

FONDEN

Mexico's Natural Disaster Fund – A Review

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Foreword

Natural disasters constitute a significant fiscal risk in the form of a contingent liability in disaster-prone countries. If disasters are not anticipated and financially planned for, there can be considerable delays in post-disaster response, potentially significantly exacerbating the adverse human and economic consequences of an event. Governments may also be compelled to draw heavily on budgets intended for development purposes, hindering long-term growth and development.

Governments are becoming increasingly aware that they can no longer ignore the fiscal risk posed by disasters. Many governments face trends of rising disaster losses as capital stocks increase. And while exposure of populations and assets rises, insufficient attention is paid to resilience against hazards. Increases in the incidence and magnitude of climatological hazards are anticipated as a consequence of climate change, fuelling the trend of rising losses. Much greater emphasis on proactive disaster risk management, including disaster risk financing and insurance, is essential in stemming this tide.

Mexico stands at the forefront of initiatives to develop comprehensive disaster risk management structures and programs, including disaster risk financing and insurance strategies to manage the fiscal risk posed by disasters. Mexico is exposed to a large variety of geological and hydro-meteorological phenomena. It is ranked as one of the most seismically active country in the world, experiencing more than 90 earthquakes with a magnitude of 4.0 or above on the Richter scale on average annually. Around two-fifths of Mexico's territory and over a quarter of its population are exposed to storms, hurricanes, and floods.

As part of its disaster risk management efforts, the Federal Government of Mexico established the Fund for Natural Disasters FONDEN to support disaster

relief and reconstruction. FONDEN was originally established as a budgetary tool through which federal funds were annually allocated for expenditure on post-disaster response. Since then, FONDEN has evolved significantly; changes to its operating rules and procedures have improved FONDEN's overall efficiency and effectiveness, and the introduction of several additional windows have further strengthened disaster risk management. In 2005, the Government of Mexico empowered FONDEN to develop a catastrophe risk financing strategy to leverage its resources, relying on a layered combination of risk retention and risk transfer instruments. In 2006, FONDEN issued the world's first government catastrophe bond, which was renewed in 2009. FONDEN now provides one of the most sophisticated disaster financing vehicles in the world – and the FONDEN system continues to evolve to meet Mexico's financial requirements related to natural disasters.

The World Bank has a long history of partnering with the Government of Mexico on disaster risk management. Between 2000 and 2004, the World Bank provided advisory services to the Natural Disaster Management Project. In 2005, the World Bank supported the Federal Government of Mexico on the issuance of its first catastrophe bond. When the Government of Mexico issued a second catastrophe bond, it was the first country to use the World Bank MultiCat program, a cat bond platform that allows for the issuance of cat bonds with multiple perils, regions, and countries; Mexico issued a US\$290 million multiperil cat bond in October 2009 for coverage against earthquake and hurricane in different regions of the country. The collaborative effort on disaster risk management between Mexico and the World Bank continues through today, with projects to strengthen the population's resilience to disasters and to improve the government's fiscal risk management of disasters. Throughout the years, the World Bank has extensively used the case of Mexico in its

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dialogue on disaster risk management with other governments.

This report, *FONDEN: Mexico's Natural Disaster Fund – A Review*, continues the World Bank and the Government of Mexico's productive collaboration on disaster risk management. It aims to share Mexico's considerable achievements on financial management of natural disasters with other governments. The report outlines the evolution of FONDEN to date and highlights aspects of particular bearing and ap-

plicability to other disaster-prone countries. The report is of particular relevance to middle-income countries but also contains important messages for both high- and low-income countries.

We hope that this report will contribute to the dialogue on financial disaster risk management and inspire innovation elsewhere, leading to the improved financial management of natural disasters around the globe.

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Abbreviations and Acronyms

BANOBRAS	Banco Nacional de Obras y Servicios Públicos (National Bank of Public Works and Services)
CENAPRED	Centro Nacional de Prevención de Desastres (National Centre for Disaster Prevention)
CADENA	Componente de Atención a Desastres Naturales (Agricultural Fund for Natural Disasters)
CONAGUA	Comisión Nacional de Agua (National Water Commission)
DGRMSG	Dirección General de Recursos Materiales y Servicios Generales (Directorate General of Resources, Materials, and General Services)
FIPREDEN	Fideicomiso Preventivo de Desastres Naturales (Natural Disaster Preventive Trust)
FOPREDEN	Fondo para la Prevención de Desastres Naturales (Natural Disaster Prevention Fund)
FONDEN	Fondo de Desastres Naturales (Natural Disaster Fund)
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
PACC	Programa de Atención a Contingencias Climatológicas (Climate Contingencies Program)
R-FONDEN	Riesgo-FONDEN (FONDEN Risk)
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (Ministry of Agriculture, Livestock, and Rural Development)
SCT	Secretaría de Comunicaciones y Transportes (Ministry of Communications and Transportation)
SEDESOL	Secretaría de Desarrollo Social (Ministry of Social Development)
SEGOB	Secretaría de Gobernación (Ministry of Interior)
SEP	Secretaría de Educación Pública (Ministry of Public Education)
SHCP	Secretaría de Hacienda y Crédito Público (Ministry of Finance and Public Credit)
SSA	Secretaría de Salud (Ministry of Health)

Conversion rate US\$1 = MXN 12.5



Executive Summary

FONDEN, Mexico's Fund for Natural Disasters, was established in the late 1990s as a mechanism to support the rapid rehabilitation of federal and state infrastructure affected by adverse natural events. FONDEN was first created as a budget line in the Federal Expenditure Budget of 1996, and became operational in 1999. Funds from FONDEN could be used for the rehabilitation and reconstruction of (i) public infrastructure at the three levels of government (federal, state, and municipal); (ii) low-income housing; and (iii) certain components of the natural environment (e.g., forestry, protected natural areas, rivers, and lagoons).

FONDEN consists of two complementary budget accounts, the FONDEN Program for Reconstruction and FOPREDEN Program for Prevention, and their respective financial accounts.

The original, and still the primary, FONDEN Program is the FONDEN Program for reconstruction. In the early 2000s, however, in recognition of the need to promote stronger ex ante disaster risk management, the Government of Mexico began to allocate funding specifically for preventive activities. Although resources for prevention remain significantly less than those for reconstruction, the Mexican Government continues its effort to shift focus and funding from ex post response to ex ante disaster risk management. Fiduciary responsibility for the financial accounts lies with BANOBRAS, Mexico's state-owned development bank.

FONDEN is funded through the Federal Expenditure Budget. The Federal Budget Law requires that an amount of no less than 0.4 percent of the annual federal budget should be available to FONDEN, FOPREDEN, and the Agricultural Fund for Natural Disasters at the beginning of each fiscal year. This amount is net of the uncommitted funds in the FONDEN Trust at the end of the previous fiscal year. In practice, the minimum 0.4 percent requirement – equivalent to around US\$800 million in 2011 – has become the standard budget appropriation for these

programs. Should this appropriation be insufficient, the law stipulates that additional resources must be transferred from other programs and funds, such as the oil revenue surplus.

The FONDEN Program for Reconstruction is FONDEN's primary budget account. It channels resources from the Federal Expenditure Budget to specific reconstruction programs. In the aftermath of a disaster, funds committed to a specific reconstruction program will be transferred to a dedicated sub-account in the FONDEN Trust for execution. The FONDEN Trust holds these resources until reconstruction programs are implemented and makes payments for reconstruction services to implementing entities. It also acts (through BANOBRAS) as the contracting authority for market-based risk transfer mechanisms, including insurance and catastrophe bonds. Over the years, dedicated subaccounts for emergency relief and recovery actions as well as priority reconstruction activities, the Revolving Fund and Immediate Partial Support Mechanism, respectively, have been established to address funding requirements during earlier post-disaster phases. Furthermore, FONDEN strives for reconstruction activities to not recreate vulnerabilities – FONDEN funding can be used to rebuild infrastructure at higher standards (the “build back better” principle) and to relocate public buildings and/or communities to safer zones.

The FOPREDEN Program for Prevention supports disaster prevention by funding activities related to risk assessment, risk reduction, and capacity building on disaster prevention. Akin to the FONDEN Program for Reconstruction and the FONDEN Trust, FOPREDEN is a budget account that funnels resources to specific prevention projects under FIPREDEN, FOPREDEN's financial trust. FOPREDEN promotes informed decision making about investment in risk reduction by requiring states to complete a risk assessment (including the development of a risk atlas) before being eligible for financing for risk mitigation projects. The FOPREDEN Program for

Prevention remains much smaller than the FONDEN Program for Reconstruction, with its annual allocation currently totaling about US\$25 million.

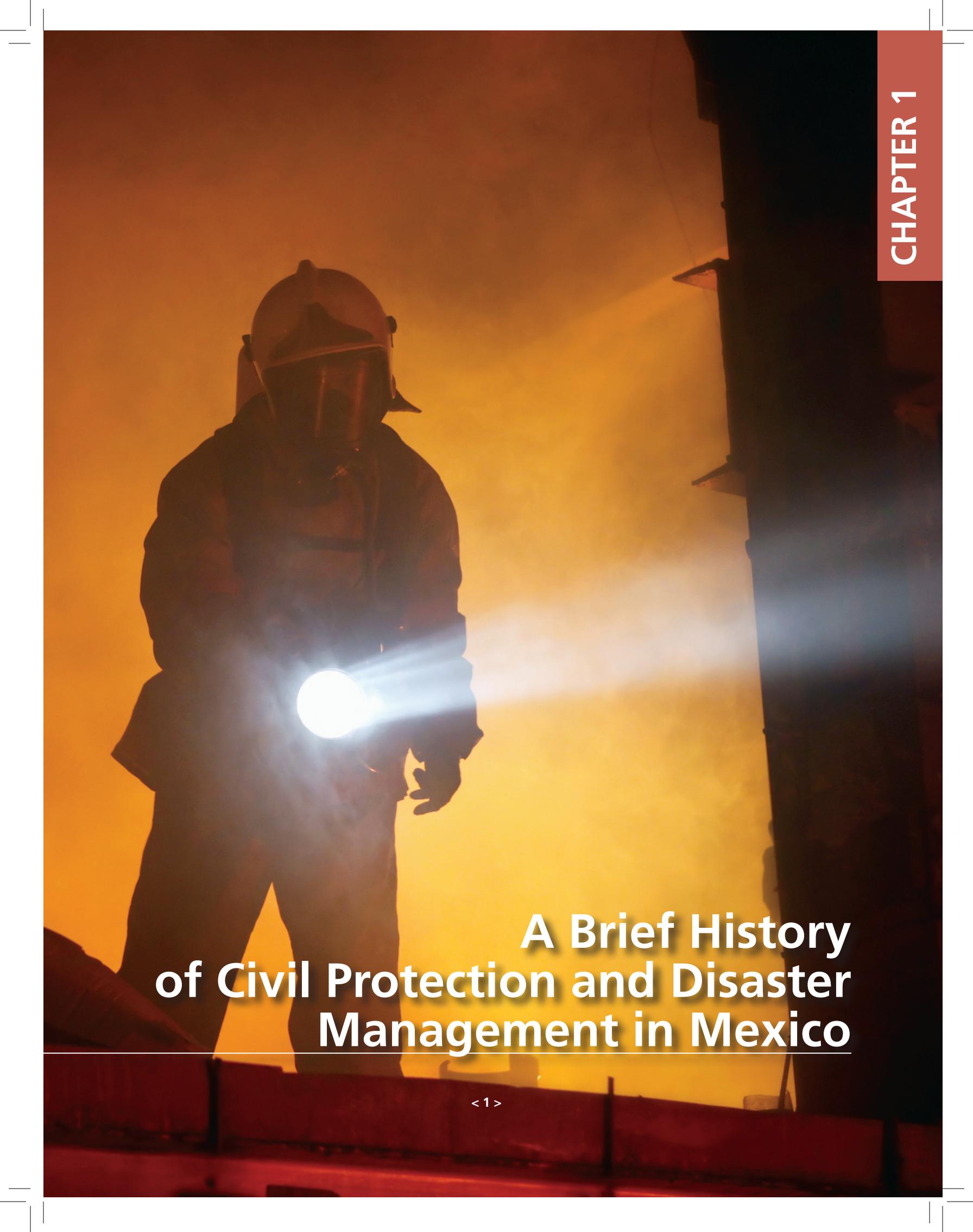
The process for accessing and executing reconstruction funding from FONDEN balances the need for time-efficient disbursement with accountability and transparency concerns. The Ministry of Interior, SEGOB, holds responsibility for managing this process. First, SEGOB must issue a declaration of a natural disaster in order for FONDEN resources to be accessible by affected federal agencies or state governments. Once this declaration has been made, the federal agencies and/or state government(s) can apply for funding and the damage assessment process can begin. FONDEN avails of innovative information technology, such as geocoding and digital imagery, to ensure efficiency and accuracy of the damage assessment process. Based on the findings of the damage assessment, SEGOB reviews the related funding applications, determines the appropriate allocations, and requests the Ministry of Finance and Public Credit to convene the FONDEN Technical Committee to authorize transfer of funds to a subaccount for the reconstruction program in the FONDEN Trust. From this subaccount, resources are transferred to the service providers implementing reconstruction works. FONDEN resources finance 100 percent of the reconstruction costs for federal assets and 50 percent of those for local assets. (The first time that the assets are impacted by a disaster – this percentage declines thereafter if insurance is not purchased for reconstructed assets.)

FONDEN resources are leveraged with market-based risk transfer instruments. Despite FONDEN's stable annual budget appropriation, variations in funding needs related to the occurrence of one or multiple disasters means that shortfall can occur in any given year. To manage the volatility of demand on its resources, FONDEN is allowed to transfer risks through insurance and other risk transfer mechanisms such as catastrophe bonds; FONDEN is not, however, allowed to contract debt. FONDEN first transferred disaster risk to the international capital market in 2006 for US\$160 million parametric catastrophe bond against earthquake risks in three zones for a three year duration. In ad-

dition, it secured US\$290 million of parametric reinsurance coverage for the same three zones for three years, bringing its total protection to US\$450 million. When this cat bond expired in 2009, FONDEN increased its cover by issuing a three-year, US\$290 million multi-peril parametric catastrophe bond for earthquake and hurricane. Most recently, in 2011, it secured indemnity cover for government assets and low-income housing with a US\$400 million excess-of-loss reinsurance treaty.

Working in close collaboration with the Ministry of Finance and Public Credit, FONDEN has established a strong link between its technical and financial arms for natural disasters. The National Centre for Disaster Prevention (CENAPRED) acts as the technical arm for disaster risk reduction and works closely with FONDEN, the financial vehicle for disaster management. The latest in the evolution of this partnership is the development and utilization of R-FONDEN, a probabilistic catastrophe risk model that calculates risk metrics for government assets and low-income housing for major perils. While R-FONDEN continues to be refined and developed for different applications, it has already been used to improve insurance coverage for some federal agencies and constitutes an important reference for the allocation of the excess of loss reinsurance treaty.

The FONDEN system is continuously evolving to integrate lessons learned over the course of years of experience. The Mexican Government modifies the FONDEN system with the goals of enhancing its efficiency and effectiveness and moving toward a comprehensive disaster risk management framework. The lessons from FONDEN's evolution that are captured in this report, including in its policies, procedures, and use of financial instruments, can be usefully applied by other governments. The FONDEN story provides a compelling study of how governments can establish successful government systems to support effective post-disaster interventions while promoting disaster prevention and, importantly, of how such systems should be continuously improved to integrate new understandings.



**A Brief History
of Civil Protection and Disaster
Management in Mexico**

Mexico is highly exposed to multiple natural hazards; the country is affected by natural disasters of varying magnitude on a recurrent basis. Since the mid-1980s, when major earthquakes devastated Mexico City and triggered a national dialogue on disaster risk management (DRM), the Government of Mexico has been strengthening its DRM policy framework and accompanying institutional arrangements for implementation. A critical component of this effort has been the establishment of its Natural Disaster Fund (FONDEN), initially to finance post-disaster reconstruction, and more recently, to finance all stages of the DRM cycle. This chapter presents an overview of Mexico's disaster risk profile and the Mexican Government's DRM efforts, including the establishment of FONDEN.

Disaster risk profile

Due to its diverse geography, Mexico is exposed to a wide variety of geological and hydro-meteorological hazards (see Figure 1.1). Earthquakes, volcanoes, tsunamis, hurricanes, wildfires, floods, landslides, and droughts can all impact the country; between 1970 and 2009, approximately 60 million people were affected by natural disasters in Mexico¹. The country is ranked as one of the world's 30 most exposed countries to three or more types of natural hazards². See Table 1.1. Annex 1 provides an in-depth overview of Mexico's disaster risk profile.

Located along the "fire belt" where 80 percent of the world's seismic activity occurs, Mexico is at high risk of geological disasters. On average, Mexico experiences more than 90 earthquakes per year with a magnitude of 4.0 or above on the Richter scale (FONDEN 2011). Almost all of Mexico's territory, including the capital, Mexico City, is highly exposed to earthquake risk. Mexico City is also located within the Trans-Mexican Volcanic Belt, which contains nine active volcanoes. Furthermore, tsunami represents an important threat along Mexico's Pacific coasts. Annex 2 lists major earthquakes experienced in Mexico since 1887.

Hydro-meteorological disasters occur with high frequency in Mexico. These events range from severe

tropical cyclones along both the Pacific and Atlantic coasts to heavy rainfall events occurring throughout the territory to high intensity storms, among others. Drought is also a significant concern, particularly for Mexico's agricultural sector. Other hazards with notable impacts on the country include forest fires and landslides.

Exposure to the abovementioned natural hazards in Mexico is on the rise – while Mexico's economic development improved the quality of life for its citizens, growth of Mexico's asset base and population translate into increased exposure to natural hazards. As of 2009, 77.5 percent of the population of nearly 110 million lived in urban areas – by 2050, this figure is expected to rise to nearly 90 percent of a projected 130 million people³. With a tendency for lower-income populations to reside in more hazard prone locations, these figures convey the potential for the significantly increased exposure of an already vulnerable population. Mexico City⁴, the fifth largest urban agglomeration in the world, represents the highest concentration of risk in Latin America and continues to grow. States such as Veracruz, Jalisco, and Puebla, among others, also have pockets of high population density and face significant potential disaster losses. See Annex 3 for data on population growth by state.

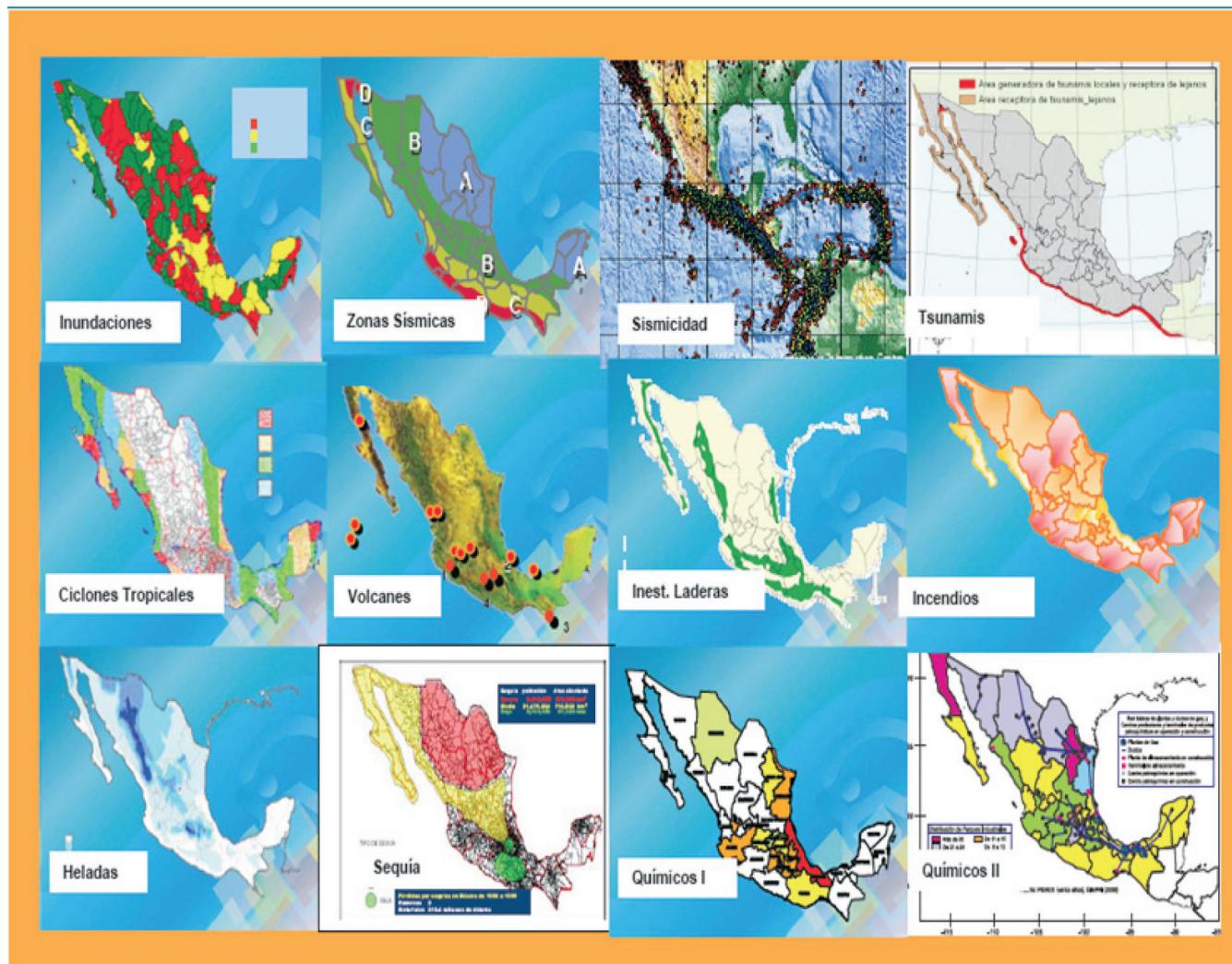
1 United Nations. 2011 Global Assessment Report on Disaster Risk Reduction. 2011.

