

COLOMBIA: A COUNTRY UNDER CONSTANT THREAT OF DISASTERS

A Monograph

by

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ABSTRACT

COLOMBIA: A COUNTRY UNDER CONSTANT THREAT OF DISASTERS, by LTC Jorge Ricardo Hernandez Vargas, 66 pages.

Colombia's internal conflict has left many victims over the last five decades. Both disasters and violence have caused human suffering and material losses. However, natural and manmade disasters can affect the Colombian people and economy more than armed conflict. Various kinds of disasters strike every nation in the world, and although these events do not occur with uniformity of distribution, developing nations suffer the greatest impact of nature's fury. As a developing country, and because of its geographical, climatic, and geological conditions, Colombia faces a wide variety of natural threats, and when coupled with its social vulnerability and population dynamics, the risk to the nation is significant. Analyzing the effects on the population and national economy, and evaluating the government response to, these effects from the four largest disasters Colombia has faced in the last five decades provides insights into Colombia's readiness to deal with disasters today. Reviewing how the Colombia's Disaster Response system evolved from *Comites Nacionales de Emergencia* (National Emergencies Committee) to *Sistema Nacional de Gestión del Riesgo de Desastres* SNGRD (Colombian National Disaster Risk Management System) provides evidence the Government of Colombia has been reactive, not proactive when responding to disasters. The Colombian Military Forces have actively participated when natural disasters have hit the country, and the Colombian National Army is the service branch that has evolved most in responding to and preventing disasters.

Holistically examining disasters as a series of complex situations currently taking place in Colombia shows how natural and manmade disasters can threaten Colombians and their livelihoods, and, depending on the disasters' intensity, can even compromise the social and economic stability of the country.

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ACRONYMS

BIADE	Colombian Army's 80th Disaster Response and Risk Management Battalion
DIGER	Colombian Army's Directorate of Risk Management
EJC	Colombian National Army
FAC	Colombian Air Force
FARC	Colombian Revolutionary Armed Forces
FFMM	Colombian Military Forces
FNC	Colombian National Disaster Fund
GDP	Gross Domestic Product
GoC	Government of Colombia
PNC	Colombian National Police
PPAD	Colombian Army's Disaster Response and Relief Platoons
SNGRD	Colombian National Disaster Risk Management System
SNIGRD	Colombian National Disaster Risk Management Information System
SNPAD	Colombian National Disaster Preparedness and Response System
UNGRD	Colombian Risk Management Unit

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INTRODUCTION

Background

When most people think destructive forces affecting Colombia, they focus on the Colombian Revolutionary Armed Forces (FARC for its acronym in Spanish) and the problems that generated the armed conflict. However, both natural and manmade disasters affect more Colombians more frequently and do more harm to the social and economic stability of the country than armed conflict.

Colombia has been involved in an internal armed conflict since 1949. The current conflict began when the Conservative Party, in office since 1946, officially initiated a violent campaign to eliminate the Liberal Party.¹ On April 9, 1949, the popular liberal political leader Jorge Eliecer Gaitán was assassinated.² Following the assassination of Gaitán, the two radical political parties, liberals and conservatives, began a bloody struggle known as *La Violencia* that grew systematically.³ In 1964, the now deceased FARC leader, Manuel Marulanda Velez, founded the FARC as the armed wing of the Colombian Communist Party, and began a rural insurgency with

¹Historically Colombia has two traditional political parties, the Liberal and the Conservative Party. The Liberal Party considers itself as the party of the people. The party has a pluralistic character, and its main goal is the promotion of the human being. The Liberal party supports religious tolerance and a positive response to the social and economic demands of the masses. The Liberals theoretically support separation of church and state, though in practice a strong church is accepted. On the other hand, the Conservative Party is the second largest political party in Colombia. Conservatism considers religion as a factor of spirituality and harmony of the individual and society. Conservatives believe in the existence of a creator of the universe, which revolves around the philosophical thought of Christianity. Conservatives are strong followers of the moral and social doctrines of Catholicism. "Historia de los Partidos Políticos Tradicionales de Colombia," Biblioteca Virtual, Biblioteca Luis Ángel Arango, <http://www.banrepcultural.org/blaavirtual/ayudadetareas/poli/poli61.htm> (accessed 27 February 2014).

²Ibid.

³Eduardo Pizarro and Ricardo Peñaranda, *Las FARC (1949-1966): de la Autodefensa a la Combinación de Todas las Formas de Lucha*, 2nd ed. (Bogotá, Colombia: Instituto de Estudios Políticos y Relaciones Internacionales: Tercer Mundo Editores, 1991), 38.

the objective of overthrowing the government.⁴ Over the past 54 years of struggle, countless Colombians suffered the consequences of the internal armed conflict. The dimensions of the violence show that Colombia's insurgency is one of the bloodiest conflicts of contemporary Latin America's history.

Although establishing the real dimensions of Colombia's internal struggle is hampered by the difficulty in collecting and processing information and from the problems arising from the dynamics of internal conflict, *El Grupo de Memoria Histórica*,⁵ (Historical Memory Group) research concluded that Colombia's internal conflict has directly affected 5,034,400 Colombians.⁶ According to the Historical Memory Group research, 177,307 (81.5 percent) civilians and 40,787 (18.5 percent) combatants were killed in the armed conflict, for a total approaching 220,000.⁷ In addition, the Historical Memory Group reported 25,007 people are missing; that armed groups had recruited 6,421 children and adolescents; 1,754 people were victims of sexual violence; 4,744,046 people were displaced; 27,023 kidnapped; and 10,189 Colombians have been victims

⁴IHS Janes, "Jane's World Insurgency and Terrorism." Fuerzas Armadas Revolucionarias de Colombia (FARC), Combined Arms Research Library Digital Library, <https://janes.ih.com.lumen.cgsccarl.com/CustomPages/Janes/DisplayPage.aspx?ShowProductLink=true&ShowProductLink=true&DocType=Reference&ItemId=+++1320752> (accessed 31 March 2014).

⁵The Colombian government created *El Grupo de Memoria Histórica* (The Historical Memory Group or GMH) as a research group belonging to *La Comisión de Reparación y Reconciliación Nacional* (National Commission for Reparation and Reconciliation) whose aim is to develop and disseminate a narrative about the armed conflict in Colombia. The GMH studies the reasons for the emergence and evolution of illegal armed groups. In addition, GMH looks for the truths and memories of violence, GMH gives a preferential option for the victims who have been suppressed or silenced. Furthermore, GMH formulates policy proposals that promote the effective exercise of the right to truth, justice, reparation, and guarantees of non-repetition. Grupo de Memoria Histórica, *! Basta Ya! Colombia: Memorias de Guerra y Dignidad* (Bogotá: Imprenta Nacional, 2013), <http://www.centrodememoriahistorica.gov.co/descargas/informes2013/bastaYa/basta-ya-memorias-guerra-dignidad-12-sept.pdf> (accessed 31 March 2014), 32-35.

⁶Ibid.

⁷Ibid.

of Improvised Explosive Devices (IEDs).⁸ These numbers show that the armed conflict affects more civilians than combatants (table 1).

Table 1. Colombia's Armed Conflict Numbers

Affectionation	Civilian	Military
Killed	177,307	40,787
Missing	25,007	
Minors Recruited	6,421	
Sexual Violence	1,754	
Displaced	4,744,046	
Kidnapped	27,023	
Victims of Improvised Explosives Devices	10,189	
TOTAL	4,991,747	40,787

Source: Created by author.

Beginning with the 1979⁹ Tumaco tsunami in southeastern Colombia, the government has been conducting partial studies of major disasters that have affected the country. Nevertheless, it was not until Armenia's earthquake in 1999 when the Government of Colombia (GoC) began to record the figures related to disasters in a coordinated and permanent manner.¹⁰ Despite, these gaps in information and partial studies, this monograph has tried to find an approximate rate of recurrence, the number of people affected, and the economic losses that disasters have caused. Due to evidence availability, this study has established two periods in Colombia's modern history. The first period covers disasters from 1979 to 1998 and the second period covers

⁸Grupo de Memoria Histórica, *! Basta Ya! Colombia: Memorias de Guerra y Dignidad*.

⁹In 1979, the Colombian government established the first national, regional and local-level disaster management institutions known as Emergency Management Committees, and established disaster preparedness and management procedures. Ernesto Sanchez-Triana, Kulsum Ahmed, and Yewande Awe, eds., *Environmental Priorities and Poverty Reduction: a Country Environmental Analysis for Colombia* (Washington, DC: World Bank Publications, 2007), 325.

¹⁰Omar Darío Cardona A. and Luís Eduardo Yamín L., *Información para la Gestión de Riesgo de Desastres. Estudio de Caso de Cinco Países: Estudio de Caso Colombia* (México: Naciones Unidas y Banco Interamericano de Desarrollo, 2007), <http://www.eclac.cl/publicaciones/xml/8/33658/ColombiaCapI.pdf> (accessed 31 March 2014), 8.

disasters from 1999 to 2012.¹¹ During the first period, (1979-1998) Colombia experienced 90 disasters,¹² an average of 2.97 disasters per year, which is the third-highest annual rate¹³ among the 19 countries of Latin America.¹⁴ During the second period (1999-2012), the number of disasters totaled 13,273, four of which were earthquakes, for an average of 19 natural disasters per week.¹⁵ Furthermore, during the second period, the most repeated disasters were floods (7,138), representing 53.8 percent of the events, followed by landslides at 2,525. In terms of impact upon the population, these disasters have affected approximately 25,092,736 Colombians in the last five decades.¹⁶ In the first period, 9,367,638 people were affected (31,456 died, 36,002 wounded, and 1,206 missing). In the second period, 15,725,098 people were affected (4,745 died,

¹¹The Colombian government defines disaster as an outcome from the events that trigger the expression of one or more natural or anthropic (manmade) disaster, which finds favorable conditions of vulnerability in people, property, infrastructure, livelihoods, public utilities, and resources. Due to these favorable conditions, disasters cause economic, social, and environmental damage, generating a severe and widespread affectation of the normal functioning of society, which demands from the state an emergency response, rehabilitation, and reconstruction actions.

¹²Including the 1956 explosion of seven army ammunitions trucks in Cali, the greatest manmade disaster in Colombia history.

¹³Sánchez, 322.

¹⁴Latin America consists of Central American and South American countries. Central American countries are: Belize, Costa Rica, El Salvador, Guatemala, Honduras, México, Nicaragua, and Panamá. South American countries are: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Perú, Uruguay, and Venezuela.

¹⁵Carlos Alberto Baena López, “Retos de Colombia Frente a la Gestión del Riesgo de Desastre Natural,” *Revista del Departamento de Ciencia Política, Universidad Nacional, Sede Medellín* (Julio-Diciembre 2011): 94-95.

¹⁶This number comes from different sources. The author used information from United Nations, Inter-American Development Bank studies, Colombian *Sistema Nacional de Gestión del Riesgo de Desastres* [National Disaster Risk Management System], and United Nations Disaster Information System. Unidad Nacional para la Gestión del Riesgo de Desastres, *Líneas Estratégicas y Avances En Priorización de Zonas de Intervención*, Bogotá: Unidad Nacional para la Gestión del Riesgo de Desastres, 2012, http://www.eird.org/wikiesp/images/COL_Documento_de_pais_L%C3%ADneas_Estrat%C3%A9gicas_DIPECHO_031012.pdf (accessed 2 April 2014).

36,391 wounded, and 1,421 missing), for an average of 966 people affected per month.¹⁷ In economic terms, disasters have cost more than \$8.6 billion. The first period's disasters resulted in economic losses of more than \$821,447 million or 11.5% of the Colombia's 1995 gross domestic product GDP.¹⁸ The second period caused economic losses of \$7.2 billion.¹⁹ A 2011 United Nations economic study demonstrated that in the near future, annual losses related to disasters will amount to one percent of gross domestic product (GDP) and is comparable to the costs of the armed conflict in Colombia for the period 1991-1996 which was estimated at 1.1 percent of GDP.²⁰ The most lethal disasters in Colombia's modern history were volcanic eruptions, landslides, Cali's truck explosions, earthquakes, and floods.

Comparing armed conflict and disasters affectation, disasters have affected 25,092,736 Colombians (83 percent of the total affected people) in the last five decades, while armed conflict has affected 5,034,400 Colombians (17 percent of the total affected people) in the same period (figure 1). According to these numbers, disasters affect four times more Colombians than armed conflict, and result in much more harm to the social and economic stability of the country.

¹⁷Baena, 94-95.

¹⁸Sánchez, 322.

¹⁹“Colombia, Profile,” Desinventar, http://www.desinventar.net/DesInventar/profiletab.jsp?countrycode=col#more_info (accessed 31 March 2014).

²⁰Álvaro Martín Moreno R. and Omar Darío Cardona A., *Efectos de los Desastres Naturales Sobre el Crecimiento, el Desempleo, la Inflación y la Distribución del Ingreso: Una Evaluación de los Casos de Colombia y México* (Global Assessment Report on Disaster Risk Reduction GAR 2011, February 2011), http://www.preventionweb.net/english/hyogo/gar/2011/en/bgdocs/Moreno_&_Cardona_2010.pdf (accessed 31 March 2014), 12.

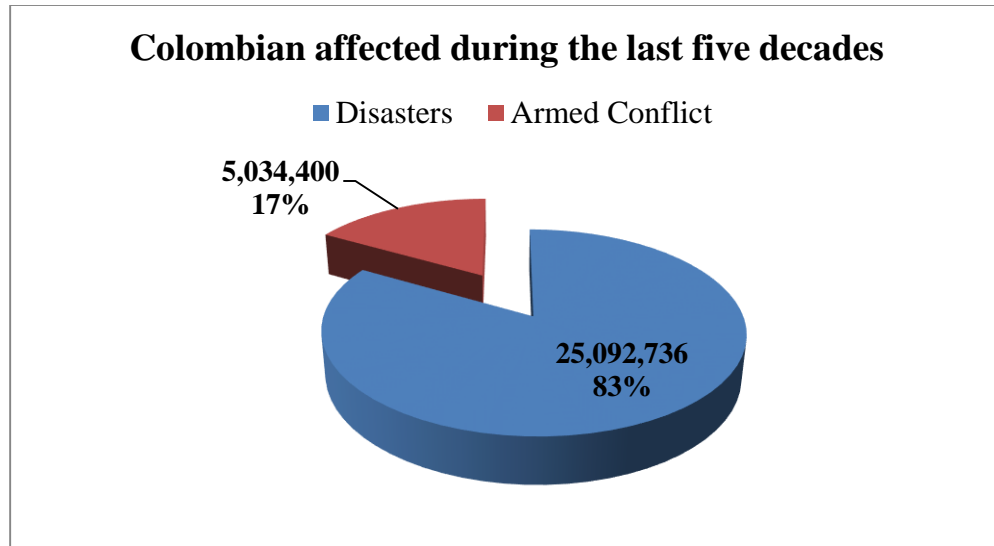


Figure 1. Disasters and Armed Conflict Comparison (1964-2012)

Source: Created by author.

