COLOMBIA POTENCIA DE LA VIDA

Gobierno de Colombia

FINANCIAL PROTECTION STRATEGY FOR DISASTER RISK MANAGEMENT OF THE TRANSPORTATION SECTOR

Programa de Financiamiento & Aseguramiento del Riesgo de Desastres

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FINANCIAL PROTECTION STRATEGY FOR DISASTER RISK MANAGEMENT OF THE TRANSPORTATION SECTOR

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WILLIAM FERNANDO CAMARGO TRIANA
Minister of Transportation

MARIA CONSTANZA GARCIA ALICASTRO
Vice Minister of Infrastructure

FERNEY CAMACHO
Infrastructure Director

MERCEDES ELENA GÓMEZ VILLAMARÍN
General Director INVIAS

JUAN JOSÉ OYUELA SOLER
Operational Director INVIAS

MAURICIO HERNÁN CÉSPEDES SOLANO
Technical and Structuring Director INVIAS

CAROLINA JACKELINE BARBANTI MANSILLA
President ANI (E)
Vice President of Procurement Management

LYDA MILENA ESQUIVEL
Executive Vice President ANI

JONATHAN DAVID BERNAL GONZALEZ
ANI Vice President of Structuring

SERGIO PARIS MENDOZA
Aerocivil Director

ALVARO JOSÉ REDONDO CASTILLO
Director Cormagdalena (E)

RICARDO BONILLA GONZÁLEZ
Minister of Finance and Public Credit

JOSÉ ROBERTO ACOSTA RAMOS
Director of Public Credit and National Treasury - DCPTN

World Bank
JOSÉ ÁNGEL VILLALOBOS
Disaster Risk Financing and Insurance Program Manager Colombia

ANA MARIA TORRES
World Bank Consultant

MIGUEL FERNANDO MUÑOZ
World Bank Consultant

Magda Buitrago Rios
Deisy Alejandra Borda Romero
Vice-Ministry of Infrastructure
Ministry of Transportation

Victor Hugo Ríos Bocanegra
Nancy Velasquez Osorio
Risk Management Sub-Directorate
National Roads Institute INVIAS

Adriana Carolina González Hernández
José Alberto Prieto Hernández
German David Currea Botero
Adriana Bareño Rojas
Mario Andrés Rodríguez Toledo
Jaime Fernando Ortiz Díaz
Laura Carolina Duarte Meneses
National Infrastructure Agency ANI

Candelaria Eljach Ortiz
Pablo Alejandro Giraldo Jiménez
Juan Pablo Corredor Grajales
Norma Liliana Gutiérrez Gamboa
Special Administrative Unit of Civil Aeronautics (UAEAC)

Lina Maria Garcia Corrales
Diana Yaneth Vargas Rodríguez
Liliana Zapata Garrido
Cormagdalena

Johanna Eunice Murcia Gutierrez
Johanna Orjuela Casallas
Risk Subdirection
Ministry of Finance and Public Credit - DCPTN

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ACRONYMS

4G	Fourth Generation of Concessions
5G	Fifth Generation of Concessions
ANI	National Infrastructure Agency
ANSV	National Road Safety Agency
PPP	Public-Private Partnership
ART	Territorial Renewal Agency
WB	World Bank
BPIN	National Pool of Investment Projects and Programs
CNV	National Valuation Contribution
Cormagdalena	Regional Autonomous Corporation of Río Grande de la Magdalena
COP	Colombian Pesos
CpC	Commitment for Colombia (Compromiso por Colombia)
DNP	National Planning Department
PFRDEP Strategy	National Strategy for Financial Protection from Disaster, Epidemic and Pandemic Risks
EPFS	Sectoral Financial Protection Strategy
AF	Adaptation Fund
FIP	Alternative Payment Sources for Infrastructure Development
GHG	Greenhouse Gases
GoC	Government of Colombia
G-20	The Group of Twenty is the main forum for macroeconomic policy coordination among the world's twenty largest economies

IDEAM	Institute of Hydrology, Meteorology and Environmental Studies
iNDC	Expected and Determined Contribution at the National Level
INVIAS	National Roads Institute
MPI	Multidimensional Poverty Index
LIVV	Green Road Infrastructure Guidelines
MHCP	Ministry of Finance and Public Credit
MT	Ministry of Transportation
ICAO	International Civil Aviation Organization
OECD	Organization for Economic Cooperation and Development
SDGs	Sustainable Development Goals
O&M	Operation and Maintenance
PATIS	Amazon Plan for Sustainable Intermodal Transportation
PATR	Action Plans for Regional Transformation
PDET	Subnational Approach Development Plans
FP	Financial Protection
PGRD	Disaster Risk Management Plan
PIFIN	Indicative Plan for Institutional Strengthening for Disaster Risk Management
RMP	Railway Master Plan
PMTI	Intermodal Transportation Master Plan
PND	National Development Plan
PNGRD	National Disaster Risk Management Plan
PNL	National Logistics Policy
PNVIR	National Roads Plan for Regional Integration
DRFI Program	Disaster Risk Financing and Insurance Program

RVP	Primary Road Network
SECO	Swiss Embassy in Colombia - Economic Cooperation and Development
SIVIC	Climate Road Information System
UAEAC	Special Administrative Unit of Civil Aeronautics - Aerocivil
UNGRD	National Unit for Disaster Risk
UPIT	Transportation Infrastructure Planning Unit

FOREWORD

The climate crisis in the world requires understanding and comprehension of the current problem in order to implement efficient actions that lead to the reduction of the risk to which communities, infrastructures and livelihoods are exposed. Thus, given the progress already recorded at the country level from the transportation sector, it is time to move on to execution in order to visualize improvement actions that will lead to effective progress in Climate Change Management. To this extend, the sector recognizes the need to undertake adjustments in the way of conceiving the infrastructure, so that, in addition to achieving its functionality, it is essential to contribute to climate change management from the planning of its infrastructure, promoting resilience and ensuring its physical sustainability, as well as the environmental and social sustainability of the territory where the country's transportation infrastructure is implemented.

This new vision entails systematic transformations in the various phases of structuring transportation infrastructure projects, including their design, construction and operation, so that each stage contributes to the reduction of greenhouse gas emissions, minimizes the consumption of natural resources, manages disaster risk and thus mitigates the impact of adverse effects on the territory and on public finances for the construction and maintenance of infrastructure in all modes of transportation.

On the other hand, Colombia has undergone repeated environmental transformations in its territories, due to the impact of anthropogenic activities, which has given rise to the conservation challenge faced by today's society. The transportation sector has been working on this challenge through the promotion of better construction practices and interventions in the territory under principles of coordination and concurrence based on sustainability and resilience proposals, incorporated in the structuring and development stages of its infrastructure projects; as established by the new *Green Road Infrastructure Guidelines,* with which a systemic and comprehensive vision is originated, where the technical and economic efforts of the national order are carried out taking into account the Land Use Planning, in search of permeable linear infrastructure, which favors ecological connectivity with its layouts and specifically addresses the interaction of transportation modes with the environment where it is implemented.

As a consequence of La Niña Phenomenon between August 2021 and January 15, 2023, 4,710 emergencies were generated, mainly in the primary road network under the responsibility of INVIAS, with 3,236 events, affecting 3,908 km and 48 bridges, whose damages exceeded COP527.270 billion[1]. Likewise, 1,474 emergencies were recorded in the concessioned roads managed by the National Infrastructure Agency - ANI, in 37 concessioned projects. Damage was also reported in 4 railways and 9 air terminals. As for the tertiary network managed by INVIAS, 26 roads were affected.

The estimate of these damages exceeds COP527.270 billion, and the estimated losses are in the order of COP282.4095 billion. In addition, damages and losses also impacted other productive sectors of the country that use transportation modes for the mobilization of inputs, products and passengers; a service that is one of the fundamental pillars of the country's economy.

Now, as part of the sectoral efforts to contribute to Climate Change Management, the *Sectoral Financial Protection Strategy - EPFS*, structured by the sector in coordination with the Ministry of Finance and Public Credit, is presented, with the support of the Disaster Risk Financing and Insurance Program of the World Bank (DRFI Program) and the Swiss Embassy in Colombia - Economic Cooperation and Development (SECO), whose main purpose is to reduce fiscal vulnerability to disasters, promoting through financial instruments the access to resources for disaster response that impact the transportation infrastructure.

The *Sectoral Financial Protection Strategy* - EPFS identifies the financial protection tools that have been used by each of the entities attached to the transportation sector, as well as Cormagdalena, an entity linked to this Sector initiative. The EPFS defines the policy objectives with which it intends to move forward towards the mentioned goals and which are focused on: i) Identification and understanding of the fiscal risk of disasters. ii) Financial management of disasters - financial instrumentation for the infrastructure of the transportation sector. iii) Catastrophic risk insurance of the sector's infrastructure (not including administrative headquarters) and iv) Guidelines for financial protection in the subnational entities.

Colombia and the transportation sector propose to the world the EPFS, which promotes the generation of financial protection mechanisms to guarantee an effective recovery and reconstruction of its infrastructure, thus

1 All monetary figures are in Colombian pesos (COP).

ensuring continuity in the provision of cargo and passenger transportation services, as well as reducing the fiscal vulnerability of the Colombian State.

In the hope that the EPFS will be consolidated as a discussion document on the subject and an initiative that can be replicated in other productive sectors affected by the impact of climate change, in the short term the operational plan will be structured to define activities, times, responsible parties and the follow-up mechanism that will guarantee compliance.

William Fernando Camargo Triana
Minister of Transportation of Colombia

PREFACE

In the framework of the National Strategy for Financial Protection against Disasters, Epidemics and Pandemics Risk (2021), of the Ministry of Finance and Public Credit -MHCP-, the objective of the *Coordination with public and private sectors* was included, *in* this sense, work has been done with different sectors in the promotion and implementation of financial protection.

In conjunction with the Transportation Sector, headed by the Ministry of Transportation, and some of the entities that comprise it: National Roads Institute, National Infrastructure Agency, Special Administrative Civil Aviation Unit, as well as the Magdalena Grande River Autonomous Regional Corporation, work has been done in the construction of *The Strategy for Financial Protection for Disaster Risk Management in the Transport Sector, in order to* guarantee a sectoral roadmap that allows financial protection through intentional retention or risk transfer instruments to be used in the response and recovery stages after a risk taking place.

The Transportation Sector is strategic in the development of the country from an economic and human standpoint; therefore, it is imperative to have the necessary resources for the rehabilitation and reconstruction after a disaster, of the different modes of transportation: Road, River, Maritime and ports, Rail and Aerial.

We are grateful to the Swiss Embassy in Colombia -SECO-, which finances the Disaster Risk Financing and Insurance Program, and to the World Bank team who technically support this process, which is the first sectoral strategy for Financial Protection worldwide.

Finally, I highlight this strategy as a product that generates sectoral resilience in financial terms and disaster risk management, which is complemented by the sector's knowledge and risk reduction capabilities.

José Roberto Acosta Ramos
General Director of Public Credit and National Treasury
Ministry of Finance and Public Credit

INTRODUCTION

Colombia's National Disaster Risk Management Plan - PNGRD is a development strategy that consolidates the actions that the actors of the *National Disaster Risk Management System - SNGRD* propose to implement in the short, medium and long term; in order to carry out, from their respective institutions, the social process of risk management, contributing to safety, improvement of quality of life and sustainable development.

The PNGRD adopted by Presidential Decree 308 of 2016 and updated by Presidential Decree 1478 of August 03, 2022, is the roadmap that guides the actions of the Ministry of Transportation and its affiliated entities to strengthen disaster risk management, where the formulation of the *Sectoral Financial Protection Strategy* - EPFS is identified as one of its priorities. Likewise, CONPES 4058 "*Public policy to reduce disaster risk conditions and adapt to climate variability phenomena*" establishes in *line of action 8 to* promote financial protection schemes for disasters due to phenomena associated to climate variability, line in which the Ministry of Transportation and its affiliated entities are committed to the development of the financial insurance goals for disasters in the country, contemplating the "*development of the sector's financial protection strategy for disasters with the support of the Ministry of Finance and Public Credit, during 2022*" (DNP. 2021. pg. 82).

Having stated the need for a *Sectoral Financial Protection Strategy - EPFS* and the commitment in its preparation, the Ministry of Transportation and its affiliated entities receive support from the World Bank's Disaster Risk Financing and Insurance Program (DRFI Program), from the Swiss Embassy in Colombia - Economic Cooperation and Development (SECO)[2], to structure a capacity to reduce fiscal vulnerability to the occurrence of disasters that impact the transportation infrastructure under its responsibility, all of this under the leadership of the Ministry of Finance and Public Credit.

2 The opinions and contents expressed in this document are not the responsibility of the Embassy.


KOBELCO

1. DESCRIPTION OF THE TRANSPORTATION SECTOR AND IMPACT OF DISASTERS

1.1. Description of the transportation sector:

According to Decree 87 of 2011, the main objective of the Ministry of Transportation is the formulation and adoption of policies, plans, programs, projects and economic regulation in matters of transportation, transit and infrastructure of road, maritime, river, rail and air transportation modes and the technical regulation in matters of transportation and transit in the same modes. The National Roads Institute (INVIAS), the National Infrastructure Agency (ANI), the Special Administrative Unit of Civil Aeronautics (UAEAC), the Superintendence of Transportation (SUPERTRANSPORTE), the National Road Safety Agency (ANSV) and the Transportation Infrastructure Planning Unit (UPIT) are the entities attached to the Transportation Sector. These entities are in charge of the different modes of transportation. Similarly, and for this specific project of structuring the *Sectoral Financial Protection Strategy* - EPFS, the Corporación Autónoma Regional del Río Grande de la Magdalena - Cormagdalena (Regional Autonomous Corporation of the Magdalena Grande River) joins the initiative.

The Transportation Sector is a fundamental actor for the country's economic growth, enabling greater access to education, work and other social and environmental services for the populations it connects. It also contributes to reduce poverty, links key points of the local, regional and national economy; it is a dynamizer of the Colombian economy with a growth rate of 4.5% for 2021. [3]

A total of 299,840 tons were mobilized in Colombia in 2021. Road transportation is the most representative within the total mobilization of cargo at 85 %; followed by the railroad, with 11 %; riverine with 2 %; as shown in Figure 2.

3 Source https://www.supertransporte.gov.co/index.php/comun-marzo-2022

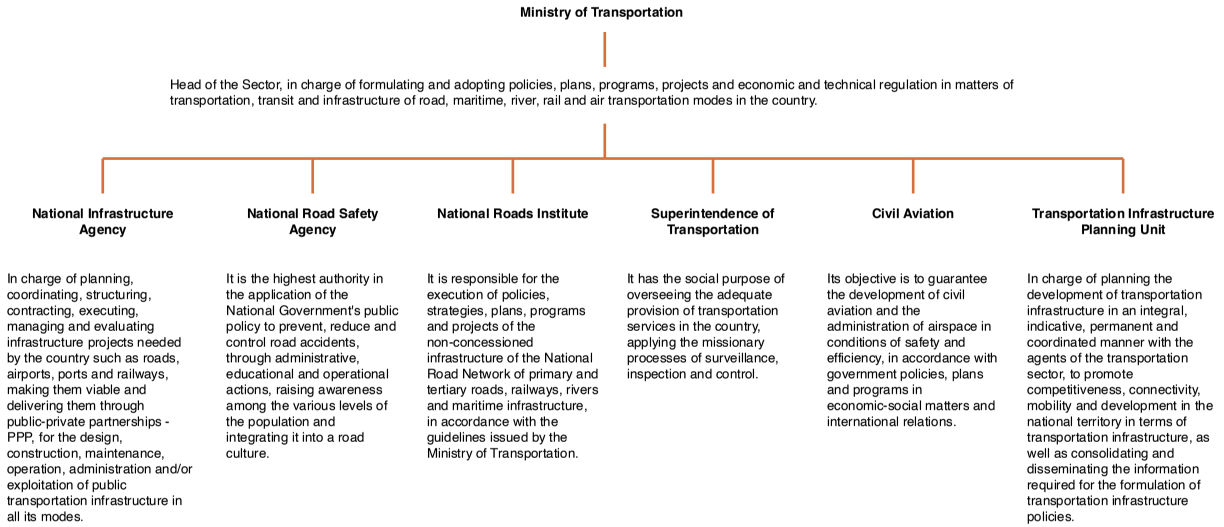


Figure 1. Sector organization chart.
Source: Own elaboration.