2 World Bank. Natural Disaster Hotspots. 2005.

3 United Nations. Urban and Rural Areas 2009. 2010.

4 This represents the Mexico City metropolitan area, which comprises of the Mexican Federal District and the State of Mexico, an independent Mexican State of 125 municipalities and with its own Constitution and Governor.

Figure 1.1. Risk maps of natural hazards in Mexico



Source: FONDEN (2012).

Table 1.1. Exposure of Land and Population to Specific Hazards

Natural hazard(s)	Exposed area		Exposed population	
	Km ²	As percentage of national territory	Millions	As percentage of total population
Storm, hurricane, flood	815,353	41	31.3	27
Earthquake	540,067	27	31.0	27
Drought	573,300	29	21.2	19
Forest fire	747,574	37	28.4	25

Source: CENAPRED (2010).

Creation of Civil Protection System in Mexico

The Mexico City earthquakes of September 19 and 20, 1985, with magnitudes of 8.1 and 7.3 on the Richter scale, respectively, marked a shift in disaster risk management in Mexico. More than 20 million people in Mexico felt the tremors; the earthquakes killed 6,000 people and generated direct and indirect losses totaling an estimated US\$8.3 billion at 2010 prices (CENAPRED 2000). Damage to buildings and infrastructure accounted for approximately 87 percent of the losses. The remaining 13 percent comprised loss of income or production, increased costs of service provision, emergency response, and temporary rehabilitation. Nearly 1,700 schools were damaged, and 30 percent of the hospital capacity in Mexico City was destroyed. Approximately 250,000 people became homeless and nearly 900,000 were left with damaged homes. These earthquakes triggered an immediate interest in improving the country's capacity to manage disaster risks.

Following the earthquakes, the Federal Government of Mexico (GoM) took steps both to support reconstruction needs and to strengthen the civil protection system. A National Commission for Reconstruction was established in October 1985 under the President's leadership as an initial step to address the needs of the affected population. The Commission was also requested to establish the necessary mechanisms, systems, and organizations to better assist populations affected by future disasters.

On May 6, 1986, a study on the creation of a National System of Civil Protection was published in the *Official Journal of the Mexican Federation*. The study defined the mandate of civil protection as the protection of the individual and society in the event of a natural or man-made disaster by preventing or reducing loss of human life, destruction of property, damage to nature, and disruption of lifeline public

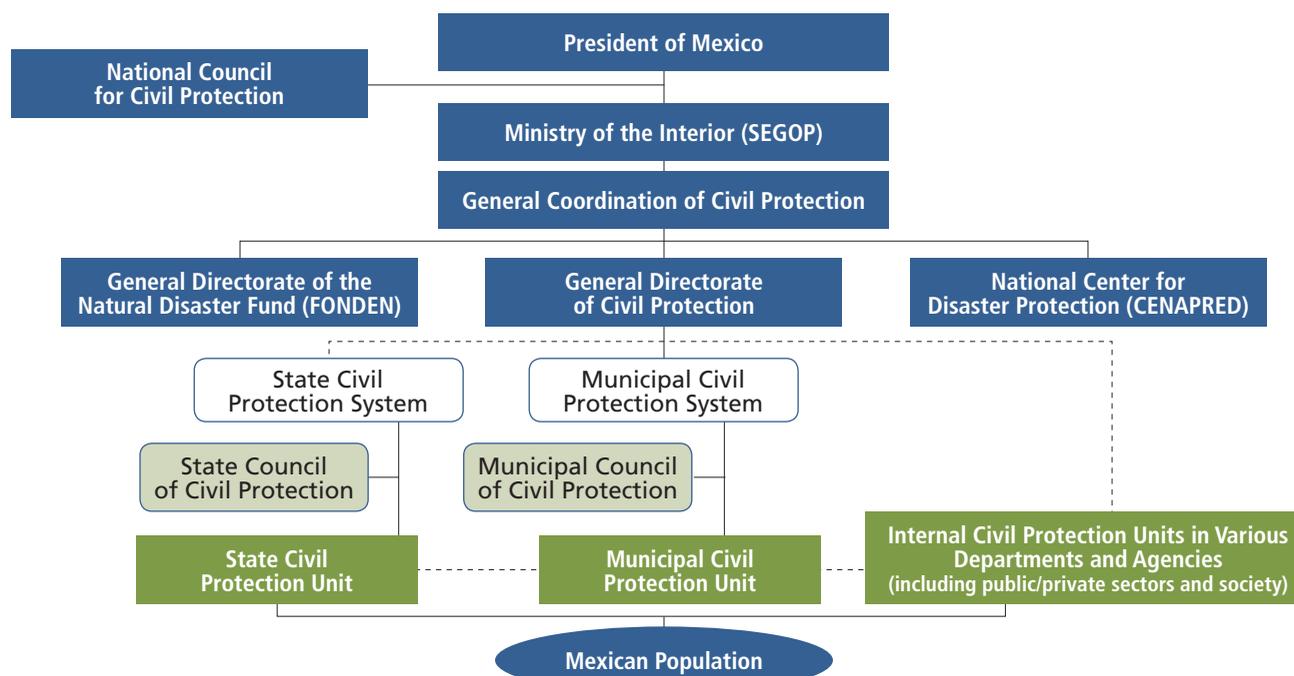
services. In light of this study, the *Sistema Nacional de Protección Civil* (SINAPROC) was created as an organized group of structures, functional relations, methods, and procedures involving all levels of government and engaging the private sector and non-governmental and civil society organizations.

The Ministry of Interior (*Secretaría de Gobernación*, commonly referred to as SEGOB) is responsible for coordinating and supervising SINAPROC under Mexico's Law of Federal Public Administration. As such, SEGOB, through its General Coordination of Civil Protection, manages the mechanisms and policies for disaster prevention and post-disaster response and reconstruction activities. Figure 1.2 illustrates the functional and coordination roles among the General Coordination of Civil Protection and the various other national and sub-national offices and agencies responsible for civil protection.

Since its establishment, SINAPROC has institutionalized disaster risk management in Mexico. The GoM broadly defines DRM as the process of planning, participation, intervention, decision-making, and design and implementation of sustainable development policies aimed at: (i) understanding the causes of risks; (ii) reducing risks; (iii) mitigation of societal impact of disasters; and (iv) strengthening the resilience of government and society against natural disasters. This definition implies a multidisciplinary approach requiring strong commitment from all levels of government and the society as a whole.

The GoM has made DRM a national priority and has integrated it into the country's planning processes. It has strengthened the capacity of national and local institutions to reduce risk *ex ante*, to plan for potential disasters, and to respond efficiently in the event of an adverse natural event. The Government also considers DRM as a tool to address climate change adaptation (CCA) by strengthening resilience to climatic extreme events.

Figure 1.2. Flow Chart of the Civil Protection System (SINAPROC) in Mexico



Source: Authors, from Mexican Civil Protection (2010).

Establishment of Mexico's Natural Disaster Fund (FONDEN)

Despite the adoption of SINAPROC, government agencies were still regularly required to reallocate planned capital expenditures toward financing post-disaster reconstruction efforts. Budget reallocations created delays and scaling back of investment programs, while also slowing deployment of funds for recovery efforts. In response, in 1996, the GoM introduced the Natural Disaster Fund (*Fondo Nacional de Desastres Naturales*), commonly known as FONDEN, as an inter-institutional financial vehicle for natural disasters.

FONDEN's original mandate was to ensure that adequate financial resources were immediately available in the aftermath of a natural disaster to finance the reconstruction of public infrastructure and low-income housing without compromising existing budgetary plans and approved public programs.

FONDEN was established as a line item (line 23) in the annual Federal Expenditure Budget.

FONDEN has evolved significantly since its creation. The GoM has introduced various changes to its operating rules and procedures to improve the overall efficiency of its resources, and a budget account for disaster prevention has been created under FONDEN to further strengthen disaster risk management. Changes are published in the *Official Diary of the Mexican Federation*. Of particular note, in 2006, budget shortfalls for post-disaster reconstruction led to the introduction of a law that requires the Ministry of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público* or SHCP) to commit a fixed percentage of its annual budget to FONDEN and to the Agricultural Fund for Natural Disasters (*Componente de Atención a Desastres Naturales* or CADENA), which is managed by the Ministry of Agriculture. According to Article 37 of Mexico's Federal Budget Law, this annual allocation together with

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the uncommitted funds from the previous fiscal year cannot be less than 0.4 percent of the total Federal budget, approximately US\$800 million per annum. On average, 87 percent of this annual appropriation goes to FONDEN.

At the end of 2010, further significant changes were made to FONDEN that simplify its procedures and streamline reconstruction activities by concentrating responsibility for reconstruction with FONDEN resources within the federal agencies, rather than spreading them across both federal and state agencies. Box 1.1 below describes the key dates in the evolution of FONDEN. Further details on the current structure, nature, and role of FONDEN and related legal and institutional arrangements are provided in Chapter 2.

FONDEN will continue to evolve to improve the efficacy and efficiency of its operations as well as to respond to increasing exposure to natural disasters in Mexico. For example, in response to the upward trend in potential scale of natural disaster losses at the state and federal level, FONDEN, in partnership with the Ministry of Finance and Public Credit (SHCP) and the General Coordination of Civil Protection, is considering incorporating new financial instruments to increase capacity for larger-scale responses. FONDEN is also promoting a comprehensive risk management approach to deal with disaster risk (see Chapter 5).

Box 1.1. Key Dates in the Evolution of DRM & FONDEN in Mexico

1985: Soon after the devastating earthquakes in Mexico in September, the National Commission for Reconstruction is created to conduct a study on the establishment of a national system of civil protection.

1986: The Official Diary of the Federation publishes the study “Basis for the Establishment of the National System of Civil Protection” in May.

1988: The Vice Ministry of Civil Protection, Prevention, and Social Recovery and the General Directorate of Civil Protection are created in the Ministry of Interior (SEGOB), which is mandated to establish the mechanisms, systems, and organizations to better assist populations affected by future disasters.⁵

1996: Mexico's Natural Disaster Fund, FONDEN, is created as a line item in the Federal Expenditure Budget (Budget line 23 of the ‘Economic Provisions’ budget) to ensure that resources are made available to efficiently finance the post-disaster reconstruction and restoration of damaged public infrastructure, low-income housing, and forestry, protected natural areas, rivers, and lagoons. The program is introduced as a budgetary instrument administered by the Ministry of Finance and Public Credit (SHCP).

1999: A first set of rules is established to provide general guidance on damage assessments and access to FONDEN resources, including regulations on the mechanisms, requirements, procedures, milestones, and deadlines to be met by state and federal agencies. The Federal FONDEN Trust is established. SEGOB becomes the coordinator of FONDEN and the entity in charge of issuing and publishing declarations of natural disasters.

2000: FONDEN's operating procedures are modified to include emergency declarations and the establishment of sector committees to support damage assessments. Representatives from both federal and state governments are designated to participate in joint damage assessments to determine the level of FONDEN resources required in response to eligible disaster events. Legal agreements are also established with each of the 32 state governments, creating state trust accounts to hold FONDEN resource allocations for specific disasters.

continues

5 The Vice Ministry of Civil Protection, Prevention and Social Recovery used to sit above the General Directorate of Civil Protection. In 2001, the Organic Law for Public Administration was reformed to create a new Ministry of Public Security. The Vice Ministry of Civil Protection, Prevention, and Social Recovery was then disbanded, and the General Coordination of Civil Protection was created within the Ministry of Interior.

Box 1.1. Key Dates in the Evolution of DRM & FONDEN in Mexico (cont.)

2002: The Natural Disasters Preventive Trust, FIPREDEN, is created under Article 32 of the General Law of Civil Protection to support federal agency and state government preventive actions in case of imminent and potentially adverse events that could not have been foreseen.

2003: The Fund for Natural Disaster Prevention, FOPREDEN, is created through Decree Sections 3 and 4 of the General Law of Civil Protection to support federal agency and state government investments in risk identification and risk reduction. SEGOB is designated responsibility for the coordination of FOPREDEN.

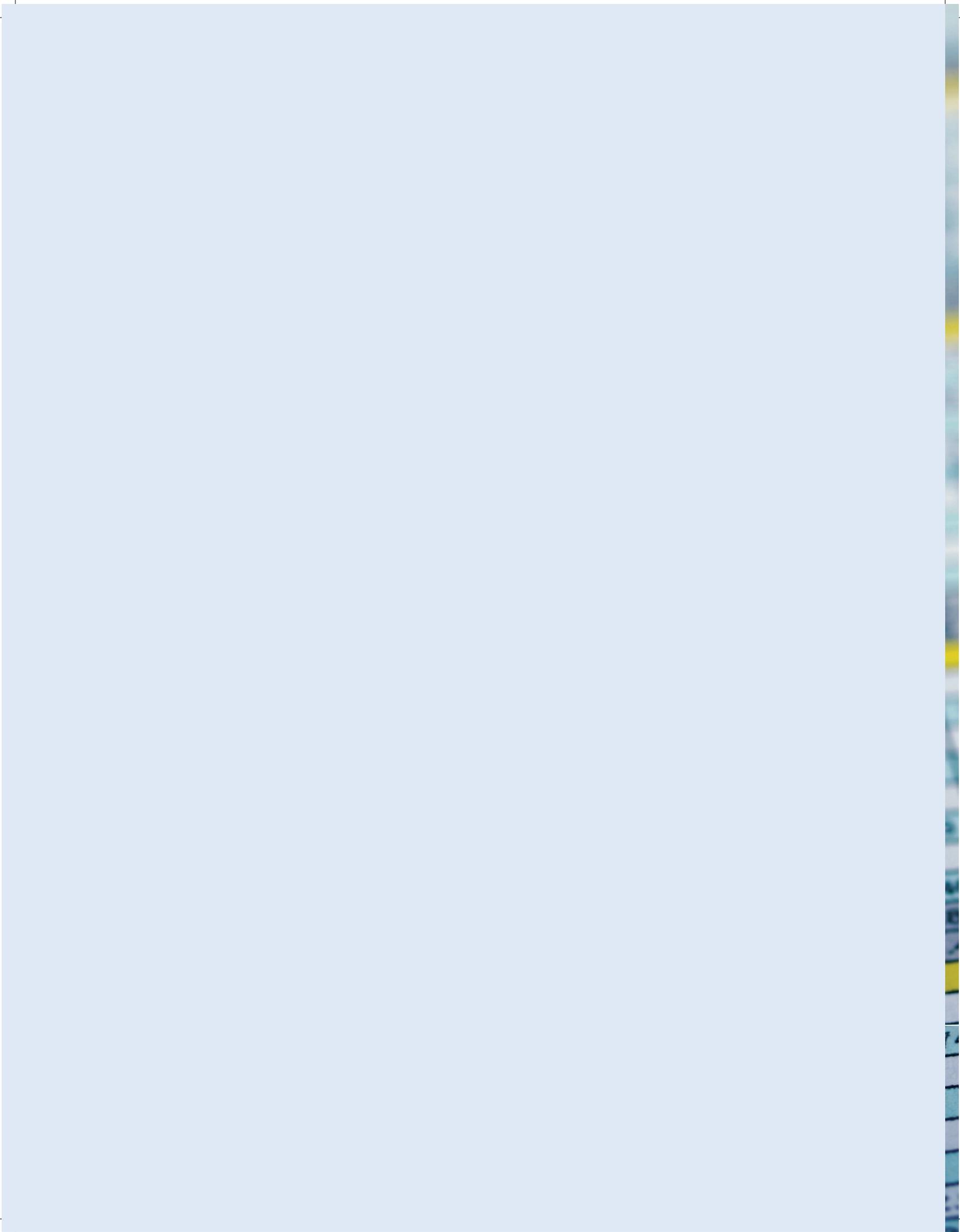
2004: FONDEN's operating rules are revised to give state governments a more prominent role in accessing post-disaster resources. The new rules indicate that the Fund's resources will be made available to state governments within 23 working days.

2006: A new Federal Budget Law is approved to address the regular shortfall in FONDEN's budgetary resources. Article 37 of Mexico's Federal Budget Law requires the SHCP to commit an annual percentage (no less than 0.4 percent) of its annual federal budget to FONDEN and related activities. Additional modifications are made to FONDEN's rules to simplify its allocation approval process and thereby further expedite resource authorizations. FONDEN issues the world's first government catastrophe (cat) bond, Cat MEX (US\$160 million), which is combined with a parametric reinsurance scheme (US\$290 million) for coverage against earthquakes totaling US\$450 million (US\$150 million for each zone) and a three-year maturity.

2009: Further reforms are adopted to expedite approval of FONDEN resources and a new mechanism is introduced to provide "Immediate Partial Support" (referred to as Apoyos Parciales Inmediatos – APIN) to finance urgent post-disaster actions while the full damage assessment and fund approval process is undertaken. These advance payments are later reconciled with the approved allocation. With assistance from the World Bank, FONDEN issues a multi-peril cat bond, covering hurricane and earthquakes risks in specific regions of the country for an amount of US\$290 million, to replace Cat MEX.

2010: At the end of the year FONDEN issues new rules and guidelines whereby federal agencies are assigned responsibility for the management of all federal and 50 percent of state infrastructure reconstruction works. FIPREDEN and FOPREDEN are merged into one single window for prevention. New operating rules are also announced for the preventive window in December 2010. Major disasters (including hurricanes and floods) affect several Mexican States, resulting in the approval of 58 requests for FONDEN support.

2011: A new Reconstruction Fund for state-level governments is introduced on a pilot basis as part of Mexico's 2011 Federal Budget. In June, FONDEN places in the international reinsurance market a US\$400 million insurance coverage in excess of a US\$1 billion FONDEN expenditure in reconstruction of public assets and low income housing.



FONDEN Mandate and Financial Accounts

FONDEN is central to the GoM's ability to enact swift response and reconstruction efforts in the aftermath of a disaster. Financing post-disaster reconstruction is the core of FONDEN's mandate – FONDEN's primary budget and financial accounts, the FONDEN Program for Reconstruction and the FONDEN Trust, respectively, are the mechanisms used to execute this work. In addition to these accounts, FONDEN has evolved to include preventative budget and financial accounts, FOPREDEN and FIPREDEN, to finance investment in disaster risk reduction. This chapter provides an overview of FONDEN's mandate and administrative structure as well as descriptions of FONDEN's budget and financial accounts and flow of funds.

FONDEN's Mandate and Scope of Activities

FONDEN is an instrument for the coordination of intergovernmental and inter-institutional entities to quickly provide funds in response to natural disasters without compromising existing budgetary plans and approved public programs. FONDEN is anchored within SINAPROC, and is administered by SEGOB. The mandate of FONDEN is threefold: (i) to finance emergency assistance to affected populations in the aftermath of a natural disaster; (ii) to finance post-disaster rehabilitation and reconstruction of public infrastructure (including the restoration of certain components of the natural environment); and (iii) to finance the rehabilitation and reconstruction of low-income housing. Box 2.1 defines “disaster” under Mexican Law and lists the main types of natural events eligible for FONDEN support.

FONDEN resources can be made available for the recovery and reconstruction of both federal and state infrastructure. To access FONDEN resources, the affected federal and state agencies must demonstrate that the magnitude of reconstruction needs exceeds their financial capacity and file specific request detailing the extent of the damage and estimated cost of reconstruction. FONDEN does not provide direct support to municipalities. State governments, however, have traditionally applied for FONDEN resources to restore municipal assets and have then provided municipalities with assistance for the execution of these resources.

Box 2.1. Overview of definition of natural disasters and qualifying events for FONDEN under Mexican Law

Mexico's Civil Protection Law defines a disaster as “... a situation in which the population of one or more state entities suffers severe damage from the impact of a natural or man-made disaster calamity, resulting in loss of life, infrastructure, or environment, in a way that disrupts the social structure and disturbs the essential activities of society, affecting livelihoods.”

Main Types of Adverse Natural Events Eligible for FONDEN Support:

Geological	Hydro-meteorological	Other*
Avalanche	Severe hail	Forest fire
Volcanic eruption	Hurricane	
Tsunami	River flooding	
Slope movement	Rain flooding	
Extreme wave	Severe rain	
Earthquake	Severe snow	
Subsidence	Severe drought	
	Tropical storm	
	Tornado	

* Damage resulting from any other natural phenomenon or weather situation with characteristics similar to the phenomena listed above, in terms of origin, frequency and severity of impact, can also be considered for FONDEN resources.

Source: FONDEN (2011).

FONDEN's Budget & Financial Accounts

FONDEN's primary budget and financial accounts are the FONDEN Program for Reconstruction and the FONDEN Trust, respectively. A number of subaccounts for specific applications have been established under the FONDEN Trust, such as the Revolving Fund, which provides resources for immediate relief in the

aftermath of a disaster. In addition, the GoM has established a smaller budget and linked financial account for ex ante disaster risk management, the Natural Disaster Prevention Fund (*Fondo para la Prevención de Desastres Naturales* – FOPREDEN) and its trust account, *Fideicomiso Preventivo*, or FIPREDEN. Each of these budget and financial accounts are discussed in depth below. Table 2.1 provides a summary of FONDEN’s budget and financial accounts.

FONDEN, comprising all of these accounts, is required by Mexico’s Federal Budget Law (Article 37) to receive no less than 0.4 percent of the federal budget at the beginning of each fiscal year⁶. This

amount is net of uncommitted funds for the previous fiscal year; in 2011, US\$800 million was approved for FONDEN. This amount is primarily allocated to the FONDEN Program for Reconstruction, with about US\$25 million allocated to FOPREDEN. Figure 2.1 illustrates FONDEN’s resource allocation process, including post-disaster financial flows. FONDEN is responsible for allocating resources in accordance with its operating rules. Any funds that are unutilized at the end of the fiscal year are transferred to the FONDEN Trust (80 percent of unused funds) and FIPREDEN (20 percent) as reserves for use in subsequent years.