The GoC's response to disasters has evolved during the last five decades. During this time, Colombian Armed Forces have assumed a larger role within disaster response. The first attempt to create a Disasters Response System in Colombia was following the Colombian Pacific Coast tsunami in 1979. The GoC established national, regional, and local-level disaster management institutions known as Emergency Management Committees, and implemented disaster preparedness and management procedures. Two years after the Armero tragedy²¹ the GoC created a special program called *Sistema Nacional para la Prevención y Atención de Desastres* (National Disaster Preparedness and Response System or SNPAD). The main purposes of the SNPAD are: 1) to define the functions of all public and private institutions related to disaster prevention and management; 2) to integrate public and private efforts for disaster prevention and management; and 3) to assure timely and efficient management of the human,

²¹Armero's tragedy killed 24,523 people on 13 November 1985, and is discussed later in this monograph.

technical, administrative, and economic resources necessary for preventing and managing disasters.²² In the aftermath of the 2010-2011 floods, the President of Colombia replaced the old SNPAD with *Sistema Nacional de Gestión del Riesgo de Desastres* (National Disaster Risk Management System or SNGRD) in 2012. The new system introduced a new policy focused not only on disaster response but also on disaster prevention.²³ Within the SNPAD, the main effort was the mobilization of all the assets available once disaster occurred.²⁴ The SNGRD allows the governmental agencies not only to address the disasters' consequences, but also to reduce the risk that Colombia faces. In addition, SNGRD modified and established new governmental agencies in order to create a robust network that will bring together all public and private organizations related to disaster risk prevention and disaster response, forming a single system able to be mobilized whenever necessary.

Las Fuerzas Militares de Colombia (Colombian Military Forces or FFMM) play a key role when major disasters occur. When major disasters overwhelm the capacities of disaster response agencies such as Civil Defense, Red Cross, and local-regional firefighting departments, the Colombian Armed Forces' logistics capacity is the only asset to provide support to the affected areas. The air capacity of the *Fuerza Aérea Colombiana* (Colombian Air Force or FAC) is an especially vital asset when disasters occur. Using a variety of fixed and rotary wing aircraft, FAC provides medical evacuation and the mobilization of relief material and personnel to the affected areas. In order to improve FFMM's response, the Colombian Ministry of Defense created the first Disaster Response Battalion in 2009, and established a local-based response

²²Sánchez, 326-328

²³“Por Primera Vez, Colombia Cuenta con una Política Enfocada en el Conocimiento y la Prevención de Desastres Naturales: Presidente Santos,” República de Colombia, Presidencia de la República, http://wsp.presidencia.gov.co/Prensa/2012/Abril/Paginas/20120424_01.aspx (accessed 31 March 2014).

²⁴Ibid.

network using active territorial battalions in 2011. In addition, *Policía Nacional de Colombia* (Colombian National Police or PNC) secures the disaster area and supports the affected population, to include coordinating for their temporary lodging.

Despite the considerable efforts of the GoC in the last 15 years, disasters continue to constitute a significant threat to the socio-economic stability of the country. Volcano eruptions, landslides, earthquakes and floods have been responsible for substantial harm to life and economic losses. There is a deficiency in the recording of disaster information through Colombia's history, and this is a contributing cause for why a shortage of data exists, which also degrades the ability to capture lessons learned from these disasters. In addition, the evidence indicates that the GoC's interest in the issue of disasters has arisen only when a new disaster has occurred. The high frequency of disaster occurrence, the toll these events have taken on human lives, and the additional constraints that the economic losses impose on the country's budgetary resources emphasize the need to develop more robust institutional responses than are currently available.

Methodology

This study is limited to the social, economic, and political aspects of disasters. However, it will analyze in great depth the threat that disasters pose to Colombia, and the GoC's capability and capacity to anticipate, prepare for, and respond to disasters. It will do this using an analysis of several major disasters in Colombia history. Finally, the study will provide conclusions and recommendations for Colombian disaster response and prevention policy.

THE THREAT

Thus, it is said that one who knows the enemy and knows himself will not be endangered in a hundred engagements.

—Sun Tzu, *Art of War*

Historically, disasters of all kinds have struck every nation in the world. Colombia is not an exception. Natural disasters such as floods, landslides, severe earthquakes, and volcano eruptions have continuously afflicted Colombia. Disasters constitute a threat to the livelihood and very existence of a significant percentage of Colombia's population, and have been responsible for substantial loss of life. Additionally, these disasters have caused significant damage and destruction to property.

Colombia's General Description

Colombia is located in the border area between Central America and South America covering an area of 2,070,408 square kilometers. Colombia is the only South American country with coastlines on two oceans. It has a 1,600 km coastline on the Caribbean Sea and 1,300 km coastline on Pacific Ocean.²⁵ The three Andean ranges, which run north and south through the western half of the country, characterize Colombia's geological features. The eastern half is a low, jungle-covered plain, drained by tributaries of the Amazon and Orinoco rivers. The plain is inhabited mostly by isolated, tropical-forest Indian tribes. The fertile plateau and valleys of the eastern range are the most densely populated parts of the country. With an estimated 45,745,783 people in 2013,²⁶ Colombia is the third-most populous country in Latin America.²⁷

²⁵República de Colombia, Ministerio de Vivienda y Turismo, Fondo de Promoción Turística de Colombia, *Colombia Guía Turística* (Bogotá: D.C: Editora Géminis, 2012), 6-8.

²⁶The World Fact Book, "Colombia," Central Intelligence Agency Library, <https://www.cia.gov/library/publications/the-world-factbook/geos/co.html> (accessed 1 April 2014).

²⁷The most populated countries in Latin America are Brazil (201,009,622) and Mexico (118,818,228). The World Fact Book.

According to the disaster classification of the United Nations Economic Commission for Latin America and the Caribbean,²⁸ Colombia faces mainly geological, hydro-meteorological natural hazards and some anthropic hazards. Socio-economic conditions contribute to the worsening effects from these natural threats.

Earthquakes and landslides cause the most deaths. Storms are among the leading causes of damage to houses, but not destruction of houses. Floods and earthquakes had the largest impact, measured by total number of people killed, injured, or affected and houses destroyed and damaged.²⁹ Figure 2 shows the distribution of major natural disaster threats by region in Colombia. According to the figure, floods threaten the Pacific, Andean, Amazon, Orinoquia, and Caribbean regions. Landslides threaten the Pacific, Andean, and Caribbean. Earthquakes and volcanic eruptions have been the main threat throughout the Pacific and Andean regions. Rainfall and climatic events are frequent and widespread throughout all regions. Floods and landslides, which occur most frequently during the rainy months of May, June, October, and November, account for two-thirds of all disasters. It is estimated that 86 percent of Colombia's population is exposed to a mid-high seismic risk, 28 percent to a high risk of flooding, and 31 percent at mid-high risk of landslide; this means that most Colombia's population is exposed to multiple natural threats.³⁰

²⁸Alfonso Mata, *Metodología para la Identificación, Clasificación y Cuantificación de los Impactos Ambientales de los Desastres Naturales* (Ministerio de Relaciones Exteriores de Italia y CEPAL, Naciones Unidas, 2000), http://www.eclac.cl/dmaah/mdn/cd/material/met_02.pdf (accessed 1 April 2014), 9.

²⁹Sánchez, 144.

³⁰Unidad para la Gestión del Riesgo de Desastres, *Líneas Estratégicas y Avances en Priorización de Zonas de Intervención*, 4.

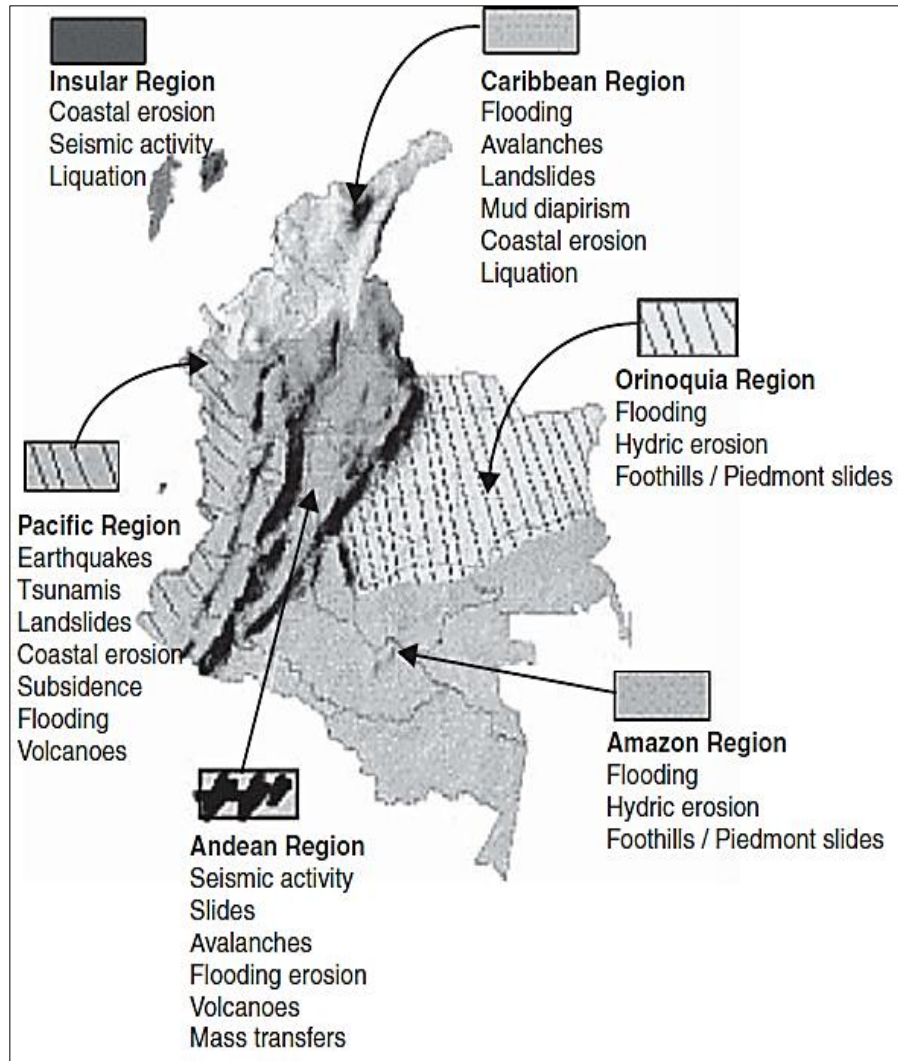


Figure 2. Geographical Distribution of Natural Disasters in Colombia

Source: Ernesto Sánchez-Triana, Kulsum Ahmed, and Yewande Awe, *Environmental Priorities and Poverty Reduction a Country Environmental Analysis for Colombia* (Washington, DC: World Bank Publications, 2007), 324.

Geological Hazards

Colombia's location along the Ring of Fire and Colombia's geological features set the conditions for natural disasters. The Ring of Fire is an area of very high tectonic complexity where the Nazca, South America, and Caribbean plates generate elevated seismic and volcanic activity (figure 3).

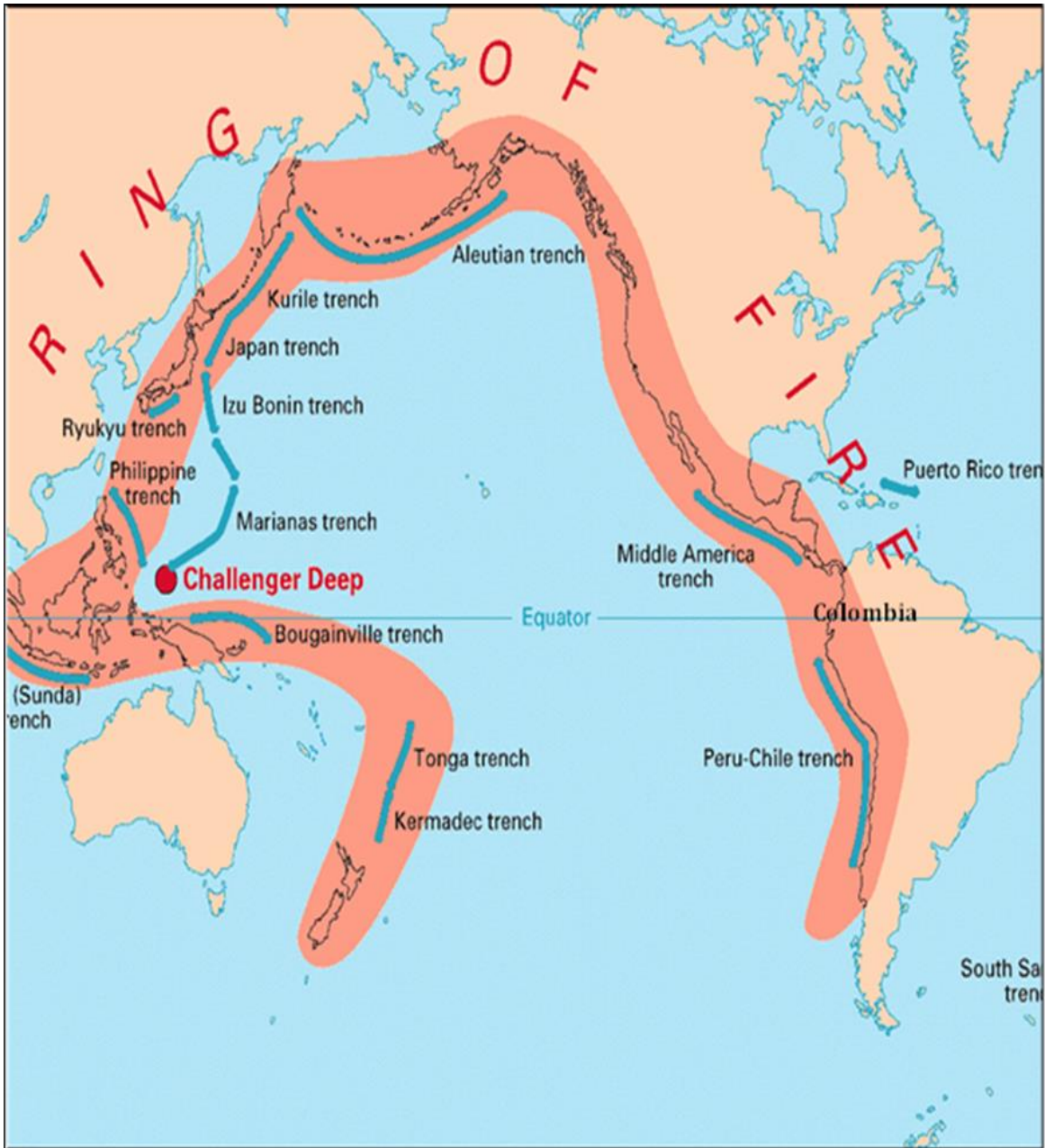


Figure 3. The Ring of Fire

Source: US Department of the Interior, US Geological Survey, "Ring of Fire," 1999, <http://pubs.usgs.gov/gip/dynamic/fire.html> (accessed 24 October 2013).

The Ring of Fire has 452 volcanoes and is home to over 75 percent of the world's active and dormant volcanoes.³¹ About 90 percent of the world's earthquakes and 81 percent of the world's largest earthquakes occur along the Ring of Fire.³²

In addition, Colombia's terrain features contribute to other geological hazards. In the eastern portion of Colombia, the Great Plains and the Amazon region are the main terrain features. In the central-western part there are three mountain chains, and among them are the inter-Andes valleys that come together to form extensive plains with small isolated mountain systems. The brusqueness of these mountainous regions and the action of anthropic and meteorological factors such as rain, wind, and changes of temperature (characteristic of tropical climates) generate other geological hazards such as landslides, subsidence, mudflows, and sinkholes.³³ Accordingly, due to its location and geological features, Colombia's major geological hazards are volcanic eruptions, landslides, and earthquakes.

