Belt Reconstruction Fund
GoC	Government of Colombia
GoCDB	Government of Capital District of Bogota
IBRD	International Bank for Reconstruction and Development
LAC	Latin America and Caribbean Region
PNPAD	National Plan for Prevention and Disaster Response
POT	Land Use Plan
SDPAE	District System for Prevention and Emergency Response
SDA	District Environment Secretariat
SDIS	District Social Integration Secretariat
SDS	District Health Secretariat
SED	District Education Secretariat
SG	Government Secretariat
SHD	District Secretariat of Finance
SIRE	Information System for Disaster Prevention and Emergency Response
SNPAD	National System for Prevention and Disaster Response
UPC	Project Coordination Unit

Vice President:	Jorge Familiar
Country Director:	Gloria Grandolini
Practice Manager:	Anna Wellenstein
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ICR Team Leader:	Javier Sanchez-Reaza

COLOMBIA
Bogota Disaster Vulnerability Reduction Project in support of the Second Phase of the Disaster Vulnerability Reduction Program

CONTENTS

A. Basic Information			
Country:	Colombia	Project Name:	Disaster Vulnerability Reduction Project - APL2
Project ID:	P085727	Credit Numbers:	IBRD-73650
ICR Date:	07/10/2014	ICR Type:	Core ICR
Lending Instrument:	APL	Borrower:	Sub-national, Bogota
Original Total Commitment:	US$ 80M	Disbursed Amount:	US$ 63.46M
Revised Amount:	US$ 77.55M		
Environmental Category: B			
Implementing Agencies: Bogota District			
Other External Partners:			

B. Key Dates				
Process	**Date**	**Process**	**Original Date**	**Revised / Actual Date(s)**
Concept Review:	04/04/2005	Effectiveness:	10/13/2006	10/13/2006
Appraisal:	07/01/2005	Restructuring(s):		06/24/2009 05/30/2011 11/13/2012 12/20/2012
Approval:	03/03/2006	Mid-term Review:		03/20/2009
		Closing:	06/30/2011	01/31/2014

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes:	Moderately Satisfactory
Risk to Development Outcome:	Low
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Moderately Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)			
Bank	**Ratings**	**Borrower**	**Ratings**
Quality at Entry:	Moderately Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Moderately Satisfactory
Overall Bank Performance:	Moderately Satisfactory	**Overall Borrower Performance:**	Moderately Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators			
Implementation Performance	**Indicators**	**QAG Assessments (if any)**	**Rating**
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	Yes	Quality of Supervision (QSA):	Highly Satisfactory/Likely (QALP-1 Assessment date 09/24/2008)
DO rating before Closing/Inactive status:	Satisfactory		

D. Sector and Theme Codes		
	Original	**Actual**
Sector Code (as % of total Bank financing)		
Central government administration	3	3
General education sector	35	35
Health	50	50
Non-compulsory pensions and insurance	2	2
Other social services	10	10
Theme Code (as % of total Bank financing)		
City-wide Infrastructure and Service Delivery	25	25
Natural disaster management	50	50
Participation and civic engagement	25	25

E. Bank Staff		
Positions	**At ICR**	**At Approval**
Vice President:	Jorge Familiar	Pamela Cox
Country Director:	Gloria Grandolini	Isabel Guerrero
Program/Sector Manager:	Anna Wellenstein	John Henry Stein
Project Team Leader:	Eric Dickson	Francis Ghesquiere
ICR Team Leader:	Javier Sanchez-Reaza	
ICR Primary Authors:	Javier Sanchez-Reaza	
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F. Results Framework Analysis

Project Development Objectives (from Project Appraisal Document)

The purpose of this APL2 project is to reduce the vulnerability of the Capital District of Bogota to adverse natural events, by: (i) strengthening its capacity to manage Disaster risks, and (ii) reducing vulnerability in key sectors.

Revised Project Development Objectives (as approved by original approving authority)

There were no changes to the original PDO throughout the life of the Project.

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Reduction in identified population at risk.			
Value (Quantitative or Qualitative)	604,000[1]	480,000		236,972
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Target surpassed by 40%. The Project effectively reduced the population at risk from 604,000 to 236,972, through the development of risk maps and other studies that enabled the District to identify high-risk areas and prioritize key actions to reduce vulnerability.[2]			
Indicator 2:	Reduction in estimated average annual loss.			
Value (Quantitative or Qualitative)	N/A	N/A		3.9%
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Baselines/targets were not set for this indicator in the PAD. Civil works were carried out to retrofit schools/kindergartens and to prevent landslides/flooding that overall reduced the intervened buildings' vulnerability and potential losses. The probable maximum loss (PML) of a 1-in-100-year earthquake was estimated to decrease from 6.1 to 2.2%.[3]			

[1] The original baseline of 600,000 was adjusted in the Mid-Term Review.
[2] Although maps and studies do not reduce risk per se, they were used as inputs to prioritize actions and areas towards the completion of risk reduction and resettlement components.
[3] Source: Ghesquiere et al. (2006)

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	**1.a Improved understanding of risks**			
Value Quantitative or Qualitative)	N/A	N/A		1,762
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Baselines/targets were not set for this indicator in the PAD, however a series of training activities were carried out to strengthen capacity of safety wardens in public schools benefiting 1,762 teachers.[4]			
Indicator 2:	**1.b Increased capacity to monitor risks**			
Value Quantitative or Qualitative)	900 ha	700 ha		543 ha
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Target surpassed by 22%. The Project was very successful reducing the total non-monitored risk area to 543 ha. To that effect the district carried out 57 risk assessment studies, 40 building-retrofitting designs, and 3 networks were extended to monitor geotechnical and landslide risks.			
Indicator 3:	Increased proportion of public buildings (schools, hospitals, fire stations) resistant to earthquakes.			
Value Quantitative or Qualitative)	580,000[5]	455,000		235,183
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Target surpassed by 38%. This indicator was set based on the number of people exposed to risk in public buildings, and as a result of the Project a total of 344,817 people in public buildings are now safer.			
Indicator 4:	**4.a Increased capacity of agencies involved in SDPAE**.			
Value Quantitative or Qualitative)	N/A	N/A		5,730
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Baselines and targets were not set for this indicator in the PAD. However, 74 training courses, including rescue techniques and decision making during a crisis, were carried out targeting operational personnel from Firefighters, Civil Defense, Red Cross, Fund for Prevention and Response to Emergencies (FOPAE), District Health Secretariat (SDS) and District Social Integration Secretariat (SDIS).			

4 Since a target was neither set at implementation, this ICR considers that using the number of teachers that were trained, not only reflects the dissemination of a better understanding of DRM, but also that this activity could have served as a the multiplier effect over a wider population being more aware of risks and their implications.

5 The original baseline of 600,000 was adjusted in the Mid-Term Review

Indicator 5:	**4.b Number of agencies integrated in the Information System for Disaster Prevention and Emergency Response (SIRE)**			
Value Quantitative or Qualitative)	2	8		18
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Target surpassed by 10 agencies. By Project closing, a total of 18 agencies were incorporated in SIRE, including District Institute of Risk Management and Climate Change (IDIGER) and Local DRM Councils (by neighborhood), among others.			
Indicator 6:	Reduction in the number of families living in high risk.			
Value Quantitative or Qualitative)	25,000[6] people	700 households		1.067 households
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Target surpassed by 53%. 367 additional families living in the Nueva Esperanza neighborhood were resettled to safer locations with secure housing tenure.			
Indicator 7:	Increased coverage of public and private assets against natural disasters.			
Value Quantitative or Qualitative)	0	2 studies		N/A[7]
Date achieved	03/03/2006			01/31/2014
Comments (Incl. % of achievement)	Target not met. Although evidence of studies to reduce the District's fiscal vulnerability to disasters were provided during the ICR workshop, these studies were not delivered, disseminated or used in planning before Project closing, and therefore no contribution to the achievement of the PDO was registered.			
Indicator 8:	Construction progress in hospitals.			
Value Quantitative or Qualitative)	23.9%	100%		57%
Date achieved	12/20/2012	12/31/2013		01/31/2014
Comments (Incl. % of achievement)	Target not met. In spite of two restructurings extending the Project's closing date, limitations in contract management, institutional arrangements, and recurrent delays in construction contributed to the underperformance of this indicator.			

[6] While the indicator was expressed in reduction of families living under high risk, the baseline was set as number of people. The Subcomponent D.4 description at the PAD establishes as target "up to 700 households have been earmarked for resettlement to safer locations with secure housing tenure"; therefore, this indicator was measured in number of households. For planning purposes, the Bogota District's Planning Department assumed that a household/family is composed by an average of four individuals.

[7] This ICR registered this outcome as N/A since no evidence was provided by the Client on whether public buildings were insured or not.

G. Ratings of Project Performance in ISRs

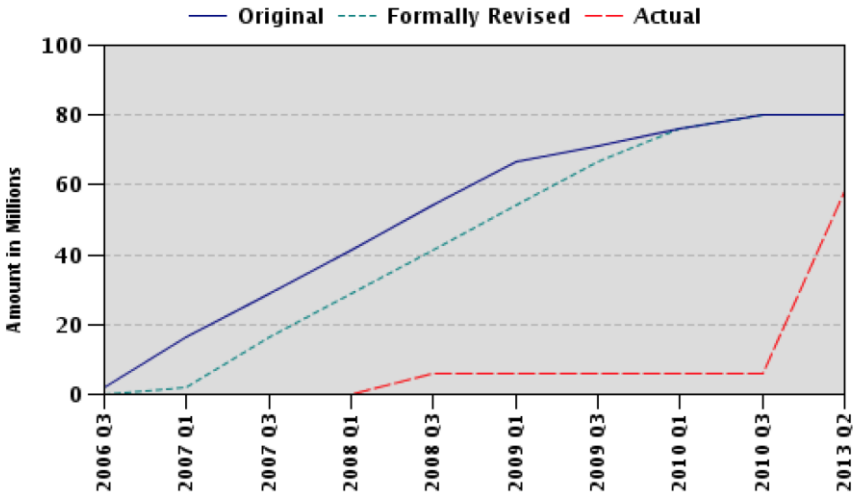
No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
1	06/01/2006	Satisfactory	Satisfactory	0.00
2	12/18/2006	Satisfactory	Satisfactory	0.00
3	06/04/2007	Satisfactory	Moderately Satisfactory	0.00
4	12/15/2007	Satisfactory	Moderately Unsatisfactory	6.09
5	06/20/2008	Satisfactory	Moderately Unsatisfactory	6.09
6	08/28/2008	Highly Satisfactory	Moderately Satisfactory	6.09
7	01/09/2009	Highly Satisfactory	Moderately Satisfactory	6.09
8	08/19/2009	Highly Satisfactory	Moderately Satisfactory	6.09
9	03/23/2010	Highly Satisfactory	Moderately Satisfactory	6.09
10	11/06/2010	Highly Satisfactory	Moderately Satisfactory	6.09
11	06/22/2011	Highly Satisfactory	Moderately Satisfactory	37.94
12	12/24/2011	Highly Satisfactory	Moderately Satisfactory	50.24
13	07/10/2012	Satisfactory	Moderately Satisfactory	50.24
14	01/29/2013	Satisfactory	Moderately Satisfactory	58.15
15	12/03/2013	Satisfactory	Moderately Satisfactory	58.15

H. Restructuring (if any)

Restructuring Date(s)	Board Approved PDO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in USD millions	Reason for Restructuring & Key Changes Made
		DO	IP		
06/24/2009		HS	MS	6.09	Based on MTR: (a) revision of the extent of works under Component B to reflect a reduction of the number of retrofitting or rebuilding works; (b) increase of the construction of new buildings where this was found to be more efficient than retrofitting old buildings, and (c) changes to the environment and social safeguards arrangements described in the PAD
05/30/2011		HS	MS	37.94	Extension of Project closing date to December 31, 2012, to allow the completion of seven hospitals and reallocation of unallocated Loan proceeds of US$ 4,683,000 between categories.

12/20/2012		S	MS	58.15	Extension of the Project closing date to January 31, 2014 to allow the completion of four hospitals, and cancelation of civil works of three hospitals.

I. Disbursement Profile



1. Project Context, Development Objectives and Design

1.1 Context at Appraisal

1. **Country and Sector Background**. Colombia is highly prone to natural disasters. The country straddles the Andean mountain region and Pacific "belt of fire", where high seismic potential combines with volcanic activity. In the last 25 years, the country has suffered six major earthquakes, three volcanic eruptions, major landslides, and extensive flooding. The location –in high-risk prone areas- and the speed of urbanization have led to an increased exposure to risk, and have increased the country's vulnerability to adverse natural events.

2. With around 7.7 million inhabitants, and 26 percent of national GDP, the Capital District of Bogota is by far Colombia's largest concentration of economic activity, yet it is also located in a region prone to earthquakes, floods, and landslides. The District's total surface is 1,777.98 km2 of which 27 percent are urban or suburban areas. Growing at an average annual population growth rate of 1.48 percent,[8] the city sits on the oriental branch of the Andean mountain chain and is exposed to a variety of hazards including floods and forest fires, with medium to high exposure to seismic activity. Modeling exercises financed during project preparation estimate that a major earthquake occurring in Bogota could result in losses in excess of US$10 billion[9] with serious social and economic repercussions on both human welfare and the national economy.

3. **Government strategy.** Since the inception of the National System for Prevention and Disaster Response (SNPAD) after the 1983 Popayan earthquake, the Government of Colombia (GoC) shifted to a broader disaster risk management (DRM) approach and focused on risk identification, risk reduction, and risk transfer. As a result national programs were decentralized by the active participation of regional agencies and local government addressing local risks. In addition, a series of laws have helped to shape a national DRM framework, particularly by establishing seismic-resistant building standards for new construction, a timeline for the retrofitting of key public facilities such as hospitals and fire stations, and Land Use Plans (POT) to promote and direct territorial planning and urban management processes.

4. Bogota already has many important elements of a disaster management system. The Government of the Capital District of Bogota (GoCDB) has adapted the SNPAD at the municipal level through the District System for Prevention and Emergency Response (SDPAE), bringing together public, private, and community actors involved in risk management under the leadership of the Mayor. Further legislation was approved in 2004, strengthening the System by defining organizational roles and responsibilities for

[8] Colombia's National Statistics Agency (DANE) has estimated Bogota's population growth rate for the period between the 2005 census and 2010.

[9] *Exposición del Estado Colombiano ante Desatres Naturales*, PHRD Study, Omar Dario Cardona, 2005

participating agencies, coordination mechanisms, and a mandate to formulate a 10-year Plan for the Prevention and Attention to Emergencies in the District.

5. The Country Assistance Strategy (CAS) Progress Report, approved by the Board on September 9th 2005, proposed a strategy for consolidating the Bank's partnership with Colombia over the following two years (FY06-FY07), including natural disaster risk management in support of: (i) Achieving Fast and Sustainable Growth, and (ii) Sharing Growth with all Colombians. In this context, the CAS recognized that the country's macroeconomic stability would benefit from improved DRM and a reduction in Bogota's exposure to adverse natural events.