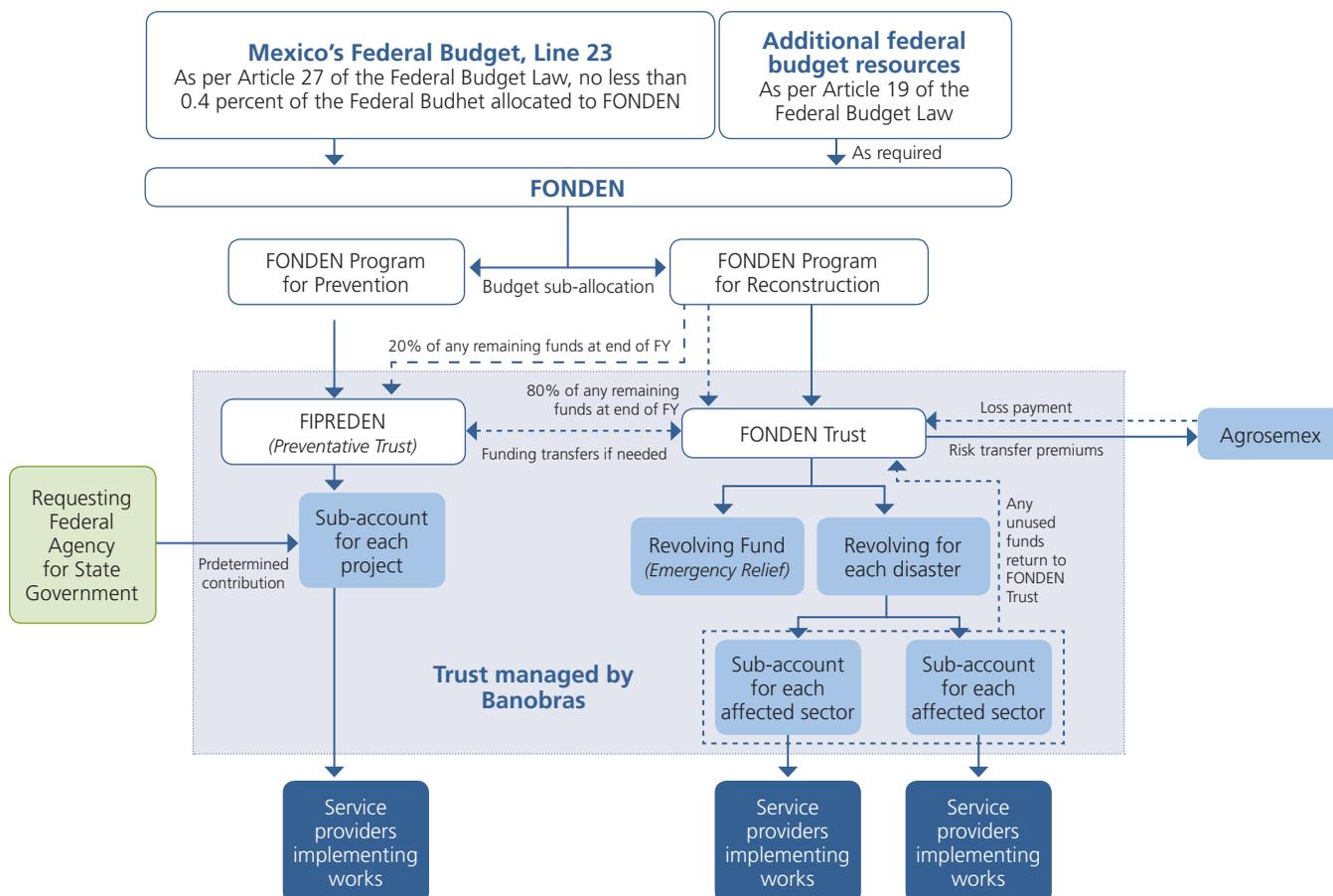
While the original, and still the primary, budget account created under FONDEN is the FONDEN Pro-

⁶ This allocation also includes a small amount for CADENA, the Agricultural Fund for Natural Disasters.

Table 2.1. Overview of FONDEN’s Financing Instruments

Purpose	Instruments and activities	
Reconstruction Budget and Financial Accounts		
Recovery, reconstruction, and contracting of risk transfer instruments	<p>FONDEN Program for Reconstruction: A budget account that provides resources for the rehabilitation and reconstruction of uninsured or underinsured public assets. The FONDEN Program for Reconstruction focuses on: (i) financing emergency assistance to affected populations in the aftermath of a natural disaster; (ii) financing post-disaster rehabilitation and reconstruction of public infrastructure (including the restoration of certain components of the natural environment); and (iii) financing the rehabilitation and reconstruction of low-income housing.</p>	
	<p>FONDEN Trust: A financial account managed by BANOBRAS through which resources from the FONDEN Program for Reconstruction are funneled. Once funding is approved for a specific program, these resources will be held in a dedicated sub-account of the FONDEN Trust. The FONDEN Trust (through BANOBRAS as the fiduciary agent) also acts as the contracting authority for insurance and other risk transfer instruments.</p>	
	Aid supplies and emergency response	<p>Revolving Fund: An instrument that is financed by the FONDEN Trust that provides resources for the acquisition of aid supplies to respond to the immediate needs of the population affected by a natural disaster. Qualifying expenditures include, among others, medicine, food, water, cleaning supplies, and temporary shelter supplies.</p>
Prevention Budget and Financial Accounts		
Risk identification and risk reduction	<p>FOPREDEN: A budget account that provides resources to support ex ante proactive risk management activities, which include (i) identification and assessment of hazards, exposure, and vulnerabilities; (ii) ex ante disaster risk reduction and mitigation activities; and (iii) local community capacity building around disaster prevention.</p>	
	<p>FIPREDEN: A financial account managed by BANOBRAS through which resources from FOPREDEN are funneled to approved preventative activities.</p>	

Figure 2.1. FONDEN's Resource Allocation Process



Source: Authors, from FONDEN (2011).

gram for Reconstruction, over the years, the addition of sub-accounts under the FONDEN Trust and the preventative accounts has enabled FONDEN to provide more effective financing for the disaster risk management cycle. The addition of FOPREDEN, for example, has helped the GoM to begin to transition from a reactive approach to disasters to a preventative approach by making resources available at the federal and state level for investment in prevention. And FONDEN continues to evolve as its administrators recognize vulnerabilities in Mexico's defences against disasters. For example, FONDEN plans to introduce state-level natural disaster funds in recognition of the need for improved reconstruction financing for local assets. Figure 2.2 illustrates the role of FONDEN instruments in the DRM cycle in Mexico.

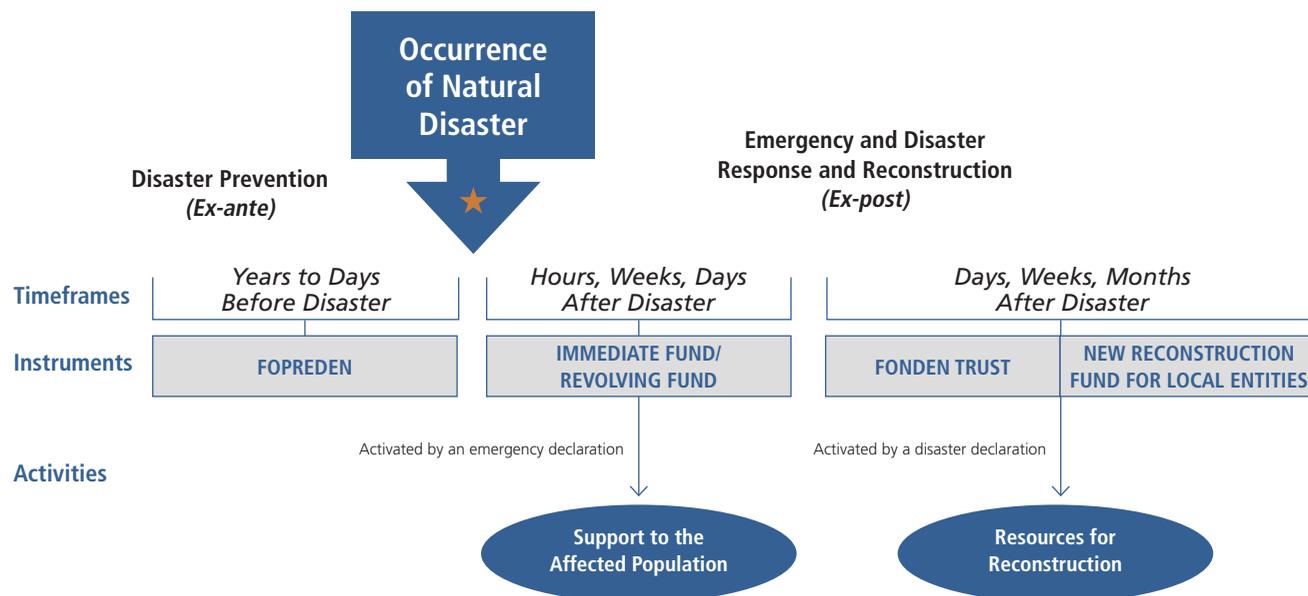
FONDEN's accounts for post-disaster financing

FONDEN Program for Reconstruction

The FONDEN Program for Reconstruction is FONDEN's primary budget account. As discussed above, this account receives the budget transferred to FONDEN for post-disaster activities at the beginning of the fiscal year. Its primary purpose is to channel resources for the reconstruction of public infrastructure, (uninsured) low-income housing, and restoration of forestry, protected natural areas, rivers, lagoons, and other natural resources affected by adverse natural events⁷. In the aftermath of a

⁷ Damage to the agricultural (crop and livestock) sector is covered by a special fund, known as CADENA, which is the Natural Disasters Attention Component of the Agricultural,

Figure 2.2. Role of FONDEN's Instruments in Mexico's National System of Civil Protection



★ All federal plans and programs are activated for disaster response

Source: FONDEN (2011).

disaster, funds committed to a specific reconstruction program are transferred to a subaccount under the FONDEN Trust for execution. Funds from the FONDEN Program for Reconstruction can also be transferred to FIPREDEN to finance prevention activities. At the end of the fiscal year, 80 percent of uncommitted funds in the FONDEN Program for Reconstruction are transferred to the FONDEN Trust and 20 percent are transferred to FIPREDEN to build reserves.

While in recent years (2005-2010) FONDEN has spent, on average, US\$789 million, in some years with high occurrences of disasters, its costs run significantly higher than its approximately US\$800

million budget. Should resources made available to FONDEN at the beginning of the year prove insufficient, Article 19 of the Federal Budget Law allows for exceptional budget allocations to be made to FONDEN. In this case, SHCP is allowed to allocate resources from the federal budget surplus directly to FONDEN. To date, Mexico's oil revenue surplus has been the main source of additional resources for FONDEN. When there is no excess revenue in a given fiscal year, Article 32 of Mexico's Civil Protection Law stipulates that SHCP should seek transfers from other programs to provide FONDEN with sufficient financing to cope with natural disasters.

FONDEN Trust

The main purpose of the FONDEN Trust is to hold federal resources approved by FONDEN Technical Committee for specific reconstruction programs and to hold resources for emergency relief in the Revolving Fund. The FONDEN Trust (through its fiduciary agent, BANOBRAS) also acts as financial vehicle to

Livestock, and Fishery Sector of the Prevention and Risk Management Program managed by the Ministry of Agriculture, Livestock, and Rural Development. Damage to infrastructure, however, for fisheries and aquaculture, as well as restoration of lagoon systems, coastal estuaries, bays, and inland waters within the public domain can be covered by FONDEN in accordance with its General Rules and Specific Operating Guidelines.

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purchase risk transfer instruments such as insurance and catastrophe (cat) bonds.

The FONDEN Trust is managed by BANOBRAS, Mexico’s national development bank for public works and services, which acts as fiduciary agent and trustee for the resources transferred to the FONDEN Trust. Transfers to the FONDEN Trust are approved by SHCP. In accordance with the “Specific Operating Guidelines for the Natural Disaster Fund” published on January 31, 2011, the FONDEN Trust honors payments for reconstruction activities upon

submission of invoices and other documentation by implementing entities. The FONDEN Technical Committee directs payments from the FONDEN Trust to the submitting federal agencies or service providers. This committee is chaired by SHCP and meets every trimester, although additional meetings can be called as necessary. Table 2.2 lists the members of the FONDEN Technical Committee and respective voting authority of each of its representatives at the federal level. Annex 4 lists the members of the FONDEN Technical Committees at both the federal and state level.

Table 2.2. Members of the FONDEN Federal Technical Committee and their voting authority*

Technical Committee Member	Voting Authority
Two Representatives of the Ministry of Finance and Public Credit	Voting Power
Representative of the Ministry of Interior (SEGOB)	Voting Power
Representative of the Ministry of Civil Service	Observer Status (No Voting Authority)
Representative of BANOBRAS as the Fiduciary Agent of the FONDEN Trust (Permanent invitation with mandatory attendance required at all Technical Committee meetings)	Observer Status (No Voting Authority)

Source: FONDEN (2011).

* All representatives designate an alternate to ensure participation. In the rest of the text, the Committee is referred as the FONDEN Technical Committee

The FONDEN Trust can also be used to pay premiums and receive any loss payments from risk transfer instruments, such as insurance and cat bonds⁸; its experience with these risk transfer instruments is described in Chapter 4. In addition to the financing of post-disaster reconstruction activities, the FONDEN Trust is able to provide resources for preventive projects by transferring resources to FIPREDEN if necessary.

FONDEN Revolving Fund

The Revolving Fund, also referred to as the Immediate Fund, is FONDEN’s small, flexible financial instrument to support emergency activities immediately

prior to or upon occurrence of a disaster. The Revolving Fund is structured as an instrument financed by the FONDEN Trust and provides resources for immediate response and for the acquisition of emergency supplies. It allows FONDEN to provide humanitarian assistance directly to an affected population through local service providers before, during, and after a disaster; such assistance may include food and medical supplies, articles for temporary shelter (such as blankets and mattresses), search and rescue equipment, and other relief items.

The Revolving Fund is managed within SEGOB through the National System of Civil Protection. Although the Revolving Fund is financed by the FONDEN Trust, it operates under its own rules, governed by the “Agreement establishing the guidelines for issuing declarations of emergency and the use of the Revolving Fund,” as published in the *Official Journal*

⁸ Stipulated in Article 4, Section V and 21 of FONDEN’s General Rules and paragraphs 35 to 37 of the FONDEN Guidelines.

of the Mexican Federation on December 31, 2008. A declaration of emergency is required in order for states to request urgent support from the Revolving Fund. The state’s request must include an explanation of the purpose(s) of the goods or services requested and an indication of the number of affected people that would be supported. Figure 2.3 outlines the design and functional differences between the Revolving Fund and a reconstruction subaccount under the FONDEN Trust.

Figure 2.3. Activation Triggers and Timing of FONDEN’s Resource Allocations

	Financing Instruments	
	Revolving Fund (Immediate Fund)	FONDEN Trust Reconstruction Subaccount
ACTIVATION TRIGGER*	Declaration of Emergency	Disaster Declaration
RESOURCES PROVIDED	Acquisition of Aid Supplies and Human Rescue Efforts	Reconstruction of Public Infrastructure and Low-Income Housing
POST-DISASTER PHASE	Emergency	Recovery and Reconstruction
FUND ALLOCATION AFTER EVENT OCCURRENCE	Within Hours to Months	Within Days to Months

Source: FONDEN (2011).

* All federal plans and programs are activated for disaster response once triggered.

The Directorate General of FONDEN considers the validity of requests for support under criteria issued by the General Coordination of Civil Protection. If approved, the Directorate General of FONDEN submits the requests to SEGOB’s Directorate General of Resources, Materials, and General Services (DGRMSG). The DGRMSG fulfills the requests by procuring the goods and/or services, which are delivered to the requesting states for distribution to the affected populations in municipalities under the declared state of emergency. The invoices, containing a detailed breakdown of the products ordered and delivered, are submitted to the Directorate General of FONDEN. Delivery notices are also included, pro-

viding a breakdown of all products received. These invoices are then forwarded to SHCP, which calls for a FONDEN Technical Committee meeting, in order for the payment of the invoices from the Revolving Fund to be approved under the FONDEN Trust. FONDEN’s fiduciary agent, Banobras, transfers the approved funds directly to the suppliers and service providers.

The Revolving Fund is financed through the annual budget appropriation for FONDEN’s Program for Reconstruction. This appropriation is allocated to the Revolving Fund through the FONDEN Trust as needed. Since its inception, it is estimated that allocations to the Revolving Fund have averaged less than 10 percent of the total resources used for FONDEN’s post-disaster activities.

FONDEN’s accounts for prevention financing

FOPREDEN and FIPREDEN

El Fondo para la Prevención de Desastres Naturales, commonly referred to as FOPREDEN, is FONDEN’s primary mechanism to support investment by the GoM in ex ante risk reduction. The “new” FOPREDEN was established in 2010 as the second generation tool of the GoM to support disaster prevention; its predecessors, which were merged to form the “new” FOPREDEN, are the Preventative Trust (Fideicomiso Preventivo, or FIPREDEN) and “old” FOPREDEN. FIPREDEN and the “old” FOPREDEN were established in the early 2000s to help the GoM achieve its long-term objective to transition from a reactive disaster management system to an integrated disaster risk management system focused on ex ante risk reduction. FIPREDEN’s original mandate was to finance preventative actions in cases of imminent adverse events that could not be foreseen, while FOPREDEN financed investment in risk identification and risk reduction. In the “new” FOPREDEN, FIPREDEN functions as FOPREDEN’s financial trust (akin to FONDEN Trust for the FONDEN Program for Reconstruction).

The mandate of the “new” FOPREDEN merges and builds on the mandates of its predecessors. Preventive actions financed by the “new” FOPREDEN focus on: (i) identification and assessment of hazards, exposure, and vulnerabilities; (ii) ex ante disaster risk reduction and mitigation activities; and (iii) local community capacity building around disaster prevention. FOPREDEN is administered by SEGOB's General Coordination of Civil Protection. The General Coordination of the Civil Protection, through the General Directorate of FONDEN reviews applications to FOPREDEN to ensure that the projects are solely focused on preventative actions against natural disasters and that they enable technical support to be provided for cases where there have been previous efforts to assess and better manage high priority risks. Before the General Coordination of Civil Protection will consider a state's application for a project to invest in risk mitigation, the state must conduct a risk assessment and produce a risk atlas.

Project proposals can be presented for financing from FIPREDEN throughout the year. A Technical Committee (similar to the FONDEN Technical Committee) reviews and approves the proposals, and Banobras acts as the FIPREDEN's fiduciary agent. As with reconstruction projects under the FONDEN Program for Reconstruction, there is cost-sharing between the federal and local governments for prevention projects under FOPREDEN. Unlike the FONDEN Program for Reconstruction, however, the percentage varies depending on the type of project and the level of marginalization of the state or municipalities in which the project will be implemented. Also different from the FONDEN Program for Reconstruction, under FOPREDEN, the applicant (whether a federal or state entity) for FOPREDEN funding must deposit its predetermined contribution to the project's subaccount in FIPREDEN before the project can commence. FOPREDEN's rules are articulated in the “Agreement setting out the rules of operation of the Fund for Natural Disaster Prevention (FOPREDEN),” published in the *Official Journal of the Federation* on December 23, 2010. See Box 2.2 for an example of a FOPREDEN-financed project in Mexico City.

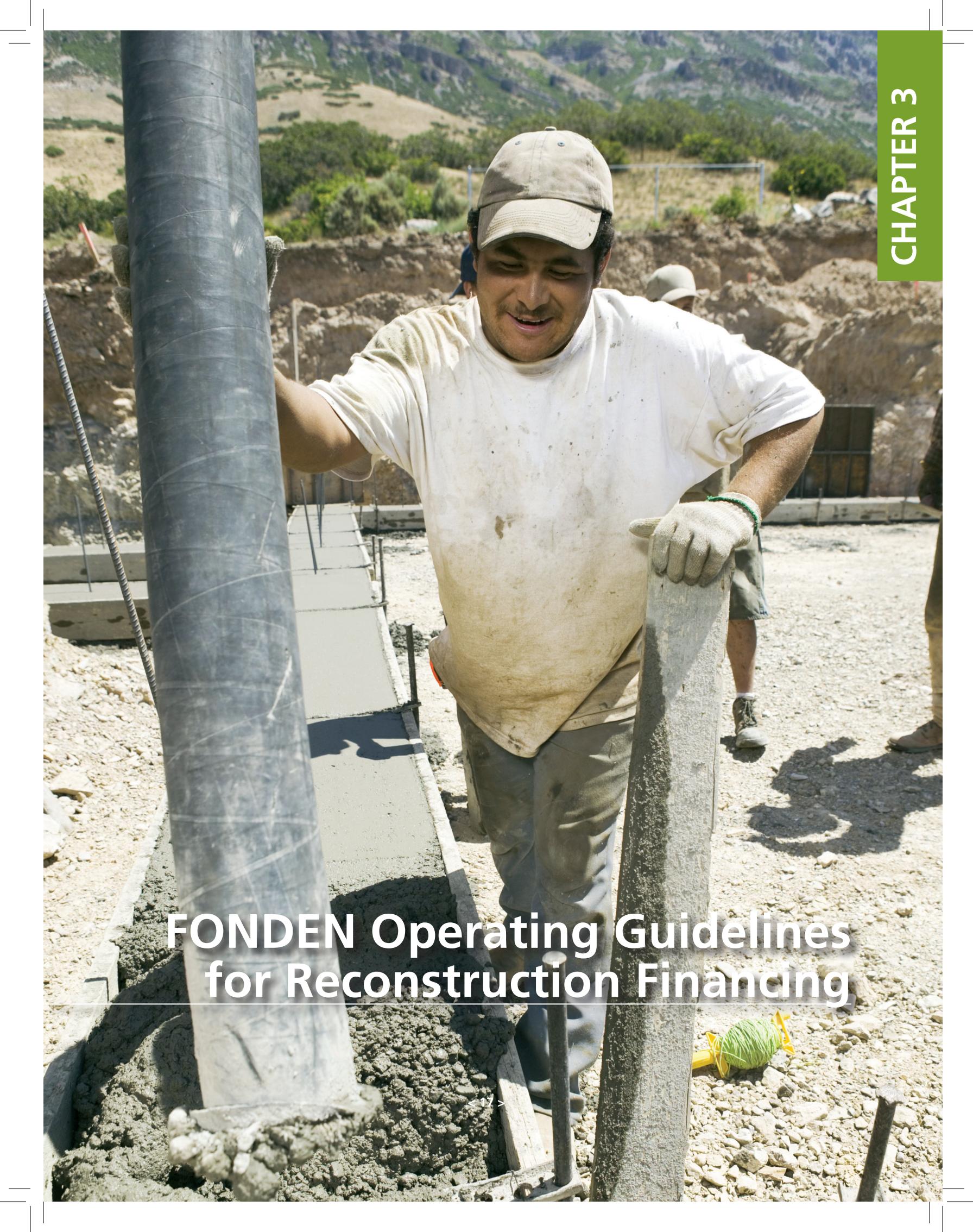
FOPREDEN receives an annual budget allocation each year through line 23 of the Federal Budget amounting to around US\$25 million. In addition, at the end of each fiscal year, 20 percent of any uncommitted funds in the FONDEN Program for Reconstruction are transferred to FIPREDEN. If needed, FIPREDEN can receive transfers from the FONDEN Trust. Conversely, uncommitted funds can be transferred from FOPREDEN or FIPREDEN into the FONDEN Trust if additional resources are needed for post-disaster activities. Any funding remaining in FOPREDEN's ordinary budget (line 23) allocation at the end of the fiscal year are transferred to FIPREDEN to build reserves, rather than reverting to the Federal Treasury.