Volcanic Eruption

In Colombia, volcanic eruptions have caused more deaths than any other natural disaster. Volcanic eruptions cause injuries, death, and destruction through a number of processes, including direct burns, suffocation from ash and other toxic materials, trauma from ejected rocks, floods, and mudflows from quickly melting snow and ice. Volcanoes also bury victims under burning hot pyroclastic ash flows, as well as traumatic deaths.³⁴ In 1985, Colombia's Nevado Del Ruiz had an eruption causing the melt down of its peak's snow and ice. The combination of

³¹Bryden O'Gallagher, "The Pacific Plate," Prezi, <http://prezi.com/unrr7eq5dcka/the-pacific-plate-the-ring-of-fire/> (accessed 2 April 2014).

³²Ibid.

³³Cardona and Yamín, 28.

³⁴George Haddow, Jane Bullock, and Damon P. Coppola, *Introduction to Emergency Management*, 4th ed. (Burlington, MA: Butterworth-Heinemann, 2011), 47.

lahars, melted snow and ice, and water from some creeks, created mudflows that buried 24,523 people in the surrounding towns.³⁵ Colombia has 15 major volcanoes, such as the Nevado del Ruiz, which are a permanent threat to the country (figure 4).

Colombia has several major volcanoes. Galeras is one of Colombia's most active volcanoes. Galeras erupted in 2009 and 2010 causing major evacuations in the nearby towns. The second major volcano is the Nevado del Ruiz, which last erupted in 1991. Additionally, after 500 years of dormancy, the Nevado del Huila volcano reawakened in 2007, and since then has experienced frequent eruptions. Other active volcanoes are Cumbal, Doña Juana, Nevado del Tolima, and Purace.³⁶

Landslides

The second most deadly natural hazard in Colombia is landslides. A landslide is the uncontrolled movement of a mass of dry rock, soil, or debris down a slope.³⁷ Landslides can flow rapidly, striking with little or no warning at avalanche speeds. Landslides can travel several miles from their source, growing in size as they pick up trees, boulders, cars, and other materials.

³⁵Javier Darío Restrepo, *Avalancha Sobre Armero, Crónicas, Reportajes y Documentos de una Imprevisión Trágica* (Bogotá: El Ancora Editores, 1986), 125.

³⁶“Volcán Galeras Generalidades,” Servicio Geológico Colombiano, Observatorio Pasto <http://www.sgc.gov.co/Pasto/Volcanes/Volcan-Galeras/Generalidades.aspx> (accessed 27 February 2014).

³⁷Federal Emergency Management Agency, Ready, Prepare, Plan, Stay Informed, “Landslides and Debris Flow,” <http://www.ready.gov/landslides-debris-flow> (accessed 1 April 2014).

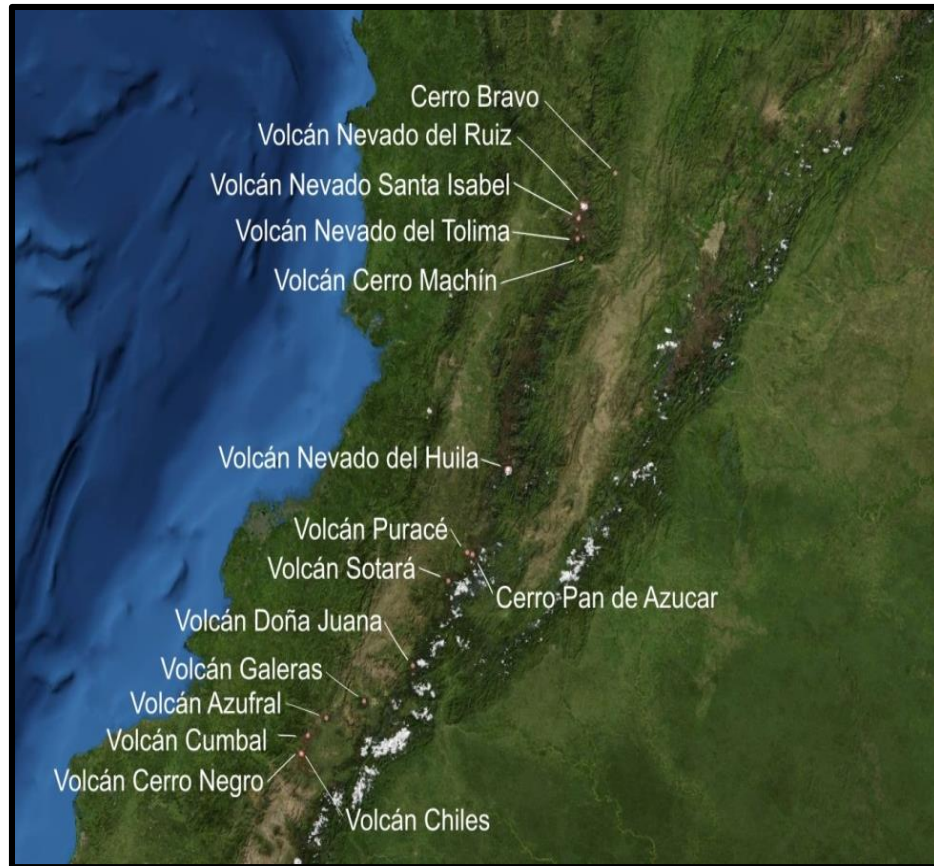


Figure 4. Colombia's Volcanoes

Source: República de Colombia, Instituto Geológico y Minero, “Principales Volcanes de Colombia,” http://intranet.ingominas.gov.co/pasto/Imagen:Volcanes_de_colombia.jpg (accessed 18 January 2014).

Landslides can cause severe damage to homes, and cultivated areas, and can destroy or obstruct major transportation routes. In 1974, on the road from Bogota to Villavicencio, at a place known as Quebradablanca, a landslide obstructed the road and left Bogota isolated from the Colombian Eastern Region for more than 30 days.³⁸ A variety of factors including the rainy season, deforestation, and unsustainable agricultural practices are the main causes of landslides in

³⁸Cardona and Yamín, 5.

Colombia.³⁹ Landslides occur most frequently during the rainy months of May, June, and October in the Colombian Andean, Pacific, and Caribbean regions (figure 5). Major landslides in recent Colombian history include landslides in Quebradablanca (1974), El Guavio (1983), Villatina-Medellin (1987), San Carlos (1990), Dabeiba (1993), and Florida-Bagado (1994).⁴⁰

Earthquakes

The third deadly natural hazard that Colombia faces is earthquakes. An earthquake is the shifting of tectonic plates beneath the earth's surface, which causes a sudden, rapid shaking of the earth's crust.⁴¹ Major earthquakes often last for less than a minute and yet it can be very difficult to accurately estimate their scale and impact.⁴² The shaking may cause the collapse of buildings and bridges; cause disruptions in gas, electric, and phone service; and trigger other natural hazards such as landslides, avalanches, flash floods, fires, and tsunamis.⁴³

All 32 Colombian departments are at some risk for earthquakes (figure 6). According to a 1995 seismic hazard study,⁴⁴ 11,330,702 people (35 percent of Colombian population), from 475 municipalities, are at high seismic risk. Another 16,766,465 people (51 percent of Colombian population) from 435 municipalities are at intermediate seismic risk. Furthermore, 4,744,873 people (14 percent of Colombian population) from 151 municipalities are at low seismic risk. In other words, 84 percent of the Colombian population is at some seismic risk.

³⁹Sánchez, 322.

⁴⁰Cardona and Yamín, 29.

⁴¹Federal Emergency Management Agency, Ready, Prepare, Plan, Stay Informed, "Earthquakes," <http://www.ready.gov/earthquakes> (accessed 1 April 2014).

⁴²Keith Smith, *Environmental Hazards, Assessing Risk and Reducing Disaster* (New York, NY: Routledge, 1992), 105.

⁴³Haddow, 32.

⁴⁴Cardona and Yamín, 58.

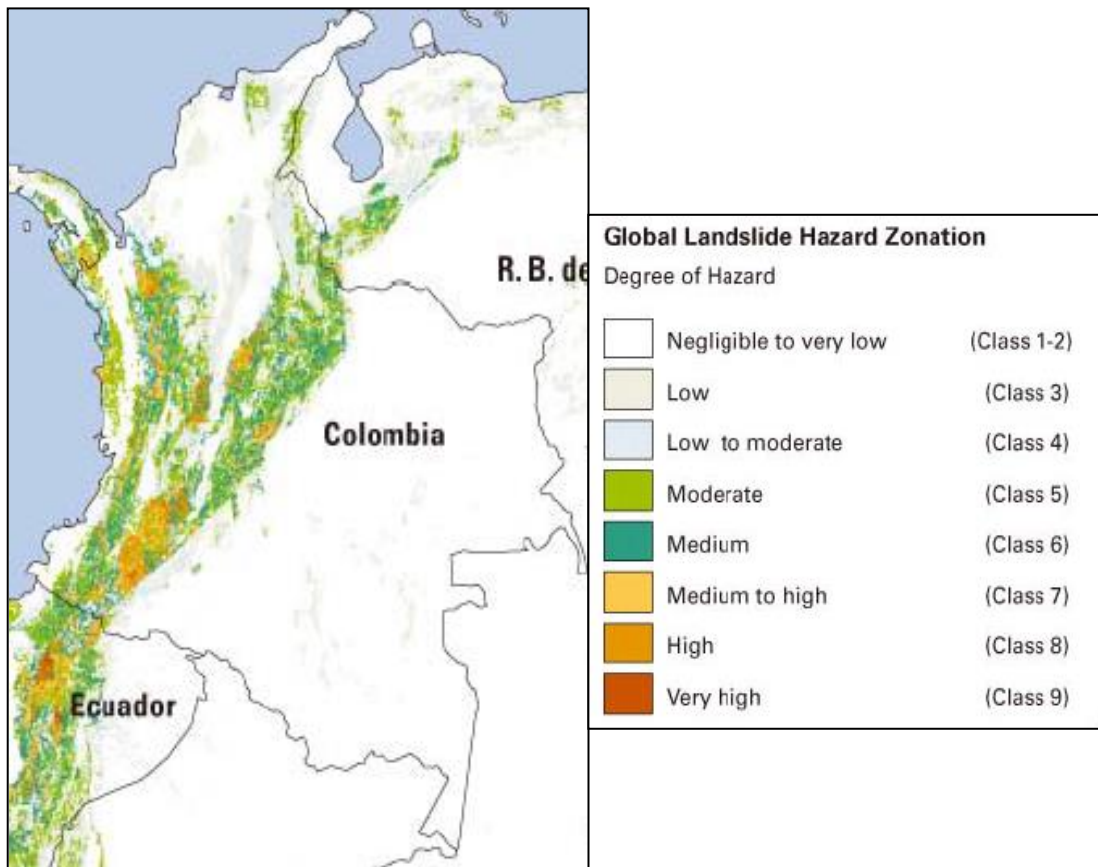


Figure 5. Colombia’s Landslides Hazard Map

Source: Margaret Arnold et al., *Natural Disaster Hotspots: Case Studies* (Washington, DC: World Bank, 2006), <https://openknowledge.worldbank.org/handle/10986/7091> (accessed 3 April 2014),40.

Unlike landslides, earthquakes are not seasonal or climate dependent and therefore can occur at any time. When an earthquake occurs in a populated area, it can cause deaths, injuries, and extensive property damage.⁴⁵ In 1999, an earthquake caused extensive damage to the Coffee Axis Region, which included the city of Armenia, capital of Quindio Department, and the city of Pereira, capital of Risaralda Department. In total, 1,230 people were killed, 5,300 injured, an

⁴⁵Federal Emergency Management Agency, “Earthquakes.”

estimated 200,000 people affected (lost their homes and workspaces), and the earthquake damaged about 50,000 buildings in that region.⁴⁶ Major earthquakes in recent Colombian history include earthquakes in Cúcuta (1875), Caldas (1979), Popayán (1983), Atrato (1992), Tauramena, Pereira, and Pasto (1995), and Armenia (1999).⁴⁷

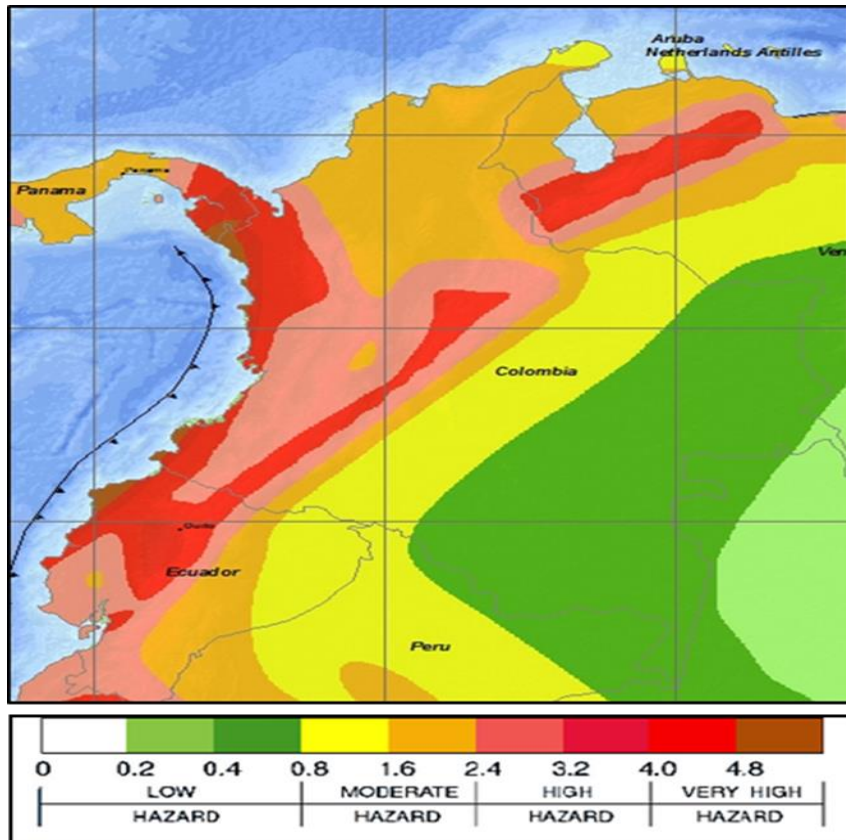


Figure 6. Colombia's Seismic Map

Source: US Department of Interior, US Geological Survey, "Colombia Seismic Hazard Map," <http://earthquake.usgs.gov/earthquakes/world/colombia/gshap.php> (accessed 3 April 2014).

⁴⁶Omar D. Cardona A, "Terremoto En Colombia, Enero 25 de 1999: Lecciones Para La Prevención y Atención de Desastres Sísmico," *DIRDN Informa, Boletín para América Latina y el Caribe Número 14*, 1999, http://www.eird.org/esp/revista/No14_99/index_14e.htm (accessed 1 April, 2014), 1.

⁴⁷Sánchez, 480.

Hydro-meteorological Hazards

The Colombian hydro-meteorological conditions present other natural hazards in Colombia. In particular, Colombia has large sectors of land susceptible to flooding, mainly in the lower parts and major river valleys. Rainfall is the main cause of flooding, and is concentrated in two wet seasons, May to June and October to November. Colombia's Pacific coast has an annual rainfall of 12,000 millimeters, one of the highest levels of rainfall in the world.⁴⁸ On the other hand, rainfall in parts of the Guajira peninsula (Atlantic coast) seldom exceeds 762 millimeters per year.⁴⁹ Rainfall in the rest of the country runs between these two extremes (figure 7).