6. **Rationale for the Bank's involvement.** Colombia's 2005 CAS priority of "achieving a fast sustainable growth" required the strengthening of the national disaster risk mitigation and reduction framework. As a result, the Bank was in a unique position to support investments in retrofitting infrastructure and strengthening the economic, institutional, and social aspects of disaster risk management.

7. The Bank has been proactively supporting DRM in Colombia since the late 1990s, and in 2005 approved a three-phased Adaptable Program Loan (APL).[10] The Program was aimed at reducing the State's fiscal vulnerability to adverse natural events by strengthening national capacity to manage disaster risk and at reducing vulnerability in key municipalities. Although highly exposed to disasters, the selected municipalities contribute significantly to national income and productivity. The APL represented one of the more innovative experiences in addressing urban risk reduction through a multi-faceted approach. It also represented an opportunity to move away from a focus on emergency, reconstruction and deferred maintenance finance, towards a comprehensive disaster risk management. In particular, the APL2 was the first DRM experience at sub-national level in the region.

8. Finally, mitigation and prevention works would reduce the vulnerability of key premises that provide social services to the general population (for example, schools, hospitals, vital roads, and water systems). The prevention of illegal/unsustainable settlements and the relocation of families from hazard-prone areas -where the poorest tend to live- would reduce both, their exposure to natural hazards and associated economic losses. Lastly, risk-transfer mechanisms designed under the Project would provide insurance mechanisms.

1.2 Original Project Development Objectives (PDO) and Key Indicators

[10] On May 10, 2005, the Board approved the Colombia-Disaster Vulnerability Reduction Project.

9. The purpose of this APL2 Project was to reduce the vulnerability of the Capital District of Bogota to adverse natural events, by: (i) strengthening its capacity to manage Disaster risk, and (ii) reducing vulnerability in key sectors.[11]

10. According to the Project Appraisal Document (PAD), the key indicators were:

- Improved knowledge of risk, vulnerability, and hazard conditions;
- Increased proportion of key infrastructure with improved structural integrity;
- Improved capacity of agencies that are part of the emergency response and prevention system;
- Reduced number of families living in risk-prone areas;
- Improved financial resilience of the district of Bogota.

11. For reporting and analysis purposes, this ICR used the Results Framework matrix in the PAD (Annex 3) as presented in the Data Sheet. However, it is important to bear in mind that supervision and evaluation were hampered by the lack of baselines, targets and quantitative indicators for some of the intermediate outcome indicators and PDO indicators matrices.

1.3 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification

12. There were no changes to the original PDO throughout the life of the Project.

1.4 Main Beneficiaries

13. Natural disasters disproportionately affect poor and socially vulnerable groups who tend to live in areas prone to risk, particularly in buildings that have not been subject to formal sector codes or regulations. These groups typically lack any type of economic safety net such as insurance plans.

14. Overall, the Project's direct beneficiaries included: (a) households in the District of Bogota who benefited from a strengthened DRM framework; (b) authorities and technical staff of the GoCDB benefiting from technical assistance, and improved coordination with DRM agencies; and (c) DRM agencies, which benefited from an improved governance structure and capacity development. The Project had a major beneficial impact on vulnerable population, whom are at greater risk of losing their lives, property, and assets in a natural disaster.

1.5 Original Components (*as approved*)

15. The Project had five original components:

[11] Although the PDO statement in the PAD and the legal agreement differ slightly, this ICR will use the PDO in the Loan Agreement.

A. *Risk Identification* (Total US$4.5 million, US$ 0 million from IBRD). This component aimed to enhance the capacity of the District of Bogota to identify and monitor risks in order to better target its investments and identify potential calamities before they occur, through hazard identification, vulnerability assessments and risk mapping.

B. *Risk Reduction* (Total US$104.3 million, US$ 78.6 million from IBRD). This component intended to complement the city government's existing risk reduction efforts to critical facilities and lifeline infrastructure in the event of a disaster by supporting the implementation of nonstructural and functional mitigation measures for service to continue during and after emergencies. Activities under this component included the engineering designs, retrofitting or construction works in public buildings to meet the latest seismic standards, and small mitigation works to mitigate landslides.

C. *Institutional Strengthening* (Total US$ 7.5 million, US$ 1.1 million from IBRD). This component aimed at enhancing the effectiveness and capacity of the District Administration to prepare for, respond to, and recover from significant emergencies. In this context, the component also supported the strengthening of the District's capacity to implement the project. Activities financed under this component included training of participating agencies' staff in safeguard, fiduciary, and technical aspects of the project, capacity building for Prevention and Emergency Response, and the implementation of an environmental management strategy to strengthen compliance of district public works with environmental requirements.

D. *Risk Prevention and Awareness* (Total US$20.9 million, US$ 0 million from IBRD). The objective of this component was to increase awareness at all levels of society, but particularly at the community level in order to convey the importance of risk mitigation and disaster preparedness. Activities carried out under this component included risk education, information campaign, and resettlement of approximately 2,300 families living in high-risk areas.

E. *Financial Coverage for Risk Management* (Total US$0.5 million, US$0.3 million from IBRD). This component objective was to develop a risk-financing strategy for losses arising from natural disasters. It aimed at providing the Municipality of Bogota D.C. with a financial strategy that guaranteed the appropriation of resources needed for disaster reconstruction or rehabilitation based on the most advanced catastrophe-risk modeling techniques (probabilistic earthquake risk models) and financial instruments (parametric insurance, contingent debt and/or catastrophe bonds). It also intended to facilitate the development of a private catastrophe insurance market, based on recent experiences in Colombia.

1.6 Revised Components

16. There were no changes to the Components throughout the life of the Project.

1.7 Other significant changes

17. **2009 Project Restructuring.** Based on the need to streamline Project activities, a first Project restructuring was approved in June 2009 that included: (a) revision of the extent of works under Component B: Risk Reduction, to reflect a reduction in the number of retrofitting or rebuilding works; (b) an increase in the construction of new buildings where this was found to be more efficient than retrofitting old buildings, and (c) changes to the environment and social safeguards arrangements described in the PAD.

18. **2011 Project Restructuring.** In May 2011, a second Project restructuring was approved to allow the completion of seven hospitals, and included: (a) an extension of the Project closing date from June 30th 2011 to December 31, 2012; and (b) a reallocation of Loan proceeds of US$ 4,683,000 between categories from category 6 (unallocated) to categories 1, 2, and 3 (works and training, works and training, and goods and training).

19. **2012 Project Restructuring.** A third Project restructuring was approved[12] on December 19th 2012 that included: (a) an extension of the Project closing date from December 31st 2012 to January 31st 2014; (b) the cancellation of financing for civil works of two hospitals (Antonio Nariño and Pablo VI Bosa) of the six unfinished hospitals given the non-fulfillment of the respective milestones; and (c) the inclusion of an additional indicator to measure weighted progress on hospital construction.

20. **Extension of Closing Dates**. The Project officially ended in January 2014 after two closing date extensions: (a) with the May 2011 restructuring from June 30th 2011 to December 31st 2012 to allow for additional time to complete civil works in seven hospitals; and (b) with the December 2012 restructuring, to January 31st 2014 to provide additional time for completing the civil works of four hospitals.

21. **Reallocation of funds across expenditure categories**. The 2011 restructuring reallocated credit proceeds from categories that had savings in order to support the completion of civil works in seven hospitals.

22. **Funds cancellation**. In September 2009, a total of US$ 2.45 million were cancelled due to misprocurement on the contracting related to the retrofitting of five kindergartens. At project closing a total of US$ 16.5 million unused funds were cancelled from the original loan.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

[12] Such approval followed a conditional extension approved in September 2012 that was granted to complete a set of milestones by November 30th 2012.

23. **Soundness of Background Analysis**. Project design was based on a thorough analysis of the country's DRM program. During project preparation, there was a growing body of knowledge and lessons learned on DRM and emergency projects within and outside the Bank. Moreover, the Project design benefited from lessons learned with the Bank-financed disaster risk management projects that incorporated risk analysis, local risk-reduction investments, and risk-transfer elements. These included the Honduras and Nicaragua Disaster Mitigation Projects, the Mexico Disaster Management Loan, the Colombia Earthquake Recovery Project, the Turkey Earthquake Reconstruction Project, and the Organization of Eastern Caribbean States (OECS) Catastrophe Risk Management and Insurance Reform Project. The team also benefited from the experience of the Bank-financed Bogota Urban Services project under implementation since 2003.

24. **Assessment of Project Design**. The PDO focused mainly on increased capacity for disaster vulnerability reduction in the District of Bogota and seemed achievable in a five-year period. The objective was clear and important for the country as indicated in the 2005 CAS. Additionally, the Project was proposed as the second phase of a three-phased Adaptable Program Loan (APL). The original choice of an APL stemmed from the need to address sector issues at the national level in order to create a platform for coordinating and supporting risk reduction activities, together with targeted interventions, in regions that combine the greatest economic productivity with high vulnerability to natural disasters. A second reason to use the APL stemmed from the need to allow municipalities to enter the program as they were ready and as they present viable disaster reduction investment plans. This would have therefore allowed parallel interventions in different municipalities, entering the Program at different times, but operating under the same national framework.

25. The Project was designed to benefit from the initial results of APL1, but also to contribute to it through improved coordination with national entities and through studies requiring the involvement of both the national and local level. The strategic choices underlying the original Project design reflect lessons learned on DRM. As part of a Program, the Project focused on reducing the GoCDB's fiscal vulnerability to adverse natural events by strengthening national capacity to manage disaster risk. Although APL1's appraisal took place only a few months prior to appraisal for the APL2, the Project benefitted from the experience the APL1 offered. The latter was informative in facilitating direct execution arrangements for Executing Partners in the former. APL1 was also useful for to design the APL2 as the former evinced the need to strengthen risk identification and analysis.

26. Although safeguard risks were properly addressed at Project design through Banks safeguard policies, adjustments to the Project Appraisal Document (PAD) were needed to enable environment and social safeguards arrangements.

27. Project components were clearly formulated and conducive to PDO achievement. Based on close collaboration between the Bank and the GoCDB, project design

emphasized: (i) risk identification and reduction, (ii) institutional strengthening, (iii) risk mitigation, and (iv) financial coverage for risk management.

28. **Risk Assessment**. Overall project risk was assessed as *Moderate* at appraisal. This rating, in retrospect, seems to have gauged the challenges of the project related to its innovative nature and institutional weaknesses. Most of the identified risks materialized during project implementation, while in several cases the proposed mitigation measures were effective. One of these risks, rated as moderate –Capacity of project management activities will make it difficult to follow Bank fiduciary and procurement guidelines– materialized on two occasions: (i) in 2009, when the mitigation measure resulted in cancelling funds due to misprocurement on contracting civil works proved effective, and (ii) towards the second half of the implementation, where difficulties in contract management prevented seven civil works from being finished on time, requiring two extensions of project closing date.

2.2 Implementation

29. For most of the Project's lifespan, implementation was adequate due to strong Government commitment. However, delays and limitations in contract management impinged on implementation progress resulting in a rating of *moderately satisfactory* at Project closing.

Several factors helped implementation positively:

30. *Continuous Government-Bank partnership and strong Government commitment.* The Government and the Bank built a solid partnership on DRM, which has ensured continuous technical and financial support and close collaboration free from political changes in the District. In parallel, throughout project implementation the GoCDB demonstrated its commitment to PDO achievement. The adoption of local environment policies and construction guidelines for all new constructions in Bogota safeguarded the effort on retrofitting and reconstruction.

31. *Implementing Agency's technical capacity of staff*. The implementing institutions, without exception, have staff with a high level of dedication and professionalism, which has positively benefited project implementation. A sound understanding of the Project and a strong commitment to the achievement of its objectives is also worth highlighting.

32. *Efficient local procurement system.* Development of a procurement system that in addition to complying with Bank's principles, enabled local competition, resulting in competitive prices and a more efficient and transparent implementation of the selection/bidding evaluation process.

Several factors affected implementation adversely:

33. *Unrealistic target setting.* Weaknesses during project execution were evidenced by: (i) the lack of consistency between district's policies/sector development plans and

project goals led to a discrepancy between targeted hospitals by the Project and those considered under Bogota's Health Master Plan and the District's Biannual Strategic Plan, and (ii) the gap between project targets and reality on the ground, given the lack of pre-feasibility studies, that were neither addressed at Project design, nor in any of the subsequent restructurings.

34. *Limitations on PIU's administration and control.* Complex implementation arrangements given GoCDB's structure included six sector agencies responsible for the implementation of components/activities. SDH faced obstacles to enforce reporting and project management as executing agencies received resources directly, which effectively reduced incentives to comply with reporting and advancing mechanisms.

35. *Health sector's legal framework.* Delays in project implementation due to the particular health system legal framework effectively prevented both SDH and SDS from ensuring proper execution of project activity. As hospitals operate independently from SDS as *Empresas Sociales del Estado* (State-owned Social Enterprises), strong coordination issues arose during project implementation delaying extensively the retrofitting and new construction activities. An action plan was prepared to address the resulting delays and meet construction targets during grace period after project closing date; nevertheless, these works were not finished (see Annex 2 for a list of hospitals and their status).

36. *Civil works planning weaknesses*. Shortcomings in technical and financial planning of some implementing agencies to ensure compliance of civil works, building designs/plans approved in spite of technical deficiencies, as well as an underestimation of required timeframes to obtain building permit and connections to public utilities, led to delays and additional operational costs.

37. *High staff turnover and low filing effort.* Project implementation has been adversely affected by a staff turnover in various agencies within the GoCDB. Delays in project implementation were linked to low institutional memory and lack of incentives to file documents related to contract decisions and agreements as evidenced in the 2011 Independent Procurement Review report.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

38. **M&E design**. The original Project Results Matrix (detailed in Annex 1 of the PAD) had shortcomings, especially if assessed on the basis of current M&E practice. The PDO outcome indicator should be better defined in terms of accuracy, where it states two indicators but only provide baseline and target for one. In addition, baselines in several intermediary outcome indicators fell in the same problem of the PDO, or were not well defined by corresponding data; in particular, the indicator for number of affected families in high-risk area was expressed in population figures. Nonetheless, development of a practical methodology and baseline surveys to measure some of the key potential environmental, social and economic impacts identified in the PAD should have been attempted at the time of the original design.

39. Building on the MTR revision results, the 2009 Project Restructuring missed the opportunity to address the inconsistencies of the M&E design, by establishing better indicators' measurement units.

40. **Implementation and Use**. Appropriate data for PDO indicators were not always systematically collected, especially in the initial implementation phase. Thanks to the GoCDB's concerted effort and enhanced inter-institutional coordination, particularly with the Fund for Prevention and Response to Emergencies (FOPAE) overall M&E was carried out effectively, and monitoring reports were used appropriately for project management and preparation of a final report. A Project Impact Evaluation was contracted to an independent evaluator; nevertheless, due to contract management issues its final report will not be ready by the time of the presentation of this ICR.