Box 2.2. Improving early estimation of trapped persons in case of earthquake in Mexico City

The September 19 and 20, 1985, earthquakes that devastated Mexico City took the lives of 6000 people – and the potential for an earthquake to inflict major fatalities in Mexico City remains high, particularly depending on the time of day that an earthquake would strike. The ability to map damaged buildings, infrastructure, and the dispersion of potential victims in real-time following an earthquake could save the lives of people trapped in damaged, unstable buildings and under collapsed infrastructure.

For this reason, in 2010 the Distrito Federal was approved to use FOPREDEN resources to develop studies that will enable the establishment of a system to generate maps which allow authorities to have an early estimation of potential victims and damages of strategic assets and infrastructure within 15 minutes of the beginning of a seismic occurrence. With this information, the Civil Protection Department can have an informed probabilistic view of damage scenarios to improve quality and speed of decision making in alignment with protocols for emergency response.

Source: FONDEN (2012).

A construction worker wearing a white t-shirt, a tan baseball cap, and work gloves is working on a concrete structure. He is leaning on a vertical concrete pillar and holding a wooden plank. The background shows a construction site with a large concrete pillar, a gravel area, and a mountainous landscape under a clear sky. The text "FONDEN Operating Guidelines for Reconstruction Financing" is overlaid on the bottom half of the image.

**FONDEN Operating Guidelines
for Reconstruction Financing**

The FONDEN operating guidelines are designed to ensure the time-efficient disbursement of appropriate levels of reconstruction financing while balancing accountability and transparency concerns. The process for accessing and executing reconstruction financing can be broken into four phases: (i) declaration of a natural disaster; (ii) damage assessment and request for FONDEN resources; (iii) disbursement of resources and implementation of reconstruction activities; (iv) public reporting on post-disaster activities. FONDEN continues to innovate to improve its operations throughout these phases; for example, it has been an early mover in adopting information technology to streamline the damage assessment process and has adopted a “build back better” approach to reconstruction financing. This chapter presents the FONDEN approach to post-disaster reconstruction financing and highlights some of FONDEN’s forward-looking practices.

Overview

FONDEN’s Program for Reconstruction, with its resources allocated through the FONDEN Trust, forms the cornerstone of building back (and building back better) in a timely manner following a disaster in Mexico. The Program’s operating guidelines are intended to ensure time-efficient disbursement of financial resources for reconstruction of federal and state assets, with cost-sharing between federal and state governments for state assets, while prioritizing accountability for the execution of funds. As is true for the broader FONDEN system, this process continues to evolve; over the years, new features have been incorporated such as innovative information technology for damage assessment and the Immediate Partial Support Mechanism for urgent reconstruction needs, among others, to improve the efficiency, effectiveness, and transparency of this process.

SEGOB is responsible for the overall coordination of the post-disaster reconstruction process. It issues emergency and disaster declarations, announces these declarations in the *Official Journal of the Mexican Federation*, and coordinates the allocation of FONDEN resources. SEGOB also monitors the reconstruction of both federal and local infrastructure to ensure proper use of these resources. The overall process for accessing FONDEN support and executing related activities can be summarized in four main phases:

(i) Declaration of a natural disaster;

- (ii) Damage assessment and request for FONDEN resources;
- (iii) Disbursement of resources and implementation of reconstruction activities;
- (iv) Public reporting on post-disaster activities.

Each phase in the process to access and execute FONDEN resources for post-disaster reconstruction is discussed below. Further information on this process prior to changes made in early 2011 is available in Annex 5. Annex 6 provides an in-depth illustration of the new procedure to access and execute FONDEN resources discussed below. Finally, Annex 7 includes two case studies that outline the FONDEN process in the context of an earthquake in Baja California and a hurricane in Nuevo León.

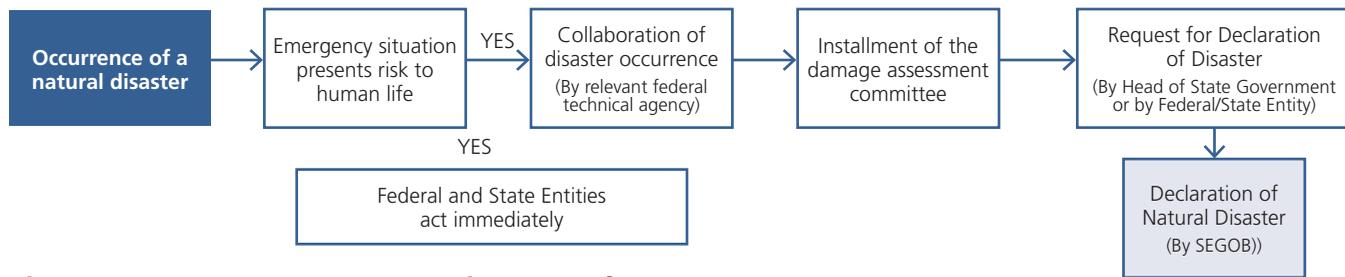
Phase 1: Emergency Declaration and Declaration of Natural Disaster

FONDEN financing is accessible upon SEGOB’s issuance of a declaration of natural disaster. Articles 29-37 of Chapter VI of the Mexican General Law of Civil Protection specify the requirements for declarations of disaster⁹. In the absence of such a declaration, requests for funding by federal agencies, line ministries, or state entities are ineligible.

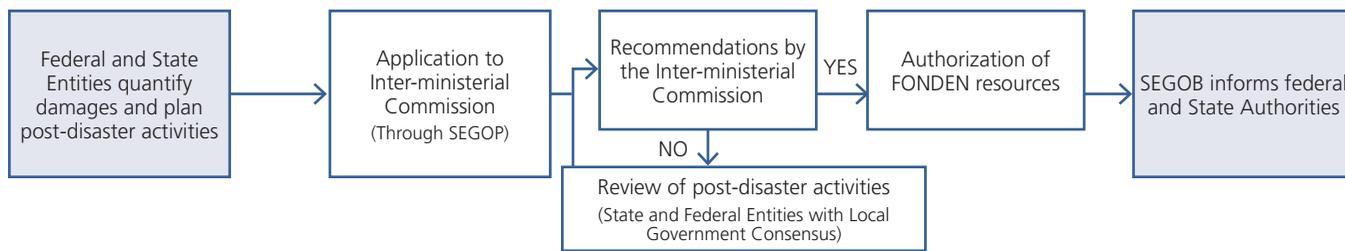
⁹ The requirement for declarations of emergency and disaster was originally foreseen in the General Law of Civil Protection which was published in the *Official Journal of the Mexican Federation* on May 12, 2000, even though previous FONDEN rules already contemplated that process.

Figure 3.1. Process to access and execute FONDEN resources for post-disaster reconstruction

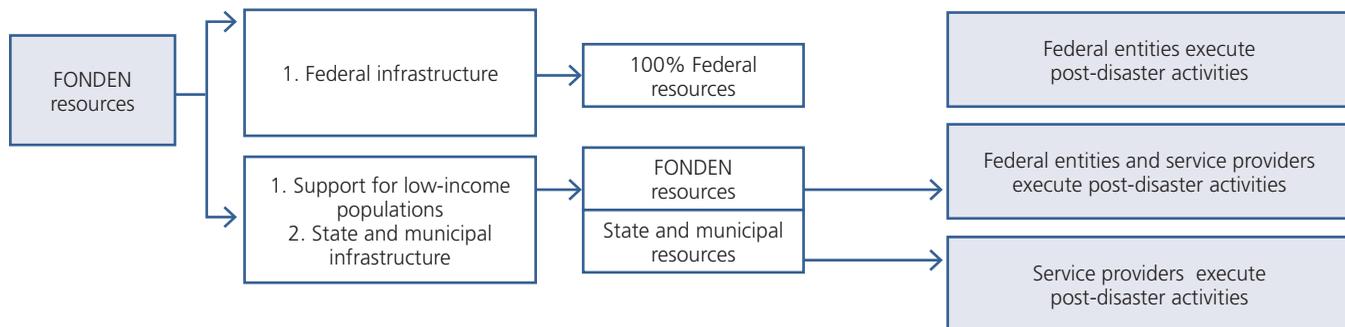
Phase 1: Occurrence and Declaration of a Natural Disaster



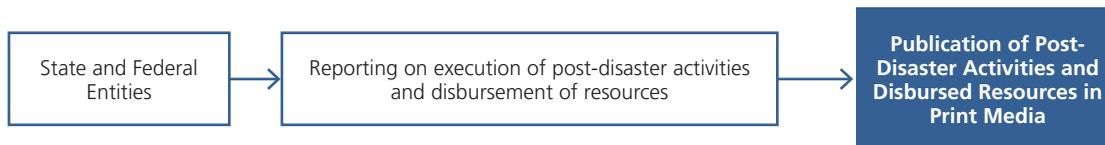
Phase 2: Damage Assessment and Request for FONDEN Resources



Phase 3: Disbursement of Resources and Implementation of Post-Disaster Activities



Phase 4: Dissemination of the Report on Post-Disaster Activities



Source: SHCP (2011).

SEGOB can issue a *declaration of natural disaster* if an adverse event has caused damage that exceeds local response capacity. Applications for the declaration of a disaster can be submitted to SEGOB by state governments, when disaster response and recovery needs exceed their operational and financial response capacity, and/or by federal agencies and line ministries.

Upon occurrence of a disaster, the governor(s) of the affected state(s) or relevant ministers must request the relevant technical federal agency to confirm within three days of an event the occurrence of a disaster in at least one municipality. Each technical federal agency is pre-assigned to events based on the types of natural hazards under its respective areas of responsibility (see Table 3.1). The technical agency fo-

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cuses its analysis on the severity of the natural disaster according to parameters defined by FONDEN rules and does not assess damage. The technical agency either confirms the occurrence of a natural disaster to FONDEN or denies that the event's impact is severe enough to merit the declaration of a natural disaster. In the latter case, the FONDEN process ends here.

If the technical agency issues a confirmation, then the application for the declaration of natural disaster is verified, and SEGOB has 12 calendar days to publish the declaration of natural disaster in the *Official Journal of the Mexican Federation*. State gov-

ernments and federal entities have 30 calendar days from the day the disaster declaration is published to submit documented request for FONDEN's financial support¹⁰. Box 3.1 discusses the frequency and interstate distribution of declarations of natural disasters in Mexico in recent years.

¹⁰ The General Law of Civil Protection allows for a longer 12 calendar days from the date of application for the declaration of a natural disaster to the issue of a disaster declaration. FONDEN's rules and guidelines are stricter and require that the declaration be published in the *Official Journal of the Mexican Federation* no later than four working days from the time of the request, whether or not the damage assessment process has been completed.

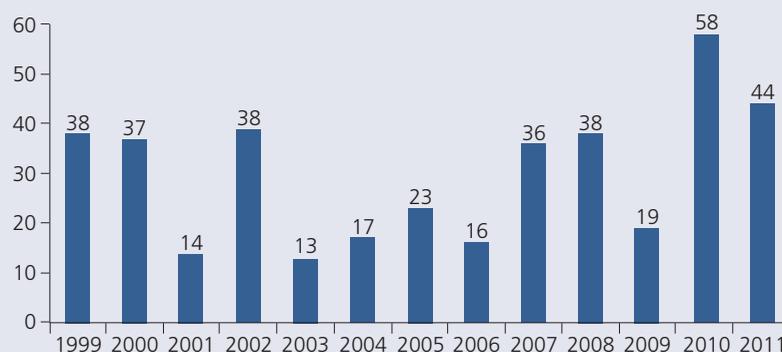
Table 3.1. Technical agencies responsible for confirming the occurrence of severe natural disasters

Technical agency	Natural hazard(s) under its responsibility
National Water Commission (CONAGUA)	Hydro-meteorological hazards
National Forestry Commission (CONAFOR)	Forest fires
National Center for Disaster Prevention (CENAPRED)	Geological and other hazards

Box 3.1. Frequency of declarations of natural disasters in Mexico

Between 1999 and 2011, Mexico experienced an average of 30 disaster declarations every year. 2003 was the year with least declarations (13), while 2010 counted the most with 58 declarations of natural disasters.¹¹

Declarations of Natural Disasters in Mexico by Year, 1999-2011



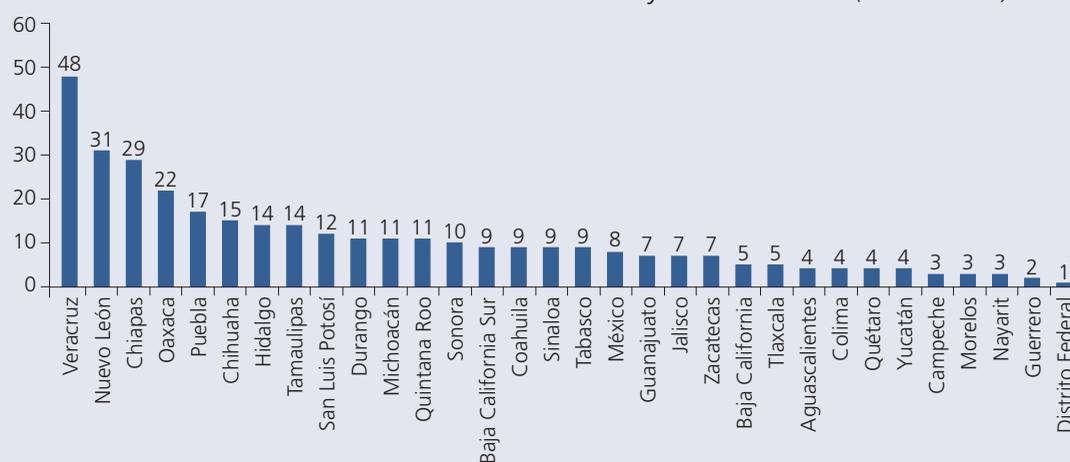
Source: FONDEN (2011).

¹¹ It should be noted that the number of disasters declaration in any given year is not necessarily indicative of the scale of disaster impact since the latter depends on the location, magnitude, number of municipalities declared, and geographical scale of each event.

Box 3.1. Frequency of declarations of natural disasters in Mexico (cont.)

The number of disaster declarations also varied considerably across states during this period. Veracruz experienced the most declarations by far, with 48, followed by Nuevo León and Chiapas, with 31 and 29, respectively.

Number of Declarations of Natural Disasters by Mexican State (1999-2011)



Source: FONDEN (2011).

Phase 2: Damage Assessment and Requests for FONDEN Resources

The Damage assessment process

FONDEN Operating Procedures prescribe that a Damage Assessment Committee is to be established within twenty-four hours following written confirmation by the relevant technical agency that a severe natural phenomenon has occurred in at least one municipality. The Damage Assessment Committee is comprised of both federal and state representatives from affected agencies. (See Box 3.2.)

Damage assessments are initiated at an opening session held by the Damage Assessment Committee. At this session, subcommittees are formed for each affected sector, such as housing, roads and bridges, hydraulic infrastructure, urban infrastructure, education, health, etcetera. Field work and site visits are then expeditiously conducted to assess the damage. The Damage Assessment Committee identifies affected public infrastructure at the federal, state, and municipal levels and determine the extent of losses

Box 3.2. Members of the Damage Assessment Committee Federal Government Representatives:

- Representative of the FONDEN General Directorate of the Ministry of Interior (SEGOB)
- Representative of the Policy and Budget Control Unit at Ministry of Finance and Public Credit (UPCP)
- Representatives of each affected Federal Ministry and Agency
- Additional Representatives (when applicable):
 - The Unit of Insurance, Pensions, and Social Security of the Ministry of Finance
 - The Responsible Technical Agency (as per Table 3.1)

State Government Representatives:

- State Governor who acts as Chairman of the Damage Assessment Committee (or a representative with delegated authority)
- Representative of the Ministry in charge of Budget and Public Expenditures
- Representative of the State Civil Protection Unit
- Representative of Local Control Authority
- Representatives of each affected Local Agency

Source: FONDEN (2011).

incurred. Each sector team has ten working days from the date of the Committee's establishment to assess the damage and confirm the resources needed for reconstruction. This period can be extended

by an additional ten working days in exceptional circumstances. FONDEN uses innovative information technology to ensure the efficiency and accuracy of this process. (See Box 3.4.)

Box 3.4. FONDEN's innovative use of information technology

FONDEN is a first-mover in the adoption of information technology for DRM applications. FONDEN has implemented geocoding and digital image capture to provide evidence of damage in affected sectors while improving the accuracy of post-disaster damage assessments. The use of geo-referencing also facilitates the expeditious collection and recording of data on disasters' impacts. The approach allows for increased transparency and precision in the damage assessment process while reducing errors. The geocoding and digital image capture process entails three key steps, summarized below.

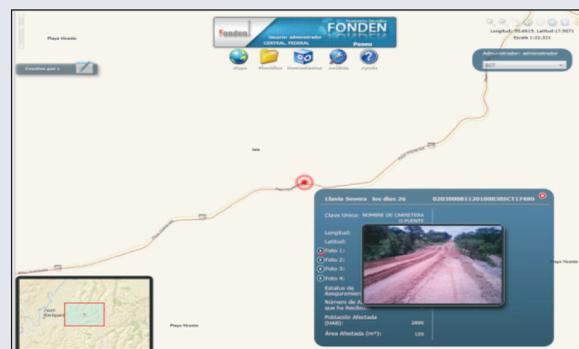
Examples of handheld devices used to collect information on damaged infrastructure



Step 1: Collecting information on damaged infrastructure by using georeferenced photos

Every agency requesting FONDEN support following a disaster must submit at least four georeferenced photographs for each reconstruction work requested. Pictures must be georeferenced and uploaded to FONDEN's automated system for submission to the Damage Assessment Committee as evidence of the impact of the disaster in their sector. The georeferenced photographs are complemented by polygons, which provide visuals of the affected area, and by data quantifying the damage in each sector. As part of damage assessment, the Damage Assessment Committee uses handheld devices with GIS capabilities to collect information and take pictures of damaged infrastructure, including the location and the date.

Geo-referenced image of damage caused by severe rain in Mexico



continues

Box 3.4. FONDEN’s innovative use of information technology (cont.)

Step 2: Capturing the information online

The Directorate General of FONDEN compiles these records into a validated system of requests for FONDEN resources and creates an inventory of post-disaster activities.

Step 3: Storing the information in FONDEN’s database

The pictures are stored in a database for subsequent analysis of future risk reduction. The data are used regularly for information requests, preparation of graphics and statistics, calibration of loss models, validation of past FONDEN support to reconstruction of public infrastructure, and identification of insured infrastructure.

Source: FONDEN (2011).

The request for funding process

In order to apply for FONDEN resources, both federal and state agencies must demonstrate that the scale of relief and reconstruction requirements exceeds the resources earmarked in their programs to manage natural disasters.

Within ten days of the establishment of the Damage Assessment Committee, each subcommittee presents its findings on the identification and quantification of damage and related reconstructed needs at a

Results Meeting chaired by the Governor of the affected state. Critical information and evidence must be provided for each sector including: (i) geocoded photographs documenting the type of damage to each affected asset in all of the municipalities under the disaster declaration; (ii) itemized reconstruction needs and related costs; and (iii) proposed improvements as part of the reconstruction work to mitigate and even prevent future disaster damage (i.e., to “build back better”), related costs, and a comparison of these costs with the replacement cost of each public asset. Box 3.5 contains an overview of

Box 3.5. FONDEN’s effort to build back better and to encourage risk financing measures

The FONDEN Technical Committee can approve post-disaster rehabilitation funding not only for the replacement (to restore the asset to as it was before the disaster) but also for the improvement of damaged assets to strengthen their resilience against future disasters -- to “build back better.” About 25 percent of approved FONDEN resources for post-disaster program are generally allocated with this purpose.

To further encourage proactive risk reduction, FONDEN has established rules limiting repeat eligibility for FONDEN resources. FONDEN will only finance 50 percent of the reconstruction cost for eligible uninsured federal assets that have received support in the past (assuming the same assets remain uninsured) and 25 percent of the cost of reconstruction of eligible state assets. Thereafter, the assets are rendered ineligible for further FONDEN support. These rules apply to both federal and local assets. In contrast, insured assets are eligible for FONDEN funding (covering 100 percent of reconstruction costs for federal assets and 50 percent for local assets) irrespective of the number of times the assets have received reconstruction support from FONDEN in the past.

FONDEN’s financing of insured and uninsured federal and state assets

	Insured federal asset	Insured local asset	Uninsured federal asset	Uninsured local asset
First disaster	100%	50%	100%	50%
Second disaster	100%	50%	50%	25%
Third and subsequent disaster	100%	50%	0%	0%

Source: FONDEN (2011).

FONDEN's "build back better" policy, and Box 3.6 to reducing Mexico's vulnerability to natural disasters. provides case studies of how this policy contributes

Box 3.6. Implementing FONDEN's "build back better" policy in Tabasco and Nuevo León

In recent years, FONDEN has increased its commitment to ensure that each natural disaster event is used as an opportunity to reduce Mexico's vulnerability to future events. As described in Box 3.5, the FONDEN Technical Committee can approve post-disaster rehabilitation funding not only for the replacement but also for the improvement of damaged assets to strengthen their resilience against future hazard events. These resources can be used to ensure that reconstruction programs do not recreate the same vulnerabilities. Two examples, severe flooding in the State of Tabasco and Hurricane Alex in the State of Nuevo León, provide insight on these "build back better" initiatives. Such initiatives are proving to be cost-effective in terms of avoided damage and losses.