Colombia's hydro-meteorological condition causes heavy floods both in mountainous areas in low-lying watersheds as well. Rainfall intensities can vary with the El Niño/La Nina weather phenomenon, which occurs in unpredictable cycles.⁵⁰ In consequence, due to these unique conditions, floods are the most common natural hazard Colombia faces.

Floods

Floods are capable of undermining buildings, bridges, eroding shorelines, riverbanks, tearing out trees, washing out access routes, and causing severe loss of life, property, and injuries.⁵¹ Additionally, floods can locally affect a neighborhood, community, or very large river basins in multiple regions.⁵² For example, Colombia suffered severe floods in 2011, which

⁴⁸Mauricio Bedoya, Claudia Contreras, and Franklin Ruiz, *Alteraciones del Régimen Hidrológico y de la Oferta Hídrica por Variabilidad y Cambio Climático* (Bogotá: IDEAM, 2010), https://www.siac.gov.co/documentos/DOC_Portal/DOC_Agua/3_Estado/20120928_Alter_regi_hidro_ENA2010Cap7.pdf (accessed 1 April 2014), 308.

⁴⁹Ibid.

⁵⁰Ibid., 317.

⁵¹Haddow, 30.

⁵²Ibid.

affected 28 of Colombia's 32 departments.⁵³ Major floods in recent Colombian history include floods in Canal del Dique (1983-1984), Southern Caribbean Region (1988), Northern Caribbean Region (1995), and Colombia floods (2010-2011).⁵⁴

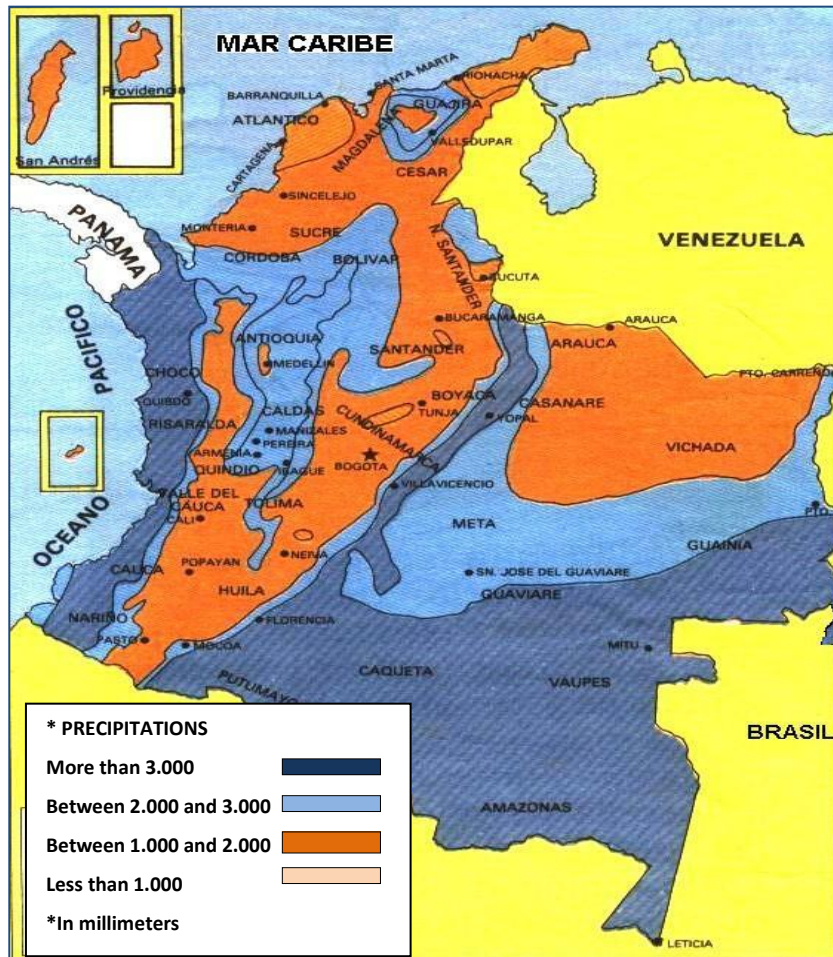


Figure 7. Colombia's Hydrological Map

Source: El Clima Colombiano, "El Clima Colombiano, Ciclo Anual de Lluvias," <http://pwp.supercabletv.net.co/garcru/colombia/Colombia/clima.html> (accessed 3 April 2014).

⁵³Abhas K. Jha, Robin Bloch and Jessica Lamond, *Cities and Flooding: a Guide to Integrated Urban Flood Risk Management for the 21st Century* (Washington, DC: World Bank Publications, 2012), 166.

⁵⁴Cardona and Yamín, 8.

Anthropic Hazards

In addition to natural disasters, Colombia also faces anthropic disasters, i.e. man-made threats. These types of disasters can be the result of intentional or negligent human actions. Accidental anthropic disasters can occur when humans use technology in ways that yield grave consequences to the population and the environment.⁵⁵ The most common anthropic disasters in Colombia are related to terrorism and technological accidents.

Terrorism

US Department of Defense Joint Publication 1-2, *Dictionary of Military and Associated Terms*, defines terrorism as the use of force or violence against individuals (civilians) or property for purposes of intimidation, coercion, or spreading fear in order to attain political, religious, or ideological goals.⁵⁶ Colombian terrorist groups, including the FARC, the National Liberation Army, and criminal organizations engaged in narcotics trafficking frequently use explosive devices, from letter bombs to truck and bus bombs as weapons. Remote control is the most common method used by terrorists in Colombia to detonate explosive devices.⁵⁷ Terrorists utilize these bombs in a variety of attacks, but especially in their attacks on public places.⁵⁸ Terrorists in Colombia have targeted public locations near government agencies and the National Police HQ.

The most deadly terrorist attacks in recent Colombian history have been against *Departamento Administrativo de Seguridad* (Administrative Department of Security or DAS),

⁵⁵Kevin M. Cahill, ed., *Basics of International Humanitarian Missions* (New York: Fordham University Press, 2003), 37.

⁵⁶Joint Chiefs of Staff, Joint Publication 1-02, *Dictionary of Military and Associated Terms* (Washington, DC: US Government Printing Office, 8 November 2010), 282.

⁵⁷CREI, *Estrategia para la Reducción de Artefactos Explosivos Improvisados* (Bogotá: Imprenta Nacional, 2011), 16-17.

⁵⁸Federal Emergency Management Agency, Ready, Prepare, Plan, Stay Informed, “Explosions,” <http://www.ready.gov/explosions> (accessed 2 April 2014).

Colombia's equivalent to the U.S. Central Intelligence Agency headquarters and Nugal Club bombing attack. DAS building bombing was a truck bomb attack in the capital, Bogotá planned and executed by the Medellín cartel. Cartel members parked a truck loaded with an estimated 500 kilograms of dynamite, near the building. The attack killed 52 people and injured about 1,000, including both government officials and civilians, while the bomb blast destroyed more than 300 commercial properties.⁵⁹

The second deadly attack was the Nugal Club bombing in 2003 in Bogotá. In this case, the FARC was responsible for the attack against an elite, social and business club. The FARC used a car, containing 200 kilograms of explosives, parked in a garage on the third floor of the multi-story club. The attack killed 36 people, and injured about 200 civilians.⁶⁰

Hazardous Material Incidents

Another anthropic threat Colombia faces is hazardous material incidents. Hazardous materials are substances that if mishandled or released can pose a threat to the environment or personal health.⁶¹ Some hazardous materials may be toxic or dangerous, such as explosives, but can also include flammable, corrosive, poisonous, and radioactive substances. Accidents typically occur because of mishandling during transportation or accidental releases at production or storage facilities. Depending on the nature of the hazardous material, an accident's outcome can include death, serious injury, long-lasting health effects, and damage to buildings, homes, other property, and the environment. In 1956, the mishandling of explosives during transportation caused a

⁵⁹“20 Años Después del Ataque de Pablo Escobar al DAS solo ha Habido dos Condenas,” *El Tiempo (Bogotá)*, December 4, 2009, <http://www.eltiempo.com/archivo/documento/CMS-6744448> (accessed 2 April 2014).

⁶⁰Fernando Ramos and Adriana Vargas, “At Least 32 Killed in Colombia Club Blast,” *CNN.com/World*, <http://www.cnn.com/2003/WORLD/americas/02/08/colombia.explosion/index.html> (accessed 2 April 2014).

⁶¹Haddow, 52.

severe hazardous material incident in the downtown section of Cali, capital of the Valle del Cauca Department. The explosion of seven army trucks loaded with dynamite close to Cali's downtown center destroyed 40 neighborhoods, killed 3,500 people, and injured approximately 10,000.⁶²

Disasters' Enhancers

Social issues, such as high poverty, overpopulation, corruption, and bureaucracy can enhance the impact of disasters. Although the Colombian government's anti-poverty efforts have increased in recent years, the country still experiences high rates of poverty and inequality. Around 32.7 percent of Colombia's population lives below the national poverty level, and an additional 10.8 percent live in extreme poverty.⁶³ The GINI index, which measures the distribution of income consumption on a scale from zero, which represents perfect equality to 100, which represents perfect inequality, ranks Colombia 56.⁶⁴ The living conditions of the Colombian people under poverty expose them to more direct risks, but poverty and income gaps can indirectly impact risk, in that these social factors fuel social tensions and weaken the social cohesion needed to assess and respond to potential disasters.⁶⁵ Colombian people under the poverty line typically live and work in the areas most at risk for natural disasters. The poor live in the highest risk areas, rely on environmentally predatory farming techniques, or work on marginal

⁶²"Hace 50 años Cali conoció el infierno. Una explosión mató a unas 10.000 personas," Caracol Radio, <http://www.caracol.com.co/noticias/actualidad/hace-50-anos-cali-conocio-el-infierno-una-explosion-mato-a-unas-10000-personas/20060805/nota/317112.aspx> (accessed 2 April 2014).

⁶³Comunicado de Prensa: Pobreza Monetaria Julio 2012 - Junio 2013 (Bogotá: DANE, 2013), 1-2, http://www.dane.gov.co/files/investigaciones/condiciones_vida/pobreza/cp_pobreza_jun13.pdf (accessed 2 April 2014).

⁶⁴The World Bank, "Colombia," The World Bank Group, <http://data.worldbank.org/country/colombia> (accessed 2 April 2014).

⁶⁵Organization for Economic Co-Operation and Development, *Emerging Systemic Risks in the 21st century: An Agenda for Action* (Danvers, MA: Organization for Economic Co-Operation and Development, 2003), 13.

lands that prevent them from earning more. The poor also have less access to information, basic services and both pre- and post-disaster protection.⁶⁶

In addition, Colombia's accelerated urbanization created high-density populations in very high-risk areas. Internal conflict related to FARC insurgency and new economic opportunities brought a significant amount of people into fragile urban areas in the last 50 years. In 1950, 70 percent of Colombia's population lived in rural areas, with only 30 percent in urban areas. In the 1990s, these percentages reversed,⁶⁷ illustrating the significant growth of Colombia's urban centers. Cities like Bogota, Cali, Medellin, Barranquilla, Bucaramanga, Cúcuta, Pereira, and Manizales expanded human settlements in areas prone to landslides and floods. Further, these urbanized areas have frequently not been built in accordance with official construction norms, do not offer satisfactory sanitary conditions, contain large pockets of poverty, and are particularly exposed to natural and manmade hazards.⁶⁸ One example of how the urban growth affects natural disaster response is the Villatina disaster on September 23, 1987. A landslide occurred in one of the poorest and badly planned urbanized area of Medellin's slopes, an area known as *Cerro de Pan de Azúcar*. The disaster buried more than 640 and affected about 6,436.⁶⁹

According to Transparency International's 2013 Corruption Perception Index, Colombians perceive high levels of corruption in the official sector. On a scale of zero (highly

⁶⁶United Nations and Inter-American Development Bank, *Information on Disaster Risk Management, Case Study of Five Countries, Main Technical Report* (Mexico City: United Nations and Inter-American Development Bank, 2007), 12.

⁶⁷Cardona and Yamín, 58.

⁶⁸Judy L. Baker, ed., *Climate Change, Disaster Risk, and the Urban Poor: Cities Building Resilience for a Changing World* (Washington, DC: World Bank Publications, 2012), 8.

⁶⁹EM-DAT, the International Disaster Database, "Top 10 Natural Disasters in Colombia," Centre for Research on the Epidemiology of Disasters (CREED), <http://www.emdat.be/result-country-profile> (accessed 2 April 2014).

corrupt) to 100 (very clean), Colombia scored 36 (ranking 94 from 177 countries).⁷⁰ The widespread corruption erodes the effectiveness of almost the entire governmental system including the SNGRD. In 2011, Santander Department's Prosecutor investigated mayors, council members, and officials from 16 municipalities for alleged corruption in the delivery of aid to victims of 2010-2011 rainy seasons.⁷¹ The irregularities include the delivery of humanitarian aid to people who were not affected by the disaster, the use of flood emergency resources for political purposes, and partial and untimely delivery of aid.⁷²

In addition, bureaucratic processes exacerbate the effects of disaster by diverting resources from humanitarian aid and disaster relief. The level of bureaucracy is so high in Colombia, that in the previous example, the government authorized \$5 million to support the Colombian peasants. From that five million, two million dollars (41 percent) were spent on bureaucracy.⁷³

Disasters' Impacts

Complementing the numbers presented in the introduction, table 2 shows the disasters' impact in Colombia's people, economy, and infrastructure in the last five decades. During this period, disasters have affected a total of 25,092,735 Colombians. In addition, the country lost

⁷⁰ Transparency International, "Corruption Perceptions Index 2013: Americas," 2013. http://www.transparency.org/files/content/pressrelease/CPI2013_Americas_EN.pdf (accessed 2 April 2014).

⁷¹ Juan Carlos Gutiérrez, *Investigan Corrupción en 16 Municipios de Santander con Ayudas a Damnificados*, *Vanguardia.com (Santander)*, September 7, 2011, <http://www.vanguardia.com/santander/region/120779-investigacion-corrupcion-en-16-municipios-de-santander-con-ayudas-a-damnificado> (accessed 2 April 2014).

⁷² *Ibid.*

⁷³ "La Plaga que Eliminó el Presupuesto para Subsidios," *Noticias Uno, La Red Independiente*, <http://noticiasunolaredindependiente.com/2013/09/29/secciones/que-tal-esto/la-plaga-que-elimino-el-presupuesto-para-subsidios/> (accessed 2 April 2014).

about \$8, 6 billion represented by infrastructure destroyed or damaged, agricultural losses, and recovery actions.

Table 2. Disasters' Impacts in Colombia During the Last Five Decades

Impacts on Population	
Deaths	36,201
Injured	72,393
Missing	2,627
Relocated	28,361
Evacuated	365,542
Directly Affected	24,587,612
Total	25,092,736
Impacts on Infrastructure	
Education Centers Affected	2,662
Hospitals Affected	340
Houses Destroyed	210,505
Houses Damaged	1,382,973
Damage in Roads (Meters)	4,645,024
Lost Cattle	2,584,459
Damage in Crops (Hectares)	3,824,108
Impacts on Economy	
Losses \$ USD billion	8,6

Source: Created by author.