2.4 Safeguard and Fiduciary Compliance

41. **Safeguard Compliance**. The Project was classified as Category B, and triggered the following policies: Environmental Assessment (OP/BP 4.01), Involuntary Resettlement (OP/BP 4.12), and Physical Cultural Resources (OP/BP 11.03). As reflected in the 2009 Restructuring Package,[13] MTR and ISRs, the main findings are:

42. *Environmental Safeguards*. The project has promoted positive impacts on the environment through the District Environment Secretariat's (SDA) work on environmental awareness through social networks, linking over 40 organizations, to encourage and coordinate prevention activities in hazard-prone areas. The project also financed the administration of protected land through community participation schemes. In addition, the environment management activities included: (a) identification, evaluation, and monitoring of risks; (b) risk mitigation works; (c) institutional strengthening activities including environmental management; and (d) natural hazards prevention and awareness. However since civil works were carried out (schools, hospitals, kindergartens, fire stations and some minor flood mitigation works) as part of the project, some usual construction related environment impacts were registered. The environmental impacts, associated with these interventions, where not expected to be and have not been significant or irreversible. No buildings with cultural heritage value have been retrofitted; therefore the discussion of OP 4.11 is not relevant.

Although the GoCDB's institutional capacity to enforce environmental regulations was considered weak at Project preparation, and thus private construction initiatives and public works have not fulfilled their environmental responsibilities at the time, the Project was very successful in providing technical support for establishing environmental guidelines and strengthening the institutional capacity to enforce environmental regulations.

[13] The 2009 Restructuring allowed the construction of new buildings when these were more cost-effective than retrofitting and therefore the environmental and social safeguards were updated to reflect this change.

43. *Social Safeguards*. The social safeguard compliance is also considered generally satisfactory. Based on supervision missions and the assessments mentioned above, it is concluded that GoCDB's procedures, regulations, policies, and institutional capacity were adequate to implement resettlement processes to the Bank's satisfaction. The OP 4.12 was triggered mainly to prevent that any person or group of persons were affected by acquisition of land or property to carry out reconstruction or retrofitting works or potential temporary disturbances caused by the construction itself.

44. Concerning social impacts in terms of land or property acquisition in other sectors than the resettlement of families in high-risk areas, health was the only sector where such impacts have been identified. An Abbreviated Resettlement Action Plan (ARAP for less than 200 people affected) was prepared for minor impacts in addition to the inclusion of comprehensive information and guidance for how to prepare for and mitigate social impacts at the Project Implementation Manual (PIM) in 2009. The fact that not a single complaint has been filed in any of the implemented projects is evidence that a good relationship with the affected community was maintained.

45. **Fiduciary Compliance**. Although an isolated misprocurement case on the contracting related to the retrofitting of five kindergartens was detected and addressed in 2009, no major fiduciary issues requiring Government or Bank attention emerged throughout Project implementation, as corroborated by audit reports and procurement post-reviews.

46. *Financial Management*. Throughout the Project, stable project management was based on SDH's adequate experience in financial management (including accounting records, interim financial reports or IFRs, and external audits). However, at project closing the overall Financial Management was rated as Moderately Satisfactory due to shortcomings in the financial management of health sub-component activities by SDS. More precisely: (i) lack of separate accounting records or subsidiary ledger for project activities to avoid financial information inconsistencies; (ii) payments were not processed within the target of 28 days, affecting project implementation; and (iii) deficiencies in the supervision of the works financed by the project and significant delays in project implementation.

47. On the Bank's side, a lower-than-expected disbursement ratio is likely to have affected the Project's financial performance. Lack of disbursements and an early repayment in the first four years of the Project are related to the municipality's cash surplus partially as a result of the issuance of a bond, an issue that was also identified in the ISRs and the Quality Assessment of Lending Portfolio (QALP-1) carried out in late 2008. On the Government's side, lower disbursements in the aftermath of the global financial crisis, not only lowered interests paid on the loan, but also reduced financial risk related to potential currency volatility. When the right financial moment came for the municipality to disburse all the expenditures made up to December 2010, the GoCDB disbursed 31.9 million at once.

48. *Procurement*. The Procurement Unit at the PCU was assessed as having adequate capacity to comply with Bank's procurement standards and procedures. Nevertheless, the procurement performance at project closing was rated Moderately Satisfactory as a result of the following issues related to the health sector sub-component: i) delays in the implementation of procurement processes; (ii) the fact that one contractor was awarded several works, which placed at risk the achievement of targets within the agreed time frame; and iii) weaknesses with regards to the monitoring and control of ongoing contracts, last-minute requests, and continuous amendments and additions to the contracts.

2.5 Post-completion Operation/Next Phase

49. The Project supported the establishment of a solid basis in the Capital District of Bogota to reduce its vulnerability to natural events, by strengthening its capacity to manage disaster risks. This Project is part of the District's long-term program to save lives and reduce social, economic, and financial losses resulting from adverse natural events, including earthquakes, floods, and landslides. Although an APL3 phase will not take place since the triggers set out in APL1's PAD were not met,[14] a focus on disaster risk reduction would continue through regional initiatives and specific national efforts financed by other agencies and potentially the Bank.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

50. The **Project Development Objective** (PDO) remains highly relevant and is consistent with the 2010 National Development Plan "Prosperity for All", the District's Human Development Plan –in particular its DRM Program 2012-2016— and the current World Bank's CPS (FY2012-2016). The 2010 National Development Plan identified Environmental and Disaster Risk Management as a crosscutting theme supporting sustainable growth and competitiveness, equality of opportunities for social prosperity, and consolidation of peace. The CPS recognizes Colombia as a leader in managing disaster risk, with sophisticated institutional arrangements in place to manage disaster risk. The CPS also identifies the need to improve knowledge and risk assessments of territorial management. In addition, the CPS reiterates the importance of DRM to secure sustainable growth with enhanced climate-change resilience -one of its three strategic themes.

51. **Project design** was consistent with the PDO and remains relevant to ongoing and planned efforts to continue strengthening DRM. The Project was flexible, allowing for adjustments to reflect emerging good practices on institutional strengthening, implementation responsibilities and modalities, the engagement of District agencies and

[14] APL3 triggers set out in APL1's PAD in terms of the guarantees that the national government should grant to local authorities and the number of local authorities (i.e. minimum 3) that should take part.

communities, and different methodological approaches. The original focus on reducing the vulnerability of Bogota's population to disasters remains highly relevant and positively contributes to the positioning of the city in contemporary regional and global policy debates on these topics, including social accountability, disaster risk management and climate change. However, some inconsistencies between PDO design and outcome indicators were found. The PDO was designed to address vulnerability in Bogota by on the one hand, strengthening its capacity to manage disaster risks, and on the other hand, reducing vulnerability in key sectors.

52. **Project implementation** contributed to the increase of the Bogota's resilience to adverse impact of disasters through the retrofitting and reconstruction of public assets, resettlement of population in high-risk areas and institutional strengthening in DRM, supported by an evolving legal and institutional framework for disaster risk management including a set of guidelines and policies for environmental and resilient building codes. Implementation of Project activities remained highly relevant at project closing because of the significance of well-defined high-risk areas for the GoDCB to better target its investments and identify potential calamities before they occur.

3.2 Achievement of Project Development Objectives

53. Project Development Objectives were achieved. PDO was to reduce vulnerability of the Capital District of Bogota to adverse natural events by (i) strengthening its capacity to manage disaster risk, (ii) reducing vulnerability in key sectors.

(i) Strengthening its capacity to manage disaster risks

54. One important outcome of the Project was the better understanding and identification of hazards and risks in Bogota. Component A on Risk Identification was entirely financed by the District's budget and aimed at enhancing the capacity of the District of Bogota to identify and monitor risks in order to better target its investments and identify potential calamities before they occur. A thorough assessment of risk for Bogota was carried out during the project, including risks associated to hazards such as earthquakes, landslides and flooding. As a result, the GoCDB is now able to identify risks by type of hazard. Detailed maps were produced to better understand how different hazards could affect unique areas of the territory. Seismic hazards were mapped using return periods from 250 years to 2,500 years of historical events.

55. The Project brought about new knowledge and methodologies (e.g. probabilistic modeling) that strengthened Bogota's understanding of risk, as well as the identification of risk-prone areas. There is now a clear understanding that Bogota District faces seismic threats that have historically been the result of activity in the fault lying underneath the plains bordering the Eastern Mountain Range (Llanos Orientales). Although even before the Project, there was a sophisticated understanding of risk by GoCDB, the Project was

able to foster knowledge that ultimately resulted in estimations that were able to calculate the buildings' response spectrum[15].

56. The Project was also a vehicle to increase Bogota's understanding of flood dynamics and what the return period would be for particular events. Stochastic modeling based on past events was used to develop micro-zoning maps of affected areas from 3 to 100 years. Moreover, research undertaken in connection with this Project and published by Yamin et al (2013) was able to model changes in affected areas as a result of mitigation works for both, 100 years of probable floods, as well as extreme events. Yamin et al. (2013) were also able to identify landslide hazards and non-mitigable risk areas.

57. Not only was there a better understanding and identification of risks as a result of the Project, it also led to a better communication to the public of such risks and to effective preventive resettlement of population living in non-mitigable risk-prone areas with results well above set targets. Component C on Institutional Strengthening was largely financed with District's resources but US$ 1.1 million from the Bank was employed. This component aimed at enhancing the effectiveness and capacity of the District's administration to prepare for, respond to, and recover from significant emergencies including training and capacity building for prevention and emergency response, as well as the implementation of an environmental management strategy.

58. Project implementation was effective at informing public policy in Bogota in a number of ways. Risk mapping by type of hazard was instrumental to determine areas that were in need of mitigation measures. Although Bogota has a long tradition of effective urban planning and a number of initiatives have become best practices for middle-income countries, Bogota's 2011 Territorial Plan (Plan de Ordenamiento Territorial – POT) was able to incorporate some of the findings of the risk-identification process. Such an achievement is partly the result of this Project's implementation. Some areas were found to be special treatment zones that required mitigation, which includes infrastructure upgrades that make buildings more resilient to hazards. Some other areas were found to be facing non-mitigable risk and therefore the GoCDB decided to start a relocation program for those living in areas of non-mitigable risk in a similar fashion as this Project did. In addition, other zones subject to hazards and risks were also identified (Yamin et al., 2013).

59. In addition, as a result of this Project, monitoring networks and early-warning systems became a critical part of the DRM strategy in Bogota. A hydro-meteorological and geo-technical monitoring network was created to put in place early-warning systems under the coordination of FOPAE. The accelerometer network was monitored to better understand seismic hazards leading to the design and implementation of a risk-information system that will enable systematic updates of studies and treatments.

[15] The response spectrum is calculated through the identification of maximum response values in terms of acceleration, velocity and movement for a range of buildings with different vibration periods.

Earthquake-resistant design was incorporated in Bogota's POT as a result of the General Study on Seismic Hazard in Colombia (AIS, 2010). To address landslide and hydrologic hazards, structural measures such as de Planes de Manejo de Cuencas (basin-management plans), river-basin protection and drainage construction were put in place; non-structural measures that have been put in place include river-channel maintenance and cleaning to avoid clogging, monitoring and warning systems, emergency and contingency plans, education and dissemination programs (Yamin et al., 2013).

(ii) Reducing vulnerability in key sectors

60. Risk reduction was an area in which the Project also managed to exceed targets with the notable exception of health-sector activities. Component B, on risk reduction concentrated over 98 percent of the amount of original loan and was key to physically reducing risk in public buildings (i.e. kindergartens, schools and hospitals). Engineering designs, retrofitting to meet seismic standards, works to mitigate landslides, and rebuilding of infrastructure –where retrofitting was proved to be more expensive), were the tools by which the District was expecting to reduce risk. Project implementation was able to, in most activities, go beyond the established targets. On education, 43 schools were planned to be reinforced, and progress at closing showed that 38 –5 schools short from target—providing services to 46,897 students were effectively reinforced or rebuilt. While just over 88 percent of targeted schools were finalized, the social integration sector in charge of kindergartens fully met targets. Twenty-nine kindergartens were reinforced and adapted. The Project was also effective, exceeding targets by 33% on the construction of civil works to mitigate landslide risk.

61. Risk-reduction activities aimed at preventing disasters for population living in high-risk areas also exceeded targets in terms of number of people living at risk. At project inception, GoCDB had identified 600,000 inhabitants living at risk. A Mid-Term Review found that the baseline was slightly higher at 604,000 people. The original target was set to reduce the population at risk from 604,000 to 480,000 inhabitants. By closing, the Project reduced the number of people living at risk beyond the target to 236,972 inhabitants. In terms of resettlement, the District Social Integration Secretariat exceeded the original goal of relocating up to 700 families; at Project closing 1,067 families were resettled.

62. However, results in the health sector were much more disappointing completing only 2 of the 18 hospitals set by the revised target. The District's Health Secretariat had originally planned to rebuild or reinforce 25 hospitals, but the 2009 Project restructuring formally revised the target to 18 hospitals. The SDS managed to conclude the construction of one hospital (Meissen Hospital) with its own sources, but unilaterally and without officially informing the Bank, decided to take out 10 hospitals from the project to finance those with own sources. The revised target of 8 hospitals was in line with Bogota's Health Master Plan and the District's Biannual Strategic Plan. With the project being considered for extension at a time when only one additional hospital (CAMI Chapinero) had been completed (in this instance with Bank financing), and several more in the midst of construction, the Bank took the decision to only continue providing

financing to those hospitals that had the most potential for completion and had initiated construction by December 2012. A series of milestones and associated quantitative construction targets were established in order to define a transparent set of criteria which would determine whether a hospital sub-project would remain eligible. Out of the 6 remaining hospitals, only 4 met the selection criteria. However, none of those 4 healthcare centers (Kennedy, Tintal, Antonio Nariño and Los Libertadores) were finished by the time of this evaluation. With only 2 out of the 18 hospitals finished, the health sector largely missed the goal.

63. There is a fair question to be raised concerning the performance of the health sector vis-à-vis other agencies. How is it that the education or the social integration agencies were able to deliver sometimes exceeding targets ahead of time while the health sector was not? The answer lies in two factors. On the one hand, the construction of schools can be deemed fairly straightforward from a civil-engineering perspective, while the same cannot be said for hospitals. The scale and complexity of this reality was only fully understood with the incorporation of an engineer on the Bank's team with a specialization in large-scale civil works and the implementation of Colombia's newly updated seismic resistance norms. On the other hand, a unique institutional barrier specific to the health sector became evident during the course of project implementation. The Bogota District Council's Agreements #20 of 1990 and #19 of 1991 restructured Bogota's health sector. Hospitals in Bogota since 1991 operate independently from the District Health Secretariat (SDS) under the legal construct of *Empresas Sociales del Estado* (State-owned Social Enterprises). While the construction was responsibility of the former, the latter's prerogative is the design of such buildings. Important coordination issues came to bear delaying extensively planned retrofitting and new construction activities. Both issues could have been probably better addressed at the outset by the Bank, having had a clearer understanding of the complexity of hospital construction, but even more importantly, of the institutional and legal setting of the health sector in Bogota.