Extreme hydro-meteorological events lead to a comprehensive water plan in Tabasco

In October 2007, a number of tropical depressions and cold fronts in the southeastern states and the Gulf of Mexico generated intense and continuous rains throughout the country. Tabasco was particularly affected, with water covering most of its territory, including the capital city, Villahermosa. This event was the worst flooding ever recorded in the state.

In the aftermath of the flood, the authorities took immediate action to develop a Comprehensive Water Management Plan aimed at reducing the vulnerability of Tabasco's population, economy, and ecosystems. The Plan encompassed a series of analytical studies and outlined a broad structural investment program, including construction of dams, reinforcement of levees, cleaning and dredging of channels and drains, building and reconstruction of dikes and protective walls, construction of floodways and other risk reduction investments. Initial investments took place from November 2007 to the end of 2008, with MXN 1.8 billion (US\$150 million) in funding provided by FONDEN and the Mexico's National Water Commission (CONAGUA). Additional investments amounting to MXN 2.8 billion (US\$233 million) were implemented in 2009 and 2010 with resources provided by CONAGUA. Longer-term studies and activities costing MXN 4.8 billion (US\$400 million) are now underway and should be completed by the end of 2012.

The benefits of these investments have rapidly become clear. In 2010, Tabasco again experienced extreme weather, with cumulative rainfall exceeding that experienced in 2007. Moreover, the state experienced monthly rainfall in excess of 550 millimeters in two consecutive months in 2010, compared to only one month in 2007. Despite this excessive level of rain, losses were limited to MXN 7.2 billion (US\$570 million) in 2010 compared to MXN 32 billion (US\$2.9 billion) in 2007, a direct consequence of Tabasco's efforts to strengthen its resilience to extreme hydro-meteorological events.

Hurricane Alex and risk reduction efforts in Nuevo León

The State of Nuevo León was heavily affected by floods caused by Hurricane Alex in 2010. At the request of the state authorities, FONDEN funded a number of hydrological, hydraulic, and geotechnical studies to determine how best to reduce the risk of flooding in the state. Interventions were subsequently designed for the restoration of a hydraulic section of the Santa Catarina River, channel dredging of 27 kilometers in the Santa Catarina River, and the construction of four kilometers of protective walls. Extensive flood mitigation efforts were also implemented to protect population centers in the Topo Chico Creek in Apodaca, Nuevo León, and the municipality of Monterrey.

Source: FONDEN (2011).

Within seven days of the Results Meeting discussed above, each federal agency must deliver its final diagnosis for its sector (covering both federal and local assets) to the Directorate General of FONDEN. Within a further two days of receipt of these documents, the Directorate General of FONDEN must:

- Verify that there is no duplication of effort among the federal and state entities;
- Verify that the requested resources are only intended to address damage caused by the disaster (not preexisting damage);
- Verify that each reported damaged asset has not previously received any reconstruction financing from FONDEN. If any have, and catastrophe insurance was not secured for the asset following the disaster, then lower levels of support will be made available for those assets, in accordance with FONDEN's policies (see Box 3.5);

- Develop and submit to SHCP a consolidated request for funding for all sectors affected, including SEGOB's opinion on whether the application complies with FONDEN's requirements for resource authorization.

Once SHCP receives SEGOB's request, it has five days to convene a meeting of the FONDEN Technical Committee to authorize transfer of the resources to a specific account established in the FONDEN Trust. Annex 8 provides examples of FONDEN resources authorized for reconstruction in Mexico in 2011.

While FONDEN's process ensures that funds can be allocated through the FONDEN Trust for a reconstruction program, in recent years, FONDEN recognized that more immediate access to financing was often needed to take urgent recovery actions and developed the Immediate Partial Support Mechanism, discussed in Box 3.7.

Box 3.7. The Immediate Partial Support Mechanism

In 2009, a new financing mechanism was introduced under FONDEN's rules known as 'Immediate Partial Support' (Apoyos Parciales Inmediatos - APIN). APIN provides partial financial support immediately after a disaster to finance urgent post-disaster needs and actions while the full damage assessment and fund approval process is completed.

Upon installation of a Damage Assessment Committee, federal and state agencies may request APIN for the implementation of urgent activities such as the restoration of federal and local communications and lifeline infrastructure, debris removal, equipment and heavy machinery rental, rental of provisional classrooms, and other activities to help normalize the situation in the affected areas. APIN resources are authorized by SHCP within 24 hours of the receipt of a request for support from a federal or state entity and are made available through the FONDEN Trust.

The advance payments are later reconciled with the total approved FONDEN allocation. In the case of state support, if APIN disbursements exceed 50 percent of the total agreed cost of reconstruction at the state level (a very rare situation), then this over-payment is returned to the FONDEN Trust. This procedure allows FONDEN to provide resources to meet urgent needs in the immediate aftermath of a disaster while maintaining its cost-sharing arrangement with state governments.

Annex 9 provides examples of immediate partial support funds approved by FONDEN during 2011.

Source: FONDEN (2011).

Phase 3: Disbursement of Resources and Implementation of Reconstruction Activities

Since January 2011, when the FONDEN Specific Operating Guidelines were issued, federal agencies have been solely responsible for the execution of all FONDEN-supported rehabilitation and reconstruction activities. Federal agencies are responsible for the design, contracting, and supervision of all rehabilitation and reconstruction works using their own operating procedures. They can, however, contract third-party service providers for the reconstruction works or agree to transfer some of the work to the state or municipality if they do not have sufficient capacity to undertake all of it. When utilizing FONDEN funds they are required to submit regular progress reports to FONDEN using a standardized template. The FONDEN Technical Committee monitors the implementation of reconstruction activities. If any approved FONDEN funds are not used, or any reconstruction activities are cancelled, the funds are released back into the FONDEN Trust for use in future programs. (See Figure 2.1)

Reconstruction of federal infrastructure

FONDEN resources can be used to finance the reconstruction of eligible federal infrastructure in full with no requirement for counterpart funding. Resources are allocated directly for implementation by the relevant federal agencies – for instance, to the Ministry of Communication and Transportation (SCT) for road and bridge construction, the Ministry of Health (SSA) for hospital reconstruction, the Ministry of Education (SEP) for school reconstruction, the National Water Commission for hydraulic infrastructure reconstruction, and the Ministry of Social Development (SEDESOL) for low-income housing and urban infrastructure reconstruction.

FONDEN resources to finance the reconstruction remain in sub-accounts within the FONDEN Trust. Banobras, FONDEN's fiduciary agent, makes pay-

ments directly to the federal agencies or third parties in charge of reconstruction activities (upon receipt of documented requests for disbursement). The relevant federal agencies submit financial statements and quarterly reports on physical and financial progress to the Directorate General of FONDEN for examination during meetings of the FONDEN Technical Committee.

Reconstruction of local infrastructure

Immediately following the FONDEN Specific Operating Guidelines were issued, SEGOB and SHCP signed an agreement with each of the 32 Mexican States, which was a new mandate in order for a state to be eligible to receive funds from FONDEN. The agreement's main purpose was for the states to accept the new FONDEN process, in which for every new disaster, the federal agencies would use FONDEN funds to execute up to 50% of the reconstruction costs of the local infrastructure.

Thus, if a natural disaster occurs, within the four days after the Results Meeting of the damage assessment committee, each federal and local agency responsible for an affected sector should sign an addendum of the agreement in which the parties agree on a specific list of reconstruction activities to be undertaken by the federal agency for up to 50 percent of the budget allocation. State-level entities remain responsible for financing the remaining activities. Every addendum lists infrastructure to be rehabilitated by federal agencies together with an implementation plan and estimated execution periods. These implementation plans are signed by the relevant federal agencies that will be responsible for executing the reconstruction activities. Box 3.8 provides an overview of recent changes to FONDEN's operating guidelines on reconstruction of state infrastructure.

FONDEN resources are provided on the understanding that the remainder of the reconstruction activities will be conducted by state and municipal agencies

drawing on their own resources. Since catastrophic losses triggered the establishment of the Reconstruction Fund for Local Entities in 2010, state governments have been able to access resources from this fund if they are unable to meet their 50 percent

share (see Chapter 4). Although this fund is likely to cease operations in the near future, the GoM is advancing another initiative to improve understanding of risk and to facilitate risk financing for states.

Box 3.8. FONDEN's new operating guidelines on reconstruction of state infrastructure

Prior to 2011, FONDEN's rules mandated that resources allocated for the reconstruction of local assets should be transferred to State Trusts under FONDEN. These funds were then disbursed to match state contributions for work goods or services executed by state agencies, service providers, and municipalities as appropriate. The state's 50 percent counterpart contribution was required in order to release the support of these funds. In some instances, however, there were difficulties in securing this contribution. In these cases, the inability to disburse FONDEN funds led to significant delays in post-disaster reconstruction.

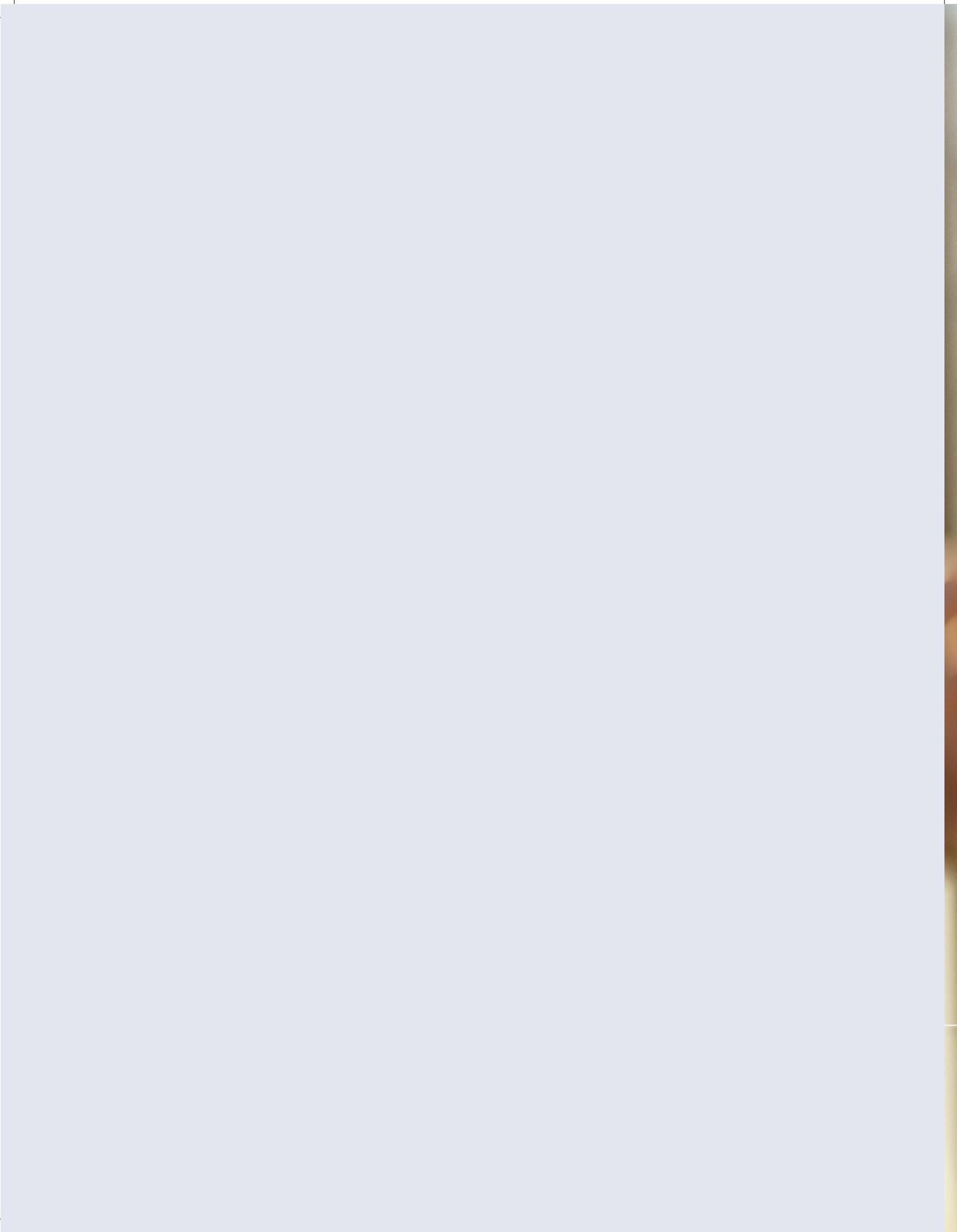
Since 2011, new operating guidelines dictate federal agencies to execute all of FONDEN's resources, including the federal resources allocated for the reconstruction of state-owned infrastructure. As a result, FONDEN resources are no longer transferred to FONDEN State Trusts. A decision is made at the time of resource allocation to clearly separate what local infrastructure will be financed with FONDEN resources and what local infrastructure will remain the responsibility of the state, which is then responsible for financing 100 percent of remaining reconstruction needs, using either its own resources or drawing on a line of credit from the Reconstruction Fund for Local Entities.

Source: FONDEN (2011).

Phase 4: Dissemination of the Report on Post-Disaster Activities

Transparency is a top priority for FONDEN and efforts are made to ensure that FONDEN's resource alloca-

tions and post-disaster reconstruction activities are carefully monitored and reported publicly. Real time information on FONDEN allocations for post-disaster reconstruction by disaster and sector are publicly disclosed through SEGOB's website (see Annex 8).



FONDEN
Financial Management

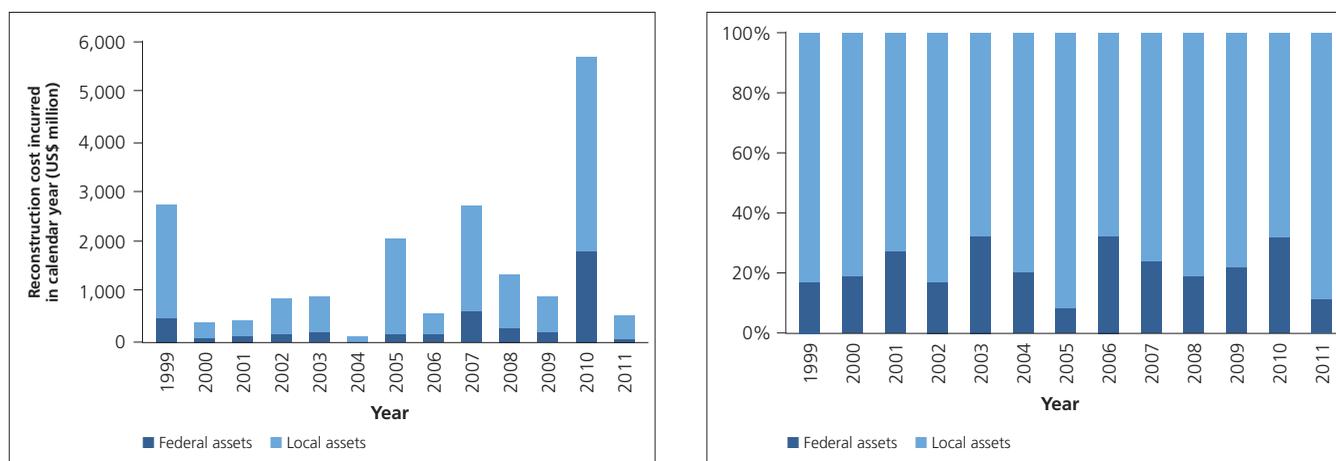
Disasters represent a highly variable, often significant cost to the Government of Mexico at the federal and the sub-national levels. The cost of disasters to the government varies across states, assets, and types of disasters; most of the cost of disasters is incurred for the reconstruction of key public assets, mainly roads, hydraulic infrastructure, and low-income housing, and the primary hazards driving these costs are hurricanes and floods. FONDEN has developed a layered risk financing strategy utilizing both risk retention and risk transfer (e.g., parametric catastrophe bonds) to manage these costs. This chapter reviews and analyzes FONDEN's financial disaster risk profile and describes the disaster risk financing strategy developed by FONDEN to manage its portfolio of assets at risk.

Disaster Risk Profile of Federal and State Governments

Disasters can impose a significant burden on the public budget; over the period 1999 to 2011, the costs of post-disaster reconstruction of public assets and low income housing financed by the Mexican

government averaged US\$1.46 billion per annum (in 2011 constant dollars), of which 77 percent were related to local (state and municipal) assets. The highest costs were incurred in 2010, when major floods generated rehabilitation needs exceeding US\$5 billion. Local assets (including low-income housing) accounted for two-thirds of this total. See Figure 4.1.

Figure 4.1. Post-disaster reconstruction costs for federal and local assets (including low-income housing), 2011 constant US dollars



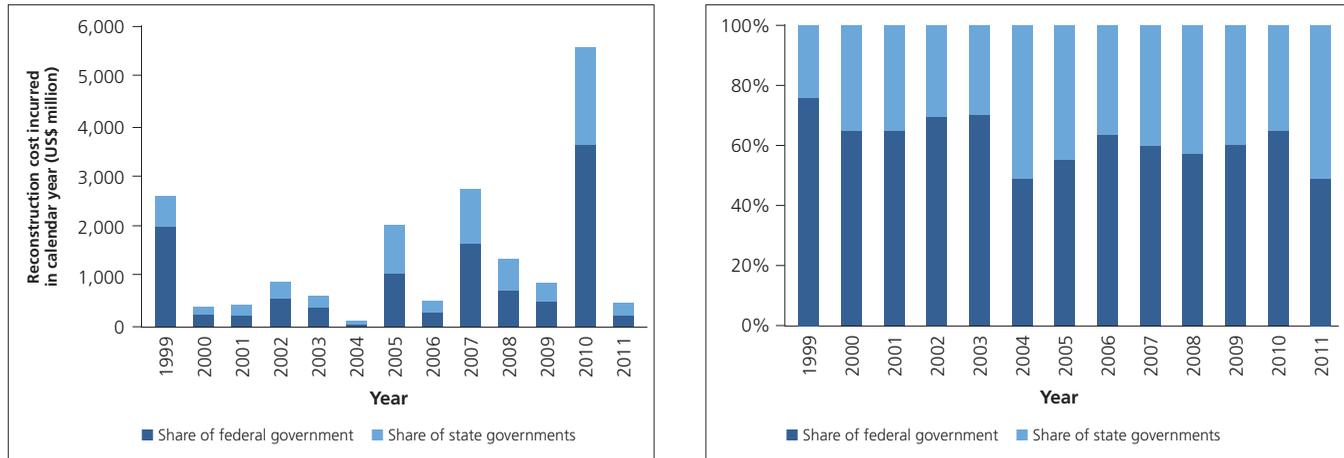
Note: Local assets refer to assets owned by states and municipalities.

Source: Authors, from FONDEN (2011).

As per FONDEN's operating guidelines, reconstruction costs are shared by the federal and state governments – the federal government finances all costs for federal assets and 50 percent for local assets, and states are responsible for the remaining 50 percent of costs for local assets. Over the period 1999

to 2011, the federal and state governments spent an average US\$939 million and US\$521 million (in 2011 constant dollars), respectively, each year on reconstruction. The federal government accounted for 64 percent of total public reconstruction expenditure. See Figure 4.2.

Figure 4.2. Post-disaster reconstruction costs paid by the federal government and state governments (in constant 2011 US dollars)



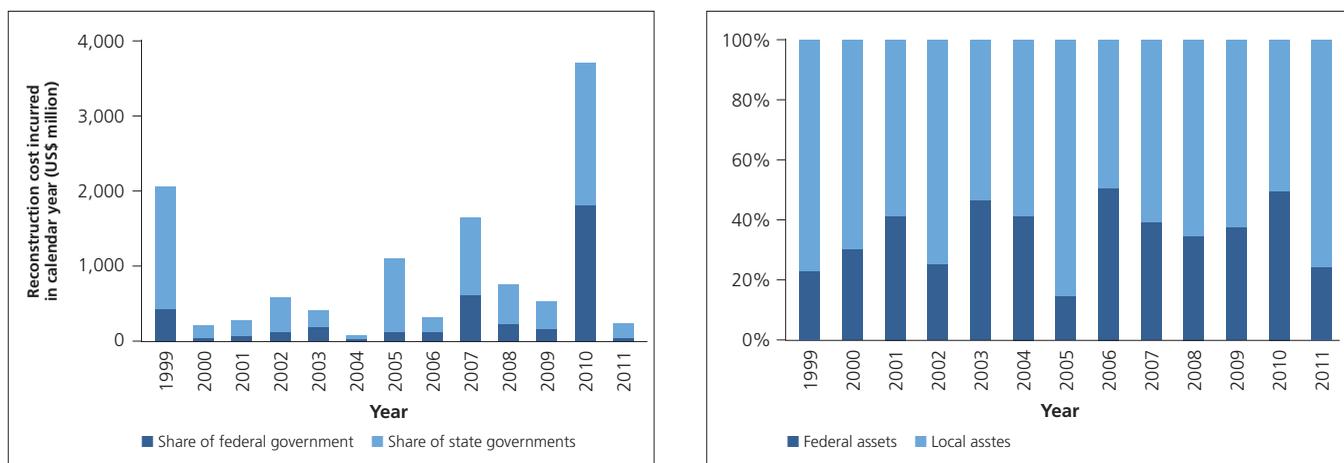
Source: Authors, from FONDEN (2011).

Financial Risk Profile of FONDEN

Over the period 1999 to 2011, on average FONDEN spent US\$339 million per year on the reconstruction

of federal assets and US\$600 million per year on the reconstruction of local assets and low-income housing. See Figure 4.3.