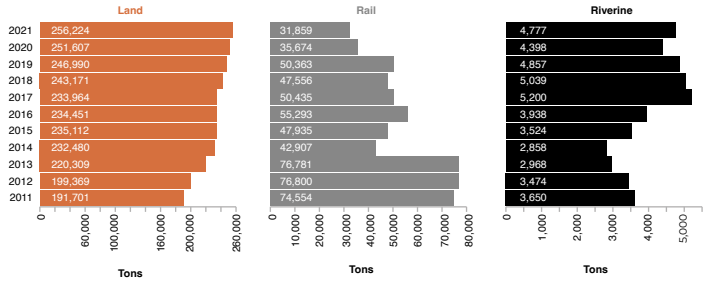


Figure 2 . National cargo movement by mode of transport
Source: Transportation Statistics in Figures, 2019

1.1.1. Road Modality

The road modality is relevant for both cargo and passenger transportation. During 2021, 68,052,414 passengers were mobilized by the 49 land passenger transportation terminals enabled and/or approved in the country, for the year 2020 there was a decrease of 67% of passengers mobilized, which represented approximately 90.7 million passengers less than what was reported in 2019, see illustration 3. For the year 2021, there was a recovery in the number of passengers mobilized, with a variation of 50% compared to the year 2020. In 2021, 123,647 tons - dry cargo and 3,762 gallons - liquid cargo were mobilized in the land cargo transportation modality.

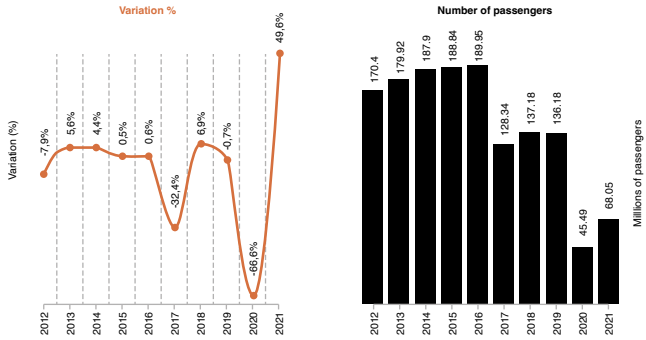


Figure 3 . National passenger movement by road modality
Source: Transportation Statistics in Figures, 2021

Colombia has a road network of 205,745 km of which 8.9% or 18,323 km correspond to the primary network, 22% or 45,137 km to the secondary road network and 69% or 142,284 km of the road network corresponds to tertiary roads[4] . Figure 4 shows the behavior of the composition of the road network by functionality.

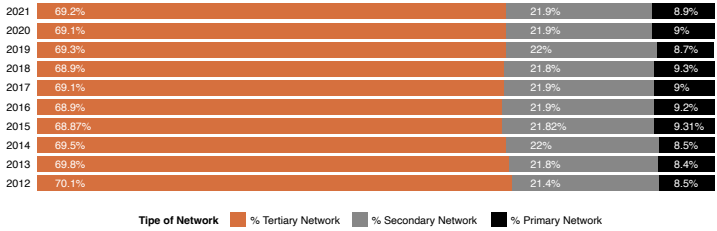


Figure 4. Composition of the National Road Network
Source: Transportation Statistics in Figures, 2021

Of the 18,323 Km of primary network managed by the nation, 59.2%, 10,840 Km, are handled by the National Roads Institute - INVIAS and 40.8% corresponding to 7,484 Km are handled by National Infrastructure Agency - ANI through concession contracts. Figure 5 shows the behavior of the distribution in the management of this network. The secondary network is entirely under departmental administration and of the 142,284 km of tertiary network, 70.8% (100,748 km) is handled by the municipalities, 9.8% (3,959 km) is under departmental management and 19.4% (27,577 km) is handled by the nation through INVIAS.

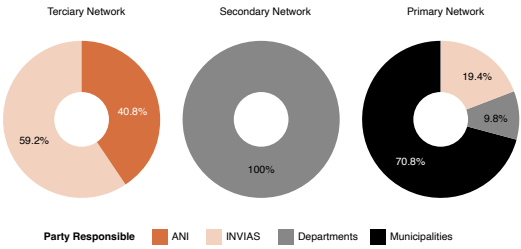


Figure 5. National Road Network Management
Source: Transport Statistics in Figures, 2021

4 The kilometers of the road network are variable, as they change over time.

Regarding the national primary network, as shown in Figure 6, INVIAS is in charge of 59% of the total primary network and is responsible for the construction, maintenance and operation of this network. On the other hand, ANI (Agencia Nacional de Infraestructura, formerly Instituto Nacional de Concesiones-INCO) has been in charge since 2006 of the projects under concession, which by 2021 correspond to 41% of the primary network distributed in 42 concession contracts.

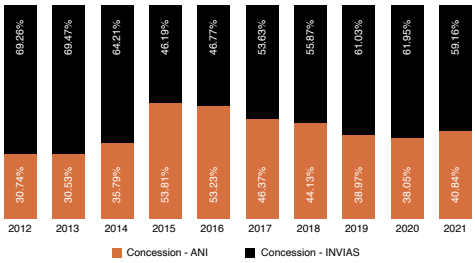


Figure 6. National Primary Network Management
Source: Transport Statistics in Figures, 2021

In this context, the Primary Road Network becomes the backbone to boost the national economy and is a fundamental pillar for other sectors of the economy such as agriculture, mining and manufacturing to mobilize their products to national and international markets. This is why it is necessary to have a road infrastructure that is adapted, resilient and in optimal conditions to ensure the country's local, regional, national and international development and competitiveness.

1.1.2. Riverine Modality

Colombia's river network has a total length of 24,725 km, of which 74%, 18,225 km, are navigable and 26% (6,500 km) are non-navigable.

The Magdalena River, with more than 1,500 km in length, which runs through 13 departments, is undoubtedly the most representative of this mode of transport and a fundamental axis for the development of intermodal transportation. This is demonstrated by its cargo mobilization records, which indicate a 32% increase during the twelve months of 2022, compared to what occurred in 2021, going from 3,262,461 tons of cargo mobilized to 4,306,874 tons, according to figures reported by river inspections and transport companies, which were consolidated by Cormagdalena.

Of the total cargo mobilized by the river, liquid cargo had the highest representation with 85%, with over 3,600,000 tons. In terms of dry cargo, first of all, containers accounted for 50% of the total dry cargo, followed by general cargo and coal, respectively, in second and third place, followed by other solid bulks and other types of cargo.

The most transported products in the liquid cargo category on the Magdalena River are fuel oil and crude oil, with 1,616,331 and 1,598,814 tons, respectively. In third place is naphtha with 259,149 tons; the rest pertains to other liquid substances.

So far throughout the year, during the twelve (12) months of 2022 we had a growth of 0.5% compared to the same period in 2021. The Port Zone has mobilized during the period Jan-Dec 2022 12,313,067 tons, this figure is 55,811 tons higher than the total of the previous year. This figure, for the year 2022, is the highest number of tons mobilized in the port area of Barranquilla.

In the current month (December 2022), 964,866 tons have been mobilized in the Barranquilla Port Zone, corresponding to:

- 34% imported solid bulks such as corn, clinker, soybean and wheat
- 26% export coke
- 15% liquid bulk cargo such as chemicals, soybean oil, caustic soda, among others
- 13% general cargo, mainly imported steel
- 12% containerized cargo

Given the characteristics of its infrastructure, the river modality requires connection with other modes of transport for cargo to move from its origins to final destinations, i.e., it is a mode of connection between other modes of transport (Ministry of Transportation, 2005, pg. 70). Like the railroad modality, this mode of transport with 18,225 km of navigable river network is lagging behind (Ministry of Transportation, 2021). Now, the entire navigable river network can be permanently sailed by smaller vessels and out of them, 62% or 11,273 km can also be sailed by larger vessels taking into account that 7,063 km can do so permanently and 4,210 km on a transitory basis (Ministry of Transportation, 2021, pg. 77). (Figures 7 and 8).

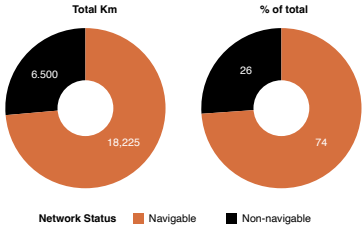


Figure 7. Navigable and non-navigable river network
Source: Transport Statistics in Figures, 2021

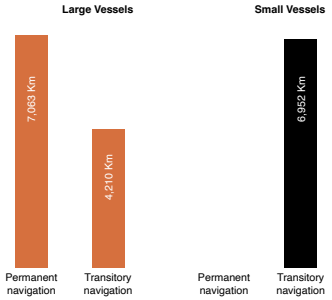


Figure 8. Kilometers of permanent and transitory navigable network by type of vessel.
Source: Transport Statistics in Figures, 2021

The country's main navigable basins are the Magdalena, Atrato, Orinoco and Amazon river basins. The latter have the longest navigable lengths in the riverine network. In turn, the Magdalena river basin with 2,770 km of navigable network integrates 1,092 km of the river with the same name, currently under the management and conservation of the Corporación Autónoma Regional del Río Grande la Magdalena - Cormagdalena. (Ministry of Transportation, 2020b, pg. 78). Table 1 shows information on the navigable length of the country's main rivers.

Main rivers	Navigable lenght (Km)			Total	Non-navigable lenght (Km)	Total (Km)
	Permanent	Large Transitory	Small Permanent			
Cuenca del Magdalena	**1,188**	**277**	**1,305**	**2,770**	**1,488**	**4,258**
Magdalena	631	256	205	1,092	458	1,550
Canal del Dique	114	0	0	114	0	114
Cauca	184	0	450	634	390	1,024
Nechí	69	21	45	135	100	235
Cesar	0	0	225	225	187	412
Sinú	80	0	110	190	146	336
San Jorge	110	0	83	193	207	400
Otros	0	0	187	187	0	187
Cuenca del Atrato	**1,075**	**242**	**1,760**	**3,077**	**1,358**	**4,435**
Atrato	508	52	0	560	160	720
San Jauan	63	160	127	350	60	410

Main rivers	Navigable lenght (Km)			Total	Non-navigable lenght (Km)	Total (Km)
	Permanent	Large Transitory	Small Permanent			
Baudó	80	0	70	150	30	180
Otros	424	30	1,563	2,017	1,108	3,125
Cuenca del Orinoco	**2,555**	**1,560**	**2,621**	**6,736**	**2,161**	**8,897**
Orinoco	127	0	0	127	163	290
Meta	800	51	15	866	19	885
Arauca	0	296	0	296	144	440
Guaviare	774	173	0	947	0	947
Inírida	30	0	418	448	471	919
Vichada	149	101	330	580	88	668
Vaupés	600	60	0	660	340	1,000
Unilla	75	25	0	100	50	150
Otros	0	854	1,858	2,712	886	3,598

Main rivers	Navigable lenght (Km)				Non-navigable lenght (Km)	Total (Km)
	Permanent	Large Transitory	Small Permanent	Total		
Cuenca del Amazonas	**2,245**	**2,131**	**1,266**	**5,642**	**1,493**	**7,135**
Amazonas	116	0	0	116	0	116
Putumayo	1,272	316	12	1,600	117	1,717
Caquetá	857	343	0	1,200	150	1,350
Patía	0	250	100	350	100	450
Otros	0	1,222	1,154	2,376	1,126	3,502
National total	**7,063**	**4,210**	**6,952**	**18,225**	**6,500**	**24,725**

Table 1. Navigable length of the main rivers in Colombia
Source: Transport Statistics in Figures, 2021

1.1.3. Maritime and Port Modality

In Colombia there are 9 port zones located in the maritime port infrastructure, 8 on the Caribbean Coast: San Andres, La Guajira, Santa Marta and Cienaga, Barranquilla, Cartagena, Gulf of Morrosquillo, and Turbo. The remaining 2 areas: Buenaventura and Tumaco, are located on the Pacific Coast.

Pursuant of Law 1 of 1991, the country's port areas are under concession. There are currently 63 port terminals under concession by ANI and 34 terminals under concession by Cormagdalena, 20 of which are located in the port area of Barranquilla. Most of the port companies are dedicated to handling foreign trade cargo and international transshipment. INVIAS is in charge of the access channels to the public maritime ports owned by the nation, located in the port areas of San Andres, La Guajira, Santa Marta, Barranquilla, Buenaventura and Tumaco (Ministry of Transportation, 2020b, pg. 81). (See Map 1).

Map 1. Major maritime port areas in Colombia
Source: Ministry of Transportation, 2017, taken from Ministry of Transportation 2008.

Colombia mobilizes 93.7% of foreign trade cargo through public or private ports under the regulation and control of the State. During 2021, 168,644,842 tons were mobilized through the country's seaports, of which 138,232,919 tons representing 93.7% of all cargo, were mobilized by foreign trade operations, 80.8% or 95,442,330 tons as exports and 12.9% or 42,790,589 tons as imports. Regarding the movement of cargo by port, the largest amount of tons are mobilized by Ciénaga with 19% or 31,997,417 tons, Cartagena with 26.9% or 45,448,851 tons and the Gulf of Morrosquillo with 14.8% or 24,897,356 tons which together with the port of Guajira mobilize 28.8% of the cargo (Superintendence of Transportation, Port Traffic Statistical Bulletin in Colombia 2021, pg. 4). (Figure 9).

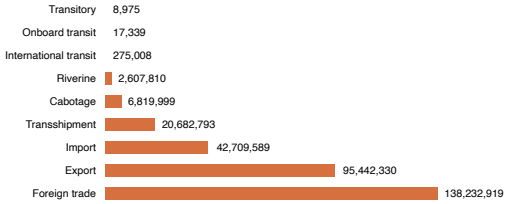


Figure 9 Million tons mobilized by port traffic from January - December (2021). Source: Superintendence of Transportation (2021)

Contributing to the dynamization of the economy particularly in certain cities such as Cartagena and Barranquilla; seaports have generated a transforming dynamic in the development of these cities in the Colombian Caribbean. Although the maritime transport sector in the national GDP of port cities does not represent a significant percentage by itself (about 0.8% in the share of Colombian GDP in 2018), the industrial dynamics and the linkages originated by the port sector in employment generation, investment in infrastructure, need of suppliers that link with other suppliers to create chains that generate approximately a share in GDP close to 7% of the city of Cartagena and 5% of the Bolivar department. This dynamic is similar in the other port municipalities of the Caribbean and, according to the Superintendence of Transportation, the country's port areas mobilized 168.6 million tons, which shows growth of 1.4% compared to 2020.

The Caribbean ports specialized in coal and hydrocarbons, such as Puerto Bolívar in La Guajira and the hydrocarbon and liquid terminals located in the Gulf of Morrosquillo, generate a different dynamic, with little linkage. In the case of La Guajira, coal exports generate about 43% of the department's

income. This situation makes port development in the department and its coal specialty relevant.

The port of Buenaventura is located on the Pacific coast and represents the country's most important source of income. The port handles 31.3% of Colombia's imports to Bogotá. The port of Buenaventura moves approximately 10.6% of the cargo of all port areas in the country.

1.1.4. Railway Modality

Colombia's railway network has a length of 3,533 km, of which 51%, i.e. 1,799 km are active and 1,729 km are inactive (Figure 10). Of the 3,533 km, 1,610 km are managed by ANI, 1,734 km are managed by INVIAS and 189 km are private lines, see Figure 11.