COLOMBIA'S MAJOR DISASTERS NARRATIVE

Narrative is the representation of an event or a series of events.⁷⁴ Major disasters in Colombia's recent history may be considered a narrative because of their causal connection.⁷⁵ Specifically, each of them is a natural or manmade disaster that has caused significant economic and social damage to the country. This section will serve as a narration of major disasters in Colombia's recent history. Chronologically ordered, these disasters include the explosion of trucks in Cali (1956), the Nevado del Ruiz volcano eruption (1985), the Coffee Axis earthquake (1999), and the 2010-2011 floods.

Explosion of Trucks in Cali

On August 7, 1956, the worst manmade disaster in modern Colombian history occurred. Seven army trucks loaded with 40 tons of dynamite exploded near Cali's old railroad station close to downtown. The previous day, 20 trucks fully loaded with dynamite had departed from the nearby city of Buenaventura.⁷⁶ The Colombian Ministry of Public Works had intended to use the dynamite for the construction of new roads in the central region of the country. The trucks stopped in Cali before 13 of them continued toward Bogota, Colombia's capital city. Drivers parked the remaining seven trucks overnight at Cali's old railroad station. Just after midnight, the seven trucks suddenly exploded in a quick chain reaction. The old railroad station that at the time was used as a military post was demolished.

⁷⁴H. Porter Abbot, *The Cambridge Introduction to Narrative* (New York, NY: Cambridge University Press, 2002), 13.

⁷⁵Ibid.

⁷⁶Buenaventura has the main Pacific Ocean's commercial harbor in Colombia. The city is just 80 miles from Cali.

According to unofficial reports, the disaster destroyed 40 neighborhoods; killed approximately 3,500 people and injured thousands (table 3).⁷⁷ Five hundred soldiers perished while they were resting at the old railroad station.⁷⁸ A three-block area of the densely populated city was absolutely razed. Due to the media censorship of the time,⁷⁹ and the lack of experience of the National Disaster Response Agency to track this type of events, the data available is very limited. Despite its size, Colombia could handle the tragedy without international support. Several factors contributed to this. First, the country had already created a nationwide Disaster Response Agency.⁸⁰ The Secretary of Welfare, an agency with the necessary physical infrastructure and human capabilities, dealt with the tragedy. Second, the role of clergy was also important.⁸¹ Catholic Action organized the first aid and then served as the supporters of the victims. Third, the fact that a military government ruled the country helped to resolve the situation by facilitating control and avoiding the excesses typical of civilian actions in such circumstances. Fourth, the Colombian people participated in an exemplary solidarity campaign. Several cities set up committees, which soon raised a high sum of monetary donations and supplies. People speculated that the tragedy may have been caused by overheated trucks.

⁷⁷“Hace 50 años Cali conoció el infierno.”

⁷⁸Ibid.

⁷⁹In 1956, Colombia was under a military junta and the president was Lieutenant General Gustavo Rojas Pinilla. The military government censored the press and no local reports were made. The news about the explosion of trucks in Cali was spread out and known by the Colombians just from reports coming from other countries.

⁸⁰Cesar Augusto Ayala Diago, “La Explosión de Cali: Agosto 7 de 1956,” *Revista Credencial Historia*, September 1999, <http://www.banrepcultural.org/blaavirtual/Revistas/credencial/septiembre1999/117explosion.htm> (accessed 2 April 2014), 1.

⁸¹Ibid.

However, the cause formulated by the President of the Republic was the most telling: A “political sabotage” of the opposition.⁸²

Table 3. Impacts of Trucks’ Explosion in Cali

Deaths	3,500
Neighborhood Affected	40
Blocks Destroyed	3

Source: Created by author.

The Nevado del Ruiz Volcano Eruption (1985 Armero’s Tragedy)

On November 13, 1985, the deadliest natural disaster in Colombia’s history occurred. The Nevado del Ruiz volcano erupted, triggering debris, mudflows, and lahars. The eruption ejected materials that melted part of the glacial ice cap at the summit of the volcano. The volcano released lahar that descended through steep, narrow river canyons at velocities as great as 50 kilometers per hour.⁸³ Main successive lahar waves, which descended the eastern side of the volcano down the valley of the Río Lagunillas, devastated the city of Armero. Most of the casualties were crushed and buried in their homes while they slept. The main flow killed about 20,000 and 5,000 more were injured in Armero.⁸⁴ Another lahar descended the western slope of the volcano through the narrow canyon of the Río Chinchiná, destroying 400 homes and causing an estimated 1,600 deaths near the town of Chinchiná.⁸⁵

⁸²Cesar Augusto Ayala Diago, 1.

⁸³Robert L. Schuster and Lynn M. Highland, U.S. Geological Survey Open-File Report 01-0276, *Socioeconomic and Environmental Impacts of Landslides in the Western Hemisphere*, 2001, US Geological Survey, US Department of the Interior, <http://pubs.usgs.gov/of/2001/ofr-01-0276/> (accessed 2 April 2014).

⁸⁴Javier Darío Restrepo, 55.

⁸⁵Schuster and Highland.

The disaster affected the social and economic stability of the region. In total (table 4) the Armero tragedy accounted 24,442 people killed, 4,970 people injured, 232,546 people affected.⁸⁶ The disaster destroyed 5,402 homes, 343 commercial establishments, 58 industrial plants, 50 schools, 19 bridges, two hospitals, and buried 3,400 hectares of agricultural land.⁸⁷ Moreover, the eruption caused severe damage to roads and railroad tracks, water and sewer systems, transmission lines, and fuel pipelines. In economic terms, the disaster caused \$246 million in losses, and more than \$356 million in recovery costs (1.72 percent of the Colombia's 1985 GDP).⁸⁸

The Nevado del Ruiz volcano eruption was second 20th century's deadliest volcanic eruption, the fourth deadliest in humankind's history,⁸⁹ and greatest natural disaster in Colombia's history. The event was a foreseeable catastrophe that was concealed by a lack of awareness of the volcano's destructive history. The volcano's impact was exacerbated by the unwillingness of those in authority to make decisions and general misinformation during the disaster. For these reasons and due to the scale of the tragedy and its impact on the socio-economic stability of the country, it became critically important to prevent a recurrence of the factors and failures that contributed to the magnitude of the tragedy.

⁸⁶Cardona and Yamín, 12.

⁸⁷Barry Voight, "The 1985 Nevado del Ruiz volcano Catastrophe: Anatomy and Retrospection," *Journal of Volcanology and Geothermal Research* 44 (1990): 351.

⁸⁸Cardona and Yamín, 14.

⁸⁹The three deadliest volcano eruptions in humankind history are: Tambora, Indonesia (1815) killed 92,000; Krakatau, Indonesia (1883) killed 36,417; and Mount Pelee, Martinique (1902) killed 29,025. Oregon State University, Volcano World, "Deadliest Eruption," <http://volcano.oregonstate.edu/deadliest-eruption> (accessed 2 April 2014).

Table 4. Impact of Nevado del Ruiz Volcanic Eruption

Deaths	24,442
Injured	4,970
Affected	232,456
Homes*	5,402
Commercial Building *	343
Industrial Plants *	58
Schools*	50
Hospitals*	2
Agricultural Land (ha.)*	3,400
Losses USD million	246
Colombia's 1985 GDP equivalent	0,7 %
Recovery Actions USD billion	1

*Destroyed

Source: Created by author.

Before the tragedy, unawareness about Nevado Del Ruiz volcano's deadly background, poor decision-making by officials, and the ongoing siege and seizure of the Colombian Palace of Justice by the M-19 guerrillas were some factors that contributed to the disaster's magnitude. Within the volcano's history, there are two known eruptions in 1595 and 1845. The 1845 eruption killed about 1,000 people living in the area around the Lagunilla River.⁹⁰ Furthermore, the volcano erupted early on September 11, 1985 and continued doing so until its fatal eruption two months later. Local and foreign scientists had warned authorities about the danger over the weeks and days leading up the eruption.⁹¹ Despite this historical background and experts' hazard

⁹⁰Committee on Natural Disasters et al., *The Eruption of Nevado Del Ruiz Volcano, Colombia, South America, November 13, 1985* (Washington, DC: National Academies Press, 1991), 9.

⁹¹A United Nations Disasters Relief Organization (UNDRO) committee consisting mainly by Italian, French, and Swiss geologists and volcanologists visited Colombia and helped the local scientists study the Nevado Del Ruiz volcano's unusual activity. The local and foreign scientists prepared several informs warning the Colombian authorities about the high risk of a volcanic eruption. Restrepo, 17.

warnings, Colombian authorities were negligent in their unwillingness to make the decision to evacuate. National and provincial authorities did not consider the volcano signals too seriously. Moreover, officials delayed the decision to evacuate Armero arguing that a false alarm could carry an economic and political cost.⁹² Prior to the 1985 volcanic eruption, there was another tragic event that distracted official authorities' attention. One week before the eruption, on November 6, M-19 seized the Colombian Palace of Justice and held the Supreme Court hostage. The army retook the palace, but in the process, over 100 people died. The result was that at the time of the Nevado Del Ruiz volcanic eruption, the attention of the GoC officials was focused on Bogotá.⁹³

During the tragedy, heavy rain distracted the attention of Armero's people, power outages affected the communications network, and general misinformation all contributed the magnification of the disaster. The rain and constant thunder masked the noise of the volcano; the residents of Armero were completely unaware of volcano's activity.⁹⁴ Although, the region had a robust communication network to cope with the disaster, the rainstorm caused continuous power outages, which produced a breakdown in communication. The severe storm also restricted the communications network between local, regional, and national authorities. Several messages ordering the evacuation failed.⁹⁵ To worsen the situation, general misinformation caused many victims to stay in their houses as they were instructed. Several messages from a national television broadcast, a local radio station, and the village priest all called for calm. According to

⁹²Voight, 378.

⁹³Ibid., 364.

⁹⁴Committee on Natural Disasters et al., *The Eruption of Nevado Del Ruiz Volcano*, 61.

⁹⁵Voight, 377.

the messages “nothing was happening and there was no cause to be alarmed.”⁹⁶ However, when Armero’s mayor was speaking on a ham radio, saying that he did not think there was any danger, he was swept away.⁹⁷

After the tragedy, a slow response to the disaster and the September 19 Mexico City earthquake were the leading factors that limited relief actions. Severe road damage impeded response teams from reaching the affected areas. Using FAC helicopters, relief teams began reaching Armero 24 hours after the eruption, but in this lapse of time, many victims with serious injuries died.⁹⁸ Another factor that hampered the international relief effort was the Mexico City earthquake. The eruption occurred six days before the 1985 Mexico City earthquake, limiting the amount of supplies that could be sent to each of the disasters.⁹⁹

Colombian Coffee Growing Axis Earthquake

On January 25, 1999, the deadliest earthquake in modern Colombian history occurred, when two significant seismic events affected an estimated area of 1,360 square kilometers in what is called the *Eje Cafetero* (Colombian Coffee Growing Axis).¹⁰⁰ At 13:19 local time, an earthquake measuring 6.0 on the Richter scale hit the area. After the main event, at 17:40 hours

⁹⁶Voight, 372.

⁹⁷Committee on Natural Disasters et al., *The Eruption of Nevado Del Ruiz Volcano*, 62.

⁹⁸Ibid., 65.

⁹⁹Peter Osterlund, “Colombia’s Pleas for Disaster Aid Draw Worldwide Response,” *The Christian Science Monitor*, November 19, 1985, <http://www.csmonitor.com/1985/1119/acolum.html> (accessed 2 April 2014), 1.

¹⁰⁰The Colombian coffee growing axis is an area located in the central mountainous part of the country. The area is a part of the Colombian Andean region, which is famous for growing, and production of a majority of the Colombian coffee. There are three departments in the area: Caldas, Quindío, and Risaralda. These departments are among the smallest departments in Colombia with a total combined area of 5,356 square miles, about 1.2 percent of the Colombian territory. The combined population is 2,291,195 (2005 census). República de Colombia, Ministerio de Vivienda y Turismo, *Colombia Guía Turística*, 127.

was a significant aftershock of 5.8 on the Richter scale.¹⁰¹ During next month after the initial quake, 138 aftershocks occurred over an area of 300 square kilometer, with magnitudes that in some cases reached 4.4 on the Richter scale.¹⁰² Inhabitants of 28 municipalities in five departments of the western part of Colombia, which are among the most densely populated, directly felt the primary earthquake's effects. The departments affected were Caldas, Quindio, Risaralda, Tolima, and Valle del Cauca. In particular, the 12 municipalities, within Quindío's Department were the most severely affected by the earthquake effects.¹⁰³ These 12 municipalities suffered severe loss of life and property, as well as losses or damage to their means of production. The earthquake caused extensive damage to the city of Armenia, Quindio Department's capital.

The disaster affected both the social and economic stability of the Coffee Growing Axis region and the country itself. In total (table 5), 1,862 people were killed, 8,523 wounded, 721 missing, and the number of people directly affected was estimated at 163,393 (1 percent of Colombian population).¹⁰⁴ All of the affected people lost both their homes and work areas. The disaster destroyed 17,551 houses, 143 schools, 28 industrial plants, and 8 hospitals. In addition, the disaster affected 18,421 houses severely, 43,474 partially (27 percent of the total of houses in the entire region), and affected 29,720 hectares of agricultural land. The full impact of the earthquake was over \$1.85 billion (2.2 percent of the Colombia's 1998 GDP).¹⁰⁵

¹⁰¹*El Terremoto de Enero de 1999 en Colombia: Impacto Socioeconómico del Desastre en la Zona del Eje Cafetero* (México: UN-CEPAL, 1995), http://www.cepal.org/colombia/noticias/documentosdetrabajo/5/42315/Eje_Cafetero.pdf (accessed 2 April 2014), 5.

¹⁰²*Ibid.*, 9.

¹⁰³*Ibid.*

¹⁰⁴*Ibid.*, 10.

¹⁰⁵*Ibid.*, 70.

Table 5. Impact of Coffee Axis Earthquake

Deaths	1,862
Injured	8,523
Missing	721
People Affected	163,393
Homes*	17,551
Schools*	143
Industrial Plants*	28
Hospitals*	8
Homes Affected	50,002
Agricultural Land Affected	29,720
Losses and Recover USD billion	1,85
Colombia's 1998 GDP equivalent	2.2 %

*Destroyed

Source: Created by author.

The earthquake affected mainly old buildings with unreinforced masonry as well as buildings constructed without reinforced concrete, all buildings designed and constructed prior to the issuance of the first national code of earthquake resistant buildings. Additionally, the earthquake caused a significant number of landslides on the roads that connected Armenia with the rest of the country.

Before, during, and after the disaster there was a better local, state, and federal response. In contrast to the disasters mentioned before, some state agencies took immediate action to prevent and mitigate the disaster's effects. Once the National Seismological Network located the earthquake's epicenter, they activated the National System of Disaster Prevention and Attention,¹⁰⁶ which is a decentralized institution created by the GoC after the Armero's tragedy. However, the magnitude of the disaster in the city of Armenia was such that the emergency overwhelmed the local and regional Disaster Prevention Committees, requiring action from

¹⁰⁶Cardona A.

national level agencies.¹⁰⁷ Two of the main institutions' headquarters responsible for disaster management, the Armenia's police and fire departments were destroyed and unable to react immediately. Four days after the disaster occurred the Colombian president appointed Luis Carlos Villegas as a President of Coffee Axis Region Social-economic Reconstruction and Development Fund (Fondo para la Reconstrucción y Desarrollo Social del Eje Cafetero).¹⁰⁸ Although there were some issues after the tragedy, Villegas' played a key role as leader, coordinator, and facilitator between all of the national and international agencies and the Non-Governmental Organizations involved in the disaster relief. In comparison to past disasters, when the Coffee Axis region earthquake occurred, the GoC demonstrated an advanced capability to manage disasters.