Figure 4.3. Post-disaster reconstruction costs paid by FONDEN for damaged federal assets and local assets (in constant 2011 US dollars)

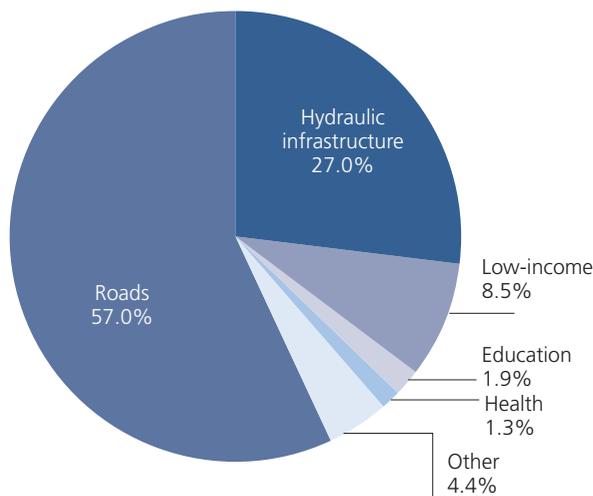


Note: Local assets refer to assets owned by states and municipalities.

Source: Authors, from FONDEN (2011).

Much of this expenditure was concentrated on the reconstruction of roads, hydraulic infrastructure, and low-income housing. The reconstruction of federal and local roads alone accounted for over half of FONDEN's total reconstruction spending, followed by the reconstruction of hydraulic infrastructure (27 percent) and low-income housing (9 percent). Figure 4.4 shows FONDEN's spending by type of assets for the period 2000 to 2011.

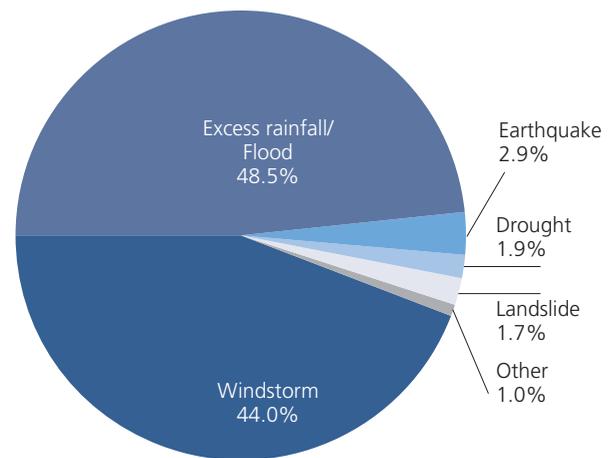
Figure 4.4. Post-disaster reconstruction costs covered by FONDEN, by type of assets, 2000-2011



Source: Authors, from FONDEN (2011).

Excess rainfall, flooding, and windstorms were responsible for the vast majority (93 percent) of reconstruction costs between 2000 and 2011. Earthquakes, droughts, and landslides were each responsible for less than 3 percent of total reconstruction costs. Figure 4.5 shows FONDEN's spending by peril for the period 2000 to 2011.

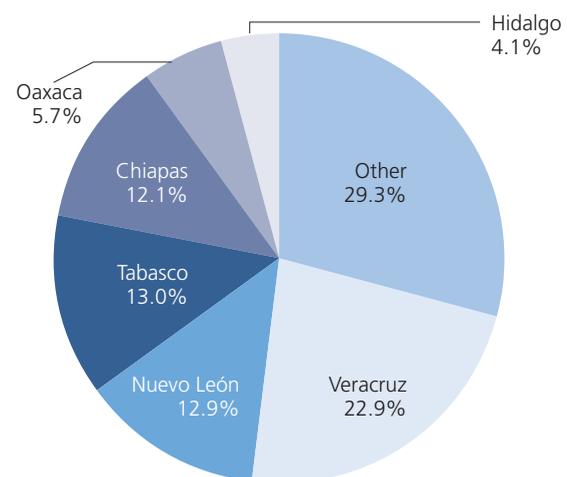
Figure 4.5. Post-disaster reconstruction costs covered by FONDEN, by type of peril, 2000-2011



Source: Authors, from FONDEN (2011).

A majority (67 percent) of reconstruction costs met by FONDEN between 2000 and 2011 benefitted just five states, over half of which (36 percent) of total reconstruction costs related to windstorms and flooding in 2010. Most of the reconstruction costs in respect of assets in Nuevo León (90 percent) were caused by events in 2010, as were around half (between 44 and 45 percent) of the costs of the other four states with the largest historical reconstruction costs paid by FONDEN, Veracruz, Tabasco, Chiapas, and Oaxaca. Figure 4.6 shows FONDEN's spending by state for the period 2000 to 2011.

Figure 4.6. Post-disaster reconstruction costs covered by FONDEN, by state, 2000-2011



Source: Authors, from FONDEN (2011).

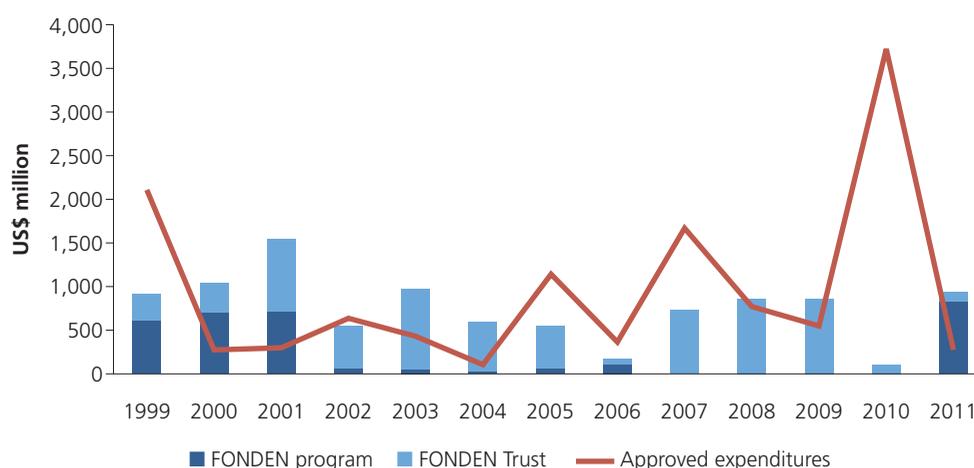
Risk Financing Strategy

FONDEN's support for post-disaster reconstruction is financed through FONDEN's annual federal budget appropriation and from reserves in the FONDEN Trust. Over US\$500 million per annum was allocated from the federal budget to FONDEN in the early years of the program (1999-2001), but this allocation was drastically reduced in subsequent years, as shown in Figure 4.7. Despite the cut in federal budget allocations from 2002 onward, the FONDEN Trust was able to build up some reserves over time, reaching US\$857 million in 2009. However, these reserves were severely depleted in 2010 due to major flood losses; this experience prompted a much

higher FONDEN allocation in 2011 – the highest yearly allocation yet, totaling US\$833 million.

FONDEN's approved expenditures have exceeded the combined financing available from its annual federal budget allocation and the FONDEN reserves in five years from 1999 through 2011, with the most dramatic deficit in 2010. In this year, the federal government had to transfer over US\$3.3 billion from elsewhere in its budget to meet FONDEN's post-disaster reconstruction commitments. Article 19 of the federal budget allows for additional exceptional budget allocations of this nature for FONDEN, drawing on resources from the federal surplus (such as the oil revenue surplus) and other programs.

Figure 4.7. Resources and expenditures of FONDEN, 1999-2011 (in constant 2011 US dollars)



Source: Authors, from FONDEN (2011).

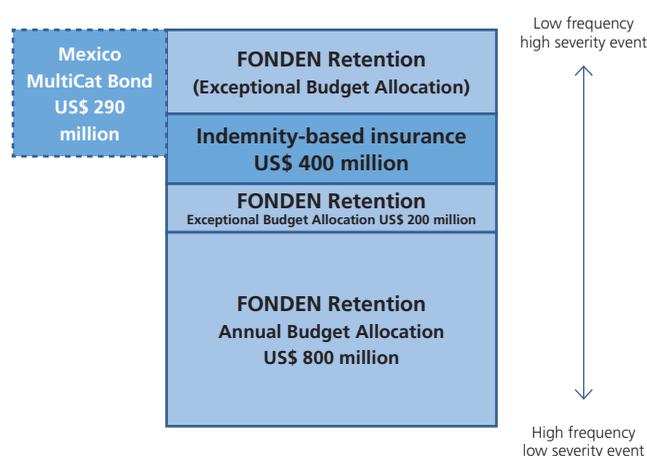
Since 2004, to help FONDEN meet its mandated responsibilities, the SHCP has been working with the General Directorate of FONDEN to develop a more sophisticated financial protection strategy. This strategy has evolved over the years, based on a 'bottom up' risk layering approach. FONDEN's strategy was to secure funds for more frequent events first while considering a series of market-based risk transfer instruments, such as indemnity-based reinsurance and catastrophe bonds (cat bonds), for less frequent events. Also in 2004, modifications were made to FONDEN's operational manual to allow for the use

of risk transfer instruments, enabling FONDEN to access the reinsurance and capital markets.

FONDEN's disaster risk financing strategy as of 2011 is illustrated in Figure 4.8 below. The bottom layer of risk, up to US\$1 billion, is retained by FONDEN through its annual budget appropriation and, if necessary, by an exceptional additional federal budget allocation (mainly from oil surplus revenues). The US\$400 million layer in excess of this US\$1 billion is covered through an indemnity-based insurance policy on the whole FONDEN portfolio. Should to-

tal reconstruction costs exceed US\$1.4 billion, these excess losses are financed through a further exceptional budget allocation. FONDEN also issued a three-year cat bond in 2009 to provide immediate liquidity for emergency losses should a major earthquake and/or hurricane occur in pre-defined areas of the country. These market-based risk transfer instruments are further described below.

Figure 4.8. 2011 FONDEN disaster risk financing strategy



Source: Authors, from FONDEN (2011).

Annual Budget Allocation

As discussed in Chapter 2, the federal government established a law in 2006 that requires at least 0.4 percent of Mexico's federal annual budget, net of FONDEN Trust's reserves, to be allocated for the FONDEN Program for Reconstruction, FOPREDEN, and the Agricultural Fund for Natural Disasters. These funds are earmarked at the beginning of the fiscal year and subsequently financed by federal revenues or reserves as needed for approved activities. These annual budget allocations represent the core of FONDEN's resources but have increasingly proven insufficient to address the reconstruction needs of the country.

Figure 4.7 illustrates the often significant variations between the amounts of funding earmarked for

FONDEN at the beginning of the year and the levels of resources required for post-disaster activities. Demand for funding varies between years depending on a combination of the frequency and intensity of natural hazard events each year and the exposure and vulnerability of affected populations and public assets. While the FONDEN Trust acts as multi-year reserve fund, the budget allocation law means that this reserve is de facto capped at 0.4 percent of the federal budget.

If the annual budget allocation proves insufficient, FONDEN can receive an exceptional budget allocation from the federal government's reserve funds or other programs, as already noted. In recent years, some of the income surplus from Mexico's oil revenues has been redirected to cover FONDEN financing gaps for post-disaster activities. In 2010, the exceptional allocation needed to meet all FONDEN's commitments for losses was around US\$3.3 billion, more than three times FONDEN's original allocation.

To better manage fluctuation of demand on FONDEN resources, SHCP, the General Coordination of Civil Protection of SEGOB, and other federal and state agencies are working together to ensure that sufficient resources are available on a sustainable basis via the development of an adequate reserve fund for FONDEN. This initiative is intended to reduce FONDEN's dependence on surplus revenue from oil and other commodity prices, while also minimizing the need to redirect public finances from other federal programs to FONDEN in years of catastrophic loss.

Risk transfer instruments

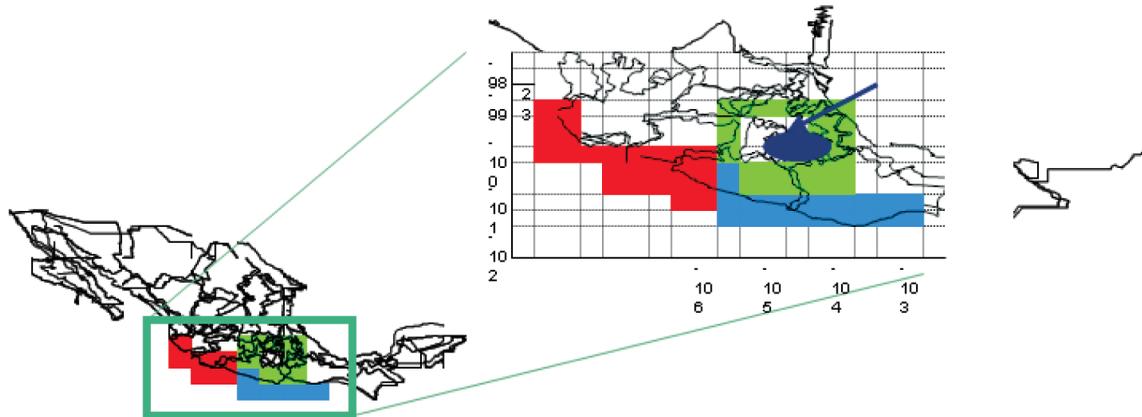
Over the past five years, the federal government has introduced financial instruments to reduce its fiscal exposure by risk transfer to the international reinsurance and capital markets. FONDEN's risk transfer arrangements are intermediated by Agroasemex, Mexico's public insurance company.

Catastrophe bonds

In 2006, FONDEN issued the world’s first governmental cat bond, CatMex, which provided coverage against earthquakes in three specific zones of the country. The US\$160 million cat bond was part of a US\$450 million catastrophe risk transfer strategy. According to the terms of the cat bond, a payout would be triggered if two conditions were met: (i) an official state of emergency or disaster declaration was issued by the SEGOB, and (ii) an earthquake with a specified magnitude, depth, and epicenter within the three pre-defined zones was registered. Figure 4.9 summarizes these parametric details.

A parametric catastrophe bond provided an attractive option to the GoM because it ensured immediate availability of funds for emergency losses in the case of a catastrophic earthquake; if triggered, the government would receive an expedited payout from the bond. In addition, the catastrophe bond received a high-quality credit rating for high risk (low probability) layers. Thus, the GoM could trust that the principle of the bond would be safe as in an escrow account and available if the bond were triggered. The GoM also identified other benefits from using a catastrophe bond, such as multi-year coverage and no correlation with other financial instruments.

Figure 4.9. Features of CatMex’s parametric triggers



	Zone A: Northwest	Zone B: Central Cocos	Zone C: Outer Mexico City
Trigger magnitude (Mw)	>8.0	>8.0	>7.5
Trigger depth (km)	200	200	150

Source: FONDEN (2011).

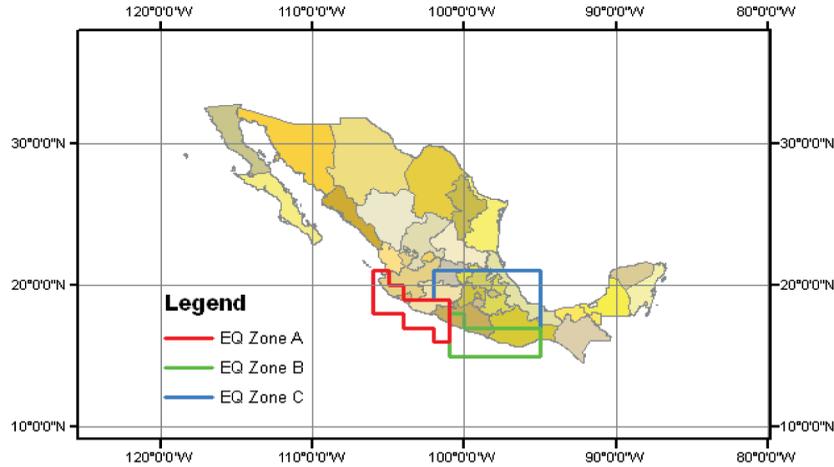
After CatMex matured in October 2009, the GoM decided to further diversify its coverage by pooling multiple risks across multiple regions. In October 2009, the federal government issued a multi-peril cat bond using the World Bank’s newly established MultiCat Program. This US\$290 million, earthquake and hurricane coverage with a three-year maturity is the cat bond known as MultiCat Mexico. It provides parametric insurance to FONDEN against earthquake risk in three regions around Mexico City and against hurricanes on the Atlantic and Pacific coasts. Figure 4.10 illustrates

MultiCat’s parametric features. For the earthquake cover, trigger levels were reduced to include more potential events and the zones covered were extended in order to protect a larger population and assets.

In the event of a disaster, an insurance claim will be triggered if an official declaration of a state of emergency is issued by SEGOB and the event also meets certain other criteria. The principal will be repaid to investors if no claims are triggered over the life of the cat bond. Table 4.1 summarizes MultiCat’s main features.

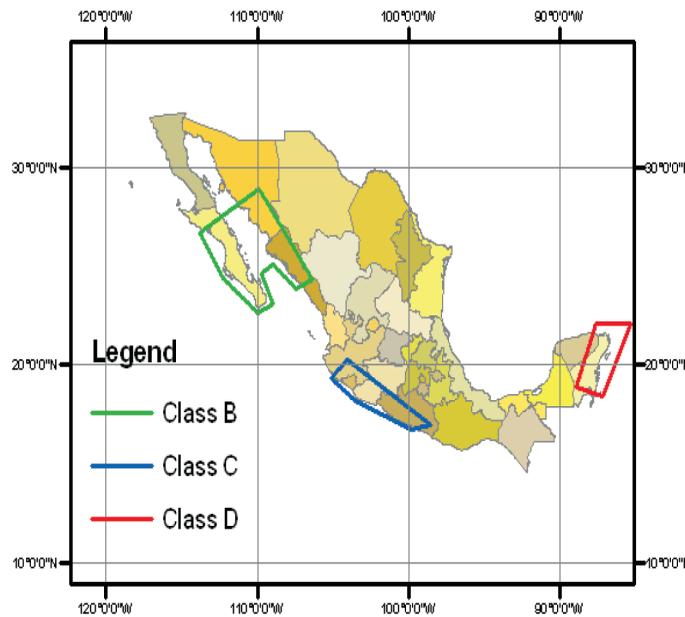
Figure 4.10. Features of MultiCat's parametric triggers

Earthquake hazard



Zone	Zone A	Zone B	Zone C
Trigger magnitude (Mw)	>7.9	>7.4	>8.0
Trigger depth (km)	200	200	200
Sum insured (US\$ mil)		US\$140 mil	

Hurricane hazard



Zone	Zone B: South Pacific Area – Baja California	Zone C: North Pacific Area - Michoacán	Zone D: Atlantic Yucatán
Trigger Category	4	4	5
Sum Insured (US\$ mil)	50	50	50

Source: FONDEN (2011).

Table 4.1. MultiCat Mexico 2009 – Summary of Terms

Peril	Class A Earthquake	Class B Pacific Hurricane	Class C Pacific Hurricane	Class D Atlantic Hurricane
National (US\$ million)	140	50	50	50
S&P rating	B	B	B	BB-
Maturity	October 2012	October 2012	October 2012	October 2012
Interest Spread (over US Treasury Money Market Fund)	11.50%	10.25%	10.25%	10.25%
Annual Expected loss	4.65%	4.07%	4.22%	2.39%
Multiple	2.47	2.52	2.43	4.29

Source: FONDEN (2011).

Indemnity-based insurance

In June 2011, the federal government placed an indemnity-based excess-of-loss insurance treaty of US\$400 million in excess of US\$1 billion. The payouts are based on cumulated losses borne by FONDEN, as reported by local and federal entities when a disaster occurs. Only the replacement costs, which on average represent 75 percent of total reconstruction costs, are covered by this insurance treaty. The insurance program covers all perils and assets protected by FONDEN rules, and benefits from its operational procedures, as well as technological platform, to gather damage information necessary for loss assessment and claims settlement.

The public asset inventory database constructed as part of Mexico's ongoing effort to improve risk assessment, for improved DRM and disaster risk financing strategies, was a fundamental input for the exposure and risk profile analysis necessary to place this insurance scheme; see Box 4.1 below for information on how Mexico is advancing on disaster risk assessment.

Reconstruction Fund for Local Entities

Throughout FONDEN's history, FONDEN's requirement that state governments finance on average 50 percent of the cost for reconstruction of local infrastructure through their own budget resources has

proven challenging. In 2010, in light of the exceptional needs created by disasters during that year, Banobras, in collaboration with SHCP, established the Reconstruction Fund for Local Entities (*Fondo de Reconstrucción de Entidades federativas*). The Fund, created with a US\$360 million (MXN 4.5 billion) contribution from the federal budget, is used to guarantee zero coupon loans with a 20-year maturity issued by the SHCP through Banobras to states that have suffered disasters since January 1, 2010, and that have requested FONDEN support.

Under this Fund, Banobras can issue loans up to a combined total value of US\$1.8 billion (MXN 22 billion). State governments can apply for loans up to a value not exceeding their required contribution to FONDEN-supported reconstruction efforts as determined by the FONDEN Technical Committee. At the end of the loan period, the state only pays the interest on its loan while the Reconstruction Fund for Local Entities pays the principal. The Fund, however, did not receive an allocation under the 2012 Federal Expenditure Budget. Once its initial allocation is fully utilized, the Fund will probably cease to operate, as it was primarily created to address primarily the 2010 catastrophic losses.

Box 4.1. Using risk assessment to support FONDEN's risk financing strategy

The FONDEN Technical Committee has conducted various studies to better assess natural disaster risks in Mexico since 2007. The initiative *Design of financial mechanisms to protect the assets of the FONDEN Trust against the risks of earthquake, flood, and tropical cyclone* aimed to identify the assets exposed to natural disasters: roads and bridges, hospitals, schools, hydraulic infrastructure, and low-income housing. The initiative relied on three components:

- 1) Data Gathering. An asset inventory was developed that included the key variables required for evaluation of vulnerability and loss of infrastructure in the database. Hazard information was also included.
- 2) Hazard Risk Modeling: Earthquake, tropical cyclone, and flood hazard models were developed to assess the impact of those disasters on the assets. Vulnerability functions for each type of infrastructure were also developed.
- 3) Financial Modeling: Probabilistic risk modeling and actuarial analysis of historical losses were conducted to develop a disaster risk financing strategy (retention and transfer) for the infrastructure.

The Institute of Engineering of the *Universidad Nacional Autónoma de México* (UNAM) was in charge of the technical coordination of the initiative. UNAM integrated the results into the Loss Estimation System for Federal Risk (R-FONDEN). R-FONDEN is a probabilistic catastrophe risk model that simulates disaster events and provides risk metrics such as annual average loss and loss exceedance probability curves.