Figure 10. National Railroad Network
Source: Ministry of Transportation

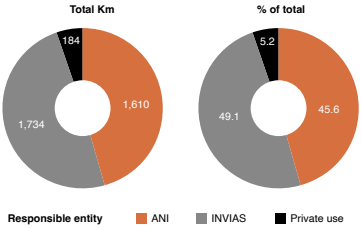


Figure 11. Railroad Network Management
Source: Transport Statistics in Figures, 2021

The sections managed by ANI, either under concession, or handled through work contracts and/or structuring, correspond to the Pacific and Atlantic railroad network and the La Dorada Chiriguaná and Bogotá Belencito railroad corridors. Of the railroad network managed by INVIAS, 99.7% is inactive and the remaining 0.3% corresponds to the Bogotá section, which goes from K0+000 to K5+000 of the railroad corridor (Ministry of Transportation, 2021, pg. 43-45). See Figure 12.

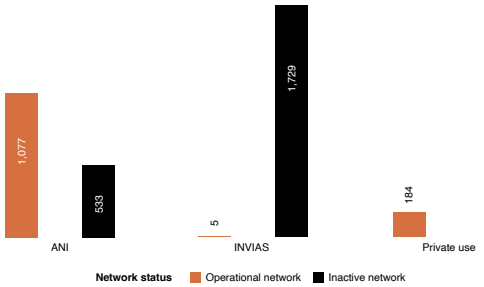


Figure 12 Kilometers of active and inactive network
Source: Transport Statistics in Figures, 2021

The Pacific Railroad Network was delivered under a concession scheme in 2000, was declared expired in May 2020 and is in the process of liquidation. This corridor covers a length of 498 km between Buenaventura and La Felisa in the departments of Valle del Cauca, Risaralda, Caldas and Quindío. The corridor is made up of 4 sections and is not currently in operation because the concession contract expired. The Atlántico Railway Network, under concession to Ferrocarriles del Norte de Colombia S.A., FENOCO S.A., covers a length of 245 km in the Chiriguaná - Santa Marta section, crossing the departments of Cesar and Magdalena. The entire corridor is in commercial

freight operation and 165 km of the network are built in double line (Ministry of Transportation, 2021, pg. 45).

Regarding the Central Railroad Network, the 559 km long LA DORADA-CHIRIGUANÁ railroad corridor crosses the departments of Caldas, Antioquia, Santander and Cesar, and facilitates the connection from the center of the country (municipality of La Dorada) with the Atlantic Railroad Network, to reach the Caribbean ports in intermodal operations; in turn, the 308 km long BOGOTÁ - BELENCITO section connects Boyacá and Cundinamarca with the capital of the Republic. These rail corridors are currently in operation.

The private railroad network consists of the Belencito - Paz de Río route, 39 km long, and the Cerrejón - Puerto Bolívar route, the latter built in standard gauge to transport coal from the Cerrejón mines to Puerto Bolívar, with an extension of 150 km (Ministry of Transportation, 2021, pg. 46).

In 2022, 30.78 million tons of cargo were transported along the country's three main rail corridors, Bogotá-Belencito, La Dorada-Chiriguaná and Chiriguaná-Santa Marta.

Through this mode of transport Colombia mobilized in 2021 about 11% of the country's total cargo[5] , including coal and oil. Circumstance that promotes the emergence of initiatives that seek to position the railroad modality as a real transportation option, consolidating logistic corridors that have provided better connectivity of the interior of the country with the Caribbean ports and a greater connection of Cundinamarca and Boyacá, with Bogotá city.

The reactivation of the railroad modality is based on the degree of competitiveness that the mode offers for the mobilization of goods in high volumes, low operating costs, lower congestion and accident rates, and low greenhouse gas emissions that are harmful to the environment.

1.1.5. Air Modality

According to information from the Special Administrative Unit of Civil Aeronautics (UAEAC), the public network of airports amounts to 251, whose responsibility is shared between the Nation and the Subnational Entities (Table 2). Of the 68 airports owned by Aeronáutica Civil, 16 are managed by airport concessions, handled by the National Infrastructure Agency - ANI. The Matecaña airport, owned by the subnational entity, is also handled by concession.

5 Estimated using the document Transporte en Cifras 2021, published on the Colombian logistics portal of the Ministry of Transportation (https://plc.mintransporte.gov.co/Estad%C3%ADsticas/Transporte-en-Cifras).

OWNERS	QUANTITY
Special Administrative Unit of Civil Aeronautics - UAEAC	68
GOVERNMENT	24
MUNICIPALITY	91
MUNICIPAL TOWNSHIP	10
INDIGENOUS RESERVATION	35
COMMUNITY ACTION COUNCIL	2
OTHER	21
TOTAL	**251**

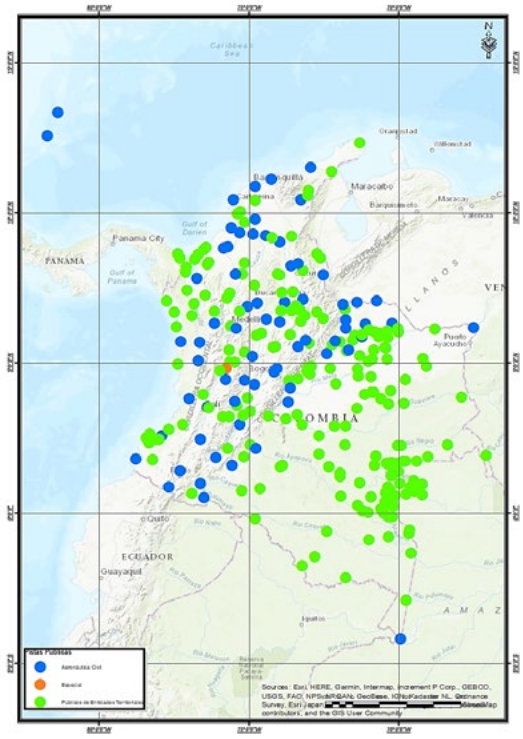
Table 2. Distribution of Public Aerodromes by Owner
Source: Air Navigation Plan for Colombia. Volume II

The most important airports in Colombia are Bogotá's El Dorado airport with a 49% share in passengers and 68% in cargo, Rionegro with a 9% share in passengers and 12% in cargo, and Cali with an 8% share in passengers and 4% in cargo (Gordillo, 2015, pg. 45). Map 2 identifies the network of public airports/aerodromes.

Air passenger transportation has registered a significant growth as evidenced in the Sectorial Studies Report of the Special Administrative Unit of Civil Aeronautics - Aerocivil[6] on air passenger traffic, growing in 2018 by 72% compared to 2010; increasing the number of passengers mobilized from almost 14 million to more than 24 million by the end of 2018. For 2019, an increase of 13% was recorded, mobilizing more than 27 million passengers.

El Dorado International Airport, which handles the largest number of passengers annually in the country, has become a high-risk node due to the possibility of flooding as a result of the threat posed by the overflowing of the Bogotá River, as a result of the increase in its levels due to heavy and constant rainfall in the capital and its surrounding municipalities, as occurred in late 2010 and early 2011, when it altered the normal operation of the most important air terminal in Colombia.

6 Development of Colombian civil aviation. Source: Grupo de Estudios Sectoriales - GES De Aerocivil, 2018.



Map 2. Network of public aerodromes/airports
Source: UAEAC, 2022

1.1.6. Progress in transportation infrastructure policy

According to the Ministry of Transportation, the calculation carried out by its Logistics Group, the Superintendence of Transportation, the Regional Autonomous Corporation of the Rio Grande de la Magdalena Cormagdalena and the National Infrastructure Agency ANI, during the year 2021 a mobilization of 299,840 million tons[7] by the different modes of transportation was recorded in the country. Likewise, the National Cargo Registry - RNDC reveals that the movement of cargo within the logistics corridors during the year 2021 increased by 4.5% compared to 2019[8] , while the mobilization of passengers

7 Source: Transport in figures MT 2021

8 The comparison is made with 2019, taking into account the situation in the 2020 pandemic by COVID.

through the various modes of transport increased by 5.6% compared to those carried out during the same year.

Within the sector's progress, it is important to mention that the management of transportation infrastructure in the country has been permeated by good practices shared by the OECD[9] , related to effective governance and the adoption of the G-20 principles, positioning the Ministry of Transportation as a policy formulator and working for this purpose in the following areas: 1. Regulatory and institutional environment, 2. Infrastructure planning, 3. Project development and 4. Project implementation.

Regarding the regulatory and institutional environment, the sector has a robust and strengthened regulatory framework, defined in Law 1508 of 2012, which establishes the legal regime for PPP and Law 1682 of 2013 or Infrastructure Law, which provides tools to the sector to overcome bottlenecks that affect the development of infrastructure projects. Likewise, Decree 1082 of 2015 regulating Law 1508 of 2012, Decree 438 of 2021 by which Chapter 1 of Decree 1082 of 2015 is modified and Decree 655 of 2021 regarding functional units of river projects. Added to this regulatory framework is the possibility of having new sources of financing through Decree 223 of 2021 by which the fund of alternative sources of payment for the development of infrastructure (FIP) is regulated, progress is also being made in the INVIAS toll securitization project and CONPES document 3996 of 2020 was adopted, which contains the public policy guidelines for the application and implementation of the National Valuation Contribution as a source of payment for national infrastructure. Progress is being made in the normative structuring to regulate the Infrastructure Project Prioritization Committee and establish the methodology for the qualification and prioritization of the projects that would be subject to the application of the CNV.

Regarding infrastructure planning, the sector contributes to the construction of the National Development Plan 2022 - 2026, has the Intermodal Transportation Master Plan (PMTI) of 2015, which is being updated with the support of the National Planning Department DNP, the River Master Plan, the Railway Master Plan of 2020, which establishes the technical guidelines and the roadmap of the normative, institutional, regulatory, operational, financing and project planning components that contribute to economic development, including the structuring of the Railway Bill for the country. Likewise,

9 The Organization for Economic Cooperation and Development (OECD) is an international cooperation organization composed of 38 states, whose objective is to coordinate their economic and social policies. Colombia officially became the 37th member of the Organization on April 28, 2020.

the National Roads Plan for regional integration PNVIR and the Strategic Aeronautical Plan for 2030, which outlines policy guidelines to achieve the development of the air transportation sector in Colombia through actions that optimize national and international connectivity, boost competitiveness, improve and facilitate operational and civil aviation safety.

In this aspect, infrastructure planning considers both intermodalism and cost reduction, and in this sense, there is the National Logistics Policy (PNL) of 2020, which promotes intermodality in transportation and the willingness of trade to reduce logistics costs and times. Costs that represented a national average of 13.5% of sales reached 12.6% in 2020 according to the results published in July 2021, a result that exceeds the transformational goal proposed at the national level for the year 2022.

The sector has the *National Urban and Regional Mobility Policy -CONPES 3991 of 2020*, which proposes actions to materialize a vision of quality mobility that contemplates the participation of all actors in the system, the policy for the reactivation, repowering and growth *Commitment for Colombia - CONPES 4023 of 2021*, proposes different actions for the sectors to resume the country's development route prior to the arrival of COVID 19, moving towards a more sustainable growth. For the transportation sector, the multiplier effect on employment generated by the dynamization of transportation infrastructure interventions was considered, prioritizing 81 projects in the sector.

The new port policy is in the process of being structured, aimed at promoting a modern institutional framework, planning the development of the port sector under a vision of intermodality with a long-term perspective where the use of coastal resources and infrastructure is rationalized in an adequate and sustainable manner, in compliance with the provisions of Article 2 of Law 1 of 1991.

Created by Decree 946 of 2014, the Transportation Infrastructure Planning Unit -UPIT- is launched in October 2021 as a commitment to the institutional strengthening of the sector, of the coordinated infrastructure planning processes and of the development of the country's intermodal transportation system.

Since the end of the 20th century, transportation policies around the world have increasingly promoted intermodality through the articulation of a strategic transportation network under parameters of efficiency and sustainability[10] .

10 Efficiency, in logistical terms, is understood as reducing transportation costs; and sustainability is understood as the generation of optimal conditions for the implementation of the operation and infrastructure of the modality.

The importance of reducing environmental impacts and the costs of negative externalities of transportation raises the need to reconfigure the logistics chain to favor the use of those modes that, depending on the routes, types of cargo and their modal vocation reduce transportation costs, promote good performance and reduce greenhouse gas (GHG) emissions (OLADE, 2018).

Thus, the Railway Master Plan (PMF) is defined as the transportation sector's commitment to reactivate the railroad modality, recognizing its potential to boost the country's economic and social development. The reactivation of the modality represents an opportunity for the creation of new logistics centers and the consolidation of those already existing in the country, promoting the strengthening of services for the transportation of goods and raw materials. In terms of regional development, the railroad modality will contribute to the consolidation of decentralized markets, under clear rules and with modern technological characteristics, as it will allow greater competitiveness by stimulating intermodality.

Through the rail modality, 30.8 million tons of cargo were mobilized through the three main rail corridors in the country in 2021: Bogotá-Belencito, La Dorada-Chiriguaná and Chiriguaná-Santa Marta, being the Chiriguaná-Santa Marta line the one that moves almost all the cargo in this modality. As for the mobilization of passengers by this mode of transportation, in 2021 it closed with a total of 107,694 passengers.

Based on the sector's commitment to intermodalism through the strengthening of rail and river transport, the transportation sector formulated the Amazon Sustainable Intermodal Transport Plan - PATIS, a planning tool for the development of transport and mobility policy in the area, this is a planning tool for the development of transportation and mobility policy in the area, which guarantees the integration of modes of transportation to communicate the regions, giving priority to the environmental, social and cultural component of the region, ensuring the conservation of Amazonian biodiversity and the ecosystem services it provides, contributing to strengthening territorial planning, reducing deforestation, and mitigating the generation of Greenhouse Gases.

Sector planning has been enriched from the conception of intermodality from the identification of the differential needs of the territory in the regions (CONPES 4010 of 2020) that estimates projects analyzed from the implementation of a prioritization methodology that includes criteria of legality (defense and security) and intersectoriality such as sustainable rural development, mines and energy and decentralization; promoting the increase of the national connectivity index, the reduction of annual operating costs, the

benefit of the inhabitants of the region with the generation of local employment contributing to reduce the multidimensional poverty index - MPI. CONPES Document 4023 of 2021 of policy for the reactivation, repowering and sustainable and inclusive growth.

1.2. Impact of disasters and adverse climate change events affecting the transport sector

1.2.1. Climate risk for the primary road network nationwide

In 2014, the transportation sector formulated the sectoral plan for adaptation to climate change for the primary road network - RVP-, taking into account that in 2013 the RVP represented 73.2% of the share of national cargo transport. Currently, the road modality continues to be the most representative within the total cargo transportation, which according to the Ministry of Transportation amounted to 81% in 2020. However, the impacts of threatening events on the road network in recent years show risks associated with climate variability with a tendency to increase the losses and damages already recorded. Thus, the increase in precipitation in some areas of the country with their own characteristics favors the impact of landslides and floods of considerable proportions. The rise in sea level, in addition to causing flooding due to the overflowing of water bodies, triggers erosion processes on coastal roads. Changes in temperatures cause changes in the vegetation surrounding the roads, decreasing or modifying the cycles of vegetation used for erosion control and/or increasing the presence of aquatic species that negatively affect the behavior of pavements (Ministry of Transportation, 2014, pg. 7).

1.2.2. Impact on the transportation sector due to different natural events

The departments with the highest recorded impacts are Antioquia, Valle del Cauca, Tolima, Boyacá, Santander, Cundinamarca and Cauca. According to the World Bank (2012), using the DesInventar database (Corporación OSSO-EAFIT, 2011) for the period 1970 to 2011, the departments with records of damage exceeding 50% of total events correspond to Antioquia, Valle del Cauca, Tolima, Boyacá, Santander, Cundinamarca and Cauca; where the main damage arises from landslides in 52%, floods in 30% and rain/windstorm corresponds to 8% (World Bank, 2012) (Figure 13).