2010–2011 Floods

During the Colombian rainy seasons of 2010 and 2011, the country suffered the worst flood and rain related disasters in modern history. Colombia's 2010-2011 rainy seasons were an anomaly with the rainfall and flooding much higher than historically observed. As an example, Department of Huila (Colombia's Andean Region) observed an increase of 300 percent in precipitation during the 2010 rainy season. The historic average precipitation during the months of September, October, and November is about 120 millimeters. During the same period in 2010, precipitation reached a peak of 410 millimeters.¹⁰⁹ Another affected area was the Department of Guajira (Colombian Caribbean Region), where during the months of July, September and

¹⁰⁷Cardona A.

¹⁰⁸*El Terremoto de Enero de 1999 en Colombia*, 14.

¹⁰⁹Max Henríquez Daza, Razones y Sinrazones Del Diluvio En Colombia, *El Tiempo (Bogotá)*, March 6, 2014, <http://m.eltiempo.com/colombia/otraszonas/razones-y-sinrazones-del-diluvio-en-colombia/8694461> (accessed 2 April 2014).

November (2010) precipitation reached over 900 millimeters, where the annual average is 659 millimeters.¹¹⁰

Heavy rains, produced flooding and landslides were common during the 2010-2011 rainy seasons. The floods affected great areas within the country and brought about serious social and economic consequences. Between September 2010 and May 2011, there were 2,219 flood and rain related disasters: 1,233 floods (55.6 percent), 778 landslides (35.1 percent), 174 windstorms, and 24 mudflows. The remaining 10 events consisted of thunderstorms, hailstorms, and windstorms.¹¹¹

The 2010-2011 rainy seasons affected both the social and economic stability of the entire country. The floods and other disasters affected almost everything in Colombia from homes to air force bases. In total (table 6), the rainy season flooded 3,523,398 hectares, of which 416,654 were agricultural lands, 56,142 crops, and 9,726 urban areas.¹¹² According to official figures, of the 3,686,530 affected people (seven percent of the Colombian population), 467 of them were killed, 577 injured, and 41 missing.¹¹³ The majority of the affected people were the poorest in the country. Most affected were households, 554,550 (58.5 percent), farms, 299,154 (33.3 percent), and factories, 1270 (2 percent).¹¹⁴ There were also 2,295 schools, 111 hospitals, 46,104 cultural buildings, and 1,217 sports centers affected.¹¹⁵ In addition, air force, army, navy, and police

¹¹⁰Max Henríquez Daza.

¹¹¹Ibid.

¹¹²Comisión Económica para América Latina y el Caribe (CEPAL), *Valoración de Daños y Pérdidas. Ola Invernal En Colombia, 2010-2011* (Bogotá: Misión BID - CEPAL, 2012), 50, <http://www.eclac.cl/publicaciones/xml/0/47330/OlainvernalColombia2010-2011.pdf> (accessed 2 April 2014).

¹¹³CEPAL, *Valoración de Daños y Pérdidas. Ola Invernal En Colombia, 2010-2011*, 50.

¹¹⁴Ibid., 46.

¹¹⁵Ibid., 93-112.

headquarters and bases were affected. Perhaps most tragically, the damage of so many homes left a huge number of people displaced and homeless, which reflects the social tragedy that resulted from the rainy season. In addition, the rainy season brought temporary closure of schools, hospitals, roads, and airports. Thousands of students, patients, and travelers were affected. There was a lot of temporary and some permanent damage to water and sewage systems.

Table 6. Impact of the 2010-2011 Floods

Deaths	417
Injured	523
Missing	77
Affected	3,069,307
Land Flooded (ha.)	3,523, 398
Homes*	554,550
Factories*	1270
Farms*	299,154
Hospitals*	111
Schools*	2,295
Cultural Buildings*	46,104
Sports Centers*	1,217
Losses and Recovery USD Billion	6.5
Colombia's 2010 GDP equivalent	0.12 %
*Affected	

Source: Created by author.

The total damage was estimated at \$6.1 billion¹¹⁶ (.12 of Colombia's 2010 GDP).¹¹⁷ The rainy season's effect on the Colombian economy was about 0.12 percent of the GDP growth rate in 2010. If this event had not occurred, the rate would have reached 4.43 percent. Due to the

¹¹⁶CEPAL, *Valoración de Daños y Pérdidas. Ola Invernal En Colombia, 2010-2011*, 64.

¹¹⁷Ibid., 204.

natural disaster, economic activity showed a slower rate of growth of 4.31 percent.¹¹⁸ The sectors most adversely affected were agriculture, forestry, hunting, and fishing, followed by mining and quarrying. The floods severely affected crops, livestock, and fisheries. The most affected populations were those who depend mainly on agriculture, livestock, and fisheries; this means that the disaster also endangered food security. In addition, contaminated water sources resulted in deteriorated sanitary conditions in the affected areas, conditions that are very basic and often insufficient in normal periods, which led to water-borne diseases and skin conditions.

Although Colombia's major disasters have brought socio-economic damage to the country, disasters also have contributed to the evolution and development of the SNPAD. However, even though Colombia had the SNPAD fully operable at the time of the 2010-2011 flood disaster, the system collapsed due to the disaster's magnitude. In addition, local authorities' corruption and the high bureaucratic processes at all levels worsened the situation.¹¹⁹

THE MEANS: COLOMBIA'S DISASTERS RESPONSE SYSTEM

Since the creation of SNPAD in 1988 to SNGRD in 2012, Colombia's disaster response system has evolved. As shown in the past sections, natural disasters have produced socio-economic effects in Colombia, and many sectors have been involved and affected. Through several laws that increased coordination between private and governmental agencies facing disasters, SNPAD evolved to SNGRD. Furthermore, the Colombian disaster response system evolved and was updated following each disaster's occurrence, but the Nevado del Ruiz volcano eruption and the 2010-2011 floods are the events that most influenced the system's evolution.

¹¹⁸CEPAL, *Valoración de Daños y Pérdidas. Ola Invernal En Colombia, 2010-2011*, 204.

¹¹⁹¿Cómo Evitar otro Desastre? *Lecciones de la Ola Invernal en Colombia* (Oxford: UK: OXFAM International, 2011), http://www.oxfam.org/sites/www.oxfam.org/files/bp148_colombia-lecciones-aprendidas-final__spanish1104292.pdf (accessed 2 April 2014), 14.

Colombia's Disaster Response System before Armero's Tragedy, 1979-1985

Law 9 of 1979 and the Popayan earthquake (1983)¹²⁰ influenced the evolution of GoC's disaster response system before Armero's tragedy. By 1979, GoC had already established the first national, regional and local-level disaster management institutions known as Emergency Management Committees, and had established some disaster preparedness and management procedures. However, Law 9 of 1979 modified and improved former Emergency Management Committees. The law created the *Comité Nacional de Emergencias* (National Emergencies Committee). The National Emergencies Committee was responsible for declaring the beginning and end of an emergency and for coordinating emergency response activities. The law also created local Emergency Management Committees. These committees were responsible for preparing a contingency plan for each of the different types of emergencies that threaten their communities.¹²¹

The 1984 Popayán's earthquake led to the creation of the *Fondo Nacional de Calamidades* (Colombian National Disaster Fund or FNC). Decree 1547 of 1984 established FNC as the nation's special account with administrative, accounting, and statistical independence.¹²² The main purposes of the FNC's funds are to provide financial support for disaster relief, control the effects of disasters, support rehabilitation and restructuring of basic sanitation facilities, finance information systems and other equipment necessary to diagnose and manage disasters

¹²⁰On March 31, 1983, an earthquake of 5.5 magnitudes on the Richter scale hit the city of Popayan. The earthquake influenced an area of 1,033 square kilometers, affecting 12 towns, killing 287, injuring 7,248, and affecting 150,000 people. Cardona and Yamín, 209.

¹²¹Sánchez, 325.

¹²²"Fondo Nacional de Calamidades," Unidad Nacional para la Gestión del Riesgo de Desastres, UNGRD, http://www.sigpad.gov.co/sigpad/paginas_detalle.aspx?idp=40 (accessed 2 April 2014).

situations, and take actions to prevent or attenuate the effects of disasters.¹²³ After Armero's tragedy, GoC's officials were more conscious of the threat disasters represented for the country.

Colombia's Disaster Response System Post-Armero's Tragedy, 1998-2012

The Armero tragedy was the disaster that really touched the consciousness of Colombian officials and led GoC to establish a robust system aimed to face future large-scale disasters. The resolve was, "another Armero will not happen again." During Mr. Virgilio Barco's presidency, the Colombian Congress signed Law 46 of 1988, which created SNPAD.¹²⁴ With emphasis on decentralization and community, private, and inter-agency participation, SNPAD conceived a new way to address disaster prevention, response, and recovery actions. The law gave SNPAD responsibility for: 1) defining the functions of all public and private institutions related to disaster prevention and management; 2) integrating public and private efforts for disaster prevention and management; 3) guaranteeing timely and efficient management of the human, technical, administrative, and economic resources necessary for preventing and managing disasters.¹²⁵ In addition, the law changed the term emergency to disaster to give a different dimension to the problem.

Another important modification to the old system was the change introduced through Law 919 of 1989. The law changed the former *Dirección de Prevención y Atención de Desastres* (Disasters Prevention and Response Directorate) into a new *Dirección de Gestión del Riesgo para la Prevención y Atención de Desastres* (National Directorate for Disasters Risk Management,

¹²³Sánchez, 331.

¹²⁴"Gestión del Riesgo y Manejo de Desastres. Reseña Histórica del Socorro Nacional," Cruz Roja Colombiana, <http://www.cruzrojacolombiana.org/socorro/Socorro4.html> (accessed 2 April 2014).

¹²⁵Sánchez, 326-328.

Prevention and Response).¹²⁶ The difference between Disasters Prevention and Response Directorate and National Directorate for Disasters Risk Management, Prevention and Response was that the latter introduced and assumed the responsibility for Risk Management. As a result, most Colombian city and town officials commenced evaluating risks and promoting prevention planning in order to mitigate disasters' consequences.¹²⁷

The National Directorate for Disasters Risk Management, Prevention and Response worked until 2011. It was then replaced by *Unidad Nacional para la Gestión del Riesgo en Desastres* (Disaster Risk Management Unit or UNGRD). The unit was mandated under Decree 4147 of 2011, placing the organization within the Ministry of the Interior as an executive level office that reports directly to the President. UNGRD is an entity with administrative and financial autonomy. The main objectives of UNGRD are to direct the implementation of disaster risk management, create policies for sustainable development, and coordinate the operation of SNGRD.¹²⁸

2012 National Disaster Risk Management System

Taking into account the institutional changes that Colombia has experienced in recent years; and the effects of natural disasters, especially the 2010-2011 floods; GoC prioritized the need for an updated framework and policy to respond to new challenges. To tackle the 2010-2011 floods, GoC declared an economic, social, and ecological emergency on December 7, 2010. It was subsequently extended until January 28, 2011.¹²⁹ At this time, GoC issued 37 legislative

¹²⁶Sánchez, 329.

¹²⁷Ibid., 330.

¹²⁸Unidad Nacional para la Gestión del Riesgo de Desastres, 11.

¹²⁹¿Cómo Evitar otro Desastre? Lecciones de la Ola Invernal en Colombia, 5-6.

decrees. One of them created the Colombia Humanitarian campaign.¹³⁰ It also established the response strategy room and the UNGRD. All aforementioned actions worked well but the greatest change happened with the creation of SNGRD.

Law 1523 of 2012 replaced SNPAD through the creation of SNGRD.¹³¹ The improved system introduced a new policy focused not only on disaster response but also on disaster prevention. Within the former SNPAD, the main effort was the mobilization of all the assets available once disaster occurred. The new SNGRD allows governmental agencies not only to address the disasters' consequences, but also to reduce the high risks from disasters. SNGRD brings together public and private organizations related to disaster risk prevention and disaster response, forming a single system that "will be mobilized whenever is necessary."¹³² SNGRD has a structure, which is responsive to not only national level entities, but to the municipality level. Law 1523 of 2012 focused on creating a new framework, which would provide for planning, an information system, disaster declaration, funding, and special procedures.¹³³

The new structure includes not only entities operating at the national level, but also those working with territorial entities (figure 8). Furthermore, UNGRD tasks include building response capacity and risk reduction. It is required to fully coordinate and stay involved in departmental,

¹³⁰Colombia Humanitaria was a strategy created by the GoC to address the 2010-2011 floods. The strategy allowed complementing GoC's actions to Colombian society actions. To address the disaster Colombia Humanitaria created two temporary sub-accounts as part of National Calamity Fund, which purpose was to meet the humanitarian relief, rehabilitation, and reconstruction phases.

¹³¹"Por Primera Vez, Colombia Cuenta con una Política Enfocada en el Conocimiento y la Prevención de Desastres Naturales: Presidente Santos," República de Colombia, Presidencia de la República, http://wsp.presidencia.gov.co/Prensa/2012/Abril/Paginas/20120424_01.aspx (accessed 31 March 2014).

¹³²Ibid.

¹³³Colombia Humanitaria, *Ley 1523 de 2012, Sobre La Primera Política de Gestión del Riesgo de Desastres en Colombia* (Bogotá: Colombia Humanitaria, 2012), http://www.colombiahumanitaria.gov.co/FNC/Documents/2011/especiales/ley_1523.pdf (accessed 2 April 2014), 1-5.

district and municipal levels. SNGRD has a new mandate to work jointly and optimizes the performance of all public and private risk management entities. The framework includes National Risk Management Council, responsible for directing and approving relevant emergency policies, the National Risk Management Plan, and the National Disaster Response Strategy. In addition, it establishes guidelines for risk management planning, action, and monitoring. Other elements of SNGRD are National Risk Awareness, National Risk Reduction (CNRR), and National Disaster Management Committee. These three committees consist of public and private entities,¹³⁴ which work in prevention and response in the same territorial areas. Finally, the structure includes departmental, district, and municipal risk management councils. Governors and mayors head these councils and they are tasked to replicate the national model in their territorial entities.

The planning portion of the Law 1523 of 2012 mandates that local authorities identify risk and hazard areas in their regional land-use plans to prevent further construction in areas unsuitable for human habitation due to immediate risk. Further, development plans include a special chapter on risk management to determine the hazards present in each territory allowing emergency mechanisms to be established in advance. All the information collected at local levels serves as their initial guidance for prevention and management plans at national and territorial levels.

The National Disaster Risk Management Information System (SNIGRD) is the SNGRD's information component. The SINGRD's main tasks are to keep national and local databases updated and functional and provide information systems at national, provincial, district and municipal levels.

¹³⁴SNGRD includes Colombian Civil Defense, Colombian Red Cross, and Colombian Fire Department.