R-FONDEN has been used to improve the individual insurance policies of the Federal agencies. For instance, it enabled the design of an insurance program for the Ministry of Transport (SCT) in charge of federal roads and bridges – a scheme that was difficult to insure due to insufficient asset information. It has also contributed to improve the design of the insurance program of the Ministry of Education (SEP).

Source: FONDEN (2011).

An Ever Evolving System

The FONDEN system is continuously improved to meet Mexico's financial requirements related to natural disasters. This chapter describes the ongoing development of an integrated risk management framework in Mexico, including remaining challenges. The lessons learned from Mexico's experience with FONDEN can be shared with other countries that are interested in developing an integrated disaster risk management strategy, including a disaster risk financing and insurance strategy.

A system progressing toward comprehensive risk management

Since FONDEN's establishment in 1996, key lessons have been learned resulting in changes to FONDEN's procedures. A number of these changes merit recalling here. First, FONDEN administrators have promoted proactive DRM through the establishment and subsequent merging of FOPREDEN and FIPREDEN to finance investment in prevention. In addition, they have increased FONDEN's capacity to provide funding to ensure effective government response during relief, recovery, and reconstruction phases through the establishment of the Revolving Fund for emergency relief (humanitarian aid) and the Immediate Partial Support Mechanism for urgent recovery actions, respectively. Adoption of innovative technology has improved efficiency, accuracy, and transparency of post-disaster damage assessments; it has also enabled the related data to be stored for additional applications in DRM. In addition, the development of a layered disaster risk financing strategy increases FONDEN's resilience to catastrophic events by leveraging the private sector through risk transfer. Such continuous improvements have allowed the Government of Mexico to progressively enhance FONDEN's role and its ability to efficiently and effectively manage its resources to support ex ante and ex post activities.

The FONDEN system continues to evolve. In 2009, through the FONDEN rules, the federal government launched a new initiative to improve states' understanding of disaster risks and to increase their involvement in the design of financial risk transfer schemes. This initiative was enhanced in the 2011

FONDEN's Operational Guidelines¹² with an increase in financial support. It aims to assist state governments in developing inventories of public assets and low-income housing (including attributes such as type of construction, year of construction, replacement cost, location, and past damage) that are eligible for insurance and in conducting studies to identify and quantify these assets' vulnerability to natural hazards. FONDEN provides state entities with technical and/or financial support for the development of integrated risk management systems. Once a state files a formal request and the FONDEN Technical Committee approves it, financial support is available through the FONDEN Trust for several activities, as listed in Table 5.1.

Table 5.1. Financial support to promote integrated risk management systems (through FONDEN Trust)

Actions to Support Integrated Risk Management	Financial Support from FONDEN Trust (Percentage of Total Costs of the Strategy)	Timeframe for Implementation
Identification of Assets	Up to 70%	6 months
Risk Assessment	Up to 70%	5 months
Identification of Risk Transfer mechanisms	Up to 70%	3 months

Source: Mexico's Ministry of Finance and Public Credit (2011).

Likewise, the federal government is investigating financial risk transfer mechanisms for low-income housing. The housing sector remains one of the most vulnerable to natural disasters, with approximately 41 percent of housing in Mexico classified as

¹² As elaborated in Chapter 7 of FONDEN's Operational Guidelines.

low-income housing according to the Ministry of Social Development (SEDESOL). Approximately 2.8 million houses of low-income residents are located in high earthquake risk zones, and 3.2 million in high hurricane risk zones. These homes are particularly vulnerable to disasters due to low-quality construction standards. The federal government is investigating financial risk transfer schemes against floods in addition to earthquakes and hurricanes for public assets and low-income housing.

Lessons for other countries pursuing proactive disaster risk management

The Mexican Government's experience illustrates how the establishment of a financial mechanism for DRM designed with understanding of the country's ex ante and post-disaster needs can enhance the efficacy and transparency of its DRM system. Other countries considering how to improve their financial resilience to disasters while promoting proactive DRM can apply the lessons learned from FONDEN to their own context. Five lessons that countries may find useful are discussed here, although numerous others can be extracted from FONDEN's experience.

Lesson 1: Matching post-disaster funding needs

A dedicated financial mechanism for natural disasters can ensure that appropriate levels of financing are available for government response throughout post-disaster phases. Akin to FONDEN's Revolving Fund, Immediate Partial Support Mechanism, and subaccounts for approved reconstruction programs, a financial mechanism for natural disasters can comprise of unique funding windows with differential access requirements for emergency relief, urgent recovery actions, and reconstruction phases. In this way, the funding mechanism's design can balance time-efficiency and accountability concerns across post-disaster phases.

A "build back better" policy for the operating guidelines of providing reconstruction funding can allow resources to cover not only replacement costs, but

also additional costs required to build back better and to reduce physical vulnerability to disasters in the long run. Furthermore, these guidelines can promote reduced financial vulnerability by requiring catastrophe insurance purchase in order to be eligible for repeated reconstruction funding.

Lesson 2: Promoting ex ante disaster risk management

A financial mechanism for natural disasters can promote ex-ante DRM to reduce reconstruction requirements (as well as social costs) in the long-term. In Mexico's case, establishing the preventative fund FOPREDEN and linking its financial trust, FIPREDEN, to the FONDEN Trust for post-disaster reconstruction financing is helping to facilitate a shift to proactive DRM. By providing resources for risk assessment and prevention projects, a financial mechanism for natural disasters can improve understanding and ownership of risk by government entities and communities; for example, multi-hazard risk assessments can facilitate integration of disaster risk considerations into urban planning and investments in federal and local infrastructure, influencing both the design and location of assets. Resources for risk mitigation can ensure that the methods and materials used for the construction of these assets will make certain that they will be resilient to disaster impacts; it can also enable retrofitting of existing buildings and infrastructure to increase their ability to withstand disasters.

Lesson 3: Increasing overall financial resilience through integrated disaster risk financing and insurance

Countries can strategically enhance the capacity of their DRM programs by developing an integrated disaster risk financing and insurance strategy. Such a strategy builds bottom-up, first relying on risk retention through budget mechanisms such as reserves and contingency budgets, complemented if possible by contingent debt for more severe, less frequent events, and then leveraging the private sector through risk transfer for catastrophic but infrequent events. For high-risk layers, risk transfer to the rein-

insurance and capital markets can ensure immediate availability of funds following a catastrophic event and/or during high-loss years, when post-disaster government support is most likely to be needed. Although exposure data may be limited for public and private assets for which the government assumes responsibility, such as low-income housing, parametric options can enable the government to access coverage for socially or economically important high-risk regions. FONDEN's experience with risk transfer, progressing from the 2006 CatMex catastrophe bond for earthquake, to the 2009 MultiCat for earthquake and hurricane, to the 2011 indemnity-based excess-of-loss reinsurance treaty, demonstrates how the government can take an iterative approach to diversifying sources of financial protection and improving financial resilience over time – leveraging parametric products to secure essential coverage while working in parallel to improve exposure data for indemnity-based coverage where desirable.

The scope for application of alternative risk transfer tools, however, depends on a country's technical capability and extent of access to capital markets. It is useful for countries to consider the strength of domestic capital markets and their level of access to international capital markets in exploring feasible financing instruments. Technical assistance from an impartial convening power with relevant expertise, such as the World Bank or a regional development bank, could help to alleviate this concern for interested countries.

Lesson 4: Adopting technology for improved performance and accountability

The innovative use of technology can improve the quality and timeliness of information and information flows throughout a DRM system. Equally important, it can increase transparency and control of resources for both prevention and post-disaster reconstruction. In the case of Mexico's FONDEN, the requirement for geo-referenced photographic images to be provided to the Damage Assessment Committee has helped FONDEN to efficiently record and manage its resources for the reconstruction of

damaged infrastructure. Additionally, the development of the probabilistic catastrophe risk model, R-FONDEN, has numerous applications to improve the effectiveness of Mexico's DRM system, including informing decision making about the design of FONDEN's risk financing and insurance strategy and risk mapping for visualization and increased ownership of disaster risk. Governments that invest in risk information and assessment systems will benefit from reduced costs and increased effectiveness of their DRM system in the long run; policy makers can also avail of these tools to improve communication to their constituents about the benefits of ex ante investment in risk reduction and the execution of funding for post-disaster reconstruction.

Lesson 5: Empowering local entities to take ownership of disaster risks

While most decisions impacting physical and financial exposure and vulnerability to disasters are taken at the local level, available expertise and funding for DRM is often concentrated at the national level. In recognition of this dynamic, the government can increase the overall resilience of the country by empowering local entities to take ownership of disaster risks. Shared responsibility for local disaster response and reconstruction costs between federal and subnational governments increases responsibility of local authorities while ensuring federal government support for local recovery as needed. FONDEN's cost-sharing system and recent initiative to improve local risk assessment and financing capacity demonstrates how the government can balance shared national and local responsibility. Importantly, in Mexico shared responsibility for disaster impacts by local and federal governments is paired with the provision of federal resources for ex ante DRM at the local level through FOPREDEN (e.g., risk assessment, risk mitigation, and capacity building on DRM). This dynamic empowers local authorities and communities to take ownership of their exposure and reduce their expected disaster losses. Adoption of similar policies by other governments could promote amicable relations between the federal government and local governments and communities throughout the

DRM cycle and empower local communities to increase their ownership of disaster risks.

Opportunities to improve FONDEN's effectiveness

Based on FONDEN's experiences to date, several areas have been identified for further consideration and subsequent action to maximize the Government of Mexico's ability to effectively protect its people and public infrastructure against disasters:

1. Incorporate disaster risk management into national development policy through legal reforms. This would help to ensure that analysis of disaster risks is undertaken before federal budget decisions are made, helping to reduce disaster risks while also potentially avoiding or minimizing post-disaster funding shortfalls.
2. Further strengthen financial instruments for the prevention of natural disasters to help ensure a cost-efficient balance of expenditures between post-disaster response and reconstruction and prevention and risk reduction. Continued efforts to increase integration of prevention and disaster risk reduction components into Mexico's public investments are contributing to this objective.
3. Conduct additional analysis to strengthen understanding of disaster risks and to identify appropriate risk reduction measures in order to support a shift in emphasis from post-disaster support toward ex ante risk reduction.
4. Continue to promote information and training to enhance the public's awareness of opportunities for and benefits of disaster risk reduction and prevention to foster a culture of self-protection.
5. Further develop an integrated disaster risk financing and insurance strategy for FONDEN and the Mexican states, building on the various risk retention and risk transfer instruments currently available, including regional risk pooling mechanisms, to increase the fiscal resilience of the federal and state governments against natural disasters.

These options for the Mexican Government's consideration are not exhaustive, and their implementation would likely result in the identification of additional activities to further increase the efficacy of the FONDEN system. They will, however, continue to propel the system toward increased capacity to manage and finance disaster risks. In the context of increasing exposure of population and assets, the FONDEN system, like all disaster risk management systems, must always continue to evolve.

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Glossary

Adverse Selection	Adverse selection occurs when potential insurance purchasers know more about their risks than the insurer does, leading to participation by high risk individuals and nonparticipation by low-risk individuals. Insurers react by either charging higher premiums or not insuring at all, as in the case of floods.
Average Expected Loss	Expected loss per year when averaged over a very long period (for example, 1,000 years). Computationally, AEL is the summation of products of event losses and event occurrence probabilities for all stochastic events in a loss model.
Basis Risk	The risk with index insurance that the index measurements will not match individual losses. Some households that experience loss will not be covered, for example, and some households that experience no loss will receive indemnity payments. As the geographical area covered by the index increases, basis risk will increase as well.
Catastrophe	A severe, usually sudden, disaster that results in heavy losses.
Catastrophe (Cat) Bond	A high-yielding, insurance-linked security providing for payment of interest and/or principal to be suspended or cancelled in the event of a specified catastrophe, such as an earthquake of a certain magnitude or above within a predefined geographical area.
Catastrophe Risk Model	A computerized model generating a set of simulated events to calculate losses arising from a catastrophe.
Claim	An insurer's application for indemnity payment after a covered loss has occurred.
Direct Loss	Recovery cost of the damaged assets.
Diversification	Development of a portfolio containing a variety of assets in terms of geographical or sectoral spread, or credit quality. In general, risk is reduced as portfolio diversification increases.
Ex ante risk management	Action taken prior to a potential risk event. Making preparations before a disaster helps avoid inefficient, quick-response coping decisions. If ex ante strategies are not in place, resort will be to short-term coping strategies that have no significant benefit in the long run.
Ex post risk management	Risk-management strategies that are developed in reaction to an event, without prior planning. Although ex post strategies have a role to play in a risk-management program, risk-management mechanisms can be more effective when introduced ex ante.
Exposure	The amount (sum insured) exposed to the insured peril(s) at any one time.
Geo-reference	To establish something's location in terms of map projections or a coordinate system (e.g., the position of an aerial photograph within a map or the geographical coordinates of a physical asset).
Hazard	A physical or moral feature that increases the potential for a loss arising from an insured peril or that may influence the degree of damage.
Indemnity	The amount payable by the insurer to the insured, in the form of cash, repair, replacement, or reinstatement, in the event of an insured loss. This amount is measured by the extent of the insured's pecuniary loss. It is set at a figure equal to but not more than the actual value of the objects insured just before the loss, subject to the adequacy of the sum insured.

Indirect Losses	Economic consequences of the damaged assets (e.g., foregone revenue).
Insurance	A financial mechanism that aims to reduce the uncertainty of loss by pooling a large number of uncertainties so that the burden of loss is distributed. Generally, each policyholder pays a contribution to a fund, in the form of a premium, commensurate with the risk he introduces. The insurer uses these funds to pay the losses (indemnities) suffered by any of the insured.
Insurance Policy	A formal document (including all clauses, riders, and endorsements) that expresses the terms, exceptions, and conditions of the contract of insurance between the insurer and the insured. It is not the contract itself but evidence of the contract.
Layer	A range of potential loss that is covered by insurance. For example, an insurance contract may pay indemnities only for losses within a specified range of magnitude.
Moral Hazard	In insurance, moral hazard refers to the problems generated when the insured's behavior can influence the extent of damage that qualifies for insurance payouts. Examples of moral hazard are carelessness, fraudulent claims, and irresponsibility.
Parametric Insurance	A form of insurance that makes indemnity payments based not on an assessment of the policyholder's individual loss, but rather on measures of a parametric index that is assumed to proxy actual losses. It is also referred to as index or index-based insurance.
Premium	The monetary sum payable by the insured to the insurers for the period (or term) of insurance granted by the policy. $\text{Premium} = \text{premium rate} \times \text{amount of insurance}$ <p>Also, the cost of an option contract paid by the buyer to the seller.</p>
Premium Rate	The price per unit of insurance, normally expressed as a percentage of the sum insured.
Probable Maximum Loss (PML)	The largest loss believed to be possible for a certain type of event in a defined return period, such as 1 in 100 years or 1 in 250 years.
Reinsurance	Insurance purchased by an insurer. When the total exposure of a risk or group of risks presents the potential for losses beyond the limit that is prudent for an insurance company to carry, the insurance company may purchase reinsurance. Reinsurance has many advantages, including 1) leveling the results of the insurance company over a period of time; 2) limiting the exposure of individual risks and restricting losses paid out by the insurance company; 3) possibly increasing an insurance company's solvency margin (percent of capital and reserves to net premium income), hence the company's financial strength; and 4) enabling the reinsurer to participate in the profits of the insurance company, but also to contribute to the losses, the net result being a more stable loss ratio over the period of insurance.
Risk Assessment	The qualitative and quantitative evaluation of risk. The process includes describing potential adverse effects, evaluating the magnitude of each risk, estimating potential exposure to the risk, estimating the range of likely effects given the likely exposures, and describing uncertainties.
Risk Financing	The process of managing risk and the consequences of residual risk through products such as insurance contracts, cat bonds, reinsurance, or options.

Risk Layering	The process of separating risk into tiers that allow for more efficient financing and management of risks.
Risk Management	Care to maintain income and avoid or reduce loss or damage to a property resulting from undesirable events. Risk management involves identifying, analyzing, and quantifying risks and taking appropriate measures to prevent or minimize losses. Risk management may involve physical mechanisms, such as spraying a crop against aphids, using hail netting, or planting windbreaks. It can also involve financial mechanisms such as hedging, insurance, and self-insurance (carrying sufficient financial reserves so that a loss can be sustained without endangering the immediate viability of the enterprise in the event of a loss).
Risk Mitigation	Actions taken to reduce the probability or impact of a risk event, or to reduce exposure to risk events.
Risk Pooling	The aggregation of individual risks to manage the consequences of independent risks. Risk pooling is based on the law of large numbers. In insurance terms, the law of large numbers demonstrates that pooling large numbers of roughly homogenous, independent exposure units can yield a mean average consistent with actual outcomes. Thus, pooling risks allows an accurate prediction of future losses and helps determine premium rates.
Risk Retention	The process whereby a party retains the financial responsibility for loss in the event of a shock.
Risk Transfer	The process of shifting the burden of financial loss or responsibility for risk financing to another party, through insurance, reinsurance, legislation, or other means.
Total Economic Losses	Sum of direct and indirect losses.

Annexes

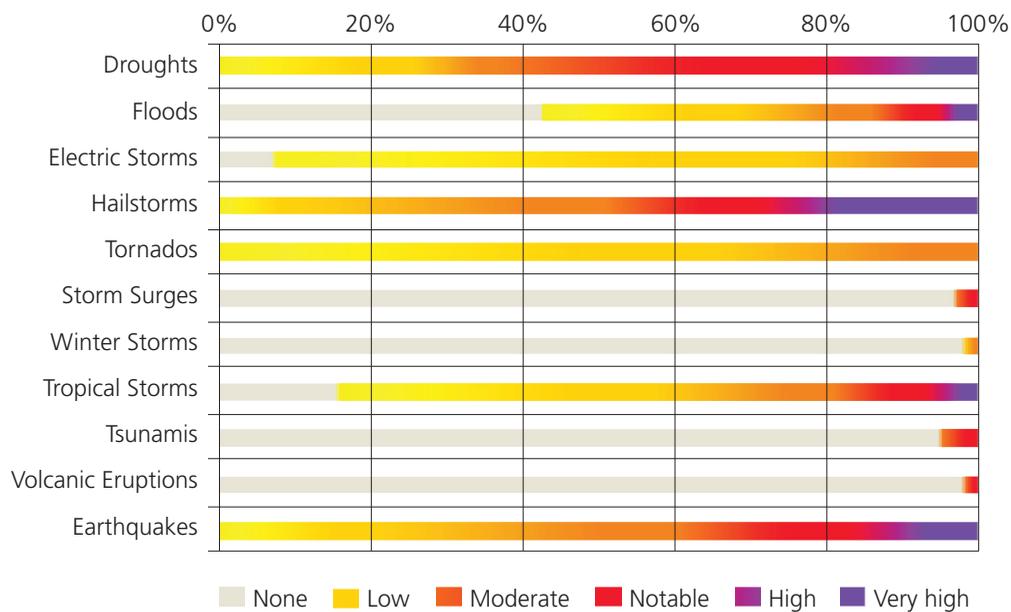
- Annex 1.** Description of Phenomena Identified in Mexico's General Law of Civil Protection
- Annex 2.** Selected Earthquakes in Mexico of General Historic Interest
- Annex 3.** Mexican States and Federal District Populations
- Annex 4.** Members of FONDEN Technical Committees – Federal and State Trusts
- Annex 5.** FONDEN's Previous Fund Allocation Process until 2010
- Annex 6.** Overview of FONDEN's New Procedures from 2011
- Annex 7.** Practical Examples of Disaster Events and Access to FONDEN Resources in 2010
- Annex 8.** Examples of Authorized Resources for Disaster Declarations in 2011
- Annex 9.** Examples of Funds Approved for Immediate Partial Support in 2011

Annex 1: Mexico's Exposure to Adverse Natural Events

Mexico is ranked as one of the world's most exposed countries to multiple types of natural hazards. Due to its diverse geography, Mexico is exposed to a large variety of geological and hydro-meteorological hazards, including earthquakes, volcanic eruptions,

hurricanes, wildfires, floods, landslides, and droughts (see Figure A1.1). This Annex provides an overview of disaster risks and related vulnerability in Mexico. It reviews each type of disaster risk affecting in the country. Box A1.1 presents an overview of the General Law of Civil Protection's treatment of natural hazards.

Figure A1.1. Percentage of geographic area in Mexico exposed to natural hazards



Source: Inter-American Development Bank's Disaster Risk Indicators, 2010, <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=35160020>, Original Source (MunichRe, <http://mrnathan.munichre.com> (2010).

Box A1.1. Natural hazards as identified in Mexico's General Law of Civil Protection¹³

Geological Phenomenon: A disaster caused by the actions and violent movements of the earth's crust. This category includes seismic movements or earthquakes, volcanic eruptions, tsunamis or tidal waves, and soil instability, also known as earth movements. The latter may take a number of different forms: slow movement or creeping, sliding, flow or current, avalanche or landslide, collapse or sinking.

Hydro-meteorological Phenomenon: A disaster caused by the violent action of atmospheric forces, such as hurricanes; floods from rains, rivers, coasts, and lakes; snow, hail, dust, and electrical storms; freezes; droughts and heat and cold waves.

Chemical-Technological Phenomenon: A disaster caused by the violent action of different substances resulting from their molecular or nuclear interaction. Includes destructive phenomena, such as fires of any kind, explosions, toxic leaks, and radiation.

Sanitary-Ecological Phenomenon: A disaster caused by the pathogenic action of biological agents that attack a human population, animals, and/or crops, causing their death or affecting their health. Epidemics or plagues constitute a health disaster in the strict sense of the term. This category includes air, water, soil, and food contamination.

Socio-Organizational Phenomenon: A disaster caused as a result of human error or by premeditated actions, which takes place in large crowds or mass population movements.

Source: FONDEN (2011).