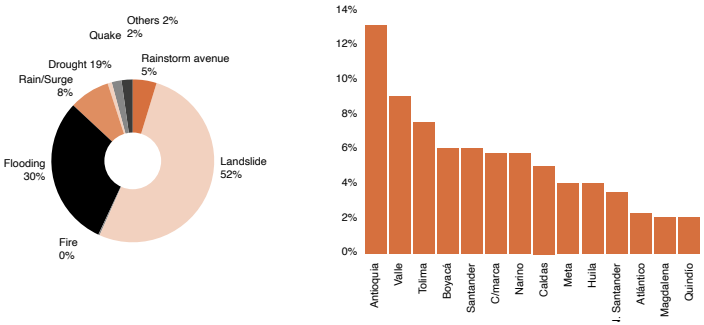


Figure 13 Distribution of events and departments with road impacts, 1970-2011.
Source: World Bank, 2012, taken from OSSO Corporation, 2011.

In Colombia, the road network is the mode of transportation most affected by the impact of disasters. In general, the large port and dam infrastructure in the country has withstood without problems the dangerous physical phenomena of the last decades, on the contrary, the national road network suffers recurrently the impact of disastrous events and does not have adequate actions of ex-ante formulation and review (World Bank, 2012, pg. 228). (World Bank, 2012, pg. 228).

The results of the Study of Economic Impacts of Climate Change of the National Planning Department, supported by the Inter-American Development Bank and ECLAC (National Planning Department, 2014) showed that, if we do not work on climate change adaptation, the sector will have negative impacts of 5.9%, which translates into the occurrence of road closures for 23 days a year; disruptions of mobility connections that would impact the productive sectors that move inputs, products and passengers through the national road network.

Taking into account the causes of landslides in Colombia inherent to the territory in which the land transportation infrastructure is located, as well as the contributing causes associated with anthropogenic actions in the same territory and the triggering causes of an adverse event, the predisposition of a large part of the Colombian territory to risks related to extreme weather phenomena, mainly to landslides as mentioned above, is understood, also including the predisposition to floods. Similarly, it is evident that the Colombian territory has experienced in recent years an increase in the frequency, intensity and duration of extreme weather events, with a tendency to become recurrent events in the medium and long term.

Proof of this is the situation recorded during the La Niña 2021 - 2023 phenomenon, where the road, railway and airport infrastructure was significantly impacted by landslides and floods attributable to the increase in rainfall, which has caused material and trees to fall, erosion and detachment of material, overflowing of water sources, loss of banks due to scour, damage to vehicular bridges, subsidence and damage to containment walls. The damage estimate exceeds COP527.2708 billion and the estimated losses are in the order of COP282.4095 billion.

Highways are the most affected infrastructure, where 4,710 emergencies were recorded, mainly in the primary road network under the responsibility of INVIAS, with 3,236 events, affecting 5,861.8 km and 47 bridges, whose damages exceeded COP290.342 billion. Likewise, 1,474 emergencies were recorded in the roads under concession managed by the National Infrastructure Agency - ANI, in 37 concession projects. Damage was also reported in 4 rail corridors and 9 air terminals. As for the tertiary network managed by INVIAS, 26 roads were affected. The most affected departments were Nariño, Huila, Boyacá, Risaralda, Caldas, Cauca, Chocó and Santander.

Similarly, sea level rise significantly affects transportation infrastructure as a consequence of the climate change already documented. The most vulnerable sections already identified are those at sea level, those connecting the ports of Buenaventura, Tumaco, Cartagena, Santa Marta, among others. Likewise, the Caribbean trunk road, especially the 400 km stretch between Cartagena and Riohacha, is exposed to sea level and the possible rise in sea level. In addition, the rise in sea level should be studied taking into account the interactions of the sea with continental water bodies such as the Ciénaga Grande de Santa Marta and the Ciénaga de la Virgen marshes, as these may have a greater impact on the sector (Gordillo, 2015, pg. 38).

Regarding the impact of climate change on Colombia's seaports, more than 80% of port areas have medium to high vulnerability to climate change (García et al., 2016). Colombia's seaports are exposed to different threats associated with climate variability and climate change. The analysis (Invemar-MADS 2013) indicates that windstorms, floods, erosion and storm surges are the most frequent in coastal departments. Bolivar and Antioquia present the highest number of reports (Ministry if Transportation et. al, 2017, pg. 14).

On the other hand, climate variability and climate change have two effects on the competitiveness of the port sector; on the one hand, they can generate an increase in operation and maintenance costs and on the other hand, they can generate benefits through the opportunities derived from the different

GHG mitigation and adaptation actions, such as participation in carbon markets, reduction of vulnerability and future damages against climate threats, positioning and competitiveness at a global level, among others (Ministry of Transport et. al, 2017, pp. 5 and 6). Regarding the observed impact of climate change on the transportation sector, the Niña 2010 - 2011 affected the port area of Cartagena and the port of Barranquilla, the contribution of sediments to the Magdalena River generated closures of the Terminal, cargo damming, grounding and diversion of ships. On the other hand, the droughts caused by the El Niño phenomenon negatively affect the depth of the access channels. Due to climate change, in addition to sediment in transport rivers, strong winds can also affect port operations (Ministry of Transportation et. al, 2017).

Colombia's marine-coastal zones have strategic ecosystems such as coral reefs, mangroves, seagrasses, beaches, among others that provide services for climate change adaptation, for example, protection against sea level change, climate and hydrological regulation, erosion control and mass removals (UNDP 2014). However, these are subject to degradation due to the unplanned development of economic activities. The above has resulted in erosive processes over a quarter of the Colombian coastline, with 23 and 25% of areas categorized as critical in the Caribbean and Pacific, respectively, and affecting coastal ecosystems and infrastructure. (Ministry of Transportation et. al, 2017, pg. 1).

1.2.3. Impact on the transportation sector due to the La Niña phenomenon (2021-2023)

As a consequence of La Niña Phenomenon that concerns us, the main damages were registered in the road, railway and airport infrastructure, being the primary road infrastructure managed by INVIAS the one that registers the greatest damages, taking into account that during the period between August 2021 and January 2023, 4,710 emergencies were registered in the primary road network, 3,236 in the non-concessioned network and 1,474 events in the national concessioned roads, with the most affected departments being Antioquia, Cundinamarca, Nariño, Boyacá, Huila, Meta, Santander, Risaralda, Caldas, Cauca and Chocó. The tertiary road network under the responsibility of INVIAS was affected in 26 road sections. Damages to the road infrastructure under the responsibility of the Nation amounted to COP478.5796 billion, where 60.7% was contributed by the primary road infrastructure under the responsibility of INVIAS, 2.2% by concessioned roads, 22.1% by bridge damages and 15% by the tertiary network.

Damages caused by La Niña 2021-2023 to roads, railways and airports exceed COP527.27 billion, as shown in Table 3, with the greatest damage to road infrastructure.

Type of infrastructure	Valuation of damages COP millions	%	No. Infrastructure affected
Primary roads INVIAS	COP290,342.5	55.1%	3,908 km affected 3,236 events
Concessioned primary roads - ANI	COP10,638.5	2.0%	12 valuated corridors 1,474 events
Bridges primary network INVIAS	COP105,989.5	20.1%	48 bridges affected
Tertiary Roads - INVIAS	COP71,609.2	13.6%	26 road sections
Railways - ANI	COP42,057.0	8.0%	4 tranches, 16affected points
Airport Infrastructure	COP6,634.2	1.0%	9 airports
Totals	**COP527,270.8**	**100%**	

Table 3. Damage or impacts on transportation infrastructure, La Niña phenomenon 2021-2023
Source: Mintransporte 2023

As a result of these damages, the losses associated with the provision of services that were impacted amount to COP282.4095 billion, with roads being the infrastructure that contributes the highest percentage as shown in Table 4.

Type of infrastructure	Estimated losses millions of COP	Percentage
Primary Road Network - INVIAS	280,334.14	99.3%
Erection of temporary bridges - INVIAS	1,390.96	0.5%
Rail Infrastructure - ANI	487.75	0.2%
Airport Infrastructure	196.64	0.1%
Total	**282,409.5**	**100%**

Table 4. Transportation Sector Losses
Source: INVIAS; ANI, Aerocivil

The Transportation sector recovery plan amounts to COP3.32 trillion, comprising the needs of the national primary road network, bridges and the tertiary network under the responsibility of INVIAS, railroad corridors and air terminals. This plan considers 3 timelines, short, medium and long term, as shown in Table No. 5.

1.2.4. Economic Impacts of Climate Change in Colombia

The main impact of climate change on the transportation sector has been identified as the losses generated by road closures. Disruptions that arise from the impact of landslides on road infrastructure, mainly due to increased rainfall over a territory. The results of the Study of Economic Impacts of Climate Change of the National Planning Department, supported by the Inter-American Development Bank and ECLAC (National Planning Department, 2014) (National Planning Department, 2014) showed that, if we do not work on climate change adaptation, the sector will have negative impacts of 5.9%, which means that we would have road closures for 23 days a year.

1.2.5. Greenhouse Gases (GHG) and the Transport Sector

Colombia updated its iNDC with an increase in ambition regarding compliance with the goal of reducing 51% of greenhouse gas emissions by 2030, with respect to the projected baseline. In 2015, the goal had been set to reduce greenhouse gas emissions by 20% by 2030, and by 30% if international cooperation was available for its implementation.

In order to contribute to reduce GHG emissions and pollutants that affect the health of the population and deteriorate air quality, in 2019 the Ministry of Environment and Sustainable Development, the Ministry of Mines and Energy, and the Ministry of Transportation published the National Electric Mobility Strategy, which aims to improve air quality in the country by reducing polluting emissions, promoting the use of electric vehicles and seeking a reduction in the effects on the health of the population from a commitment to use more efficient fuels and sustainable mobility.

The initiative contemplates the necessary actions to accelerate the transition to electric mobility, such as the definition of a regulatory framework to ensure the promotion of electric mobility in the country and the review and generation of the necessary economic and market mechanisms (Ministry of

Type of infrastructure	Short-term COP millions	Medium Term COP millions	Long-term COP millions	Total millions of COP	%
Primary roads INVIAS	COP1,692,403.0	COP65,467.5	COP982,654.8	COP2,740,525.3	82.4%
Concessioned primary roads - ANI	COP86,350.0	COP0.0	COP0.0	COP86,350.0	2.6%
Bridges primary network INVIAS	COP131,575.9	COP10,140.0	COP115,547.5	COP257,263.4	7.7%
Tertiary Roads - INVIAS	COP50,630.8	COP6,930.0	COP26,159.4	COP83,720.1	2.5%
Sub total road network	**COP1,960,959.6**	**COP82,537.5**	**COP1,124,361.6**	**COP3,167,858.8**	
Railways - ANI	COP63,050.0	COP0.0	COP 0.0	COP63,050.0	1.9%
Airport Infrastructure	COP94,795.0	COP0.0	COP2,171.0	COP96,966.0	2.9%
Totals	**COP2,118,804.6**	**COP82,537.5**	**COP1,126,532.6**	**COP3,327,874.8**	**100%**

Table No. 5. Transportation Infrastructure Recovery Plan
Source: INVIAS, ANI, AEROCIVIL

Transportation, 2020, pg. 38). In a complementary manner, the Ministry of Transportation plans to develop a policy to promote and massify the use of bicycles and walking.

Electric mobility will also contribute to GHG reduction. Within the context of electric mobility, Bogotá and the national government awarded in 2019 the First Metro Line, which will mobilize more than 1 million citizens per day with zero-emission technology (Ministry of Transportation, 2020). Additionally, in 2019, the Regiotram de Occidente project was awarded. This is a public passenger rail transportation project that will connect Bogotá with municipalities that make up the Sabana de Occidente region, such as Funza, Mosquera, Madrid and Facatativá.

The light rail, one hundred percent electric, which will operate as a commuter train in suburban and rural areas, and as a streetcar in urban areas, will be approximately 40 km long, will be developed prioritizing the existing rail corridor in the Sabana de Occidente region and will connect with the First Metro Line of Bogotá (Ministry of Transportation, 2020, pg. 60).

Now, taking into account the importance of the participation of the transportation sector in the energy basket at international and national level, and knowing that these energy sources are fossil fuels, and their combustion generates carbon emissions, the important participation of the transportation sector in GHG emissions is recognized. According to the Greenhouse Gas Inventory published by the IDEAM for Colombia, GHG emissions from transportation in the country correspond to 12.1% of total emissions in 2014, ranking third as the sector with the highest GHG emissions in Colombia, behind enteric fermentation and agricultural soils.

2. PROGRESS OF THE TRANSPORTATION SECTOR TO INCORPORATE DRM AND ACC

2.1. Progress of the transportation sector to incorporate DRM and ACC

The Ministry of Transportation and its affiliated entities have developed planning tools to move forward with the incorporation of disaster risk management and adaptation to climate change, highlighting: i) The Climate Change Adaptation Plan for the Primary Road Network, ii) The Indicative Plan for Institutional Strengthening for Disaster Risk Management - PIFIN, iii) The Comprehensive Climate Change Management Plan for maritime ports and iii) Disaster Risk Management Plans of INVIAS and UAEAC. Instruments developed in a participatory manner with the support of the Ministry of Environment and Sustainable Development, the National Planning Department, the UNGRD, the Institute of Hydrology, Meteorology and Environmental Studies IDEAM, contractors, concessionaires, the financial sector and academia in institutional strengthening processes promoting a holistic view on the subject.

Figure 14 shows a comparison between the climate change adaptation plans for the Primary Road Network and the PIFIN Indicative Plan; planning instruments that became the central axis and starting point for sectoral and institutional initiatives to manage climate change and the risk to which the transportation infrastructure, its users and the environment with which it permanently interacts are exposed.

The Comprehensive Climate Change Plan for Maritime Ports, which contains the vulnerability profile of the nine (9) Port Zones, is part of the sectoral planning tools. This Plan identifies the possible damages resulting from future climate threats and provides recommendations to implement adaptation and mitigation measures to reduce carbon emissions. The Plan is a useful tool for our Ports to anticipate to the effects of climate change, in order to maintain the competitiveness and positioning of the ports worldwide.

The sector also has an adaptation strategy for the Primary Road Network. Within the context of expected impacts due to climate change, it was established in 2014 that the adaptation strategy for the Primary Road Network (RVP) requires a first step that consists of conducting a vulnerability

Figure 14 Comparison of the two roadmaps formulated for the road subsector. Source: Own elaboration based on Plan Vías CC and PIFIN, 2015.

analysis of the RVP (Ministry of Transportation, 2014). The strategy promotes the development of roads adapted to climate variability and climate change through five cross-cutting lines, namely: 1. Adapted Roads with Innovation, 2. Information and Knowledge Management. 3.Institutional Capacity Building, 4. Awareness Raising, Education and Training and 5. Regulatory update. These are the pillars on which the INVIAS PGRD are based and were adjusted to the requirements of the air modality for the UEAEC PGRD.