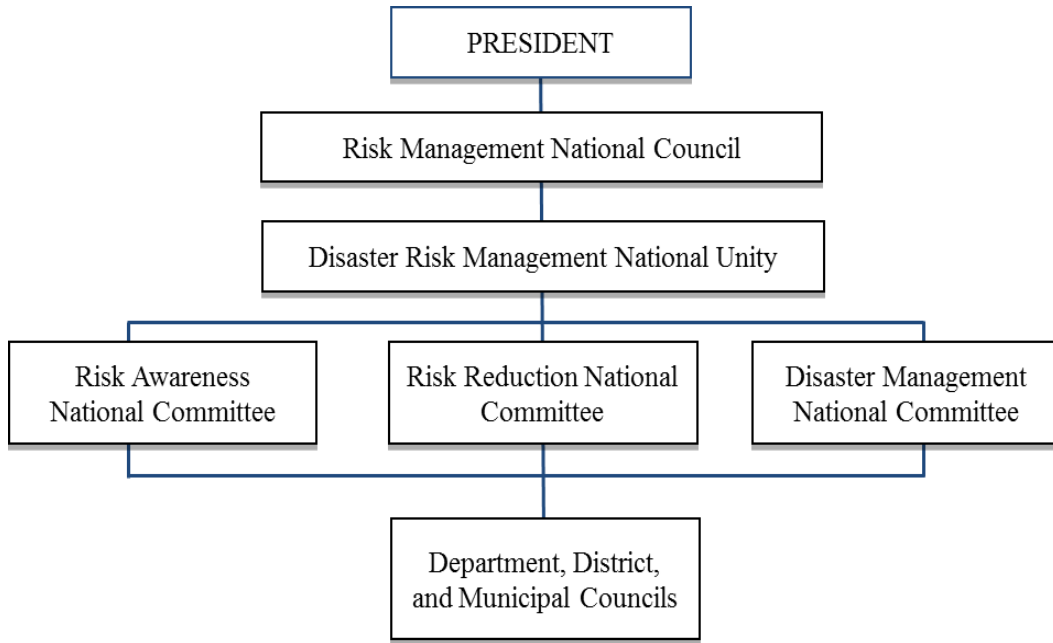


Figure 8. GoC's SNGRD's Structure

Source: Created by author.

Within the SNGRD, the president is responsible for declaring a disaster situation. The president classifies disasters as national, regional, departmental, district or municipal according to their magnitude and effects.¹³⁵ Furthermore, the president enforces the rules relevant to the specific disaster. Moreover, after approval of the Risk Management Councils at their respective levels, governors and mayors can declare a state of public calamity in their corresponding jurisdictions. After receiving a recommendation from the CNGR, the president is responsible for decreeing that the disaster is over and normalcy has returned.¹³⁶

¹³⁵Colombia Humanitaria, *Ley 1523 de 2012, Sobre La Primera Política de Gestión del Riesgo de Desastres en Colombia*.

¹³⁶Ibid.

In terms of funds, *Fondo Nacional de Gestión del Riesgo de Desastres* (National Disaster Risk Management Fund or FNGRD), replaced the former FNC. FNGRD was created under the same guidelines as the FNC, but with slight differences. FNGRD allows entry of funds derived from individual donations. Likewise, the new fund allows mayors and governors to create and manage territorial risk management funds for emergency response and recovery actions.¹³⁷

Special procedures allow for more effective response to emergencies and natural disasters. In contrast to SNPAD, SNGRD establishes a specific period for action when a disaster or public emergency has been declared. In cases of disaster declarations, special procedures establish a one-year period for interventions, and in cases of public emergencies, the period is six months. During each period, special procedures would apply for contracting, fiscal control of resources, settlement relocation, and loans for those impacted, among other measures, which would help ensure a return to normalcy as soon as possible.

Colombian Military Forces and SNGRD

Over the last five decades, FFMM have been greatly engaged in conducting disaster response. Using Colombian National Army (EJC), Navy, FAC, and National Police (PNC) assets, FFMM's support has been indispensable in mitigating the impacts of disasters. FFMM plays an important role not only in disaster-relief actions, but also in securing people and property in the affected areas. Once an emergency or natural disaster occurs, EJC and PNC, in coordination with UNGRD, civil authorities, other agencies, and Non-Governmental Organizations, adopt the safety measures required in order to prevent criminal actions that may disrupt the public order.¹³⁸ EJC

¹³⁷Colombia Humanitaria, *Ley 1523 de 2012, Sobre La Primera Política de Gestión del Riesgo de Desastres en Colombia*.

¹³⁸“Soldados Colombianos Comprometidos en Situaciones de Atención y Prevención de Desastres,” Ejército Nacional de Colombia, <http://www.ejercito.mil.co/?idcategoria=253684> (accessed 2 April 2014).

and PNC missions focus on protecting civilians and their property and on providing security for key infrastructure. Furthermore, EJC and PNC facilitate the execution of evacuation plans in the affected area.

EJC is the FFMM's branch most committed to disaster response and relief actions, however it was not until 2009 that EJC created a system to support the civilian population when natural disasters occur. EJC created the 80th Disaster Response Battalion (BIADE) in 2009, the EJC's Directorate of Disaster Risk Management (DIGER) in 2011, and Territorial Disaster Response and Relief Platoons (PPAD) in 2012. EJC also developed a contingency plan for a disaster response that supports the SNGRD's national plan.

Since its creation in 2009, BIADE's main task has been to provide immediate medical care and humanitarian relief for the victims affected by disasters. BIADE coordinates its actions directly with the Colombian National Disaster Management Committee, which enables the battalion to provide quick and efficient response.¹³⁹ With highly trained personnel to support national and territorial level committees, BIADE executes plans before, during, and after a disaster occurs. The battalion has four companies: a nuclear biological, chemical, and radiological company, construction company; an immediate response company; and a medical company.¹⁴⁰ BIADE also is trained to participate in international disasters. An example of BIADE's international disaster response capability is its deployment of a medical company to respond to Haiti's devastating earthquake in January 2010. The medical company consisted of surgeons, orthopedists, anesthesiologists, physician assistants, nurses, and paramedics. During its deployment to Haiti, BIADE's medical company performed over 17,800 outpatient visits and

¹³⁹“Soldados Colombianos Comprometidos en Situaciones de Atención y Prevención de Desastres.”

¹⁴⁰Sulderly Vargas Vásquez, Ejército Pone en Marcha el Primer Batallón de Prevención y Atención de Desastres, *Revista Ejército*, July 2009, <http://www.ejercito.mil.co/index.php?idcategoria=246906> (accessed 2 April 2014), 1.

47,937 surgical procedures.¹⁴¹ BIADE has acquired great experience in disaster prevention and response, which has made BIADE a key asset for meeting any type of disaster in Colombia as well as in other Latin-American countries.¹⁴²

In 2011, EJC created DIGER as an entity belonging to EJC's chief of engineers. DIGER's purpose is to guide and help all EJC units in risk awareness, reduction, and management as well as to support the SNGRD's national plan for vulnerable communities. DIGER is responsible for establishing the mechanisms that enable the rapid and efficient deployment of EJC units (BIADE and territorial disaster response and relief platoons PPADs) before, during, and after a disaster or emergency.¹⁴³ Using active territorial battalion assets, EJC created PPADs in 2012. PPADs task is to act as a direct support to departmental, district, and municipal risk management councils and serve as first responders in case of emergency or disaster.

In coordination with UNGRD, EJC has developed a contingency plan to respond when a territorial or national-level emergency or disaster is declared.¹⁴⁴ In either of these cases, the military commander of the affected area is responsible for activating the operations center, which is composed of sustainment, medical, operations, intelligence, and civil affairs personnel. Furthermore, the military commander of the affected area coordinates with the EJC's Aviation Brigade, FAC, Navy, and PNC for the assets required to transport, evacuate response and relief teams, wounded, and affected people. The military commander of the affected area also provides

¹⁴¹Vargas.

¹⁴²Luz Amanda Pulido, El Ejército Trabaja de la Mano con la Gestión del Riesgo, *Revista Ejercito*, July 2009, <http://www.ejercito.mil.co/?idcategoria=246916> (accessed 2 April 2014), 1.

¹⁴³“Soldados Colombianos Comprometidos en Situaciones de Atención y Prevención de Desastres.”

¹⁴⁴*Ibid.*

advice and troops to UNGRD to set up and operate humanitarian aid storage and distribution points. In addition, the military commander of the affected area helps UNGRD in damage assessment and census taking, classifying affected areas and future rehabilitation programs. The military commander of the affected area assigns available EJC's radio stations in the affected area as mean of communication to keep people informed. The EJC's contingency plan also establishes a common communications network to facilitate coordination between FFMM, PNC, and national agencies.¹⁴⁵ In turn, PNC manages the security and emergency number (123) as an integrated asset to coordinate actions between security and disaster response-relief agencies, which strives to provide the fastest response possible. In extreme cases, when a disaster's magnitude could block the communication network (landlines and cell phones), EJC has complementary military communications assets to serve as a bridge to keep the communications network working.¹⁴⁶ In general, EJC's disasters response assets provide the GoC a useful tool to support areas affected by disasters. The 2010-2011 floods provide a good example of EJC's participation in disaster response and relief. Through effective evacuations, search and rescue operations, construction of barriers, humanitarian aid delivery, removal of debris, clearing roads, installation of semi-permanent bridges, and construction of shelters among other activities, BIADE and PPADs made real differences in the lives of those affected by the floods.¹⁴⁷

The participation of the FAC has also contributed significantly to the prevention of disasters. In particular, the FAC is a key part of the volcano observation program. In order to prevent a disaster, which a volcano may potentially generate, the program permanently monitors

¹⁴⁵“Soldados Colombianos Comprometidos en Situaciones de Atención y Prevención de Desastres.”

¹⁴⁶Ibid.

¹⁴⁷Jorge A. Segura M., “Los Ingenieros Militares: Arma Estratégica del Ejercito Para Colombia,” *Avante Revista de los Ingenieros Militares*, October 2011, 14-15.

and observes Colombia's active volcanoes using FAC's assets. Thus, in 1994 and 2007, the program prevented tragedies when the Nevado del Huila unleashed avalanches in the Huila's department.¹⁴⁸

CONCLUSIONS

Although Colombia's armed conflict has left many victims in the last five decades, natural and manmade disasters have caused great human and material losses. Natural and manmade disasters affect the Colombian people and economy more than internal conflict. Armed conflict affected 5,034,400 Colombians (17 percent of the total affected people) contrasted by disasters affecting 25,092,736 Colombians (83 percent of the total affected people) in the studied period. Consequently, disasters affected Colombians four times more than armed conflict. In economic terms, disasters costed GOC \$8.6 billion. In the near future, annual losses related to disasters will amount to 1 percent of Colombia's GDP and is comparable to the 1.1 percent of GDP cost associated with armed conflict in Colombia for the period 1991-1996. In Colombia, as in the rest of the world, there are natural phenomena and manmade disasters that create situations of risk to the population and economy. Colombia constantly faces multiple geological and hydro-meteorological threats. Earthquakes and volcanic eruptions tend to be infrequent but have had large impacts on the Colombian economy and people in the last five decades. Earthquakes like Popayan's earthquake (March 31, 1983), the earthquake in the Colombian Coffee Axis (January 25, 1999), and the mega disaster caused by the eruption of Nevado Del Ruiz volcano (November 13, 1985) are geological hazards that have killed and injured the most Colombians in the studied period. In addition, floods, the hydro-meteorological hazard, affected the people and economy the most the last two decades. Estimates shows that 86 percent of Colombia's population is exposed

¹⁴⁸*Dialogo, El Foro de las Américas*, Protección en las Alturas, January 2013, 17-18.

to a mid-high seismic risk, 28 percent to a high-risk of flooding, and 31 percent at mid-high risk of landslide; this means that most of Colombia's population is exposed to multiple natural threats.

Socio-economic conditions such as poverty, overcrowded urban areas, and corruption have and will continue to increase the negative effects of disasters. Without strong GoC measures to reduce these conditions, the lives of thousands of vulnerable people will be impacted as well as the nation's economy. Today the GoC can no longer allow this chronic vulnerability to remain. It is time that the GoC begins to strengthen the development model and integrate innovative risk reduction strategies within the most vulnerable municipalities. The measures will reduce the suffering of people affected by all kinds of disasters. Moreover, the risk reduction strategies will reduce the economic losses related to damaged homes and infrastructure.

From the creation of the National Emergencies Committee in 1979, to the establishment of SNGRD in 2012, Colombia's Disaster Response System has steadily evolved. During the last four decades, the GoC has progressively developed with its creation of various state agencies responsible for preparing and advising communities for disaster scenarios. The GoC has had a Disaster Response System for more than two decades (1987). Despite efforts to create a robust system, the GoC's Disaster Response System has been particularly reactive and fails to emphasize prevention, limiting its effectiveness. In addition, the system's structure was not prepared for nor could it respond to large-scale disasters. National agencies such as Civil Defense, Red Cross, and the Colombian Fire Department, as well as international actors, promptly respond when disasters occur. However, when disasters reached their worst, the ability of most of these actors exceeded the human and material resources applied to meet the emergency. In other words, the GoC's Disaster Response System has failed to eliminate vulnerability to disasters, and therefore, the system has failed to meet its objectives fully. To

reinforce this conclusion, the 2014 rainy season is just starting and has already claimed the lives of 14 people in areas where similar natural disasters have historically occurred.¹⁴⁹

The difficulty of obtaining sufficient information on all the disasters mentioned in this paper is the first indicator of vulnerability on the issue. The lack of memory and, consequently, of systematizing these kinds of natural and socio-natural processes may be considered one of the central mistakes to the GoC's Disaster Response System. Likewise, the GoC ignored the lessons learned from the successes and failures during the first period (1979-1998).

FFMM's assets have been vital to the GoC's Disaster Response Systems in the last five decades. During this time, EJC has established DIGER, BIADE, and PPADs, which are considered models for other Latin American countries. Finally, GoC improved its Disaster Response System in 2012. Although some natural and manmade disasters can be prevented or their impact mitigated, many will inevitably lead to calamity. The next large-scale disaster will show if the improved SNGRD works well, or if it is just another reactive vice pro-active measure.

¹⁴⁹Invierno En Colombia, *El Tiempo (Bogotá)*, March 17, 2014, <http://www.eltiempo.com/noticias/invierno-en-colombia> (accessed 2 April 2014).

BIBLIOGRAPHY

- “20 Años Después del Ataque de Pablo Escobar al DAS solo ha Habido dos Condenas.” *El Tiempo (Bogotá)*, December 4, 2009. <http://www.eltiempo.com/archivo/documento/CMS-6744448> (accessed 2 April 2014).
- Abbot, H. Porter. *The Cambridge Introduction to Narrative*. New York, NY: Cambridge University Press, 2002.
- Arnold, Margaret et al. *Natural Disaster Hotspots: Case Studies*. Washington, DC: World Bank, 2006. <https://openknowledge.worldbank.org/handle/10986/7091> (accessed 3 April 2014).
- Ayala Diago, Cesar Augusto. “La Explosión de Cali: Agosto 7 de 1956.” *Revista Credencial Historia*, September 1999. <http://www.banrepcultural.org/blaavirtual/revistas/credencial/septiembre1999/117explosion.htm> (accessed 2 April 2014).
- Baena López, Carlos Alberto. “Retos de Colombia Frente a La Gestión Del Riesgo de Desastre Natural.” *Revista del Departamento de Ciencia Política, Universidad Nacional, Sede Medellín* (Julio-Diciembre 2011).
- Baker, Judy L., ed. *Climate Change, Disaster Risk, and the Urban Poor: Cities Building Resilience for a Changing World*. Washington, DC: World Bank Publications, 2012.
- ! Basta Ya! Colombia: Memorias de Guerra y Dignidad. Bogotá: Imprenta Nacional, 2013. <http://www.centrodehistoriahistorica.gov.co/descargas/informes2013/bastaYa/basta-ya-memorias-guerra-dignidad-12-sept.pdf> (accessed 31 March 2014).
- Bedoya, Mauricio, Claudia Contreras, and Franklin Ruiz. *Alteraciones Del Régimen Hidrológico y de la Oferta Hídrica Por Variabilidad y Cambio Climático*. Bogota: IDEAM, 2010. https://www.siac.gov.co/documentos/DOC_Portal/DOC_Agua/3_Estado/20120928_Alter_regi_hidro_ENA2010Cap7.pdf (accessed 1 April 2014).
- Biblioteca Virtual, Biblioteca Luis Ángel Arango. “Historia de los Partidos Políticos Tradicionales de Colombia.” <http://www.banrepcultural.org/blaavirtual/ayudadetareas/poli/poli61.htm> (accessed 27 February 2014).
- Cahill, Kevin M., ed. *Basics of International Humanitarian Missions*. New York: Fordham University Press, 2003.
- Caracol Radio. “Hace 50 Años Cali Conoció el Infierno. Una Explosión Mató a Unas 10.000 Personas.” <http://www.caracol.com.co/noticias/actualidad/hace-50-anos-cali-conocio-el-infierno-una-explosion-mato-a-unas-10000-personas/20060805/nota/317112.aspx> (accessed 2 April 2014).
- Cardona A. Omar D. “Terremoto En Colombia, Enero 25 de 1999: Lecciones Para La Prevención y Atención de Desastres Sísmico.” *DIRDN Informa, Boletín para América Latina y el Caribe* Número 14, 1999, 1, http://www.eird.org/esp/revista/No14_99/index_14e.htm (accessed 1 April 2014).