64. The Project was also effective at carrying out risk prevention and awareness activities such as training with results far exceeding targets and completing tasks well in advance of closing. Component D on Risk Prevention and Awareness which was financed entirely with Bogota's resources had the objective of increasing awareness at all levels of society by providing education on risk, putting in place information campaigns, and resettling families living in high-risk areas. In 2007, the District of Bogota had met the target of carrying out 8 events for citizens' exchange of experiences on risk management and had surpassed by 39 percent the goal of training 9,500 risk prevention and management personnel. As IDIGER's mission was defined around these goals, the Institute continued to carry out these activities despite having already met the goals in 2007. As a result, training in schools reached 2,174, which represents 155 percent of the original target. These results are evidence that the project was a vehicle to institutionalize risk prevention in Bogota. Similarly, 1,762 teachers in 73 schools (4 more than the original target) were also trained under this component. A DRM strategy was developed and implemented in two sectors and a third is in process of being implemented.

Information campaigns were carried initially as part of the project, but quickly became part of the institutional mission of FONDIGER.

65. In addition, the District's Environment Secretariat was effective at integrating 42 organizations (exceeding the original target) linked to prevention actions in high-risk zones and at putting in place 4 preventive actions to improve the environment and quality of life in high-risk areas. In addition, the original goals of protecting 40 ha and restoring 30 were exceeded to 54.4 ha and 103.2 ha respectively. The Project was very successful in providing technical support to prepare the District's environmental guidelines. The Project also helped strengthen the institutional capacity to enforce environmental regulations. The preparation of the Environmental Management Guide for the Construction Sector in 2010, along with a set of policies including the District Rural Policy, and the District Policy for Protected Soils, have provided the GoCDB with the instruments to integrate procedures to prevent, mitigate, and correct environmental impacts associated with structural retrofitting efforts and all new constructions/urban developments in the District. These guidelines have been in many cases further adapted by sector agencies to suit their needs, such as in the case of the District Health Secretariat's hospital waste management.

66. Unfortunately, the objective of developing a risk-financing strategy to face the fiscal impact of disasters was not achieved. Component E aimed at: (i) developing a financial strategy to guarantee that resources needed for disaster reconstruction or rehabilitation would be available in case of a disaster, and at (ii) facilitating the development of a private catastrophe-insurance market. However, the project was not able to deliver on either of these two goals. The project did not deliver a strategy to reduce financial exposure to risks, nor did it favor the development of a market for catastrophe insurance. By project closing, the 2 studies that would have been the basis for developing a strategy and an insurance market had not been shared with the Bank. With no evidence to verify that those studies complied with the terms of reference initially prepared to hire the consultant companies, the Bank is not able to determine the quality of such studies, nor their usefulness for the aforementioned objectives.

67. However, the electronic versions of the studies provided to the Bank by SDH on May 5, 2014, have the potential to determine exposure by presenting an inventory of asset exposure and by preparing a general analysis of risk for private and public exposure profile. Various financial coverage alternatives were identified including: (i) issuing a single insurance policy that cover all public buildings, (ii) a proposal for collective policies for a set of private buildings, (iii) the establishment of captive reinsurance companies, and (iv) commercially viable catastrophe bonds. However, none of these proposals have been taken to practice, as there is no evidence that the studies were discussed with the rest of the administration and included in future plans. Nevertheless, the studies allowed SDH to have solid negotiation position vis-à-vis private insurance companies to cover main infrastructure assets in the city, as well as triggering a continuous reflection on the best way to address financial exposure. .

3.3 Efficiency

68. The Project was assessed as efficient at design and ex-post results show that it was efficient at closing only if the value of saved lives was included in the benefits flows. The USD 80 million at Libor plus 0.5 with a maturity of 16 years including 4 of grace showed an annual IIR of 6.14%. At closing the cash flow of the Project showed that for more than 4 years, between 2006 and 2010, a single disbursement was made for 6.09 million on October 26th 2007. Two further disbursements on June 15th 2011 for 12.3 million and on December 11th 2012 for 7.9 took the balance of the Project at closing 38.5. Two final disbursements made after Project closing took the balance to 63.46 million. Taking into account both sources of funding, at appraisal the Project's objectives were to be achieved with US$ 145 million; however, the Project spent almost US$ 142 million with a greater contribution from Bogota than anticipated, but with a significant reduction in hospital completion (see Annex 1 Table b).

69. The results of a probabilistic cost-benefit analysis based on a catastrophe risk model by Ghesquiere, Yamin and Mahul (2006) are used in this ICR to assume a maximum probable loss mitigation of 3.9% of the value of the assets. Overall risk-mitigation interventions are likely to have reduced the District's vulnerability and potential losses. However, modeling exercises done in connection with this Project have focused on a single hazard (earthquakes) and provide a scenario-based approach to such seismic damages. Scenarios are offered as examples that depend on where the seism occurs and its magnitude and are not exhaustive of the multiple scenarios that can emerge from a combination of hazards. Precise analysis is particularly difficult in large-scale disaster mitigation projects where costs are definitive while benefits, which are largely derived from avoided losses, are at best probabilistic.

70. The cost-benefit analysis carried out in this ICR has made a number of assumptions that compensate for the lack of information on the value of the assets and the losses that were mitigated, as well as of lack of information on demographic trends for benefited population (i.e. resettled families, children in intervened schools). Such assumptions range from the proportion of sector-specific total asset value that each structure represents, to expected working life for children and parents (see Annex 3 for a full discussion of these assumptions). One key aspect of this analysis was the value of lives saved as a result of the works. This ICR recognizes that placing a monetary value on life presents difficult and ethical questions. Without rejecting those claims, this ICR simply presents a value of life that represents that of the typical contribution of a worker in the labor market and therefore the valuation of life that is made in Annex 3 is only partial and modest. This ICR makes two different valuations: those lives saved as a result of reinforcing schools (i.e. children's lives saved) and those lives saved by resettling families that were living in non-mitigable areas of Bogota.

71. The most salient feature of this analysis is that the Project was not efficiently carried out if only the value of the assets is taken into account. In contrast, the Project is considerably efficient if the avoided loss of lives is included. The Benefit-Cost ratio in Tables A.3.1, A.3.2 and A.3.3 is lower than 1 in all scenarios if only the avoided losses in terms of assets are included ranging in values between 0.31 and 0.62. However, if the

value of lives saved is included it delivers ratios of at least 10 times the value of its costs. The B-C ratio including lives saved ranges from 10.66 with a discount rate of 3% to 15.39 with discount rates of 12%.

72. The Project also yields solid Internal Rates of Return (IRR) and sizable Net Present Values (NPV) if the avoided loss of lives is included. IRRs range from -15.8 percent if the value of saved lives is not included, to 15.9 per cent if they are. The former is a result that appears regardless of the discount rate and only if the value of retrofitting for both hospitals (15 percent) and schools (60 percent) is assumed. The latter also results regarding of the discount rate and appear when retrofitting values for both schools and hospitals are at their lowest: 30 and 8 percent respectively.

73. As can be expected, NPV is negative for scenarios not including the value of saved lives. NPV without estimates for saved lives, go from -14.63 million dollars, to as much as 36.34 million dollars. The former is a scenario (see Table A.3.3) when the maximum discount rate of 12% and minimum retrofitting values are assumed (8 percent for hospitals and 30 percent for schools). The latter is a scenario with the lowest discount rate (see table A.3.1) and maximum assumed retrofitting values of 15 percent for hospitals and 60 percent for schools. However, if the value of saved lives is included in our estimates, NPVs are solid and positive. The smallest NPV can be found with the highest discount rate (12 percent) and maximum retrofitting values (15 and 60 percent for hospitals and schools respectively) in Table A.3.3. If a lower discount rate of 3% and minimum values of retrofitting are assumed (8 and 30 percent for hospitals and schools respectively) NPV can be as high as 327 million dollars.

3.4 Justification of Overall Outcome Rating

(combining relevance, achievement of PDOs, and efficiency)

Rating: **Moderately Satisfactory**

74. The Project is rated as moderately satisfactory in light of the PDO being achieved and the vast majority of the Project components not only met, but in many cases, exceeded established targets. The multiple successes of the Project are deemed to have compensated for other shortcomings such as those related to the health sector and the objective of reducing fiscal vulnerability. The Project is highly relevant for the country and it represents one of the more innovative experiences in addressing urban risk reduction through a multi-faceted approach. The objective of having more resilient infrastructure in the education (schools) and social integration sectors (kindergartens), have arguably made of Bogota, a global reference. The efforts by the *Caja de Vivienda Popular* to mitigate risk for those living in areas subject to landslide risks exceeded targets, and institutional capacity was built in the process with the principles and guidelines adopted under the Project now being applied to other resettlement processes. The institutional arrangements that emerged as a result of the environmental management system put in place have had city-wide impacts well beyond the Project. However, activities in the health subcomponent, which represented nearly half of the resources committed by the Bank to this Project, were not fully achieved. In spite of the two extensions that were required, the hospitals and health-care centers by and large were not

completed. In addition, the important objective of reducing fiscal vulnerability and promoting the establishment of private catastrophe insurance were not achieved. However, those missed targets were compensated by overachievements on other indicators. The legal and institutional framework is clearer and more consolidated, and the growing reach of SPDAE is fully operational.

3.5 Overarching Themes, Other Outcomes and Impacts

(a) Poverty Impacts, Gender Aspects, and Social Development

75. **Poverty Impacts and Social Development**. Since poor and socially vulnerable groups tend to live in high-risk areas, the Project was expected to have a major beneficial impact on that population group. The Project supported the resettlement of households living in the hazard-prone areas identified by the comprehensive municipal risk-mitigation plan. In addition, the Project improved disaster resiliency in public buildings (i.e. hospitals, schools and kindergartens), through retrofitting and reconstruction of facilities, which directly had an impact on the safety, quality and continuity of public services pre and post disasters.

76. **Gender Aspects**. The resettlement was carried out minimizing the disruption of the livelihood of people living in the high-risk areas, and ensuring that displaced people were treated equitably, as evidenced in the 2009 Restructuring Safeguard Note. A detailed analysis was carried out covering gender, ethnicity, income and other socio-economic factors, in order to determine the risks and design preventive measures to minimize them. Measures to minimize gender disparities embedded in social practices and traditions were put in place to reduce women's vulnerability to violence and stress during the resettlement, as well as to avoid the breakdown of community and social networks –important support systems in times of crisis— affecting women more than men. In addition, under the Project's activities to reduce underlying socio-environmental risks, a series of dissemination activities were carried out targeting families, mostly women. Such activities helped build a risk prevention culture and were effective at empowering the community as the first line of protection of the environment, and in the prevention of illegal occupation of non-mitigated risk areas. To that end, environment and risk management training was essential.

(b) Institutional Change/Strengthening

77. As noted in Section 3.2, the Project has significantly strengthened the institutional framework for disaster risk management and improved inter-institutional coordination. As evidenced by several Project indicators (Annex 2), the overall impacts of the institutional changes are already visible in the improved efficiency SPDAE.

3.6 Summary of Findings of Stakeholder Workshop

78. In April 2014, representatives of governmental agencies directly involved with the project implementation were interviewed for firsthand views on the Project's results

and impact. During the same month additional input was sought during a stakeholder workshop involving both the Bank and GoCDB representatives. Please refer to Annex 6 for main findings and commentary.

4. Assessment of Risk to Development Outcome

Rating: **Moderate**

79. Risk to development outcome is rated as *moderate* considering that the GoCDB has a clear vision and is implementing a long-term plan for vulnerability reduction. As part of this program, the District continues to invest in the consolidation of policies and its institutional framework, and in the modernization and integration of assessment in its development planning. There are several factors contributing to the overall sustainability of project outcomes: (i) the commitment to the project objectives through the large counterpart contribution to the Project (45 percent of the total investments) and the work on comprehensive disaster preparedness financed with the Government's own resources; (ii) institutional sustainability and ownership from the participating agencies, where the Program is strongly anchored in the long-term objectives of the SDH for vulnerability reduction; and (iii) technical sustainability and maintenance of retrofitted assets after project implementation following normal procedures used by the District. There are nevertheless several potential internal and external risks:

80. **Internal risks**. Potential internal risks include degradation and underutilization of risk information and sensitization programs. Although it is unlikely that the information will become obsolete in the short term, risk information could be outdated if it is not regularly maintained. Risk sensitization programs, funding and turnover of personnel in DRM-related agencies can therefore take a toll on risk and vulnerability reduction programs. It is encouraging though that going forward, there seems to be a strong emphasis on capacity building and increased coordination among agencies through SPDAE in the District's long-term program for vulnerability reduction.

81. **External risks**. There are also several external risks related to the country's growing disaster vulnerability and the magnitude of DRM challenges. Although close attention was given to the design of the hydro-meteorological system for the District, it is not possible to guarantee that it will not be damaged by a major catastrophic event. Environmental degradation and the substantial and increasing number of population living in high-risk locations could overwhelm the impacts of the Project's mitigation investments. If adequately enforced, preventive planning will continue to contribute to mitigate these issues in the future. In particular, voluntary relocation to safer places and minimizing resettlement of freed up high-risk locations represent a major social and economic challenge.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: Moderately **Satisfactory**

82. This rating is based on the close collaboration between Bank and Borrower during project preparation, the relevance of the Project to both, the Government and the Bank, as well as a project design with an integral approach to development in mind enhancing its impact in a context of institutional capacity building. The Project's design reflected a pioneering effort at the time and responded adequately to client needs. Given the intricate challenge to reduce the District's vulnerability at the same time that the institutional underpinnings for disaster management were being strengthened, communication among agencies understandably faced obstacles. Although these obstacles may have affected the initial implementation period, they did not affect long-run project outcomes. However, project design overlooked a critical legal and institutional obstacle to coordination in the health sector by not taking into account the implications of administrative decentralization mandated by Law in 1991. In addition, M&E framework failed to include indicators that allowed for an effective progress monitoring. This rating also rests upon unrealistic targets and lack of readiness (i.e. absence of pre-feasibility studies).

(b) Quality of Supervision
Rating: **Satisfactory**

83. The ICR rating recognizes that in general supervision missions were timely and solution-oriented, that there was a Mid-term Review that resulted in effective decisions and agreements (through a major project restructuring), and that critical issues affecting project implementation were adequately handled. Procurement and financial management were also well supervised. Supervision of safeguards was necessary due to unwillingness by some families to resettle as identified by the TTL and reported by the Quality Assessment of Lending Portfolio (QALP-1). Supervision was adequately conducted and no negative social or environmental impacts were at project closing identified as a result of project activities. The Bank's team made a significant effort to compensate for design flaws in terms of the challenges faced in the health sector and on the M&E framework, as well as to improve the disbursement ratio in the context of borrower's excess liquidity (see Annex 2 Table 2 for a supervision timeline).