Now, given that the sector and its affiliated entities have been working within the framework of the public risk management policy, both for the development of the tools that have been generated and for obtaining the results gradually achieved, it is evident that they are compatible with the country's initiatives on Risk Management and Adaptation to Climate Change in an updated manner, initiatives to which the sector and its affiliated entities have been linked through sectoral commitments set forth in:

1. The PNGRD *updated by Presidential Decree 1478 of August 3, 2022.*
2. CONPES 4058 "Public policy to reduce disaster risk conditions and adapt to climate variability" where the goal of INVIAS is to *design and implement by 2024 a strategy of technical assistance to the territories to increase subnational capabilities to manage disaster risk, incorporating the concept of geotechnical corridor*[11] *in the risk analysis given its relationship with extreme precipitation events.*

11 The National Roads Institute INVIAS proposes as an area of analysis and coordination with the municipal and departmental authorities in place, the concept of "Geotechnical Corridor", defined in the Methodological Guide for the evaluation of physical risk due to landslides in road infrastructure (SGC _ INVIAS, 2018). The concept of Geotechnical Corridor corresponds to the entire extension

3. CONPES 4084 La Mojana: Resilient, Sustainable, Productive and Competitive Territory whose goal INVIAS focuses on *Designing and implementing by 2023 a strategy to disseminate the progress made by INVIAS in disaster risk management and climate change adaptation in La Mojana region.*
4. NDC defined as the Nationally Determined Contribution to reduce greenhouse gas emissions under the United Nations Framework Convention on Climate Change and which, in addition, constitute the indicators of the implementation plan of Law 2169 of 2021 and NDC (for its acronym in English), to which the transportation sector, through its affiliated entities, commits itself by proposing to *Implement by 2025 three (3) tools to improve the geographic information systems of the transportation infrastructure for risk management, Prepare by 2025 two (2) technical guidelines documents aimed at conducting risk studies for transportation infrastructure and Design and implement by 2025 two (2) methodologies for estimating the risk of transportation infrastructure.*
5. CAT DOO III, the contingent credit supports actions that are expected to have direct and indirect positive effects on poverty in the short, medium and long term through a modern and resilient institutional framework. The resources managed by the Ministry of Finance and the National Planning Department will be used for response, rehabilitation and recovery in the event of a disaster. Colombia as a leading country in Disaster Risk Management in the region, recognizes the current challenges facing climate change and public health, due to the recent effects of COVID 19. Consequently, and in the context of this commitment INVIAS established as institutional goals*: 1. By 2025 to have 1,160 km of rehabilitated, improved and/or new roads in the non-concessioned national road network that incorporate risk analysis and risk reduction actions, 2. By 2025 there will be 25 pilot projects of non-concessioned national roads (sections) contracted that incorporate criteria of green road infrastructure guidelines.*

The activities proposed are guaranteed through the PGRD of INVIAS and the UEAEC, as well as the Investment Plans of both sector entities. In

of a slope that hosts a road section above and below the level of the roadway, from the upper divide, highest elevation, to the lowest elevation that usually corresponds to a flat area, at the bottom of a river or other natural watercourse. Concept recently included in the *specialized* sheet *Inclusion of national and regional transportation infrastructures as a determinant in the Territorial Management Plans. DNP, 2022.*

turn, these planning tools contain the actions to strengthen knowledge of risk, initiatives to reduce it and those that have been considered to optimize the management of events that occur given the residual risk arising from risk management interventions; pursuant of Law 1523 of 2012. Documents that integrate normative aspects, education and training and improvement in the capture and management of information related to the knowledge of the risk of the infrastructure managed, thus improving the institutional capacity for the development of sustainable projects with the purpose of facing the threats of climate change.

It is also important to point out that the National Roads Institute has economic resources under the scheme of contracts of exhaustible amount assigned to the territorial Directorates in charge of road infrastructure each year, prior to the occurrence of disastrous events, so that they can hire in advance the technical and human resources required to address an eventuality promptly.

The road subsector has Green Road Infrastructure Guidelines - LIVV. These LIVV are aimed at promoting the development of a more sustainable road infrastructure, adapted to climate change and therefore more resilient, with a systemic and comprehensive vision, where technical and financial engineering efforts generate synergy with land use arrangements and land use planning conditions, so that we achieve a better permeability of the road axes, i.e. to allow ecological connectivity in their layouts. The LIVV are defined for the different stages of the projects, from strategic sector planning, the project planning phase at the pre-feasibility, feasibility and definitive design levels, to the construction, operation, intervention and decommissioning stages.

2.2. Advances in risk knowledge

Through processes to strengthen the sector's institutional capabilities, we have worked on agreements with knowledge entities, obtaining the following results:

1. *Methodological guide for the assessment of physical risk due to landslides in road infrastructure (SGC - INVIAS, 2018)*, through Agreement No. 003 of 2018 this guide contemplates the assessment of physical risk due to landslides of road layouts, incorporates the concept of Geotechnical Corridor as the unit of risk analysis for linear infrastructure giving special relevance to the geological, geotechnical, hydrological conditions of the area where the exposed transport

infrastructure is implemented. It also makes visible the interaction of the physical space in which the linear infrastructure interacts with the territory it occupies and, therefore, relates the stages of design, construction, operation and maintenance of the road infrastructure with land use planning.

2. *Approximation to the knowledge of the physical risk due to landslides and floods through the qualitative assessment at local and regional scale of the national road network not under concession (UNISALLE - UNIQUINDIO - INVIAS, 2021),* the methodologies developed by INVIAS with the Universities of Quindío and La Salle for the qualitative analysis of risk consider the social and environmental variables that affect the qualitative assessment of risk in the transportation infrastructure, specifically in the geotechnical corridor, and constitute a technical tool for Disaster Risk Management Planning in accordance with public policy - Law 1523 of 2012.
3. *Methodological guide for risk analysis with multi-hazard approach in an airport. Application at La Florida Airport in the Municipality of Tumaco (UEAEC, 2019).* This Guide contains the methodology for the estimation of risk in the country's airport infrastructure, based on the result of the pilot study at La Florida airport, in the department of Nariño. Complying with the general guidelines for the development of the disaster risk management plan of public entities and what is indicated in Law 1523 of 2012 and Decree 2157 of 2017, this is a systematic and detailed tool for the estimation of risk with a multi-hazard approach in the airport infrastructure of the country; easy to understand, manage and apply, it is replicable in the different airports of the country. To date, this methodology has been used in updating the Risk Management Plans for the airports of Cartagena, San Andrés, Yopal and Pasto; as well as in the preparation of the Environmental Impact Assessment for the airports of Flandes, Puerto Berrio, Remedios-Otu, Cimitarra, Magangué, Trinidad and Cravo Norte. The update considered the incorporation of the processes for disaster risk management established in UNGRD Decree 2157 of 2017: i) Risk Knowledge, ii) Reduction Measures and iii) Management Measures. Similarly, the methodology allowed the formulation of the PGRDS of the airports of Tumaco, Leticia, Cúcuta, Bucaramanga, Armenia, Puerto Asís, Mompox, Puerto Carreño and Nuqui.
4. On the other hand, as a component of risk knowledge, progress is being made in improving the collection and management of information

from the source in order to strengthen the sector's GIS Geographic Information Systems. Considering the GIS as an essential tool for the consolidation of data and management of information generated for Disaster Risk Management, a Risk Management module is included in the National Highway System and mobile applications are designed to collect emergency information in real time, including the dashboard to facilitate its consultation.

5. Awareness on Risk Management for technical personnel of INVIAS, ANI, UAEAC, MT, officials, contractors, implementers, road administrators. Awareness-raising and training workshops have been held so that all stakeholders involved in the development of road projects understand the dimension of the subject and advocate for actions in line with the processes covered by the public policy on risk management, as well as adaptation to climate change. Spaces developed as a mechanism for institutional approach to the territory through didactic strategies aimed at various institutional value groups including *the Adaptation School strategy* aimed at educational communities whose classrooms are located in the vicinity of the National Road Network that are part of road projects under execution with the objective of generating risk reduction actions under principles of coordination and concurrence with the territory.

2.3. Advances in sectoral regulations related to risk management

Bringing up Article 44 of Law 1523 of 2012 by which the monitoring of Disaster Risk Management is granted to the *State Control Bodies* who will exercise monitoring, assessment and control processes in disaster risk management using for such purposes the means established by law and society through citizen oversight mechanisms, as well as the paragraph in which it is established that all public entities, and community entities shall ensure the correct implementation of disaster risk management within the scope of their sectoral and territorial competencies in compliance with their own mandates and rules that govern them, and article 53 of the same Law, which defines that budget appropriations for disaster risk management shall be included by national, regional, departmental, district and local entities, that are part of the national system through the budget items that are necessary to carry out the tasks related to knowledge and reduction of risks and disaster management:

1. Issuance of two laws that support and promote risk management and infrastructure adaptation to climate change: (i) Law 1508 of 2012, which establishes the legal regime for Public Private Partnerships, stimulating the development of public private partnerships for the construction, operation and maintenance of road infrastructure, promoting construction works with better technical specifications and (ii) Law 1682 of 2013 or Infrastructure Law, which defines that transportation infrastructure be environmentally sustainable and adapted to climate change and as a guiding principle of transportation infrastructure planning and development with goals of adaptation and mitigation to climate change.
2. The Ministry of Transportation led the issuance of Decree 602 of May 2017, through which Articles 84 of Law 1523 of 2012 and 12 of Law 1682 of 2013 are regulated and other provisions of Disaster Risk Management in Transportation Infrastructure are issued. This Decree establishes conditions for Disaster Risk Management in Transportation Infrastructure, procedures and mechanisms to respond to emergencies generated by hydro-climatological, climatic, telluric, anthropogenic, terrorist events, among others, and the actions to be followed in case of a declaration of disaster or public calamity.
3. On the other hand, in order to strengthen the organizational structure, INVIAS, as of Decree 2618 of 2013 created the Emergency Prevention and Response Sub-Directorate and through the issuance of Resolution 130 of 2014 created in this Sub-Directorate two working groups with knowledge and risk reduction functions, in addition to the existing one in the unit whose exclusive function was focused on emergency response.
4. Resolution No. 4806 of 2015: The INVIAS Risk Management and Climate Change Committee is created as the body in charge of planning, monitoring, coordinating and liaising the processes of knowledge and risk reduction, disaster management and climate change.
5. By means of Decree 1292 of 2021 the structure of INVIAS is modified and through Article 18 adjusts the name of the office in charge of Risk Management to Risk Management Sub-Directorate and incorporates new functions consisting of executing the policies and projects related to the knowledge, reduction and management of emergencies in the infrastructure under the responsibility of the Institute; actions managed by the working groups of the Sub-Directorate, named on

this occasion as i) Knowledge, ii) Reduction and iii) Emergency Management.

6. Structuring of the Risk Management in Transportation Infrastructure Investment Project in the INVIAS budget, to guarantee actions in the processes of knowledge and reduction. Under BPIN 2017011000394 resources and deadlines are allocated to the activities of the PGRD INVIAS.
7. The Ministry of Transportation issued the following administrative acts: Resolution 5845 of 2015, to create the Environmental Affairs and Sustainable Development Group, assigning it the responsibility of monitoring compliance with environmental and sustainable development policies. Resolution 4998 of 2016, creating the Sectoral Committee for Disaster Risk Management as an instance in charge of planning, follow-up, coordination and liaising of the processes of knowledge and risk reduction, disaster management and climate change.

3. LEGAL FRAMEWORK

3.1. Regulatory Framework for Disaster Risk Financial Management (DRFM) applicable to the transportation sector

The FP Strategy for the transportation sector is legally supported in a generic manner by the following regulations:

3.1.1. National Disaster Risk Management System (SNGRD). In particular, Law 1523 of 2012 and its regulatory decrees[12] . Within the regulatory framework of the SNGRD[13] the application of the principles of concurrence[14] and subsidiarity[15] stands out.

3.1.2. Regulations for the mandatory insurance of public assets. The insurance of assets owned (or under administration) by the State in Colombia is mandatory[16] .

12 National Decree 2157 of 2017. Disaster Risk Management Plan for Public and Private Entities (PGRDEPP). Financial Protection: Financial mechanisms/financial instruments-intentional retention/risk transfer- Ex ante to access Ex post to economic resources for response and recovery. National Decree 1289 of 2018 - FNGRD Regulation.

13 Law 1523 of 2012. Policy and SNGRD (Art. 4 num. 19), Financial Protection, SNGRD Financing Mechanisms, National Fund for Disaster Risk Management (FNGRD) and Territorial Funds for Disaster Risk Management (Arts. 47 to 54).

14 *"The concurrence of competencies between national and territorial entities of the public, private and community spheres that constitute the national disaster risk management system, takes place when the efficiency in the processes, actions and tasks is achieved through the union of efforts and non-hierarchical collaboration between the authorities and entities involved. Concurrent action may benefit all or some of the entities. The concurrent exercise of competences requires the respect of the proper attributions of the authorities involved, the express agreement on the common goals and on the processes and procedures to achieve them."* (L 1523/12 art. 3 no. 13).

15 *"It refers to the recognition of the autonomy of the territorial entities to exercise their competences. Subsidiarity can be of two types: negative subsidiarity, when the territorial authority of higher rank refrains from intervening in the risk and its materialization in the sphere of the authorities of lower rank, if these have the means to do so. Positive subsidiarity, imposes on the higher authorities the duty to come to the aid of the lower authorities, when the latter do not have the means to face the risk and its materialization in disaster or when a value, an interest or a protected legal right relevant to the higher authority that comes to the aid of the affected entity is at risk".* (L 1523/12 art. 3 no. 14).

16 *Articles 57 numeral 13 and 48 numeral 1 and 2 of Law 1952 of 2020, 101 and 107 of Law 42 of 1993, 101 numeral 4 of National Decree 663 of 1993 and 118 of Law 1474 of 2011 establish as an obligation of all public servants and individuals (punishable up to dismissal and inability to perform public functions), the mandatory insurance of funds, property (movable and immovable) or securities of the State that they manage or have under their care and/or management, through the acquisition of insurance policies with any of the legally authorized insurance companies, in order to carry out the surveillance and safeguarding of the property, assets and securities entrusted to them, as well as to ensure that they are used in a due and rational manner.*

3.1.3. The PND 2022-2026 (adopted by Law 2294 of 2023[17]) reiterated[18] the responsibility of the MHCP to design a strategy for insurance against natural and/or unintentional anthropogenic disaster risks, aimed at reducing the fiscal vulnerability of the State. Said strategy was designed by the MHCP in 2013, updated in 2016 (under the initial name of Public Financial Management Policy Strategy for Disaster Risk due to Natural Phenomena) and relaunched in December 2021 by the MHCP as the National Strategy for Financial Protection from Disasters, Epidemics and Pandemics Risk 2.0 (PFRDEP Strategy)[19].

3.1.4. Medium Term Fiscal Framework (MFMP). The MFMP 2021, after establishing it as one of the sectors most affected by the adverse effects of the Covid-19 pandemic, projects the transportation sector as one of the most relevant - and fastest growing - in the process of economic reactivation following the occurrence of this public health phenomenon considered a disaster event. For its part, the MFMP 2022 states that the commitment to intermodal and sustainable infrastructure will boost the growth of physical capital, while contributing to investment, job creation and greater competitiveness.

3.1.5. Insurance Contract or Bank Guarantee in Concession Contracts. In relation to the obligation of every road concessionaire to contract with an insurance company authorized by the Superintendence of Finance, an insurance policy (or constitute a bank guarantee with a financial institution) that incorporates different coverage and hedge including all risks of civil works and damages, according to the values agreed by the parties for each phase and stage of the contract, in the terms established by Laws 80 of 1993, 1150 of 2007 and the National Decree 1082 of 2015, Single Regulatory Decree of the Planning Sector.

3.1.6. PND Law 2022-2026 “Colombia World Power of Life”. The PND (Articles 241 to 243 of Law 2294 of May 19, 2023) authorizes

17 (May 19) “Whereby the National Development Plan 2022-2026 “Colombia World Power of Life” is issued.

18 Article 372 paragraph 2. Originally stipulated in Article 220 of Law 1450 of 2011 (PND 2011-2014) and continued by Articles 267 of Law 1753 of 2015 (PND 2014-2018) and 269 of Law 1955 of 2019 (PND 2018-2022).

19 The Strategy established FP in the sectoral entities as its fourth policy objective. (Available at: https://www.minhacienda.gov.co/webcenter/ShowProperty?nodeId=%2FConexionContent%2FWCC_CLUSTER-180375%2F%2FidcPrimaryFile&revision=latestreleased).

insurance companies to offer insurance under the parametric insurance modality.