- Cardona A., Omar, and Luís E. Yamín, *Información Para La Gestión de Riesgo de Desastres. Estudio de Caso de Cinco Países: Estudio de Caso Colombia*. México: Naciones Unidas y Banco Interamericano de Desarrollo, 2007. <http://www.eclac.cl/publicaciones/xml/8/33658/ColombiaCapI.pdf> (accessed 31 March 2014).
- Colombia Humanitaria. *Ley 1523 de 2012. Sobre La Primera Política de Gestión Del Riesgo de Desastres En Colombia*. Bogotá: Colombia Humanitaria, 2012. http://www.colombiahumanitaria.gov.co/FNC/Documents/2011/especiales/ley_1523.pdf (accessed 2 April 2014).
- Comisión Económica para América Latina y el Caribe (CEPAL). Valoración de Daños y Pérdidas. Ola Invernal en Colombia, 2010-2011. Bogotá: Misión BID - CEPAL, 2012. <http://www.eclac.cl/publicaciones/xml/0/47330/OlainvernalColombia2010-2011.pdf> (accessed 2 April 2014).
- Committee on Natural Disasters et al. *The Eruption of Nevado Del Ruiz Volcano, Colombia, South America, November 13, 1985*. Washington, DC: National Academies Press, 1991.
- ? Como Evitar Otro Desastre? Lecciones de la Ola Invernal en Colombia. Oxford: UK: OXFAM International, 2011. http://www.oxfam.org/sites/www.oxfam.org/files/bp148_colombia-lecciones-aprendidas-final__spanish1104292.pdf (accessed 2 April 2014).
- Comunicado de Prensa: Pobreza Monetaria Julio 2012 - Junio 2013. Bogota: DANE, 2013. http://www.dane.gov.co/files/investigaciones/condiciones_vida/pobreza/cp_pobreza_jun13.pdf (accessed 2 April 2014).
- CREI. *Estrategia para La Reducción de Artefactos Explosivos Improvisados*. Bogotá: Imprenta Nacional, 2011.
- Cruz Roja Colombiana. “Gestión del Riesgo y Manejo de Desastres. Reseña Histórica del Socorro Nacional.” <http://www.cruzrojacolombiana.org/socorro/Socorro4.html> (accessed 2 April 2014).
- Desinventar. “Colombia, Profile.” http://www.desinventar.net/DesInventar/profiletab.jsp?countrycode=col#more_info (accessed 31 March 2014).
- Dialogo, El Foro de las Américas*. Protección en las Alturas, January 2013.
- Dilley, Maxx, Margaret Arnold, Uwe Deichmann, Robert S. Chen, and Arthur L. Lerner-Lam. *Natural Disaster Hotspots: a Global Risk Analysis*. Washington, DC: World Bank Publications, 2005.
- El Clima Colombiano. “El Clima Colombiano, Ciclo Anual de Lluvias.” <http://pwp.supercabletv.net.co/garcru/colombia/Colombia/clima.html> (accessed 3 April 2014).
- _____. “Colombia’s Hydrological Map.” <http://pwp.supercabletv.net.co/garcru/colombia/Colombia/clima.html> (accessed 20 November 2013).

- EM-DAT, the International Disaster Database. “Top 10 Natural Disasters in Colombia.” Centre for Research on the Epidemiology of Disasters (CRED). <http://www.emdat.be/result-country-profile> (accessed 2 April 2014).
- Federal Emergency Management Agency. Ready, Prepare, Plan, Stay Informed. “Earthquakes.” <http://www.ready.gov/earthquakes> (accessed 1 April 2014).
- _____. “Explosions.” <http://www.ready.gov/explosions> (accessed 2 April 2014).
- _____. “Landslides and Debris Flow.” <http://www.ready.gov/landslides-debris-flow> (accessed 1 April 2014).
- _____. “Volcanoes.” <http://www.ready.gov/volcanoes> (accessed 1 April 2014).
- GMH. ! Basta Ya! Colombia: Memorias de Guerra y Dignidad. Bogotá: Imprenta nacional, 2013. <http://www.centrodehistoriahistorica.gov.co/descargas/informes2013/bastaYa/basta-ya-memorias-guerra-dignidad-12-sept.pdf> (accessed 27 February 2014).
- Gutierrez, Juan Carlos. Investigan Corrupción en 16 Municipios de Santander con Ayudas a Damnificados. *Vanguardia.com (Santander)*, 7 September 2011. <http://www.vanguardia.com/santander/region/120779-investigacion-corruccion-en-16-municipios-de-santander-con-ayudas-a-damnificado> (accessed 2 April 2014).
- Haddow, George, Jane Bullock, and Damon P. Coppola. *Introduction to Emergency Management*. 5th ed. Burlington, MA: Butterworth-Heinemann, 2013.
- Henríquez Daza, Max. Razones y Sinrazones Del Diluvio En Colombia. *El Tiempo (Bogotá)*, 6 March 2014. <http://m.eltiempo.com/colombia/otrazonas/razones-y-sinrazones-del-diluvio-en-colombia/8694461> (accessed 2 April 2014).
- IHS Janes. “Jane's World Insurgency and Terrorism.” Fuerzas Armadas Revolucionarias de Colombia (FARC). Combined Arms Research Library Digital Library. <https://janes.ihs.com/lumen.cgscarl.com/CustomPages/Janes/DisplayPage.aspx?ShowProductLink=true&ShowProductLink=true&DocType=Reference&ItemId=+++1320752> (accessed 31 March 2014).
- Invierno En Colombia. *El Tiempo (Bogotá)*, 17 March 2014. <http://www.eltiempo.com/noticias/invierno-en-colombia> (accessed 2 April 2014).
- Jha, Abhas K., Robin Bloch, and Jessica Lamond. *Cities and Flooding: a Guide to Integrated Urban Flood Risk Management for the 21st Century*. Washington, DC: World Bank Publications, 2012.
- Joint Chiefs of Staff. Joint Publication 1-02, *Dictionary of Military and Associated Terms*. Washington, DC: US Government Printing Office, 8 November, 2010.
- Líneas Estratégicas y Avances en Priorización de Zonas de Intervención. Bogotá: Unidad para la Gestión del Riesgo de Desastres, 2012. http://www.eird.org/wikiesp/images/COL_Documento_de_pais_L%3%ADneas_Estrat%3%A9gicas_DIPECHO_031012.pdf (accessed 1 April 2014).

- Mata, Alfonso. Metodología para la Identificación, Clasificación y Cuantificación de los Impactos Ambientales de los Desastres Naturales. Ministerio de Relaciones Exteriores de Italia y CEPAL, Naciones Unidas, 2000. http://www.eclac.cl/dmaah/mdn/cd/material/met_02.pdf (accessed 1 April 2014).
- Moreno R., Álvaro Martín, and Omar D. Cardona. Efectos de Los Desastres Naturales Sobre El Crecimiento, El Desempleo, La Inflación y la Distribución del Ingreso: Una Evaluación de los Casos de Colombia y México. Global Assessment Report on Disaster Risk Reduction GAR 2011, February 2011. http://www.preventionweb.net/english/hyogo/gar/2011/en/bgdocs/Moreno_&_Cardona_2010.pdf (accessed 31 March 2014).
- Naciones Unidas y Comisión Económica para Latinoamérica y el Caribe. *El Terremoto de enero de 1999 En Colombia: Impacto Socioeconómico del Desastre en la Zona Del Eje Cafetero*. México: UN-CEPAL, 1995. http://www.cepal.org/colombia/noticias/documentosdetrabajo/5/42315/Eje_Cafetero.pdf (accessed 2 April 2014).
- Noticias Uno, La Red Independiente. “La Plaga que Eliminó el Presupuesto para Subsidios.” <http://noticiasunolaredindependiente.com/2013/09/29/secciones/que-tal-esto/la-plaga-que-elimino-el-presupuesto-para-subsidios/> (accessed 2 April 2014).
- O’Gallagher, Bryden. “The Pacific Plate.” Prezy. <http://prezi.com/unrr7eq5dcka/the-pacific-plate-the-ring-of-fire/> (accessed 2 April 2014).
- Oregon State University, Volcano World. “Deadliest Eruption.” <http://volcano.oregonstate.edu/deadliest-eruption> (accessed 2 April 2014).
- Organization for Economic Co-Operation and Development. *Emerging Systemic Risks in the 21st century: An Agenda for Action*. Danvers, MA: Organization for Economic Co-Operation and Development, 2003.
- Osterlund, Peter. “Colombia's Pleas for Disaster Aid Draw Worldwide Response.” *The Christian Science Monitor*, November 19, 1985. <http://www.csmonitor.com/1985/1119/acolum.html> (accessed 2 April 2014).
- Pizarro, Eduardo, and Ricardo Peñaranda. *Las FARC (1949-1966): De La Autodefensa a la Combinación de Todas las Formas de Lucha*. 2nd ed. Bogotá: Instituto de Estudios Políticos y Relaciones Internacionales: Tercer Mundo Editores, 1991.
- Pulido, Luz Amanda. El Ejército Trabaja de La Mano Con La Gestión del Riesgo. *Revista Ejército*, July 2009. <http://www.ejercito.mil.co/?idcategoria=246916> (accessed 2 April 2014).
- Ramos, Fernando and Adriana Vargas. “At Least 32 Killed in Colombia Club Blast.” CNN.com/World. <http://www.cnn.com/2003/WORLD/americas/02/08/colombia.expllosion/index.html> (accessed 2 April 2014).
- República de Colombia, Presidencia de la República. “Por Primera Vez, Colombia Cuenta con una Política Enfocada en el Conocimiento y la Prevención de Desastres Naturales: Presidente Santos.” http://wsp.presidencia.gov.co/Prensa/2012/Abril/Paginas/20120424_01.aspx (accessed 31 March 2014).

- _____. Instituto Geológico y Minero, “Principales Volcanes de Colombia.” http://intranet.ingominas.gov.co/pasto/Imagen:Volcanes_de_colombia.jpg (accessed 18 January 2014).
- _____. Ministerio de Vivienda y Turismo. Fondo de Promoción Turística de Colombia, *Colombia Guía Turística*. Bogotá: D.C: Editora Géminis, 2012.
- Restrepo, Javier Darío. *Avalancha Sobre Armero, Crónicas, Reportajes y Documentos de Una Imprevisión Trágica*. Bogota, COL: El Ancora Editores, 1986.
- Sanchez-Triana, Ernesto, Kulsum Ahmed and Yewande Awe, eds. *Environmental Priorities and Poverty Reduction: a Country Environmental Analysis for Colombia*. Washington, DC: World Bank Publications, 2007.
- Schuster, Robert L. and Lynn M. Highland. U.S. Geological Survey Open-File Report 01-0276, *Socioeconomic and Environmental Impacts of Landslides in the Western Hemisphere*, 2001. US Geological Survey, US Department of the Interior. <http://pubs.usgs.gov/of/2001/ofr-01-0276/> (accessed 2 April 2014).
- Segura M., Jorge A. “Los Ingenieros Militares: Arma Estratégica del Ejército Para Colombia.” *Avante Revista de los Ingenieros Militares*, October 2011.
- Servicio Geológico Colombiano, Observatorio Pasto. “Volcán Galeras Generalidades.” <http://www.sgc.gov.co/Pasto/Volcanes/Volcan-Galeras/Generalidades.aspx> (accessed 1 April 2014).
- Smith, Keith. *Environmental Hazards: Assessing Risk and Reducing Disaster*. New York: Routledge, 1992.
- “Soldados Colombianos Comprometidos en Situaciones de Atención y Prevención de Desastres.” Ejército Nacional de Colombia. <http://www.ejercito.mil.co/?idcategoria=253684> (accessed 2 April 2014).
- The World Bank. “Colombia.” The World Bank Group. <http://data.worldbank.org/country/colombia> (accessed 2 April 2014).
- The World Fact Book. “Colombia.” Central Intelligence Agency Library. <https://www.cia.gov/library/publications/the-world-factbook/geos/co.html> (accessed 1 April 2014).
- Transparency International. “Corruption Perceptions Index 2013: Americas.” http://www.transparency.org/files/content/pressrelease/CPI2013_Americas_EN.pdf (accessed 2 April 2014).
- Unidad Nacional para la Gestión del Riesgo de Desastres. *Líneas Estratégicas y Avances En Priorización de Zonas de Intervención*. Bogotá: Unidad Nacional para la Gestión del Riesgo de Desastres, 2012. http://www.eird.org/wikiesp/images/COL_Documento_de_pais_L%C3%ADneas_Estrat%C3%A9gicas_DIPECHO_031012.pdf (accessed 2 April 2014).
- _____. “Fondo Nacional de Calamidades.” http://www.sigpad.gov.co/sigpad/paginas_detalle.aspx?idp=40 (accessed 2 April 2014).

- United Nations, and Inter-American Development Bank. *Information on Disaster Risk Management, Case Study of Five Countries, Main Technical Report*. Mexico City: United Nations and Inter-American Development Bank, 2007.
- US Department of Interior, US Geological Survey. "Colombia Seismic Hazard Map." <http://earthquake.usgs.gov/earthquakes/world/colombia/gshap.php> (accessed 3 April 2014).
- _____. "Earthquake Hazard Program, Colombia Seismic Map." <http://earthquake.usgs.gov/earthquakes/world/colombia/gshap.php> (accessed 18 January 2014).
- _____. "Ring of Fire," 1999. <http://pubs.usgs.gov/gip/dynamic/fire.html> (accessed 24 October 2013).
- Vargas Vásquez, Sulderly. Ejercito Pone en Marcha el Primer Batallón de Prevención y Atención de Desastres. *Revista Ejercito*, July 2009. <http://www.ejercito.mil.co/index.php?idcategoria=246906> (accessed 2 April 2014).
- Voight, Barry. "The 1985 Nevado del Ruiz volcano Catastrophe: Anatomy and Retrospection." *Journal of Volcanology and Geothermal Research* 44 (1990): 351.