(c) Justification of Rating for Overall Bank Performance
Rating: Moderately **Satisfactory**

84. Bank performance in ensuring quality at entry was rated as moderately satisfactory while supervision was deemed as satisfactory; thus, overall Bank performance is rated *moderately satisfactory*.

5.2 Borrower Performance
(a) Government Performance
Rating: **Satisfactory**

85. Government performance is rated satisfactory considering its sustained commitment to PDO achievement, including especially the concerted effort to reduce the District's vulnerability to disasters while strengthening key agencies and the SPDAE.

Although at times, the Project experienced delays due to personnel turnover and implementation arrangements limited by legal institutional framework, the priority given by the Government, consistently providing an enabling environment for project implementation, facilitated resolution to critical constraints.

(b) Implementing Agency or Agencies Performance
Rating: **Moderately Satisfactory**

86. The overall satisfactory rating considers the different performance levels of the various agencies that were responsible for implementing project activities. Delays in loan effectiveness led the District to proactively implement activities using their own funds to speed up project implementation. In the intermediate phase of the Project (2009 Project restructuring), with a greater stability in terms of personnel turnover and commitment from the GoCDB, the Project's experienced an increase of its implementation pace and performance achieving most of the PDO's established. Nevertheless, management and institutional coordination shortcomings prevented the timely delivery of health subcomponent products and activities according to original schedule. In its final phase, a series of restructurings were needed to extend the Project's closing date and revisit health subcomponent targets in order to meet Credit Agreement commitments.

(c) Justification of Rating for Overall Borrower Performance
Rating: **Moderately Satisfactory**

87. Government performance and outcome of PDO are rated as *satisfactory* and the Implementing Agency performance is rated as *moderately satisfactory*. Thus, overall Borrower performance is rated *moderately satisfactory*.

6. Lessons Learned

Design lessons

88. **Development of monitoring and evaluation systems and sound economic analysis for DRM Projects is critical** not only to measure results but also to draw well-grounded lessons. Although the importance of prevention and mitigation is broadly recognized today, there is still a need to have good evaluations of DRM efforts to ensure their prioritization in a context of budget constraints and competing priorities. Evaluation is even more critical in projects such as the one assessed in this ICR that include innovative approaches and financing for mitigation. Having specific indicators on estimated average annual loss, financial/insurance coverage of public and private assets, quality of training and integration of knowledge in beneficiaries' daily activities, and gender participation and inclusion will greatly benefit project evaluation. Identification of good practices will strengthen results of future efforts, while economic analysis of mitigation investments will help show the "business-sense" of such investments.

89. **Targets should be established realistically in terms of institutional and local market conditions**, considering local development plans and policy framework for

implementation. Therefore pre-feasibility studies and designs readily available at project approval or early implementation with clear financial costs are paramount; particularly to ensure effective coordination with all public agencies responsible for granting building permits, as well as utility companies to avoid delays in the execution of civil works. Future projects should also invest in a thorough understanding of sector-specific legal and institutional arrangements that may become a challenge for implementation.

90. **Challenges implementing risk reduction in Health sector**. The risk reduction program in the heath sector was arguably the most challenging subcomponent of the Project. Functional and nonstructural risk-reduction measures for the heath sector imply shifting equipment and patients around the city and may impinge on the access to health care by entire neighborhoods while construction works take place. Future projects involving retrofitting or reconstruction of hospitals should take into account sensitive situations in which the spread of disease or the worsening of medical conditions by current patients may arise as a result of such movement and exposure to medical waste.

Implementation lessons

91. **The establishment or consolidation of a technical project unit responsible for project activities in each implementing agency could facilitate the implementation of civil works by**: (i) ensuring its completion to satisfaction; (ii) better coordinating with permit-granting agencies and utilities companies to avoid unnecessary delays; (iii) improving the internal management, governance, and transparency; and (iv) facilitating the supervision, monitoring and evaluation by the overall Project coordinating agency to avoid pitfalls.

DRM lessons

92. **Investing in vulnerability reduction pays off in the long term**, especially if coupled with flexibility and responsiveness to city needs and conditions. The Project represents an excellent example of the importance of investing in DRM. During the Project's life, responsiveness and flexibility allowed modifying implementation arrangements to reflect the evolving legal and institutional framework, and enhance project impact. The Project already had visible impacts that have likely helped to reduce loss of life and property, particularly among the poor.

93. **DRM capacity building contributes to ownership and sustainability of results**. In the past, communities were often not included in the decisions and processes that affected their lives, which made ensuring operation and maintenance of investments and sustainability of technical capacity, one of the main constrains of DRM projects. The Project is a good example of the benefits of engaging social actors actively throughout the whole cycle of resettlement and risk reduction activities. The Project also shows the importance of investing in capacity building at the community level. Overall, through a participatory approach, the Project has left a more educated and engaged civil society, which is more likely to demand attention to DRM issues despite government changes and staff turnover.

94. **Retrofitting vs. rebuilding.** The Project is a valuable experience for other DRM projects to consider including reconstruction/new building construction as a cost-effective alternative. In this Project, considering only retrofitting led to the underestimation of costs at the outset. It can be argued that it was also a factor in the delayed implementation and cost overruns that led to the first restructuring.

95. Resettlement program and guidelines should be carefully crafted to effectively "depopulate" high-risk areas and prevent further occupation.

7. Comments on Issues Raised by Borrower

96. On July 11th 2014, the Borrower through the SDH sent comments to the draft version of this ICR which are presented in Annex 7. The final version of this ICR reflects the updated figures on disbursements sent by the Borrower, as well as precisions made regarding the municipality's cash surplus and the distinction between hospitals and clinics. In addition, the Borrower suggested that the Mid-Term Review could be used as an opportunity to reformulate the Project and reassign resources as needed to make the implementation process more flexible

97. According to the Borrower, additional lessons learned include:

- To appoint a person responsible for the project in each implementing agency.
- Implementing agencies need to be more rigorous in archiving documents related to the Project.
- Implementing agencies need also to be more rigorous in the hiring process of a service provider, particularly when it comes to their real technical and financial capacities.
- Contracts for construction works should be properly supported by documents that prove a solid planning process has been undertaken prior to the start of the works.
- Construction supervision activities should be paid by the progress made and not by the time spent in construction.

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD millions)		Actual/Latest Estimate (USD millions)		Percentage of Appraisal (%)	
	Bank	Borrow.	Bank	Borrow.	Bank	Borrow.
Component A	0	4.4	0	6.1	-	138.6
Component B	78.6	25.6	62.09	32.8	78.9	128.1
Component C	1.04	6.5	1.08	14.5	103.8	223.1
Component D	0	20.9	0	30.2	-	144.5
Component E	0.38	0.17	0.28	0	73.7	0
Total Project Costs	80	57.7	63.46	83.65	79.3	128.9
Front-end fee IBRD						
Contigencies	-	7.3				
Total Financing Required	80	65				

(b) Financing

Source of Funds	Type of Co-financing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
IBRD		80.00	63.46	79.3
Borrower		65.00	83.65	131.4
Total		145.00	157.11	108.3

Annex 2. Outputs by Component

The Project Development Objective was to reduce vulnerability of the Capital District of Bogota (GoDCB) to adverse natural events by (i) strengthening its capacity to manage disaster risk, (ii) reducing vulnerability in key sectors.

The Project implementation contributed to increasing Bogota's resilience to adverse impact of disasters through the retrofitting and reconstruction of public assets, resettlement of population in high-risk areas and institutional strengthening in DRM, supported by an evolving legal and institutional DRM framework, including a set of guidelines and policy for environmental and disaster-resistant building codes. Project implementation remained highly relevant at project closing because of the significance of well-defined risk-prone areas for the GoDCB to better target its investments and identify potential calamities before they occur.

The Project effectively reduced the population at risk from 604,000 to 236,972 through a series of activities detailed below. Although baselines and targets were not set for the reduction in the estimated average annual loss in the PAD, a series of retrofitting works were carried out in schools, kindergartens, and landslides/flooding prevention, as well as risk assessment studies, improvements in hazard monitoring, development of an Environmental Strategy for Construction and Retrofitting, and resettlements that overall contributed to reduce the district vulnerability and potential loss.

Table 1 – Project Development Objectives Indicators

Indicator	Baseline	Target	Result
Reduction in identified population at risk	604,000	480,000 less people living in risk prone areas	236,972
Reduction in estimated average annual loss	N/A	N/A	N/A

Component A: Risk Identification

This component aimed at improving the capacity and knowledge of the District of Bogota to identify and monitor the different hazards the city in order to better target its investments and identify potential calamities before they occur. Hazard mapping, vulnerability, and risk analysis of the Central District were undertaken for critical buildings, and hazard-monitoring systems installed in strategic areas. Key institutions involved in implementation were DPAE and the *Departamento de Bienestar Social* (Department of Social Welfare, DABS). The DPAE was in charge of designing methodologies and procedures for the maintenance and operation of monitoring systems, which are updated to the latest standards and techniques, which are also appropriate to Bogota's unique environment. Accordingly, the component included the following sub-

components: A.1 Risk Identification and A.2 Risk Monitoring.

A. 1.1. Risk Assessments for the District
A. 1.2. Risk Assessment and Designs for Retrofitting of Buildings
A. 1.3. Health Territorial System and Studies for Emergency Public Hospital Network
A. 2.1. Hazard Monitoring in the District

Subcomponent A.1 Risk Identification. Fifty-seven studies were carried out by DPAE in the second semester of 2008 for hazard identification covering floods, landslides, earthquakes, vulnerability assessments (housing and public buildings), and risk management (probability of loss of life when vulnerability is not addressed). These studies provided a foundation for the DPAE to promote stronger, safer physical development. DABS carried out 40 seismic vulnerability and structural retrofitting studies. Results of these studies were used to prioritize mitigation works under Component B. In addition, twenty-nine studies to reduce the seismic vulnerability of kindergartens were carried out by SDIS in 2010.

Subcomponent A.2 Risk Monitoring. This subcomponent supported the capacity of DPAE to evaluate zoning risks and carry out seismic vulnerability studies. The networks of accelerographs and hydrometeorologic monitoring were extended to monitor geotechnical and landslide risks, following the latest Bogota micro-zoning study. The subcomponent also carried out in 2008 three studies aimed at increasing the understanding of risk in three areas of the District (Alto de la Estancia, Montebello, and Zona Norte).

Table 2 – Component A Indicators

Subcomponent	Baseline	Target	Result
A.1 Risk Identification	900 ha	57 Risk Assessment Studies for the District	**Target achieved (100%)** 57 studies to evaluate landslides hazard, risk and vulnerability carried out
		29 Risk Assessment and Designs for Retrofitting of Buildings[16]	**Target achieved (100%)** 29 studies to reduce the seismic vulnerability of kindergartens carried out
		Health Territorial System and Studies for 18 Emergency Public Hospital Network	**Target achieved (100%)** 8 studies and retrofitting designs to reduce the seismic vulnerability of

[16] This target was reduced from 40 to accommodate the reduction of targets at Component B.2.1 during the 2009 Project restructuring

			hospitals prepared.
A.2 Risk Monitoring	Accelerographs and hydro-meteorological monitoring networks	Hazard Monitoring in the District	**Target achieved (100%)** 3 networks extended to monitor geotechnical and landslide risks and operational
	Bogota micro-zoning study		**Target achieved (100%)** 3 risk assessments studies (Alto de la Estancia, Montebello, and Zona Norte)

Component B: Risk Reduction

This component was designed as complement to the city government's risk reduction efforts. From the outset, it was a critical component to mitigate risk by reinforcing premises and lifeline infrastructure in the event of a disaster, in particular by supporting the implementation of nonstructural and functional mitigation measures for service to continue during and after emergencies. Activities under this component included the development of engineering designs and retrofitting of construction works for public buildings to meet the latest seismic standards, and small mitigation works to mitigate landslides.

Under this component, the Project financed risk-mitigation measures. These interventions were structural, nonstructural, and functional. Structural mitigations comprised basic reinforcements to existing buildings, while nonstructural interventions consisted of vulnerable population's resettlement. Finally, functional mitigation involved the protection of people and assets, so that they remained functional during and immediately after an emergency (which involved such tasks as contingency planning, business continuity planning, emergency access, and equipment safeguarding). These measures aimed at ensuring that any damage resulting from an adverse event was limited enough to preclude evacuation of vital buildings such as hospitals, while understanding that the disruption of some non-crucial functions may be unavoidable.

Subcomponent B.1 Seismic Mitigation Education Sector
Subcomponent B.2 Seismic Mitigation Welfare Sector
Subcomponent B.3 Seismic Mitigation Health Sector
Subcomponent B.4 Landslide and Flood Mitigation

Subcomponent B.1 Seismic Mitigation in the Education Sector. This subcomponent was proposed to retrofit the educational facilities/physical infrastructure, some of which were more than 40 years old and did not follow the latest seismic-resistant norms. A preliminary study assessed the 2,614 educational premises and established that 70.5 percent were not vulnerable, whereas the other 29.5 percent presented a high or very high risk. From the study and subsequent diagnosis of educational infrastructure, priority

buildings were selected, taking into account their vulnerability index, the student population involved, and land tenure. The target was over-estimated given the structural needs and available budget. Targets were adjusted in 2009 Project's restructuring from 140 to 42. As a result, 38 educational buildings were retrofitted to comply with the most recent building codes benefiting 46,897 students.

Subcomponent B.2 Seismic Mitigation in the Welfare Sector. This subcomponent was proposed to retrofit infrastructure in the welfare sector, under the responsibility of DABS. This target was adjusted in 2009 Project's restructuring form 40 to 29 centers, and physical rehabilitation was carried out in kindergartens and daycare centers. It also included the design and implementation of a preventive maintenance plan for the remaining infrastructure.

Subcomponent B.3 Seismic Mitigation in the Health Sector. This subcomponent was proposed to focus on retrofitting 25 hospitals and health-care centers, and on the relocation of seven more (Table 1). Most of these buildings were never updated to the latest seismic norms and many of the facilities were in need of major rehabilitation if they were to accommodate the needs of the population during and after emergencies and disasters. Functional mitigation for seismic risk was also financed under this subcomponent. This intervention consisted of implementing necessary measures for the continuous functioning of hospitals during earthquakes, nevertheless, a series of limitations in contract management, institutional arrangements, and recurrent delays in construction contributed for the underperformance of this indicator where only 2 hospitals were effectively intervened out of the revised target of 18. Table 2 presents a detailed timeline of the evolution of the efforts made by the Bank and Project Coordination teams to address shortcomings on hospitals retrofitting.