3.2. Transport sector FP regulatory framework

In addition to the generic regulation in GFRD, the transportation sector is also supported by the following regulations:

3.2.1. Basic regulations of the sector. In particular, the following regulations:

3.2.1.1. Law 105 of 1993[20] and its Regulatory Decrees regarding the operation and management of the Cofinancing Fund for Urban Infrastructure as a special system of accounts managed by the Territorial Development Bank (FINDETER) and whose resources will be used to co-finance the execution of investment programs and projects presented autonomously and directly by the municipalities, in urban and rural areas, for disaster prevention work (Art 25 Par 2).

3.2.1.2. Law 1228 of 2008 or Law of minimum mandatory withdrawal quotas or exclusion areas for highways of the national road system and the National Comprehensive Highway Information System.

3.2.1.3. Law 1682 of 2013 or Infrastructure Law.

3.2.1.4. National Decree 087 of 2011, which modifies the structure and defines the functions of the departments of the Ministry of Transportation, establishing as one of its administrative competencies the formulation and adoption of policies, plans, programs, projects and economic regulation in matters of transportation, transit and infrastructure of transportation modes.

3.2.1.5. Conditions for DRM in the sector, especially what is established by Title 9 of Single Regulatory Decree 1079 of 2015[21] (DUR) of the Transport Sector (Added by art 1 of National Decree 602 of 2017) regarding the regulation of the "Conditions for Risk Management in the Transport Sector"[22] including purpose, actors

20 Whereby basic provisions on transportation are issued, competencies and resources are redistributed between the Nation and the Territorial Entities, planning in the transportation sector is regulated and other provisions are issued.

21 (May 26) *"Whereby the Single Regulatory Decree of the Transportation Sector is issued".*

22 Risk Management in the Transport Sector is understood as "the process aimed at the formulation, implementation, monitoring and evaluation of policies, strategies, plans, programs, regulations, instruments, measures and permanent actions, for the knowledge and reduction of risk and for

and principles (Chapter I), Scope, response, interventions and economic recognitions in situations of Emergency Maintenance (Chapter III), Information Systems (Chapter IV) and Disaster Response (Chapter V) among others, as well as road emergencies in disaster and public calamity situations[23] , the maintenance of Emergencies[24] and the establishment of the conditions for DRM in the Transport Sector, the mechanisms to respond to emergencies generated by hydro-climatological, climatic, telluric, anthropogenic, terrorist events, among others, as well as the actions to follow in the event of a declaration of disaster or public calamity.

3.2.1.6. Public Private Partnership (PPP) Regime. CONPES Documents 3107 of 2001 "State Contractual Risk Management Policy for Private Participation Processes in Infrastructure", 3133 of 2001 and 3807 of 2014 that modify 3107 in some guidelines, 3760 of 2013 "Road Projects under the Public Private Partnership Scheme: Fourth Generation of Road Concessions", 3800 of 2014 that modifies with regard to regulatory risks and force majeure risks what is established in 3760, 3820 of 2014 "Fourth Generation of Road Concessions: Second Tier", 3961 of 2019 "State contractual risk policy for passenger rail system projects co-financed by the nation", 4000 of 2020 "State contractual risk policy for airport projects with private participation", 4028 of 2021 "State contractual risk policy for infrastructure projects in waterways and navigable canals with private participation", 4047 of 2021 "State contractual risk policy for freight rail system projects with private participation in the country", 4060 of 2021 "Policy for the Development of Sustainable Transportation Infrastructure Projects: Fifth Generation of Concessions under the Public-Private

disaster management in the Transport Sector, with the purpose of contributing to the safety, welfare, quality of life of people, sustainable development and mobility" (Article 2.4.9.2.1. DUR 1079 of 2015).

23 Those referred to in Article 84 of Law 1523 of 2012*: "ARTICLE 84. ROAD EMERGENCIES. The National Government may require from State contractors and concessionaires the machinery, equipment and personnel at their disposal to immediately attend to road emergencies or of any other nature that may arise in their area of activity or influence, when this method constitutes the most efficient way to mitigate the impact generated by the necessary response to emergencies that threaten the life and other rights of the population.*

PARAGRAPH: The National Government, within a term not to exceed ninety (90) days after the date on which the present law is sanctioned, shall regulate the pertinent to the areas of action, costs, prices, times and other matters related to the present article".

24 Of those dealt with in Articles 12 and 63 of Law 1682 of 2013 (November 22) *"Whereby measures and provisions are adopted for transportation infrastructure projects and extraordinary powers are granted ".*

Partnership Scheme Bicentennial Concessions". Likewise, Law 1508 of 2012 and its Regulatory Decrees, and especially the analysis of threat and vulnerability in order to guarantee the non-generation or reproduction of disaster risk conditions as one of the requirements to open contractor selection processes for the execution of public initiative PPP projects (No. 11.4. art 11).

3.2.2. Other regulations of the Ministry of Transportation (MT) as head of the sector. Specific MT standards on DRM such as:

3.2.2.1. Resolution 5845 of 2015 whereby the Environmental Affairs and Sustainable Development Group was created within the MT.

3.2.2.2. Resolution 4998 of 2016 creating the Sectoral Committee for Disaster Risk Management.

3.2.3. Other norms issued by entities of the Transportation sector. Regulations issued by other sector entities on DRM such as:

3.2.3.1. Resolution 4806 of 2015 by which the INVIAS Risk Management and Climate Change Committee was created.

3.2.3.2. Resolution 130 of 2014 whereby the working groups of: (i) Vulnerability and Climate Change Analysis; (ii) Emergency Response and (iii) Prevention are located in the INVIAS Emergency Prevention and Response Sub-Directorate.

3.2.3.3. Resolution 1978 of 2020 whereby the INVIAS Disaster Risk Management Plan is adopted.

3.2.3.4. Decree 1292 of 2021, whereby the structure of INVIAS is modified.

3.2.3.5. Resolution 2695 of 2022 updating the INVIAS Disaster Risk Management Plan initially adopted by Resolution 1978 of 2020.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4. IMPORTANCE FOR THE TRANSPORTATION SECTOR TO HAVE A FP STRATEGY IN PLACE

In addition to the high costs repeatedly assumed by the sector and its affiliated entities to respond to the impact on the transportation infrastructure, other relevant factors that explain the importance of having the *Sectoral Financial Protection Strategy - EPFS* are listed in Table 6.

Relevant aspects	Impacts
Multiple assets are connected by the transport network	Failures and outages in the intermodal transportation network generate service disruptions, impacting the supply chain, and creating cascading effects, which have economic impacts.
The economic and social impacts of critical infrastructure disruption stem primarily from the loss of the service they provide, rather than the cost of physical damage to the infrastructure.	The estimated cost of service disruption is at least 20 times greater than the cost of physical damage (World Bank, 2021).
Risk management and the economic impact management of critical infrastructure will contribute to the management of the country's contingent liabilities.	To understand the ownership of the different components of the modes of the transport sector and the relationship between the national government and the managers of the different modes of the transport sector, in order to make them all resilient.

Table 6. Importance of a Sectoral Financial Protection strategy for the transportation sector
Source: Adapted from World Bank (2021)

Similarly, the disruption of public infrastructure systems and services can slow the progress and economic growth of a region and country, given that the economic and social impacts of the disruption of critical infrastructure come mainly from the loss of the service they provide, rather than from the cost of physical damage to the infrastructure itself. The estimated cost of service disruption is at least 20 times greater than the cost of physical damage (World Bank, 2021)[25] .

Under the above consideration, it is clear that financial risk management of critical infrastructure will contribute to the management of the country's contingent liabilities. According to the World Bank (WB) (2021), a national financial protection strategy that integrates critical infrastructure to efficiently manage contingent liabilities due to shocks will support early recovery, in a context where Ministries of Finance can promote an integrated national perspective that includes financial risk management of critical infrastructure, so as to protect the government's balance sheet through efficient management of contingent liabilities while protecting the society, ensuring the continuity of services in accordance with national critical infrastructure strategies. All of the above, supported by the robust information and analysis specified in Figure 15.

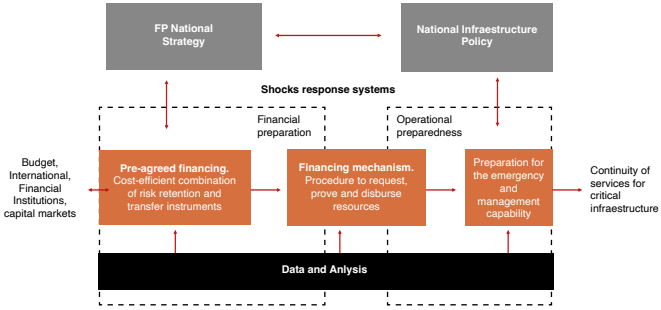

Figure 15. Three (3) components for shock response systems to protect critical service infrastructure and the relationship between the National Financial Protection Strategy and infrastructure policies.
Source: World Bank (2021)

According to the World Bank, impact response should consider a combination of financial and operational preparation. WB (2021) proposes that shock response systems should consider a combination of financial and

25 WB (2021) considers the energy, finance, health, information, communications, transportation, and water and sanitation sectors as critical infrastructure.

operational preparedness as shown in Table 7 to ensure rapid recovery of critical services.

FINANCIAL PREPARATION	OPERATIONAL PREPARATION
Plans, operational protocols and capabilities (personnel, equipment and arrangements for rapid recovery) to quickly restore critical services.	Seeks access to resources to finance both operational preparation and disaster response.
"Without proper operation and maintenance, asset quality deteriorates over time, making assets more vulnerable to disruptions due to disasters and more difficult to repair" (World Bank, 2021, p. 42).	It must consider two aspects: (i) mobilization, access to resources in a cost-efficient manner, and (ii) cash flow for the delivery of resources that can be executed quickly.
It recognizes that the costs associated with disruptions of critical services can put pressure on budgets, reduce productivity and halt investment, as well as impact growth and welfare.	

Table 7. Aspects to be considered for impact response - Combination of financial and operational readiness
Source: Prepared using WB (2021).

The *Sectoral Financial Protection Strategy - EPFS* will focus on promoting access to resources for disaster management through financial instruments in order to guarantee rapid response, rehabilitation and reconstruction that will allow the continuity in the provision of services. In a context where multiple assets are connected by the transportation network, the impacts generated on this network may cause disruption of services and, therefore, among others, impacts on the supply chain, which generates economic losses to other productive sectors of the country and the region. Consequently, there is a need for *liquidity* both for *the response* and for the *rehabilitation* and *reconstruction* processes, which will make possible the reactivation of the service in the shortest possible time. The *Sectoral Financial Protection Strategy - EPFS* establishes the contents defined in Figure 16.

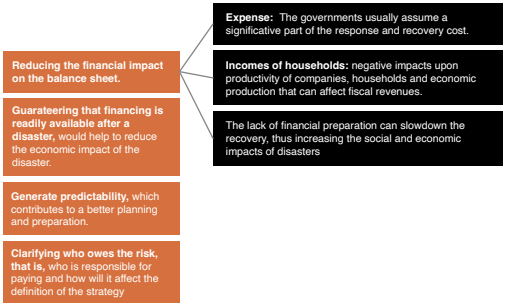

Figure 16. Sectoral Financial Protection Strategy - EPFS
Source: Prepared using WB (2021).

The Sectoral Financial Protection Strategy - EPFS must consider the needs of each of the modes. By way of illustration, some of the issues to be considered for the financial protection of the fluvial mode, identified by Cormagdalena, are defined:

1. The navigable waterway is the infrastructure to be protected, which is dynamic due to the hydrological, hydraulic, sedimentological and morphological conditions of the Magdalena River basin.
2. The most important commodity that is transported through this mode is cargo. During El Niño, the river level decreases, which could affect the transport of cargo, so a minimum should be ensured in case cargo cannot be transported.
3. It is important to optimize the transportation of cargo between the different modes, for example, the risk to the shipping company due to less movement on the river can be hedged.

The *Sectoral Financial Protection Strategy - EPFS* takes on greater relevance in view of the various initiatives being developed by the Colombian Transportation Sector, which are listed succinctly in order to visualize the importance of the proposed strategy, thus promoting the necessary protection of the investment of the resources required for the development of the transportation infrastructure in each of the following sectoral programs:

Commitment for Colombia (CpC) promotes the economic reactivation of the country after the COVID 19 pandemic, establishing an investment of 12.5% of the country's GDP by 2020 through 545

ongoing projects. The initiative includes 82 reactivation 2.0 projects[26] with an investment of COP15 trillion, generating 208,000 jobs for the construction of 2,810 km of new roads.

Road Program for legality and reactivation, vision 2030, defined in CONPES 4010 of November 30, 2020, that has as a main objective to consolidate strategic transportation corridors to improve the country's competitiveness and strengthen the presence of the State in areas where there are illegal activities, thus contributing to national economic reactivation.

Culmination of the Colombia Rural Program, which promotes the improvement of strategic corridors serving the country's 1,101 municipalities, prioritizing road corridors that increase rural productivity and connect populations with social and public services in the regions, through maintenance and improvement activities, which will be developed under different financing and implementation schemes (Ministry of Transportation, 2020, pg. 126).

Total Peace Community Roads Program that promotes the integration of the JACs[27] to rural infrastructure projects throughout the national territory as active participants in the management of resources, implementation, monitoring and quality of the works that will be used by the communities. For the 2022-2026 period, the national government plans to invest COP8 trillion in projects covering 33,102 km of rural roads, through approximately 4,000 agreements with community organizations throughout the country. Projects prioritized on the basis of binding regional dialogues and evaluated through compliance with technical criteria previously stipulated by the entity in charge, guaranteeing effective interventions in the territories.

National Roads Plan for Regional Integration (PNVIR). In the framework of compliance with the agreements for the termination of the armed conflict, the Ministry of Transportation has been accompanying the Territorial Renewal Agency (ART) through the structuring of infrastructure plans in the municipalities that are part of the 16 zones defined for Development Plans with a Territorial Approach (PDET),

26 The Reactivation 2.0 projects (whose financing was approved through CONPES 4039 of July 27, 2021) correspond to infrastructure works that are part of the second phase of the country's economic reactivation, complementing Commitment for Colombia.

27 It is a civic, social and community organization of social management, non-profit, with legal status and its own assets, voluntarily integrated by the residents of a neighborhood, who seek to unite, based on participatory democracy.

which by December 2019 already had prioritized regional corridors, based on the initiatives established in the Action Plans for Regional Transformation (PATR) (Ministry of Transportation, 2020a, pg. 127). The road infrastructure needs of indigenous communities are also contemplated.

On the other hand, the *Sectoral Financial Protection Strategy - EPFS takes into account* the relevance that the road modality has for Colombia and with it, the higher investments allocated to this modality compared to other modalities of transportation. Figure 17 shows the budgetary resources allocated to road, rail, river, maritime and air transport modalities, which shows that between 2010 and 2019, the road modality received the most resources; only in 2019, 77% of the resources of the transport sector were allocated to it, investments that must be protected under the strategy proposed in the framework of risk management actions, specifically the reduction process referred to in the public risk management policy.