Table 1. List of health centers selected for retrofitting

#	Health Center	Location	Funding	Population served
1	Ced Darío Echandía Sede A	Kennedy	World Bank	1.174
2	Ced Rafael Bernal Jiménez Sede B Gloria Gaitán	Barrios Unidos	World Bank	473
3	Ced República de Panamá	Barrios Unidos	World Bank	291
4	Ced Francisco de Paula Santander	Antonio Nariño	World Bank	1.028
5	Ced Juan del Corral	Engativá	World Bank	673
6	Ced Florida Blanca	Engativá	World Bank	1.230
7	Ced El Rodeo Sede A	San Cristobal	World Bank	1.238
8	Ced Suramericana Sede B	San Cristobal	World Bank	654
9	Ced John F. Kennedy Sede A	Kennedy	World Bank	2.440
10	Ced Gustavo Restrepo Sede A	Rafael Uribe Uribe	World Bank	1.905
11	Ced Unión Europea Sede A	Ciudad Bolivar	World Bank	1.931
12	Ced Acacias II Sede A	Ciudad Bolivar	World Bank	1.941
13	Ced Manuela Ayala Sede A	Engativa	World Bank	1.640
14	Ced Grancolombiano Sede A	Bosa	World Bank	1.980
15	Ced Gustavo Morales Sede A	Suba	World Bank	1.861
16	Ced Fernando Mazuera Villegas Sede B Gonzalo Jiménez de Quesada	Bosa	World Bank	513
17	Ced Nidia Quintero de Turbay	Engativa	World Bank	1.694

#	Health Center	Location	Funding	Population served
18	Ced Anibal Fernández de Soto	Suba	World Bank	1.293
19	Ced Piloto Bavaria Sede A	Usaquen	World Bank	951
20	Ced San José de Castilla	Kennedy	World Bank	1.400
21	Ced Carlos Albán Holguín	Bosa	Municipality	5.656
22	Ced San Cristobal Sur Sede B José A Morales	San Cristobal	Municipality	744
23	Ced República de Panamá Sede B Av. Chile	Barrios Unidos	Municipality	269
24	Ced Marco Tulio Fernández Sede B Mercedes de Fernández	Engativa	Municipality	255
25	Ced Nuevo Chile Sede A	Bosa	Municipality	2.938
26	Ced Alfonso López Pumarejo Sede B Agoberto Mejía	Kennedy	Municipality	574
27	Ced Francisco José de Caldas Sede D Dámaso Zapata	Engativa	Municipality	507
28	Ced Clemencia de Caicedo Sede A	Engativa	Municipality	493
29	Ced Jorge Gaitán Cortés Sede A	Engativa	Municipality	383
30	Ced Luis López de Mesa Sede C Granjas de San Pablo	Rafael Uribe Uribe	Municipality	643
31	Ced Nuestra Señora del Carmen	Tunjuelito	Municipality	787
32	Ced Juan Rey Sede A	San Cristobal	Municipality	645
33	Ced El Cortijo Vianey Sede B	Usme	Municipality	636
34	Ced Alfredo Iriarte Sede C La Merced Sur	Rafael Uribe Uribe	Municipality	328
35	Ced Pablo De Tarso	Bosa	Municipality	3.145
36	Ced Hunza Sede A - La Aguadita	Suba	Municipality	555
37	Ced Unión Colombia Sede A Piloto de Aplicación	Usaquen	Municipality	1.045
38	Ced Nueva Esperanza	Usme	Municipality	984
		Total Population Served		**46.897**

Table 2. Timeline of Bank and Project Coordination team interventions to address shortcomings on hospitals retrofitting

Period	Disbursement (Millions)	Action	
		Bank	**Project Coordination**
2006-2008	US$6.09	• Close supervision • MTR • QUALP	• Implementation with own funds • Early achievement of targets
2009-2010	No disbursement	• Close supervision • 1st Project Restructuring	• Implementation with own funds • Begin implementation of Health Sector activities
2011-2014	US$31.85 (2011) US$20.21 (2012)	• Close supervision • 2nd Project Restructuring • 3rd Project Restructuring • Hiring of health engineer to provide close technical assistance	• Implementation with own funds • Set up of special task force for speed up health sector activities implementation

Subcomponent B.4 Landslide and Flood Mitigation. This component involved small mitigation works such as the construction or erection of retaining walls or gabions, drainage systems, anchorages, and nets to protect the population from landslides, falling rocks, and mudslides. These small works were implemented by FOPAE, and represented the completion of 28 risk-mitigation works.

Table 3 – Component B Indicators

Subcomponent	Baseline	Target	Result
B.1 Seismic Mitigation in the Education Sector	140 educational facilities	Retrofit 40 educational facilities/physical infrastructure	**Partially achieved (88%)** 38 educational facilities/physical infrastructure retrofitted
B.2 Seismic Mitigation in the Welfare Sector	40 facilities	Retrofit 29 infrastructures in the welfare sector	**Target achieved (100%)** 29 infrastructures in the welfare sector retrofitted
B.3 Seismic Mitigation in the Health Sector	25 hospitals	Retrofitting 8 hospitals and health centers[17]	**Target not met (25%)** 2 hospitals were retrofitted
		Relocation of 7 health-care centers	**Target not met (0%)** No health center was relocated
		Functional mitigation for seismic risk for the continuous functioning of hospitals during earthquakes	**Target not met (25%)** 2 hospitals were retrofitted and functional mitigation carried out for these units.
B.4 Landslide and Flood Mitigation	N/D	Construction or erection of 21 civil works to protect the population from landslides, falling rocks, and mudslides	**Target surpassed (133%)** 28 retaining walls or gabions, drainage systems, anchorages, and nets were constructed.

Component C: Institutional Strengthening

This component aimed to enhance the effectiveness and capacity of the District Administration to prepare for, respond to, and recover from significant emergencies. The component also supported the District's capacity building, particularly to implement the Project. Activities financed under this component included training of participating

[17] The original target of 25 was revised to 18 hospitals during the 2009 Project Restructuring. At the 2012 Project Restructuring the target was further reduced to 7 hospitals to be retrofitted with credit proceeds. The hospital Messien was retrofitted with Borrower's resources resetting the target to 8 hospitals.

agencies' staff in safeguard, fiduciary, and technical aspects of the Project, capacity building for Prevention and Emergency Response, and the implementation of an environmental management strategy to strengthen the District's public works compliance with environmental requirements.

This component financed operational and administrative capacity building within the implementing institutions, including the DPAE and UCP. The technical side of the project included institutions under SDPAE that implemented institutional commitments to incorporate risk prevention, mitigation, and rehabilitation.

C.1.1 Project Administration
C.2.1. Modernization of Bogota's Fire Brigade
C.2.2. Environmental Strategy for Construction and Retrofitting
C.2.3. District Integrated Policy for Resettlement
C.2.4. Strengthening of the SDPAE

Subcomponent C.1 Project Administration. This component supported the UCP to ensure effective project implementation, including training, consulting services, office supplies, and equipment. Attention was directed towards secondary agencies participating in the Project, and will improve the agency's ability to respond to citizens' demands, such as training the government secretariat charged with oversight of firefighters.

Subcomponent C.2 Capacity Building. This subcomponent included training for the agencies part of the District's System for Prevention and Emergency Response (SDPAE) to carry out their mandate and enhance their capacity in the area of disaster prevention, response, and rehabilitation. Institutional strengthening for the SDPAE was provided by the Directorate for Prevention and Emergency Response (DPAE) to further strengthen their role in providing such support. Tools and training were provided to enable the agency to improve its decision-making processes in the fields of disaster prevention, response, and rehabilitation.

The subcomponent also included construction, equipment procurement, and training for two fire stations in the District. These stations were selected after a study under the Master Plan of Security and Justice, which analyzed the current District Fire Brigade's capacity to meet city demand. Given the constant industrial, commercial, and technological growth, coupled with accelerated urbanization, the District Fire Brigade has developed a strategy to meet the challenge. The strategy includes specialized training, equipment, fire-station reinforcement and upgrading, and strategic placement of new fire stations.

This subcomponent also comprised the development and implementation of an environmental management strategy aimed at strengthening compliance with public works requirements in the District. The activities involved a participatory process to upgrade the environmental guidelines, strengthening the District's environmental agency, and creating the conditions enabling the development of environmental auditors.

Table 4 – Component C Indicators

Subcomponent	Baseline	Target	Result
C.1.1 Project Administration	N/A	Improve the agency's ability to respond to citizens' demands	**Target achieved (100%)** Training the government secretariat charged with oversight of firefighters
C.2.1. Modernization of Bogota's Fire Brigade	Master Plan of Security and Justice, which analyzed the District Fire Brigade's capacity	Construction, equipment procurement, and training for 2 fire stations in the District	**Target achieved (100%)** 2 fire stations in the District were constructed and equipped
			Target achieved (100%) 2 training programs were carried out to firefighters
			Target achieved (100%) A new Crisis Center and Firefighter Central Command was built and equipped
C.2.2. Environmental Strategy for Construction and Retrofitting	0	Development and implementation of an environmental management strategy aimed at strengthening compliance with public works requirements in the District	**Target achieved (100%)** An Environmental Guideline for Construction and Retrofitting for the District was prepared
			Target achieved (100%) A dissemination workshop to introduce the Environmental Guideline was carried out
C.2.3. District Integrated Policy for Resettlement	0	Adaptation of the National Integrated Policy for Resettlement to District resettlements	**Target achieved (100%)** The CVP has incorporated the National Integrated Policy for Resettlement into District resettlements was carried out
C.2.4. Strengthening of the SDPAE		Training for agencies of the SDPAE in disaster prevention, response, and rehabilitation	**Target achieved (100%)** Tools and training to improve agency's decision making abilities for disaster prevention, response, and rehabilitation were provided

Component D: Risk Prevention and Awareness

The objective of this component was to increase awareness at all levels of society, and in

particular, at the community level in order to convey the importance of risk mitigation and disaster preparedness. Activities carried out under this component included risk education, information campaign, and resettlement of approximately 1,000 families living in high-risk areas.

This component secured continuity to training and information programs while providing information to communities and specific agencies on prevention, disaster response, and rehabilitation. The component collaborated to improve community participation and civil defense in comprehensive local risk management. In addition, contributed to broad information campaigns on risk management and emergency response. The implementing agencies for this component were FOPAE, the Secretariat of Education, and *Caja de Vivienda Popular* (CVP).

D. 1.1. Development of Education Strategy for Hazard Risk Management
D. 1.2. Strengthening of Educational Institutions for Prevention and Mitigation
D.2 Risk Communication
D.3 Socio-environmental Actions for Risk Reduction
D.4.1. Resettlement of Families in Risk-Prone Areas
D.4.2. Prevention and Implementation of Measures to Prohibit New Illegal Settlements

Subcomponent D.1 Risk Education. A strategy was developed to introduce risk management into educational programs, including the training of professionals in the education sector. This included designing curricula on disaster management, which were introduced at various levels of the educational system. The subcomponent also supported research grants on risk management.

In addition, the subcomponent financed the preparation of an emergency-response training plan for approximately 2,000 teachers in Bogota. Training was provided to 250 educational institutions to promote a wider awareness of the need for prevention.

Subcomponent D.2 Risk Communication. The Project financed the design and implementation of a multifaceted information campaign for the general public, using mass media. This subcomponent, supported by the Secretariat of Government and FOPAE, promoted large-scale public campaigns on risk management and information on emergency response.

Subcomponent D.3 Socio-environmental Action for Risk Reduction. Using DAMA to galvanize social networks, linking over 40 organizations engaged in environmental awareness, to encourage and coordinate prevention activities in hazard-prone areas. The subcomponent also financed the administration of protected land through community participation schemes.

Subcomponent D.4 Integrated Resettlements. About 6,000 families have been identified as living in areas subject to landslides, most of which are likely to be relocated. Specially

designed areas that include infrastructure, social facilities, and income-generating activities were prepared in advance in which families were relocated or resettled. More than 1,000 households have been resettled to safer locations with secure housing tenure. The FOPAE has developed a strategy to ensure that the previously occupied high-risk areas remain closed to future human settlements. Specific activities to select households for resettlement involved the identification of physical, legal, social, and economic status of the population. The *Caja de Vivienda*, which has been involved in resettlement under previous Bank-assisted projects, managed the implementation of this component.

Table 5 – Component D Indicators

Subcomponent	Baseline	Target	Result
D.1 Risk Education	N/A	Strategy to introduce risk management into educational programs, including the training of professionals in the education sector	**Target achieved (100%)** 3 Strategies to introduce risk management prepared
			Target achieved (100%) Curricula on DRM designed and introduced in the educational system
			Target achieved (100%) 2,066 teachers in 250 educational institutions trained to promote a wider awareness of the need for prevention
	N/A	Support research grants on risk management	**Target not met (0%)** No risk-management grants were reported
D.2 Risk Communication	N/A	Implementation of information campaign for the general public	**Target achieved (100%)** 100 large-scale public campaigns on risk management and information on emergency response carried out
D.3 Socio-environmental Action for Risk Reduction		Strengthening environmental organizations coordination in prevention activities in hazard-prone areas, linking 40 organizations	**Target achieved (105%)** 42 organizations engaged in environmental awareness through DAMA
		Administration of protected land through community participation schemes	**Target achieved (100%)** 4 environmental preventive programs to strengthen quality of life of communities living in risk-prone areas
Integrated		Identification of physical,	**Target achieved (100%)**

resettlements		legal, social, and economic status of the population for resettlement	Studies for socio-economic profiling were carried out in preparation for the resettlement process
		Specially designed areas that included infrastructure, social facilities, and income-generating activities prior resettlement	**Target achieved (100%)** Special designated areas and resettlement schemes were made available in preparation for the resettlement process
		Resettlement of up to 700 families living in areas subject to landslides	**Target surpassed (152%)** 1,067 families were relocated to safer locations, 7 families do not live in the risk-prone area anymore.
		Strategy to ensure that the previously occupied high-risk areas remain closed to future human settlements	**Target achieved (100%)** A strategy to prevent future settlements in risk-prone areas was developed by FOPAE

Component E: Financial Coverage for Risk Management

This component's objective was to develop a risk-financing strategy for losses arising from natural disasters. It aimed at providing the Municipality of Bogota D.C. with a financial strategy that guarantees the appropriation of resources needed for disaster reconstruction or rehabilitation based on the most advanced catastrophe risk modeling techniques (probabilistic earthquake-risk models) and financial instruments (parametric insurance, contingent debt, catastrophe bonds). It also intended to facilitate the development of a private catastrophe-insurance market, based on recent experiences in Colombia.

This component planned to finance two studies with 4 objectives that would contribute to the management of disaster risks in Bogota:

- Expansion of the probabilistic earthquake-risk model developed under APLl to all public and private buildings, in order to estimate the impact of earthquake scenarios on public buildings (schools, hospitals, administrative buildings), excluding infrastructure (for example, bridges, roads, telecommunication, water, electricity), and private buildings. These loss estimates complement loss estimates caused by floods and landslides (based on historical data).

- Design of a financial strategy for this residual risk, based on a combination of ex-post risk-financing instruments (for example, new loans, diverted loans, tax increases) and ex-ante instruments (for example, parametric insurance, contingent credit). The ex-ante risk-financing instruments aimed at financing the resource gap between immediate post-disaster needs (for example, emergency costs, restoration of lifeline

infrastructure). This resource gap, determined by the severity of the disaster and the ability of the District to raise funds after a disaster, defines the best cost-effective financial strategies to access financial markets.

- Revision of the current portfolio of insured and uninsured public assets that are under the direct responsibility of the District of Bogota (contracts, sum insured, risk covered, deductible, premium rate, exclusions, and so forth) in order to optimize the portfolio of insured assets, and to create a special position responsible for negotiating the insurance contracts of all public buildings with insurance brokers.

- Assessment of how the Municipality could facilitate the emergence of a private catastrophe-insurance market in the District of Bogota, as well as the preconditions for the development of such an insurance scheme.

The last two components were planned to allow the *Secretaría de Hacienda Distrital* (SHD) to assess the residual risk that is retained by the District. The institutions involved in this component were DPAE and SHD.

Although evidence of studies to reduce the District's fiscal vulnerability to disasters were provided after the ICR workshop, these studies were not delivered, disseminated or used in planning before project closing, and therefore no contribution to the achievement of the PDO was registered.

Table 6 – Component E Indicators

Subcomponent	Baseline	Target	Result
E.1 Two studies for the management of disaster risks in Bogota	0	Expansion of the probabilistic earthquake-risk model	Study carried out, but not delivered before the Project's closing date
	0	Financial strategy for residual risk	
	0	Revision of District's portfolio of insured and uninsured public assets	
	0	Establishment of a private catastrophe-insurance market in the District	

Annex 3. Economic and Financial Analysis

(including assumptions in the analysis)

Before the Project was implemented, a cost-benefit analysis was carried out by Ghesquiere, Yamin and Mahul (2006) using a probabilistic cost-benefit analysis, which in turn relied on a catastrophe risk model. This ICR relies on that report and assumes that the maximum probable loss will be mitigated in 3.9% of the value of the assets. However, the cost-benefit analysis carried out in this ICR uses actual costs of the Project by sector and assesses its benefits given a set of assumptions and parameters.

Civil works carried out in connection to the Project aimed at retrofitting schools/kindergartens and preventing landslides/flooding, improving hazard monitoring, developing building codes, and resettlement programs. Overall, these interventions are likely to have reduced the District's vulnerability and potential losses. However, modeling exercises done in connection with this Project have focused on a single hazard (earthquakes) and provide a scenario-based approach to such seismic damages. Scenarios are offered as examples that depend on where the seism occurs and its magnitude and are not exhaustive of the multiple scenarios that can emerge from a combination of hazards. Precise analysis is particularly difficult in large-scale disaster mitigation projects where costs are definitive while benefits, which are largely derived from avoided losses, are at best probabilistic.

The cost-benefit analysis carried out in this ICR has made a number of assumptions that compensate for the lack of information on the value of the assets and the losses that were mitigated, as well as of lack of information on demographic trends for benefited population (i.e. resettled families, children in intervened schools). Since no data on the value of the assets was found, this ICR relies on Bitran (nd) who found that non-structural elements in a hospital range between 75 to 85 percent of the total asset value. In other words, the physical structure of a hospital typically ranges between 15 and 25% of the total value of the asset. This ICR took the mid-point in that range and assumes that the structure (i.r. building) of a hospital represents only 20% of the value of the asset. However, since no values for hospitals structures was available, this ICR relies on Bitran (nd) who found that the value of retrofitting as a proportion of the physical structure of a hospital ranges between 8 and 15 percent as found by Bitran (nd) for a sample of Latin American countries. The scenarios presented in Tables A.3.1, A.3.2 and A.3.3 will all present financial results (e.g. B-C ratio, IRR and NPV) assuming that the value invested through the Project in retrofitting works represents either an 8 or an 15 percent of the value of the structure. With structure values calculated on the basis of investments made in retrofitting, the ICR estimated asset values considering that the estimated structure value was only 20 percent of the total. Finally, benefits from hospital retrofitting were affected by lack of completion in most of the works. Therefore, this ICR also uses the 57 percent completion rate shown by the intermediate outcome indicator 8 to calculate maximum probable benefits.

There was also an absence of valuation of assets that were retrofitted in the education sector. Although no figures for the value of structure as a proportion of the total assets

were found in the literature, past and current work elsewhere in Latin America suggest that retrofitting can represent up to 60 percent of the total asset to be cost-effective. Therefore, this ICR presents three different scenarios for school's structure value at 30, 45 and 60 percent of total assets.

One key aspect of this analysis was the value of lives saved as a result of the works. This ICR recognizes that placing a monetary value on life presents difficult and ethical questions. Without rejecting those claims, this ICR simply presents a value of life that represents that of the typical contribution of a worker in the labor market and therefore the valuation of life that is made here is only partial and modest. This ICR makes two different valuations: those lives saved as a result of reinforcing schools (i.e. children's lives saved) and those lives saved by resettling families that were living in non-mitigable areas of Bogota.

Since the approach to valuing life is to take only the labor market aspect, this ICR assumes that the working life of every child in the education system is 40 years, which in turn assumes that the retirement age is 60 (the average between retirement for women at 57 and men at 62 in Colombia) and that children become economically active at age 20. To calculate the value in the labor market that saved lives will produce in the case of resettling families, a number of assumptions are made. First, that the value of saved children's live is already counted in the schools' estimate. Second, that there is only one working parent in every household. Third, that the amount of years that a parent remains as economically active is 25 years. Fourth, that future average income of economically active persons is equal to Colombia's per capita GDP. Finally, since the economic value of a saved life is a benefit with an uncertain timeline, this ICR opted for being conservative, and assumed that such benefits to the project occur only at the end of its lifetime (2022).

In developing countries, discounted rates typically range between 8 and 12 percent. This ICR will employ the extremes of this range (8 and 12 percent) in addition to a conservative scenario of the opportunity cost of the money of 3%, which can also be seen a social discount rate. The cost-benefit analysis therefore presents 18 different scenarios that are the combination of not only the aforementioned discount rates, but also the value that retrofitting represents from each hospital's physical structure and the value that retrofitting represents from each school's physical structure. The former can take the extreme values found in Bitran (8 and 15 percent), while the latter can be 30, 45 and 60 percent.

The most salient feature of this analysis is that the Project was not efficiently carried out if only the value of the assets is taken into account. The Project is considerably efficient if the avoided loss of lives is included. The Benefit-Cost ratio in Tables A.3.1, A.3.2 and A.3.3 is lower than 1 in all scenarios if only the avoided losses in terms of assets are included ranging in values between 0.31 and 0.62. However, if the value of lives saved is included it delivers ratios of at least 10 times the value of its costs. The B-C ratio including lives saved ranges from 10.66 with a discount rate of 3% to 15.39 with discount rates of 12%.

The Project also yields solid Internal Rates of Return (IRR) and sizable Net Present Values (NPV) if the avoided loss of lives is included. IRRs range from -15.8 percent if the value of saved lives is not included, to 15.9 per cent if they are. The former is a result that appears regardless of the discount rate and only if the value of retrofitting for both hospitals (15 percent) and schools (60 percent) is assumed. The latter also results regarding of the discount rate and appear when retrofitting values for both schools and hospitals are at their lowest: 30 and 8 percent respectively.

As can be expected, NPV is negative for scenarios not including the value of saved lives. NPV without estimates for saved lives, go from -14.63 million dollars, to as much as 36.34 million dollars. The former is a scenario (see Table A.3.3) when the maximum discount rate of 12% and minimum retrofitting values are assumed (8 percent for hospitals and 30 percent for schools). The latter is a scenario with the lowest discount rate (see table A.3.1) and maximum assumed retrofitting values of 15 percent for hospitals and 60 percent for schools. However, if the value of saved lives is included in our estimates, NPVs are solid and positive. The smallest NPV can be found with the highest dioscount rate (12 percent) and maximum retrofitting values (15 and 60 percent for hospitals and schools respectively) in Table A.3.3. If a lower discount rate of 3% and minimum values of retrofitting are assumed (8 and 30 percent for hospitals and schools respectively) NPV can be as high as 327 million dollars.

Table A.3.1

Discount rate 3%				
	Retrofitting share of structure value		**Value of Life**	
	Hospital	**Schools**	**Not included**	**Included**
Benefit-Cost	8%	30%	0.62	10.95
IRR			-7%	15.9%
NPV*			($20.62)	$327.20
Benefit-Cost	8%	45%	0.59	10.93
IRR			-7.6%	15.7%
NPV*			($22.00)	$325.82
Benefit-Cost	8%	60%	0.58	10.91
IRR			-7.8%	15.7%
NPV*			($22.69)	$325.13
Benefit-Cost	15%	30%	0.37	10.7
IRR			-14.6%	15.0%
NPV*			($34.28)	$313.55
Benefit-Cost	15%	45%	0.34	10.67
IRR			-15.4%	14.9%
NPV*			($35.65)	$312.17
Benefit-Cost	15%	60%	0.33	10.66
IRR			-15.8%	14.9%
NPV*			($36.34)	$311.48

* In Millions of US$

Table A.3.2

Discount rate 8%				
	Retrofitting share of structure value		**Value of Life**	
	Hospital	**Schools**	**Not included**	**Included**
Benefit-Cost	8%	30%	0.60	13.29
IRR			-7%	15.9%
NPV*			($16.96)	$138.42
Benefit-Cost	8%	45%	0.57	13.27
IRR			-7.6%	15.7%
NPV*			($18.06)	$137.32
Benefit-Cost	8%	60%	0.56	13.26
IRR			-7.8%	15.7%
NPV*			($18.61)	$136.77
Benefit-Cost	15%	30%	0.35	13.05
IRR			-14.6%	15.0%
NPV*			($27.06)	$128.31
Benefit-Cost	15%	45%	0.33	13.03
IRR			-15.4%	14.9%
NPV*			($28.16)	$127.21
Benefit-Cost	15%	60%	0.31	13.01
IRR			-15.8%	14.9%
NPV*			($28.71)	$126.66

* In Millions of US$

Table A.3.3

Discount rate 12%				
	Retrofitting share of structure value		**Value of Life**	
	Hospital	**Schools**	**Not included**	**Included**
Benefit-Cost	8%	30%	0.58	15.39
IRR			-7%	15.9%
NPV*			($14.63)	$69.10
Benefit-Cost	8%	45%	0.55	15.37
IRR			-7.6%	15.7%
NPV*			($15.56)	$68.17
Benefit-Cost	8%	60%	0.54	15.35
IRR			-7.8%	15.7%
NPV*			($16.03)	$67.70
Benefit-Cost	15%	30%	0.35	15.16
IRR			-14.6%	15.0%
NPV*			($22.67)	$61.06
Benefit-Cost	15%	45%	0.32	15.13
IRR			-15.4%	14.9%
NPV*			($23.60)	$60.13
Benefit-Cost	15%	60%	0.31	15.12
IRR			-15.8%	14.9%
NPV*			($24.07)	$59.66

* In Millions of US$

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Alliali, Solange A.	Sr. Counsel	LEGLA	Legal
Cardona, Omar D.	Hazard Risk Management Consultant	LCSFU	Hazard monitoring
Correa, Elena	Sr. Social Specialist	LCSEO	Resettlements
Daza, Ana F.	Language Program Assistant	LCSFU	Administrative
Deeb, Alejandro M.	Hydrologist	LCSEN	Hydrology
Estupinan, Jeannette	Financial Management Specialist	LCOAA	Financial mgmt.
Ghesquiere, Francis	Hazard Risk Management Specialist	LCSFU	Task Team Leader
Jimenez, Efraim	Procurement Specialist	LCOPR	Procurement
Mahul, Olivier	Sr. Insurance Specialist	OPD	Insurance
Martinez, Jose M.	Procurement Specialist	LCOPR	Procurement
Robert O'Leary	Sr. Finance Officer	LOAGl	Financial mgmt.
Solo, Tova M.	Disaster Management Specialist	LCFPS	DRM
Toro Landivar, Jose C. Joaquin	Hazard Risk Management Consultant	LCSFU	DRM
Wright, James Otis	Urban Economist Consultant	LCSFU	Urban planning
Zarzar Casis, Alonso	Social Scientist	LCSEO	Social
Supervision/ICR			
Agudelo Martinez, Mauricio	Consultant	LCCCO	
Alfaro Alvarenga, Celso Saul	Consultant	LCCCO	
Aristizabal, Ana Maria	Consultant	LCCCO	
Bermudez Arboleda, Nury C.	Consultant	LCCCO	
Berroa, Diomedes	Senior Operations Officer	LCSOP	Operations
Burbano, Angela Lucia	Consultant	LCCCO	
Campos Garcia, Ana	ET Consultant	LCSDU	DRM
Cardenas Garcia, Claudia M.	Consultant	LCCCO	
Carletto, Andre L.	DRM Consultant ICR	LCSDU	DRM
Costa Posada, Carlos Rufino	Consultant	LCCCO	
Cuellar, Richard	Temporary	LCCCO	Administrative
Daza, Ana F.	Language Program Assistant	LCSFU	Administrative
Deeb, Alejandro M.	Hydrologist	LCSEN	Hydrology
Della Monica, Rossella	Communications Consultant	LCSUW	Communications
Diaz Giraldo, Carolina	DRM Consultant	LCSDU	DRM
Dickson, Eric	Sr Urban Specialist	LCSDU	Task Team Leader
Esquivel, Maricarmen	ET Consultant	LCSDU	DRM
Estupinan, Jeannette	Financial Management Specialist	LCOAA	Financial mgmt.
Garcia-Pertusa, Raquel	Consultant	LCCCO	
Ghesquiere, Francis	Hazard Risk Management Specialist	LCSFU	Task Team Leader
Gonzalez, Luz Maria	Consultant	LCSUW	Hydrology

Guzman Escobar, Armando E	Sr. DRM Specialist	LCSDU	DRM
Herrera, Vladimir	Consultant Web	LCSDU	Web design
Holm-Nielsen, Niels B.	Sr. DRM Specialist	LCSDU	Task Team Leader
Hoornweg, Daniel A.	Sr. DRM Specialist	LCSUW	Task Team Leader
Ivarsdotter, Kristine M.	Sr. DRM Specialist	LCSUW	
Lozano, Teresa del Pilar	Consultant	LCCCO	
Mahul, Olivier	Sr. Insurance Specialist	OPD	Insurance
Martinez, Jose M.	Procurement Specialist	LCOPR	Procurement
Meli, Nara C.	Consultant	LCSDU	DRM
Miguez, Nils Eduardo	Consultant	LCCCO	
Molina Prieto, Carlos Alberto	Consultant	LCCCO	
Moran-Porche, Silvia	Consultant	LCCCO	
Morel, Xiomara A.	Sr Financial Management Spec.	LCSFM	Financial mgmt.
Munoz Santamaria, Yecid	Consultant	LCCCO	
Myboto, Ulrich Cedric	Sr. DRM Specialist	LCSUW	Task Team Leader
Ortega Lopez, Juan Ricardo	Consultant	LCCCO	
Prieto Arbelaez, Felix	Consultant	LCCCO	
Rodriguez Pinilla, Jorge E.	Consultant	LCSDU	Engineering
Rosas Apraez, Juan Pablo	Consultant	LCCCO	
Sanchez-Reaza, Javier	Sr Urban Specialist	LCSDU	ICR TTL
Sellen, Daniel M.	Sector Leader	LCSSD	Management
Souza Weich, Mercedes	Consultant	LCCCO	
Sviedrys, Nikolai	Consultant	LCSDU	Financial
Tarazona Gomez, Marcela	Consultant	LCCCO	
Toro Landivar, Jose C. Joaquin	Hazard Risk Management Specialist	LCSFU	DRM
Torres, Santiago Rene	Procurement Specialist	LCOPR	Procurement
Trejos Gomez, Claudia Lorena	ET Consultant	LCSDU	DRM
Vanegas Santos, Olga Lucia	Consultant	LCCCO	
Zeron, Luz A.	Financial Management Specialist	LCOAA	Financial mgmt.