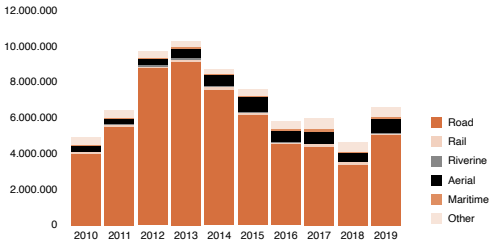

Figure 17. Budgetary resources committed in the sector by transport modality
Source. Ministry of Transportation, 2020b

Likewise, the *Sectoral Financial Protection Strategy - EPFS is a* valuable tool for the country's Concessions. The concession emerged as a viable alternative to expand the road network and improve the quality of land transportation services and is established when a public administration awards a private entity, through a bidding process, the contract to build, operate and maintain a stretch of road for a certain period of time, subject to certain conditions that seek to preserve the community interest. In turn, the concessionaire receives the right to set and charge a toll for traffic and vehicular circulation on the use of the road or a subsidy provided by the state administration. Under this premise, the country has a 4G concession program with progress of 67.61% with 27 of the 30 road projects reactivated. Similarly, it is developing the 5G projects, which have differential aspects such as: (i) they prioritize environmental affairs, (ii) they contribute 0.5% of the Capex value

to the communities through social works, generating direct jobs for people residing in the areas of influence of the project; (iii) connected with intermodalism, they should facilitate cargo transportation, reducing costs and time in the operation (Ministry of Transportation, 2020a). The first "tier" of 12 projects includes interventions in rail, river and airport modalities.

The transportation sector reactivates and provides service to fourth generation 4G projects[28] :

The 4G Program contemplated in its objectives to support the connectivity of port areas. Through the construction, expansion and modernization of the main road corridors for foreign trade cargo that connect production and consumption centers with seaports, airports and border crossings (Ministry of Transportation et. al, 2017, pg. 12). Within this investment context, it is noted that investments should consider the impacts of climate change due to scenarios of temperature increase, sea level rise and coastal erosion (Ministry of Transportation et. al, 2017).

Progress with respect to the fourth generation 4G projects includes the following projects:

1. Girardot - Honda - Puerto Salgar
   In service since June 2020, it required an investment of COP1.95 trillion. With 190 km it runs through the departments of Cundinamarca, Caldas and Tolima. This highway joins the Neiva - Espinal - Girardot and Girardot - Ibagué - Cajamarca projects, improving connectivity from the south to the north of the country.
2. Puerta de Hierro - Palmar de Varela and Carreto - Cruz del Viso
   Inaugurated in July 2021 with an investment of COP748.610 billion.
3. Pacific Connection 2
   Consisting of 96.5 km distributed in two segments as follows: La Pintada - Bolombolo new route and Primavera - La Pintada rehabilitated corridor, with an investment of COP1.7 trillion.
4. Cartagena - Barranquilla
   Delivered to the community in December 2021. Road layout consisting of the Cartagena - Barranquilla and Circunvalar de la Prosperidad corridors. With a length of 146.6 km in two-lane roads between two Caribbean capitals, including the overpass over the Ciénaga de la Virgen marsh and a new road in the Circunvalar de la Prosperidad,

28 Source: https://www.valoraanalitik.com/2022/05/30/las-siete-vias-4g-que-ya-estan-listas-en-colombia/

between Malambo and Barranquilla, the corridor had an investment of COP1.6 trillion.

5. NUS Roads
   In May 2022, the 157.4 kilometers of Nus roads will be put into service with an investment of COP1.2 trillion. Directly benefiting close to 3.3 million inhabitants of Medellín, Bello, Copacabana, Girardota, Barbosa, Donmatías, Santo Domingo, Santa Rosa de Osos, Cisneros, San Roque and Maceo.
6. Transversal del Sisga
   In February 2022 and with an investment of COP1.6 trillion, this road project that connects the departments of Cundinamarca, Boyacá and Santander will be put into service. Benefiting approximately 93,000 people in 12 municipalities, the 137 km corridor will provide an alternative connection between Bogotá and Los Llanos.
7. Autopista Mar 1
   Road corridor that connects Medellín with Santa Fe de Antioquia and whose development is key to connecting the department of Antioquia and the Eje Cafetero with the future Port of Antioquia. With an investment of COP1.9 trillion, its construction generated 2,500 jobs.

Now the country is moving forward in the construction and future commissioning of the following 4G projects, whose investments are part of the resources that must be safeguarded under the *Sectoral Financial Protection Strategy - EPFS:*

Pasto - Rumichaca, Neiva-Girardot, Villavicencio-Yopal, Chirajara-Fundadores, Autopista al Mar 2, IP Antioquia-Bolívar, Autopista Conexión Norte, Pamplona-Cúcuta, Cambao-Manizales, Pacífico 1, Pacífico 3, Bucaramanga - Barrancabermeja - Yondó, Perimetral de Oriente de Cundinamarca, Popayán-Santander de Quilichao, Mulaló - Loboguerrero, IP Expansion of the third lane Bogotá-Girardot, Pamplona-Cúcuta, Bucaramanga-Pamplona, Villavicencio-Yopal, Accesses Norte Bogotá, IP GICA (Girardot-Ibagué-Cajamarca), Santana-Mocoa-Neiva.

The transportation sector is making progress in the development of fifth generation 5G projects:

As for the Bicentennial 5G Concessions program, progress has been made in road, river and air transportation modalities.

- **Road modality**

Processes awarded:

1. New Valle del Cauca Road Network - Cali-Palmira accesses concession contract, with CAPEX investments of COP1.16 trillion and OPEX of COP1.83 trillion.
2. South ALO Project. Initiative that seeks to intervene 24.5 km of road between Chusacá (Soacha) and Calle 13 in Fontibón, with CAPEX investments of COP0.70 trillion and OPEX of COP0.47 trillion.
3. North Access 2. With 17.96 km, to improve mobility between Bogotá and Chía, Sopó, Tocancipá, Zipaquirá and Cajicá, with CAPEX investment of COP1.32 trillion and OPEX of COP0.5 trillion.
4. Magdalena Trunk Roads projects in the Puerto Salgar-Barrancabermeja (TM1) and Sabana de Torres-Curumaní (TM2) corridors. With a distance of 531 km and a projected CAPEX investment of COP3.8 trillion and OPEX of COP3.6 trillion, these trunk roads will improve the connectivity of the Caribbean Coast with the interior of the country and will consolidate with the Ruta del Sol 3 project as the most important cargo corridor in Colombia.
5. Buenaventura - Loboguerrero - Buga PPP Project: This is a 116.1 km two-lane corridor that will improve mobility from the Buenaventura port area to the interior of the country. Likewise, this project will have an investment of COP4.05 trillion (COP2.21 trillion CAPEX-work and COP1.84 opex-operation and maintenance/figures by December 2020), which will generate an estimated 66,570 direct, indirect and induced jobs.

- **Riverine Modality**

1. Riverine Initiative PPP Restoration of Degraded Ecosystems of the Dique Canal. Project of 115.5 km covering the waterway between the municipality of Calamar and the bay of Cartagena. Project that promotes the restoration of degraded ecosystems in the area of influence.

- **Air Modality**

Progress for the San Andres Airport, Rafael Nuñez Airport Expansion in Cartagena, Suroccidente Airports in Palmira, Neiva and Buenaventura, New Bayunca Airport.

Other bidding processes moving forward:

1. Construction, maintenance and operation of the road linking Santuario (Antioquia) to Caño Alegre (Boyacá). Among the municipalities benefited would be: Puerto Triunfo, San Luis, Cocorná, Santuario and Medellín, being part of the Bogotá-Medellín route. This corridor will also be known as La Ruta del Agua (The Water Route), honoring the water wealth of the surrounding municipalities along the route.
2. Technical structuring at feasibility level of the La Dorada (Caldas) - Chiriguaná (Cesar) rail corridor. With a length of 560 km and a current capacity to transport 80,000 tons/year, a capacity of 10,000,000 tons/year is projected.


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5. BASELINE OF THE TRANSPORTATION SECTOR WITH RESPECT TO THE IMPLEMENTATION OF FINANCIAL PROTECTION INSTRUMENTS

The progress in Financial Protection of the different modalities of the transport sector are presented grouped according to the operational considerations proposed by the WB (2021), which define three insurance schemes:

5.1. Centralized operational approach

It corresponds to a scheme where risks are grouped in a program or vehicle. In relation to the partially centralized operational approach, there are notable advances in the insurance of PPP road infrastructure, as shown in Box 1.

The air modality has the UAEAC insurance program, which contains a set of current instruments used by the Aerocivil for the protection of the assets under its responsibility and its operations in the provision of airport, air navigation and authority services, as described in Table 8. Except for the Casco Aviación and Ariel insurance policies, which are of specific application according to ICAO recommendations, for the others the possibility is open for consideration that it is "a partially centralized operational approach". It should be noted that the airports of the subnational entities do not report this type of protection instruments.

Box 1. Policies for road infrastructure - Agencia Nacional de Infraestructura ANI (National Infrastructure Agency).

The heavy rains of the 2010-2011 winter wave caused widespread losses throughout the country. In particular, losses from damage to transportation sector infrastructure amounted to approximately US$1.7 billion, which were mainly assumed by the Government of Colombia.

Prior to the first wave of 4G concessions in 2012, the World Bank provided the Colombian Government with technical guidelines for the insurance of highway infrastructure based on the best practices of the international market and adapted to the national context. Additionally, the National Infrastructure Agency (ANI) held working meetings with the local insurance companies - Fasecolda and with reinsurance companies to develop the terms and conditions of the policies.

ANI developed the Material Damage All Risk and the Extra-Contractual Civil Liability Insurance (Liability) that allows insuring the infrastructure in all its stages (existing, rehabilitation, construction, improvement and operation) with clauses tailor-made for Colombia, which are a condition of the 4G projects. Likewise, ANI established minimum risk rating conditions for the reinsurance of the 4G concessions, both for automatic and facultative contracts, taking into account the credit ratings of the reinsurers.

The highways built by Public-Private Partnerships (PPP) through the fourth generation of concessions (4G) have been insured for more than US$40,000 million, through contracts with improved policies, which has allowed reducing the fiscal exposure generated by this source of risk by transferring to the local and international insurance and reinsurance market the costs derived from the occurrence of disasters caused by natural phenomena. However, as it is indemnizatory, the proof of loss and payment of indemnity is not quick and is subject to general exclusions.

INSURANCE POLICY	PURPOSE
Material Damage All Risks	It covers losses and/or material damages suffered by property owned by the UAEAC, under its responsibility, possession and/or control and in general those received under any title and/or for which it has any insurable interest.
Civil Liability Airports and Air Traffic Controllers - ARIEL	It covers the civil liability of the UAEAC against the risk arising from an accident due to the possession, use, maintenance or provision of the premises, services and infrastructure necessary for the operation of airports and all functions related to air traffic and navigation services, including those functions of the entity as Aeronautical Authority.
Extra-contractual civil liability insurance (Liability)	It covers the pecuniary and non-pecuniary damages caused by the UAEAC to third parties; generated as a consequence of the non-contractual civil liability originated inside or outside its facilities, in the development of its activities or related to it, as well as the acts of its employees and officers throughout the national territory.
Freight Transportation	It covers all movements of new and used merchandise, loading and unloading, by any means of transportation of the goods owned, under possession, responsibility and/or control; typical of the normal course of business of the UAEAC from any place in the country to their final destination in Colombia and vice versa.
Casco Aviation	It covers the two (2) aircrafts and one (1) drone owned by the UAEAC, or for the damages for which it is legally responsible.

Table 8. Information on UAEAC Insurance Program in force as of September 2021
Source: UAEAC (2021)

Likewise, the UAEAC is currently researching the possibility of including a cyber risk protection, as a reaction to the incidents that took place in 2021.

5.2. Partially centralized operational approach

Corresponds to a scheme where insurance is underwritten using demand aggregation framework agreements, or any other mechanism that allows standardizing the terms and conditions of the insurance policies to be underwritten.

5.3. Decentralized operational approach

It corresponds to an individual approach for securing the infrastructure of the sector's modalities.

6. POLICY OBJECTIVES OF THE FP STRATEGY FROM A SECTORAL PERSPECTIVE

The *Sectoral Financial Protection Strategy EPFS* is framed within the sectoral policies as part of the comprehensiveness promoted for Disaster Risk Management and Climate Change Adaptation. The importance of mitigating adverse events on the various modalities of transportation is recognized, participating according to institutional and sectoral competencies in the development of actions to reduce contingent liabilities related to the risk of disasters caused by natural phenomena and also with the management of the fiscal risk resulting from these events.

From this premise, the priority policy objectives that have been established to evaluate, reduce and manage the fiscal risk due to the occurrence of disaster events that may occur on the transportation infrastructure are presented, consolidating objectives that respond to sectoral and institutional commitments included in the aforementioned tools such as the PGRD of INVIAS that establishes in the programmatic component the *implementation of the strategy for financial protection against the risk of disasters of the transportation infrastructure under its responsibility (INVIAS, 2022).* In this sense, the Risk Management Sub-Directorate has carried out a technical exercise regarding the usefulness of parametric insurance in some pilot corridors. On the other hand, the UAEAC's PGRD establishes that *the entity responsible for the airport infrastructure must underwrite financial hedging that allows it to attend the impacts in the event of a disaster, either due to the exercise of its own activity, or due to those events of natural origin that directly affect the entity or the environment, according to the offers available in the financial market* (UAEAC, 2019, p. 50).

The EPFS Sectoral Financial Protection Strategy will consider both the features and the progress in Financial Protection of each of the modalities of the transport sector. Likewise, in the case of the road modality, it will be aligned, among others, with the Primary Road Network Adaptation Strategy (RVP).

As previously noted in the sector description, each transportation modality has various administrators, which will differentiate the design and implementation of the *Sectoral Financial Protection Strategy*, since each

administrator manages the financial instruments that contribute to its fiscal resilience in a diverse and autonomous manner, contributing to the fiscal resilience of the sector as a whole.

In this sense, the role of the different actors and their responsibilities are classified, including who is responsible for the resources required to pay for damages in the event of disasters. In this regard, information on the administration of road and rail networks, port terminals and airports is relevant:

The road network[29] in Colombia is managed by: municipalities (49%), departments (28.9%), INVIAS (18.6%) and ANI (3.5%) in a discriminate manner:

- The tertiary network (69% of the road network) is under the responsibility of the municipalities (71%), the departmental administration (10%) and INVIAS (19%).
- The secondary network (22% of the road network) is entirely managed by the departmental administration.
- The primary network (9% of the road network) is under the responsibility of the National Government: INVIAS (61%) and ANI (39%).

The railroad network is managed by: INVIAS (49% at a ratio of 66.96% corresponding to operating network and 33.04% to inactive network), ANI (46% of the network, of which 69% corresponds to operating network and 31% to non-operating network) and private sector (5% of operating network).

In the aerial modality, competencies are distributed as follows: Special Administration of Civil Aeronautics - UAEAC 68 Aerodromes, Governors' offices 24, municipalities 91, townships 10, Indigenous Reservations 35, Community Action Boards 2 and others[30] .

ANI is in charge of 63 maritime port terminals under concession located in the port areas of San Andres, La Guajira, Santa Marta and Cienaga, Cartagena, Gulf of Morrosquillo and Gulf of Uraba, Buenaventura and Tumaco. Cormagdalena has 21 operating concession terminals.

We have 24,725 km of rivers, of which 18,225 km are navigable, and according to the inventory of the Superintendence of Transportation there are 479 active docks or piers in the country.

29 With figures to 2020.

30 Different national government institutions

6.1. FP strategy is aligned with the PFRDEP Strategy.

The PFRDEP Strategy (2021) was updated to include lessons learned, innovative topics such as the promotion of Disaster Risk Financial Management at the territorial and sectoral level, as well as considerations on epidemics, pandemics, and climate change, reflecting the country's challenges and opportunities to continue strengthening fiscal resilience.

Among the sectors prioritized by the national level strategy is the *transportation sector* and consequently the Sectoral Financial Protection Strategy EPFS is aligned with the national level strategy.

6.2. The FP strategy considers the principles of disaster risk financing.

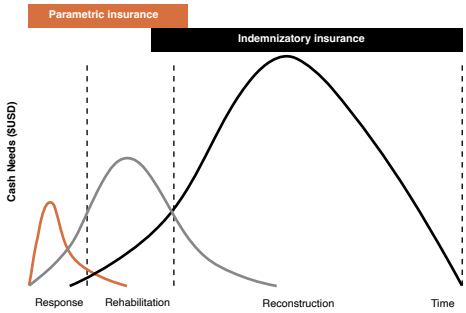

Figure 18. The time dimension of post-disaster financing
Source: Adapted Mahul and Ghesquiere, 2010.

The WB proposes five principles of disaster risk financing: (i) Need/availability of resources over time, i.e., after the occurrence of the disaster, not all resources are required at the same time, explained in Figure 18; (ii) No single financial instrument can address all risks, so it is proposed to evaluate an optimal combination of different financial instruments to cover the different layers of risk according to their frequency and intensity, as visualized in Figure 18 ; (iii) The way in which the money reaches the beneficiaries is as important as where it comes from, which promotes the allocation of resources in a transparent and timely manner to the most vulnerable population affected by disasters; (iv) Making sound financial decisions requires correct information; (v) Benefits are obtained by improving information and grouping exposures, due to the diversification benefits generated by the grouping of a risk portfolio.

The strategy will focus on promoting access to disaster resources through financial instruments to ensure rapid recovery and reconstruction, as well as the continued provision of services.

6.3. Policy objectives of the Sectoral Financial Protection Strategy EPFS

6.3.1. Policy Objective 1. Identification and understanding of the fiscal risk of disasters.

To improve the understanding of the fiscal risk of disasters, it is necessary to have information on the exposure of infrastructure and on historical disaster losses that have impacted it, so as to visualize the potential losses of the infrastructure of the different modes of the Sector (which does not include administrative buildings) in the event of disasters. This means acting in accordance with the knowledge of risk by identifying, evaluating and prioritizing interventions that guarantee connectivity in safe conditions to strengthen decision-making on sector investments and reduce disaster risk, and to define insurance coverage. To this end, it is necessary to make progress in:

1. Generating information on the detailed location of the infrastructure of the different modes of the sector, which does not include administrative buildings. Also identifying the relationship between the different modalities of the transport sector, their interconnection, resilience and vulnerability to impacts due to the occurrence of disasters, as well as indicative recovery costs by type of infrastructure.
2. Identifying the highest level of critical infrastructure, as well as critical spots. This activity is aligned with the cross-cutting axes of the RVP adaptation strategy[31] . This work will be carried out with the support of the managers of the different modalities. For example, in the case of the road network, it will be taken into account that it is managed by the municipalities in 49%, by the Departments in 28.9%, by INVIAS in 18.6%, and by ANI in 3.5%.

31 The first cross-cutting axis (Axis of Adapted Roads with Innovation in the Road Network) states that "The aim is to conduct a vulnerability analysis in light of climate change scenarios, in order to identify the factors by which roads are vulnerable and could present future risks, considering both the existing and projected road network".

The second transversal axis (Information and Knowledge Management Axis), which establishes that "... it is required to manage both information (climate, sectoral, environmental, socioeconomic), as well as existing or created knowledge.

6.3.2. Policy Objective 2. Disaster Financial Management - Financial Instrumentalization for Transportation Sector Infrastructure

The transportation sector seeks to establish a diversified portfolio of financial instruments for risk retention and transfer as shown in Figure 19. The purpose is to enable access to immediate funds for emergency response and rehabilitation, as well as to provide resources for the reconstruction phase in order to reduce the fiscal vulnerability of each of the modalities of the transportation sector. The above considering, among others: (i) that the financial instruments must cover the different layers of risk (both for recurrent and catastrophic events), (ii) the specificities of each modality of the transportation sector, as well as the responsibilities of each of its administrators.

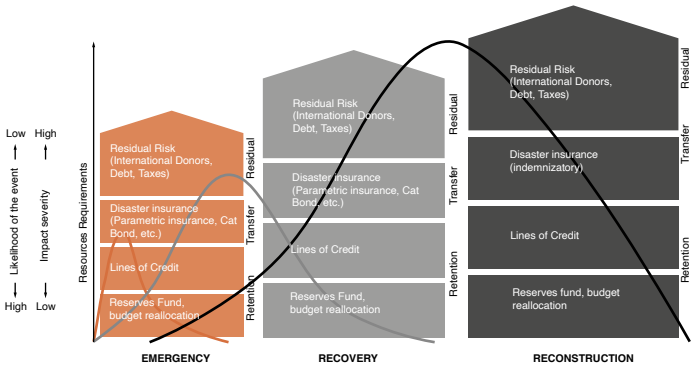

Figure 19. Layered strategy for the transportation sector (concessioned and non-concessioned)
Source: Adapted from World Bank

Within this context, strengthening or promoting will be considered for:

1. Public and private emergency fund: The legal, financial and operational aspects will be analyzed to create an emergency fund to allocate timely resources to contribute to minimize service disruption of the different modalities of the transportation sector. It includes defining aspects that respond to the following concerns (i) ¿How to articulate the structuring of the fund according to the different modalities?, ¿will different accounts be used?, (ii) ¿Who would contribute and how would the contributions be established for each of the modalities, as well as for each of the administrators?, (iii) ¿How would the fund be

structured according to the different modalities, and how would the contributions be established for each of the modalities? It will also define: (iii) rules for the use of resources.

2. Line of credit: This line of credit should allow access to immediate liquidity to attend to disasters.
3. Parametric insurance: The possibility of acquiring this type of insurance will be evaluated, among others. It is worth mentioning that the possibility of this type of insurance was approved by the law of the PND 2022-2026 "Colombia World Power of Life" (Articles 241 to 243 of Law 2294 of May 19, 2023). In parametric or index-based insurance, the claim is defined with reference to a predetermined index. It differs from indemnity insurance to the extent that the payment of the indemnity depends on the achievement of an index defined in the insurance contract, making the payment faster and without demonstration of damages. This coverage can be complementary to the indemnity insurance that operates during the term of the concession contract, and in the absence of the concession contract, cover the state infrastructure that is defined in the concession contract.
4. Indemnity insurance (both at individual level and grouping portfolios). Among others, the type of policies generated by ANI together with Fasecolda for the insurance of road infrastructure built through the 4G concession scheme will be evaluated.

6.3.3. Policy Objective 3. Catastrophic risk insurance of the sector's infrastructure (which does not include administrative buildings)

In order to strengthen catastrophic risk insurance, decision making requires robust information and analysis to understand fiscal risk. Consequently, in order to strengthen catastrophic risk insurance of the infrastructure under the responsibility of the sector, technical studies will be carried out to support decision making, such as financial gap analysis and cost-benefit analysis. The financial gap analysis will make it possible to determine the probability of depletion of existing financial instruments in order to have an objective reference point for structuring risk transfer instruments. The cost-benefit analysis will make it possible to establish the best combination of financial instruments. The above, in order to evaluate different risk transfer instruments individually, as well as the portfolio of different financial instruments as a whole.

6.3.4. Policy Objective 4. Financial Protection in local and regional entities

This policy objective seeks to generate guidelines to provide support on financial protection issues at the subnational level. The heads of the ministries have the power and legal capacity, as heads of the administration in their respective offices and within the general framework of their competencies to dictate or issue "regulations" in the form of administrative acts of general content to develop what is established in the Laws, in this sense the transportation sector can share with the subnational entities the inputs that are generated[32] .

To this effect, the Ministry of Transportation, as head of said sector, has the legal power to issue ministerial directives as guidelines, recommendations, orientations and considerations such as "regulations applicable equally throughout the national territory, without, of course, in doing so, being able to reduce or disregard the decision-making power enjoyed by the regional and local authorities or the autonomy that is constitutionally recognized to the institutions (...) for the management of their own interests"[33] and that, like the Presidential directives, "the Ministerial directives are addressed, in principle, to those who make up the Government and constitute a guideline about the understanding and scope of the law"[34]. The above, under coordination and concurrence, as well as subsidiarity, which correspond to the principles of the Colombian public policy of disaster risk management. It is worth mentioning that this specific aspect is the focus of the various risk management workshops that have been held by INVIAS, both with Local Administrations and with the Risk Management Committees of the municipalities where road infrastructure is implemented. Under the "Institutional Approach to the Territory" strategy, risk reduction actions are promoted with the communities settled in the vicinity of the road routes.

Now, in terms of DRM and, given that Law 1523 of 2012 in its Article 8 provides that public entities, including those that make up the aforementioned administrative sector of transportation are members of the SNGRD due to their mission and responsibility in the management of sustainable

32 Law 489 of 1998, Article 208 of the Political Constitution and Law 4 of 1913 (Political and Municipal Regime Code).

33 Council of State. Ruling number: 11001032400020020022801. Seventeen (17) July two thousand eight (2008). MP. Camilo Arciniegas Andrade.

34 Council of State. Ruling number: 11001032500020040009000(091904). September 13, 2007. MP. GUSTAVO EDUARDO GOMEZ ARANGUREN.

social, economic and environmental development, in the sectoral, territorial, institutional and investment projects spheres; the Ministry of Transportation, as head of the Transportation Sector, may, in application of the aforementioned legal grounds and taking into account that *"In any situation of risk or disaster, the public or social interest shall prevail over the particular interest*[35] *"* and that *"Local, regional, sectorial and collective interests shall yield to the national interest, without detriment to the fundamental rights of the individual and, without detriment to the autonomy of the subnational entities*[36] *"*, issue guidelines on Financial Protection. In this sense, and given that the Ministry of Transportation according to the provisions of National Decree 087 of 2011[37] has as its primary objective the *"formulation and adoption of policies, plans, programs, projects and economic regulation in matters of transportation, transit and infrastructure of road, maritime, fluvial, rail and railroad transportation modalities, and the technical regulation of road, maritime, fluvial, riverine and railway transportation and transit"* and that within its functions it has *"to establish and adopt the policy, plans and programs regarding safety in the different modes of transportation and the construction and maintenance of its infrastructure*", it is feasible to issue a *Ministerial Directive* that issues guidelines on good insurance practices for the infrastructure of the modalities of the transportation sector, also considering that this aspect should aim, among others, at risk transfer aimed at reducing the fiscal vulnerability of the State and that, in addition, it would also contribute to the safety, welfare, quality of life of people and sustainable development because the area of impact of an adverse event related to the sector is made up of the road infrastructure in permanent interaction with the territory it occupies, and the communities that inhabit such territory.

35 Article 3 (General Principles) numeral 7. Law 1523/12.

36 Ibid.

37 (January 17) "Whereby the structure of the Ministry of Transportation is modified and the functions of its agencies are determined".


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7. ADDITIONAL MATTERS

The implementation of Financial Protection instruments should be accompanied by protocols/procedures for the disbursement of funds, emergency response procedures and recovery service contracts. Likewise, as mentioned above, the responsibilities of all actors involved in the management of the different modes of the transport sector should be defined.

On the other hand, an assessment will be undertaken about whether financial instruments can be supplemented with non-financial mechanisms for risk transfer. For example, through contractual instruments, such as those used for rehabilitation and reconstruction after the 2011 earthquake and tsunami in Japan (Box 2).

Box 2 - Japan's experience - 2011 earthquake and tsunami

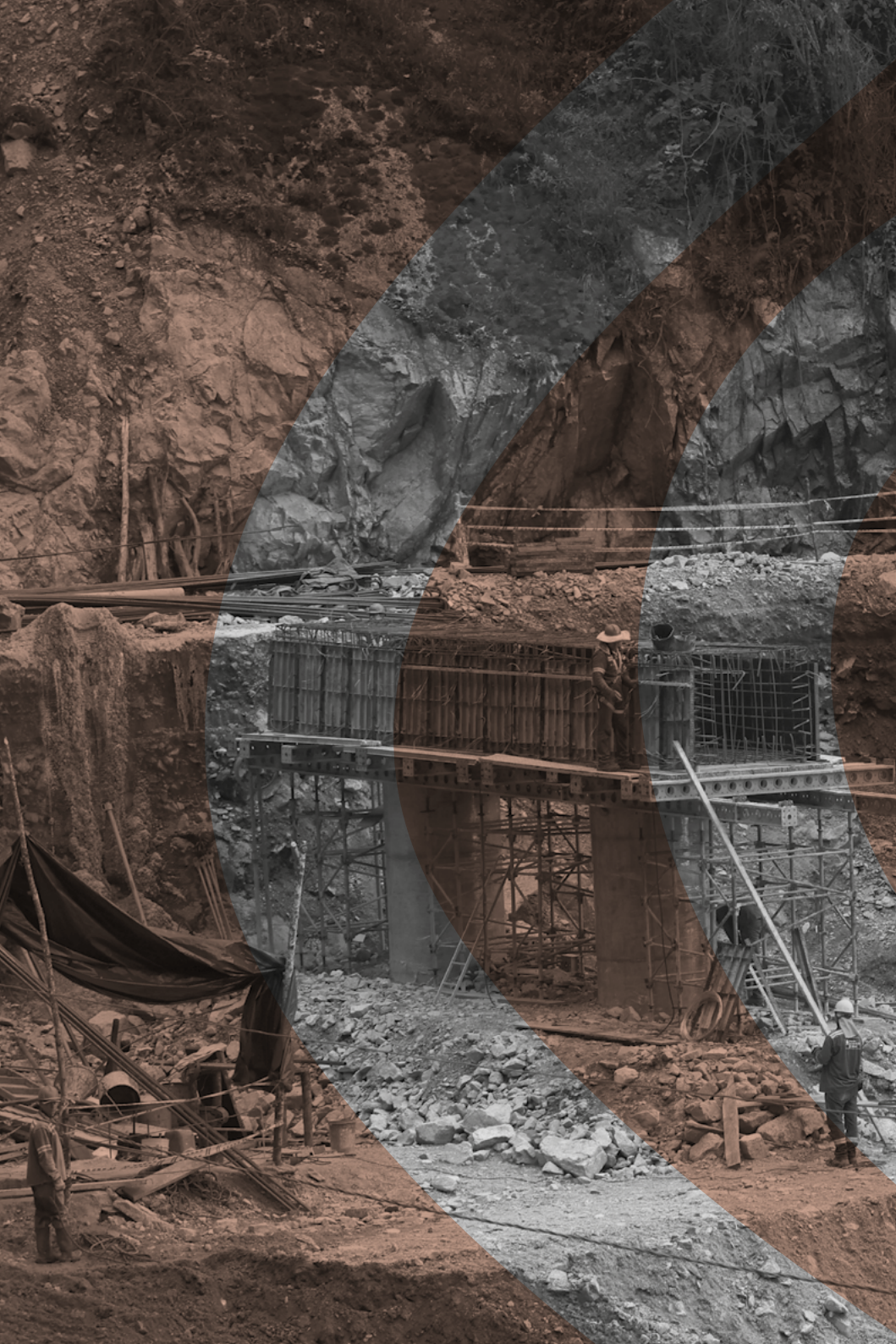
In Japan, local governments enter into agreements with private companies in advance to start rehabilitation and recovery work immediately after a disaster. Following the Great East Japan Earthquake, damage to major damaged highways was repaired in the first week under pre-arranged contracts.

In terms of financial preparedness, local governments report infrastructure damage to the relevant ministries and apply for a national subsidy for recovery work. As part of operational preparedness, they may enter into pre-disaster agreements with private companies or local industry associations in order to start recovery work immediately after the disaster.

The agreement covers information exchange, emergency inspections, debris removal and disaster recovery.

It is agreed with the companies that they will start activities on demand, even before the contract is costed. In the immediate aftermath of the major earthquake in eastern Japan, this approach contributed to the rapid recovery of heavily damaged highways and roads. Pre-disaster agreements with private companies were activated to support recovery services (World Bank, 2021, pg. 35).

Other innovative international financial instruments such as the proposed guarantee will also be evaluated. The catastrophe infrastructure guarantee is a financial package that combines adequate Operation and Maintenance (O&M) financing with pre-established fund for the restoration of critical infrastructure service after disasters. In that sense, governments could purchase disaster recovery services from O&M providers, in addition to regular O&M fees, for which they could transfer such financial risks to insurance or capital markets to ensure that they can meet their commitments after a disaster (WB, 2021).



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