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
Lending		
FY04	-	3,270.10
FY05	18.19	103,864.81
FY06	21.70	135,580.42
Total:	**39.89**	**242,715.33**
Supervision/ICR		
FY06	1.24	8,773.99
FY07	11.58	86,785.23
FY08	13.17	72,859.00

FY09	19.49	145,742.77
FY10	20.03	106,129.68
FY11	9.40	79,031.83
FY12	9.21	80,867.82
FY13	17.94	125,736.23
FY14	20.30	138,046.59
Total:	**122.36**	**843,973.14**

Annex 5. Beneficiary Survey Results

Non-Applicable

Annex 6. Stakeholder Workshop Report and Results

Bogotá, April 30, 2014

The workshop was entitled, "Validation of Results for the Bogota Disaster Vulnerability Reduction Project in support of the Second Phase of the Disaster Vulnerability Reduction Program - APL 2" was carried out with the objective to bring together representatives of the Bank, Borrower (GoB), and implementing agencies to share, discuss, and validate the results of the Project.

Present at the workshop were representatives of the World Bank (Country Office and Headquarters), Project Coordination Unit -Secretaría Distrital de Hacienda (SDH)-, and Project Implementation Agencies -*Secretaría Distrital de Ambiente* (SDA), *Secretaría Distrital de Salud* (SDS), *Secretaría Distrital de Educación* (SED*), Secretaría Distrital de Integración Social* (SDIS), *Caja de Vivienda Popular*, and *Fondo Prevención y Asistencia a Emergencias* (FOPAE)-.

Opening remarks for this participatory one-day workshop were delivered by Martha Lucía Parra, Director of Public Credit of District Finance Secretariat (Secretaría Distrital de Hacienda) in representation of the Borrower, and Javier Sánchez-Reaza, ICR TTL, in representation of the Bank.

Presentations were carried out by the ICR Team in order to introduce the importance of the report and its benefits, as well as to present the findings regarding the indicators, target achievement, positive and negative issues affecting implementation, and overall project implementation rating. After each presentation, a round of discussion followed up to search for a consensus on the discussed topic, as well as to draw lessons from issues faced during implementation.

The presence of an ample cross-section of Bank and Borrower interests fostered a highly productive discussion and exchange of views in a relatively short period of time. The salient points of the discussion are as follows:

Factors affecting implementation

- The Government and the Bank built a solid partnership on DRM, which has ensured continuous technical and financial support and close collaboration free from political changes in the District.
- The implementing institutions, without exception, benefit from staff with a high level of dedication and professionalism, which has had positive effects on project implementation.
- Use of a procurement system that in addition to complying with Bank principles, enabled local competition, resulted in competitive prices and a more efficient and transparent implementation of the adjudication process.

- The lack of consistency between District's policies/sector development plan and Project goals, and a gap between Project targets and ground reality, given the lack of pre-feasibility studies.
- SDH faced obstacles to appropriate enforcing of reporting and project management mechanisms since executing agencies obtained Bank's resources directly, which effectively reduced incentives to comply with reporting and progress mechanisms.
- Delays in project implementation due to the particular health system legal framework effectively prevented both SDH and SDS from ensuring proper execution of Project activity. Delays also occurred given the complexity of building hospitals is higher than other structures (e.g. schools) in the Project.
- Technical and financial planning shortcomings of some implementing agencies to ensure compliance of civil works and underestimation of building permit-granting and utility-service request periods.
- Project implementation has been adversely affected by a high turnover of staff in different implementation agencies.

Considerations for Project overall rating

- The Project supported the establishment of a solid basis in the Capital District of Bogota to reduce its vulnerability to natural events, by strengthening its capacity to manage disaster risks.
- Building on Project results, the District has continued with risk assessment and monitoring.
- Although several activities in the health subcomponent were not fully achieved, surpassed targets on indicators of equal or greater relative weight more than compensated this shortfall.
- The legal and institutional framework is clearer and more consolidated, and SPDAE is fully operational; its expansion is an ongoing process. For these reasons, the Project is rated as satisfactory.

Considerations for Project Bank performance

- Close collaboration with Borrower during Project preparation
- Flexibility of design and inclusion of innovative elements to enhance the Project's impact, and reasonable targets in a context of institutional evolution and experimentation.
- The Project's design was a pioneer effort at the time, and responded adequately to client needs.
- Given the difficult challenge to reduce the District's vulnerability and the particular institutional setting, risk assessment and institutional analysis understandably had some shortcomings, but did not affect project outcomes in the long run.
- Supervision missions were timely and solution oriented to address critical issues affecting project implementation.
- Procurement and financial management were well supervised.

- Supervision of safeguards was conducted and no negative social or environmental impacts were identified as a result of project activities.

Considerations for Project Borrower performance

- Government sustained its commitment to PDO achievement, including especially the concerted effort to reduce the District vulnerability to disasters while strengthening key agencies and the SPDAE.
- Given the innovative and inter-sector nature of the Project, coordination issues were bound to arise.
- At times the Project experienced delays due to personnel turnover and implementation arrangements limited by the legal institutional framework. However, the priority given by the Government to the Project consistently provided an enabling environment for project implementation and facilitated resolution to critical constraints.
- Delays in loan effectiveness led the District to proactively implement activities using their own funds to speed up project implementation.
- The speed of project implementation increased, which led to an early completion of activities and meeting most of the PDOs by year 3 of implementation.
- Management and institutional coordination shortcomings prevented the timely delivery of health subcomponent products and activities.

Considerations for Lessons Learned

- Investing in vulnerability reduction pays off in the long term, especially if coupled with flexibility and responsiveness to city needs and conditions.
- DRM capacity building contributes to ownership and sustainability of results.
- Development of monitoring and evaluation systems and sound economic analysis for DRM Projects is critical, not only to measure results, but also to draw well-grounded lessons.
- Targets should be established realistically in terms of institutional and local market conditions, and should also consider local development plans and policy frameworks.
- The establishment or consolidation of a technical project unit responsible for project activities in each implementing agency could facilitate the implementation of civil works and ensure its completion to satisfaction.

In light of the discussion around indicators and target completion, the following commitments were set:

#	Agency	Commitment	Date
1	*Secretaría Distrital de Salud* (SDS)	Send copy of the internal memo to SDH notifying the reduction from 18 to 8 hospitals as target to be retrofitted (Subcomponent B.3).	07-May-2014
2	*Secretaría Distrital de Ambiente* (SDA)	Send officially the final number of environment organizations working with DAMA in prevention (Subcomponent D.3).	05-May-2014

3	*Secretaría Distrital de Hacienda* (SDH)	Send copy of 2 risk financing studies (Component E)	05-May-2014
4	*Secretaría Distrital de Hacienda* (SDH)	Send copy of Borrower's Project Completion Report.	05-May-2014

As final conclusion, the workshop allowed a productive discussion between the Bank and implementing agencies on the design, implementation and results of the Project, which in turn allowed for a better understanding of the challenges faced during the implementation, as well as the impacts that achieving and not achieving the expected results achieved have.

The evaluation team recognizes the efforts made by various officers in all District agencies involved in the process of designing and implementing the Project, and appreciates the proactive attitude of workshop participants.

Annex 7. Summary of Borrower's Comments on Draft ICR

From: Martha Lucia Parra Garcia <mlparra@shd.gov.co>
To: "jsanchezreaza@worldbank.org" <jsanchezreaza@worldbank.org>
Cc: Luis Javier Montero Mendez <ljmontero@shd.gov.co>
Date: 07/09/2014 07:45 PM
Subject: RV: BIRF 7365-CO Observaciones documento ICR

Buenas tardes Javier,

En primer lugar te pido disculpas por el retraso en el envío de los comentarios.

Remitimos el documento de evaluación ICR realizado por el Banco con los comentarios puntales de la DDCP incluidos dentro del texto del documento pdf adjunto.

Adicionalmente a continuación presentamos los comentarios generales al documento:

- Pueden existir algunos comentarios sobre frases que cambian su sentido en el momento de la traducción del inglés al español.
- El formato del documento es preestablecido por el banco, sin embargo consideramos que las siglas y abreviaturas deberían precisarse para efectos de entender todos los términos, e incluir el objetivo del documento o una introducción que guie la estructura del mismo. Lo mismo sucede en algunos cuadros y gráficas, no hay un texto introductorio o explicativo que la contextualice.
- Se anexa el cuadro de ejecución financiera del proyecto actualizado.

Con respecto al capítulo 7 **Comentarios sobre temas sugeridos por el Prestatario/Instituciones Ejecutoras/Socios** (página 37), a continuación se presentan los siguientes comentarios, acorde con el desarrollo del taller adelantado el pasado mes de abril:

Oportunidades de mejora para el banco

- Se debe aumentar la flexibilidad para que, en desarrollo de los proyectos, se pueda autorizar la reformulación de los mismos a medida que se implementen; se debe utilizar la evaluación de medio término para este propósito y replantear los componentes críticos y reasignar recursos.
- Se solicita al banco definición clara del proceso de contratación de las auditorías externas, con su área financiera y en coordinación con los prestatarios, para evitar retrasos; en el caso de la auditoría para la vigencia 2013, se cambiaron las reglas para los términos de referencia y el esquema de contratación y, una vez finalizado el proceso de adjudicación, este fue observado y se hizo visita de revisión después de haberle sido otorgada la no objeción al proceso, lo que genero demoras en el inicio del contrato.

Lecciones Aprendidas

- Flexibilizando la posibilidad de reformular el proyecto, durante su periodo de ejecución, se pueden modificar las metas de sus componentes a fin de balancear el proyecto.
- Con base en las problemáticas planteadas al momento de ejecutar obras y de acuerdo con las situaciones enunciadas, relativas a los procesos de contratación y ejecución de las mismas, en el proceso de planeación tener en cuenta: situación financiera de los posibles contratistas, trámites a realizar previamente con entidades distritales y nacionales, un mayor seguimiento y una mayor exigencia en el cumplimiento de cronogramas a contratistas e interventores.

- Se debe procurar mantener en la SDH y en las entidades ejecutoras el personal ya capacitado e idóneo para la contratación bajo las normas banca y su consiguiente gestión presupuestal, y para la coordinación y ejecución de proyectos financiados con recursos de la banca multilateral. Se propone que en cada entidad se nombre un responsable general de lo pertinente a la ejecución del componente asignado en el proyecto.
- Las entidades ejecutoras deben ser más rigurosas con la elaboración del archivo físico e informático de la memoria y evidencia física del desarrollo de los proyectos.
- Así mismo estas entidades deben ser más exigentes en cada proceso de contratación, respecto a la verdadera capacidad financiera y operativa de los aspirantes, de cara a evitar contratar empresas que no cuenten con la capacidad técnica y financiera requerida, que a la postre no puedan terminar las obras a satisfacción.
- Previo al inicio de un proceso contractual, específicamente en los procesos de obra civil, las entidades deberán contar con toda la documentación que avale que dicho proceso está debidamente planeado y soportado.
- Para los contratos de obra civil, la entidad deberá solicitar a los posibles contratistas un reporte de las obras que este ejecutando, con el fin de validar su capacidad financiera, con el fin de minimizar los riesgos de adjudicar varios contratos a un solo oferente.
- Se recomienda estudiar la posibilidad de que las entidades ejecutoras, cuando se trate de contratos de interventoría de obra, se facture por avance de obras sobre las que se ejerce la interventoría y no sobre tiempo de permanencia en obra.

Quedamos atentos a tus observaciones.

Finalmente queremos agradecer tu apoyo en este proceso, el cual redunda en beneficios para el Distrito Capital en la ejecución de futuros proyectos.

Cordial Saludo,

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RESUMEN EJECUCIÓN BIRF7365

Informe ICR banco Javier Sanchez.pdf

Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

Non-Applicable

Annex 9. List of Supporting Documents

1. Project Appraisal Document on a Proposed Credit in the amount of US$ 80 million to the Capital District of Bogota for a Disaster Vulnerability Reduction Project in Support of the Second Phase of the Disaster Vulnerability Reduction Program (January, 2006)

2. Project Paper on Restructuring the Colombia: Bogota for a Disaster Vulnerability Reduction Project – APL2 (June, 2009)

3. Project Paper on Restructuring the Colombia: Bogota for a Disaster Vulnerability Reduction Project – APL2 (April, 2011)

4. Project Paper on Restructuring the Colombia: Bogota for a Disaster Vulnerability Reduction Project – APL2 (December, 2012)

5. Borrower's Implementation Completion Report, Original Credit (May 2014)

6. Economic and Financial Analysis for Original Credit and AF (May 2014)

7. Independent Procurement Review Report (November 2008)

8. Independent Procurement Review Report (February 2011)

9. Colombia - Probabilistic modeling for disaster risk management (in Spanish) – Yamin, et al (2013)

10. General Study on Seismic Hazard in Colombia (AIS, 2010).

11. Earthquake Vulnerability Reduction Program in Colombia: A Probabilistic Cost-benefit Analysis – Ghesquiere et al. (2006).

12. Análisis Costo-Efectividad en la Mitigación de Daños de Desastres Naturales sobre la Infraestructura Social –Bitran (nd)

13. District Decree 723 from 1999. Organization of District's Prevention and Emergency Response System.

14. District Decree 61 9 from 2000. Land Use Planning.

15. District Decree 904 from 2001. Regularization and Management Plans.

16. District Decree 332 from 2004. Update of the Organization of District's Prevention and Emergency Response System.