Geological hazards

Mexico experiences more than 90 earthquakes with a magnitude of 4.0 or above on the Richter scale on average per annum (FONDEN 2011). As such, the country's seismic activity is ranked as one of the highest in the world. This seismicity is mainly due to the activity of several tectonic plates upon which the country is situated, in addition to a series of continental and regional faults that cross and surround the country. The tectonic plates include the Cocos Plate, off the Pacific and the San Andreas Fault, and the Clarion Plate, running north to south and east to west. The Mexican states with the highest incidence of earthquakes are located in a belt stretching from Chiapas to Jalisco and taking in the states of Oaxaca, Veracruz, Guerrero, Michoacán, Colima, Mexico, Morelos, Puebla, and the Federal District (See Figure A1.2a). There is also a strip of seismic activity along the country's Pacific coastline, extending through the states of Nayarit, Sinaloa, part of Sonora, Chihuahua, and Baja California. The capital, Mexico City, is highly exposed to earthquakes due to

the ancient lake bed sediments that lie underneath the city. Refer to Annex 2 for a list of earthquake events in Mexico.

A Trans-Mexican Volcanic Belt extends from east to west across central-southern Mexico and contains nine volcanoes that have erupted in the past.¹⁴ The metropolitan area of Mexico City is located within this belt. The city is exposed to potential volcanic eruptions of Popocatepetl, Nevado de Toluca, and Jocotitlán, and to monogenetic scoria cones in the Sierra Chichinautzin Volcanic Field (Figure A1.2b).¹⁵

Tsunamis are also an important threat along Mexico's Pacific coasts. A tsunami is a sequence of waves generated by an earthquake occurring at the bottom of the ocean in coastal zones. Waves of high

¹³ Source: National System of Civil Protection (2009)

¹⁴ Source: [http://rmcg.unam.mx/9-1/\(6\)Nelson.pdf](http://rmcg.unam.mx/9-1/(6)Nelson.pdf)

¹⁵ Source: <http://specialpapers.gsapubs.org/content/402/253.abstract>

altitude can hit the coast and cause destructive effects in terms of human losses and material damages. Most tsunamis affecting Mexico are caused by seismic activity occurring in the coastal contour of the Mexican Pacific Ocean that normally originate in low-lying edges of tectonic plates which constitute the crust of the marine bottom (see Figure A1.2c).

Figure A1.2. Main geological hazards in Mexico

A1.2a. Seismic risks



Source: CENAPRED (2011).

A1.2b. Active volcanoes



Source: CENAPRED (2011).

A1.2c. Tsunami risks



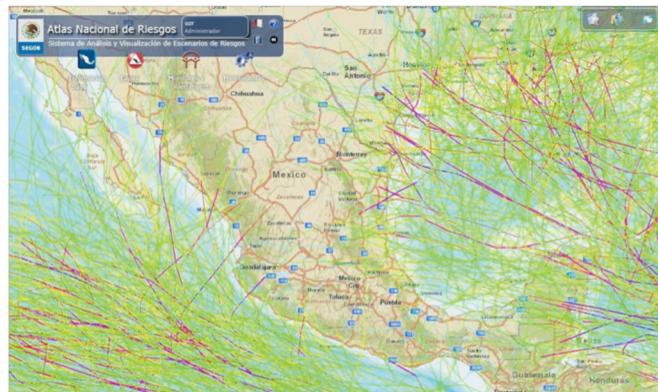
Source: CENAPRED (2011).

Hydro-meteorological hazards

Hurricanes, heavy rains, and floods occur in Mexico with high frequency. The most vulnerable regions to cyclones and floods are the Yucatan Peninsula and coastal regions in the Gulf of Mexico and along the Pacific Ocean. Mexico experiences tropical cyclones during the summer months and polar fronts associated with heavy rainfall throughout its territory in the winter. Figure 2.1 (iv) illustrate the trajectory of tropical cyclones potentially impacting Mexican territory, and Figure 2.1 (v) presents a spatial illustration of flood risks in Mexico. In addition, heavy, albeit short, storms occur. See Figure 2.2 for satellite images of hurricanes approaching Mexico.

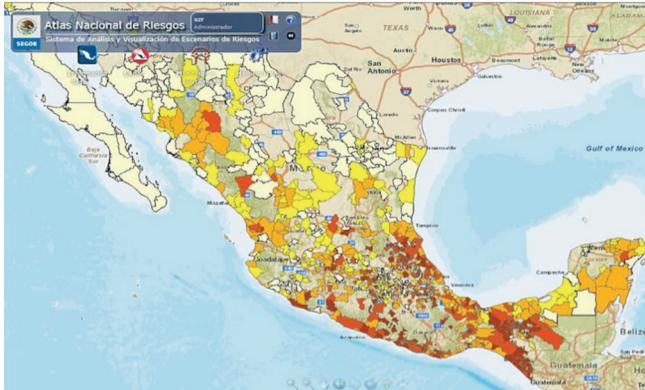
Figure A1.3. Tropical cyclones and flood hazards in Mexico

A1.3a. Historical tropical cyclone trajectories



Source: CENAPRED (2011).

A1.3b. Flood risks in Mexico



Source: CENAPRED (2011).

The control of forest fires, both in terms of limiting the number and spread of fires, has historically been poor in Mexico. Forest fire events have caused significant damages on woods and forests as well as on vegetation of arid or semi-arid regions. Most forest fires occur from January through May, which coincides with the frost and drought season, when combustible material is relatively abundant. Multiple factors can trigger these events and contribute to their development, and each of these factors has distinctive preventive measures. Some of these factors are weather, inflammable material, terrain topography, and human activity. Wildfires caused by human activity represent 97 percent of the total number of fires produced in the country. In this context, an integrated strategy for prevention and control of wildfires has been under development in

Mexico over the last decade. The strategy is implemented through the National Program for Protection against Wildfires, with participation of the three governmental levels (federal, state, and municipal), civil organizations, and volunteers.

A large portion of the Mexican territory is highly exposed to drought. A large extension of the Mexican territory is located in the high-pressure belt of the North latitude, coinciding in latitude with the vast African, Asian, and Australian deserts. These areas of the Mexican territory are characterized as arid and semi-arid and are mostly comprised of the Northern states of the country. In descending order of exposure, the states of Chihuahua, Coahuila, Durango, Nuevo León, Baja California, Sonora, Sinaloa, Zacatecas, San Luis Potosí, Aguascalientes, Guanajuato, Querétaro, Hidalgo, and Tlaxcala are the most affected by drought.

Mexico is also highly exposed to landslides, predominantly triggered by excessive rainfall. The most landslide-prone areas lie along the southern coast of the country, from the states of Chiapas to Guerrero, including the coasts of Jalisco, Veracruz, Tabasco, Puebla, Hidalgo, Guanajuato, the northern part of Baja California, and Mexico City. The states of Sinaloa, San Luis Potosí, Durango, Zacatecas, and Nuevo León are also exposed to landslides, although to a lesser extent.

ANNEX 2: Major Earthquakes Since 1887

DATE ¹⁶ (MONTH/DAY/YEAR)	LOCATION	MAGNITUDE	FATALITIES
05/03/1887	Northern Sonora	7.4	51
04/15/1907	Guerrero	7.7	--
06/07/1911	Off Guerrero	7.7	45
01/15/1931	Oaxaca	7.8	114
06/03/1932	Jalisco	8.1	45
06/18/1932	Colima	7.8	--
07/28/1957	Guerrero	7.9	68
08/26/1959	Vera Cruz	6.8	20
05/11/1962	Guerrero	7.0	4
05/19/1962	Guerrero	7.1	3
07/06/1964	Guerrero	6.9	30
08/23/1965	Oaxaca	7.3	6
08/02/1968	Oaxaca	7.1	18
10/15/1979	Imperial Valley	6.4	--
09/19/1985	Michoacán	8.0	9,500
06/15/1999	Central Mexico	7.0	--
09/30/1999	Oaxaca	7.5	--
02/22/2002	Near Mexicali	5.7	--
12/10/2002	Mexicali, Baja California	4.8	--
01/22/2003	Offshore Colima	7.6	29
09/11/2003	Near Mexicali, Baja California	3.7	--
06/15/2004	Offshore Baja California	5.1	---
01/04/2006	Gulf of California	6.6	--
08/11/2006	Michoacán	5.9	--
02/12/2008	Oaxaca	6.5	--
08/03/2009	Gulf of California	6.9	--
12/30/2009	Baja California	5.9	--
04/04/2010	Baja California	7.2	2

Source: http://earthquake.usgs.gov/earthquakes/world/historical_country.php#mexico.

¹⁶ All earthquake dates listed are UTC.

ANNEX 3: Mexican States and Federal District Populations

RANK	MEXICAN STATE	POPULATION (2000)	POPULATION (2005)	POPULATION (2010)
1	Mexico	13,096,686	14,007,495	15,175,862
2	Mexican Federal District	8,605,239	8,720,916	8,851,080
3	Veracruz	6,908,975	7,110,214	7,643,194
4	Jalisco	6,322,002	6,752,113	7,350,682
5	Puebla	5,076,686	5,383,133	5,779,829
6	Guanajuato	4,663,032	4,893,812	5,486,372
7	Chiapas	3,920,892	4,293,459	4,796,580
8	Nuevo León	3,834,141	4,199,292	4,653,458
9	Michoacán	3,985,667	3,966,073	4,351,037
10	Oaxaca	3,438,765	3,506,821	3,801,962
11	Chihuahua	3,052,907	3,241,444	3,406,465
12	Guerrero	3,079,649	3,115,202	3,388,768
13	Tamaulipas	2,753,222	3,024,238	3,268,554
14	Baja California	2,487,367	2,844,469	3,155,070
15	Sinaloa	2,536,844	2,608,442	2,767,761
16	Coahuila	2,298,070	2,495,200	2,748,391
17	Hidalgo	2,235,591	2,345,514	2,665,018
18	Sonora	2,216,969	2,394,861	2,662,480
19	San Luis Potosí	2,299,360	2,410,414	2,585,518
20	Tabasco	1,891,829	1,989,969	2,238,603
21	Yucatan	1,658,210	1,818,948	1,955,577
22	Queretaro	1,404,306	1,598,139	1,827,937
23	Morelos	1,555,296	1,612,899	1,777,227
24	Durango	1,448,661	1,509,117	1,632,934
25	Zacatecas	1,353,610	1,367,692	1,490,668
26	Quintana Roo	874,963	1,135,309	1,325,578
27	Aguascalientes	944,285	1,065,416	1,184,996
28	Tlaxcala	962,646	1,068,207	1,169,936
29	Nayarit	920,185	949,684	1,084,979
30	Campeche	690,689	754,730	822,441
31	Colima	542,627	567,996	650,555
32	Baja California (South)	424,041	512,170	637,026

Source: http://en.wikipedia.org/wiki/List_of_Mexican_states_by_population.

ANNEX 4: Members of the FONDEN Technical Committees

FONDEN Technical Committee (Federal Level)	
Two Representatives of the Ministry of Finance	Voting Power
Representative of the Ministry of Interior(SEGOB)	Voting Power
Representative of the Ministry of Civil Service	No Voting Authority
Representative of BANOBRAS as the fiduciary agent of the FONDEN Trust (permanent invitation with mandatory attendance required at all Technical Committee meetings)	No Voting Authority

FONDEN Technical Committee (State Level)*	
Two Representatives of the State Government	Voting Power
Representative of Each Affected Municipality	Voting Power
Representative of the FONDEN Trust (permanent invitation with mandatory attendance required at all Technical Committee meetings)	No Voting Authority
Permanent Invitees from Federal Government ¹⁷ : <ul style="list-style-type: none"> - One Representative from the Ministry of Finance (SHCP) - One Representative from the Ministry of the Interior (SEGOB) - One Representative from each of the participating federal agencies 	

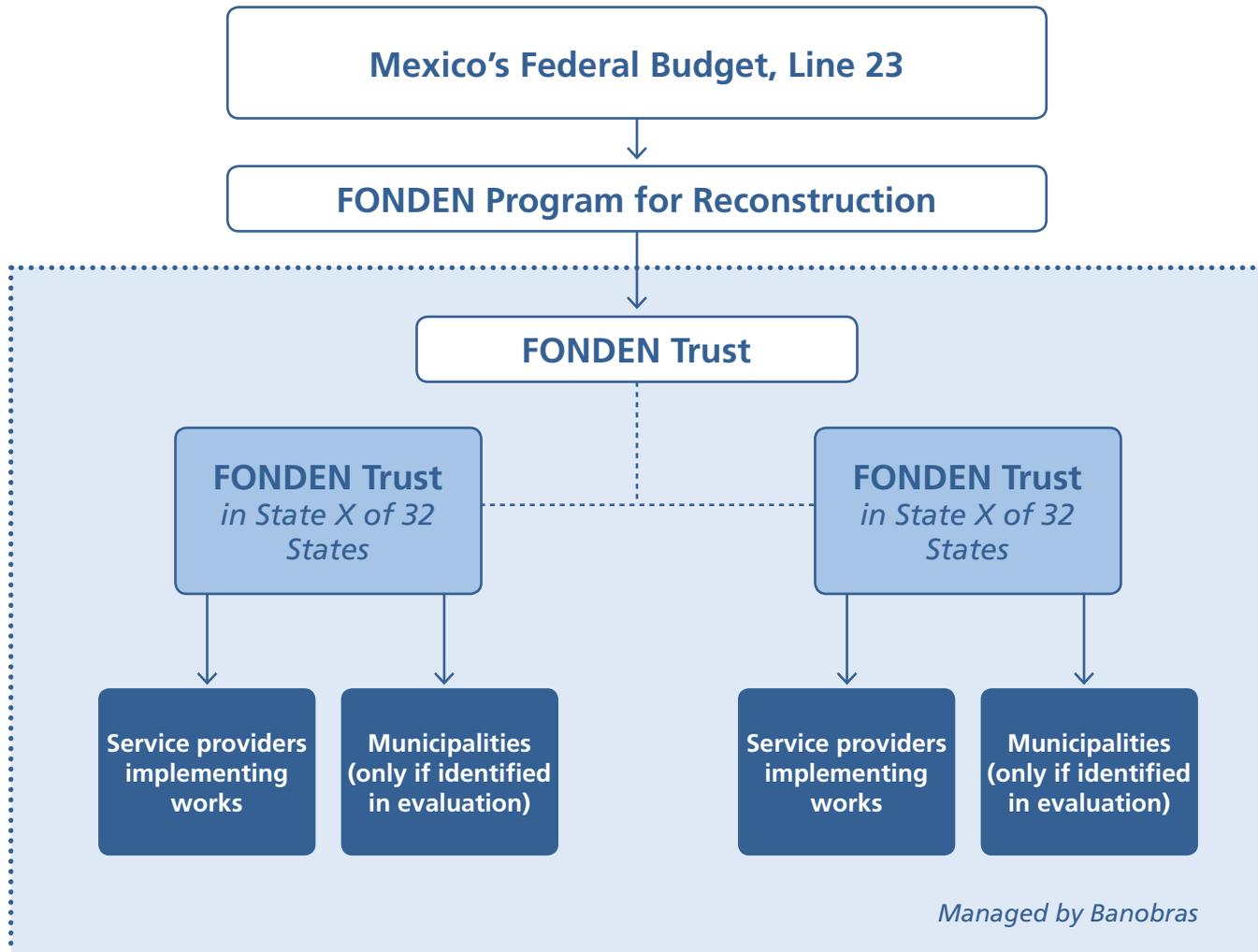
Note: All representatives designate an alternative to ensure representation.

(*): State-level technical committees no longer exist under the revised FONDEN operations procedures, but they are still active for past reconstruction projects.

Source: FONDEN (2011).

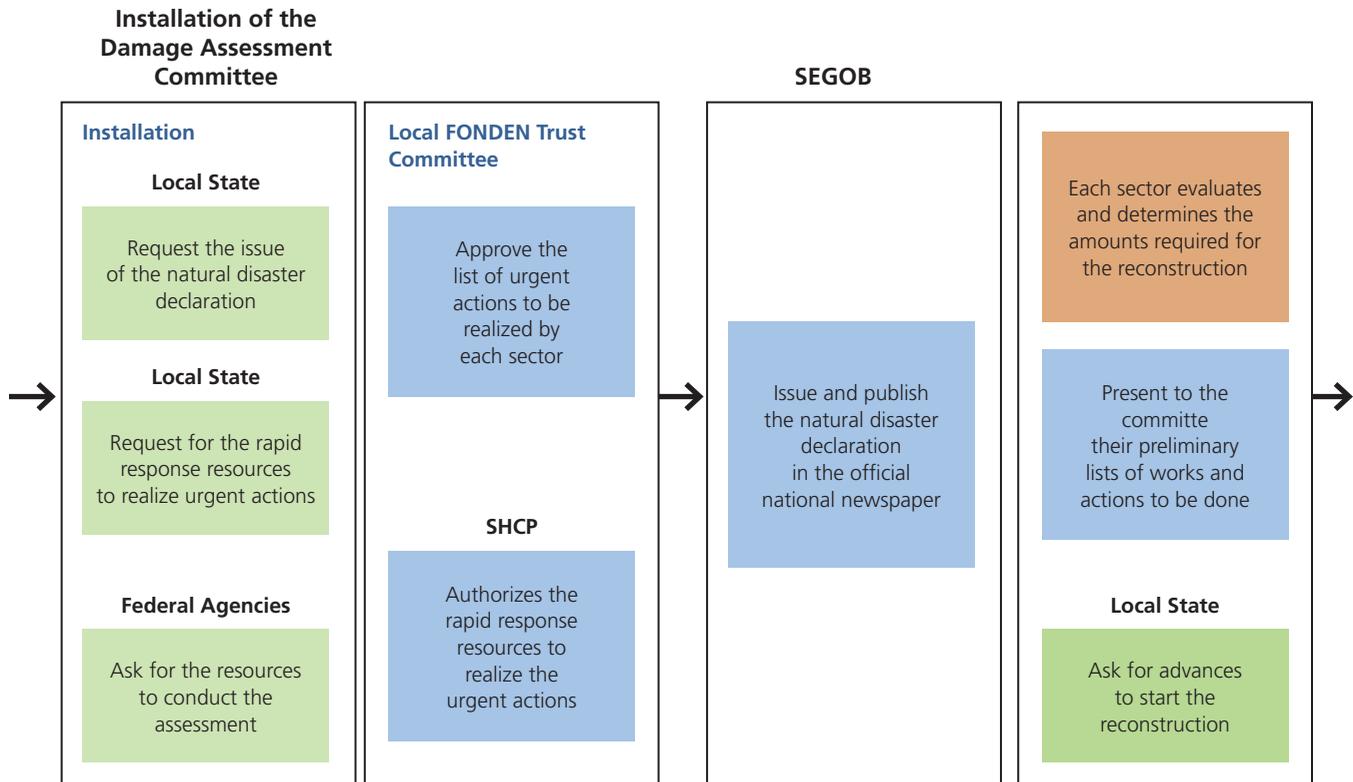
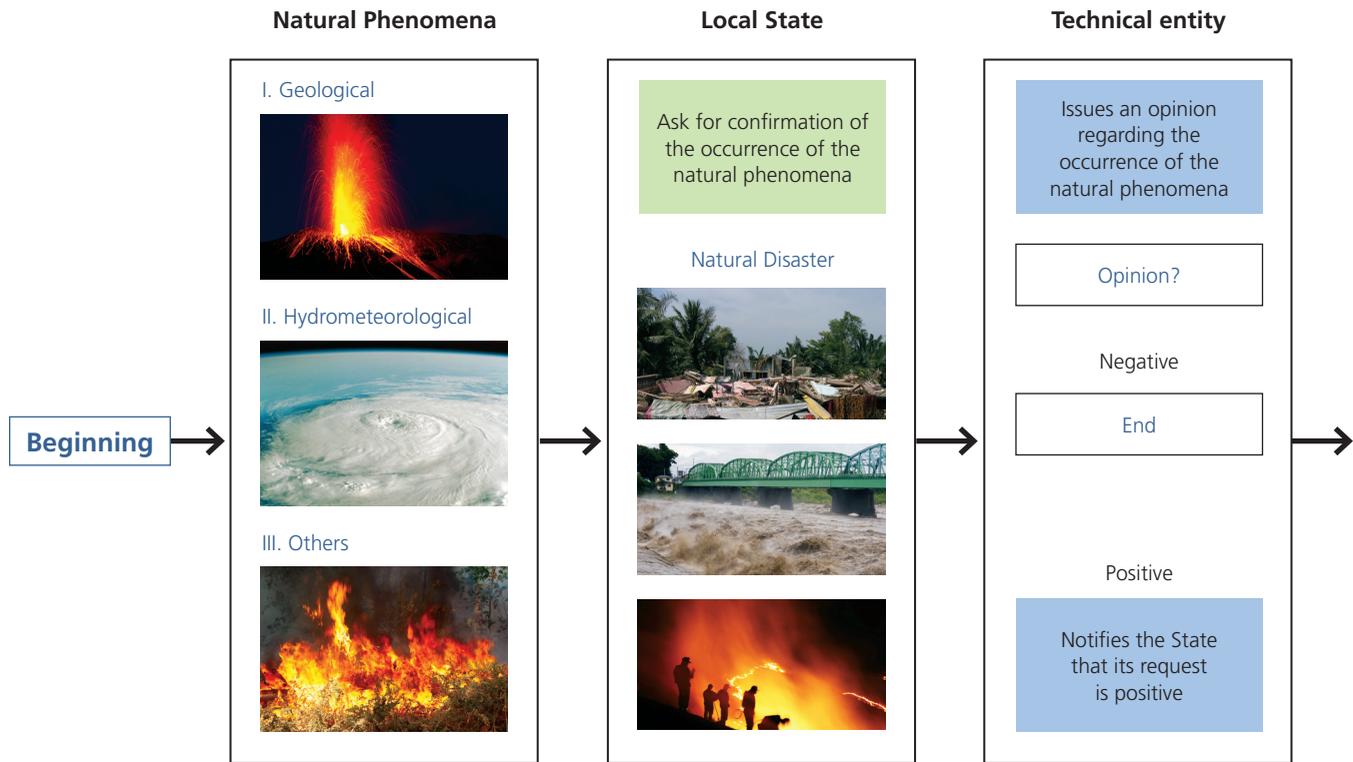
¹⁷ Note: Federal representatives participate within their respective scope of mandate and responsibilities.

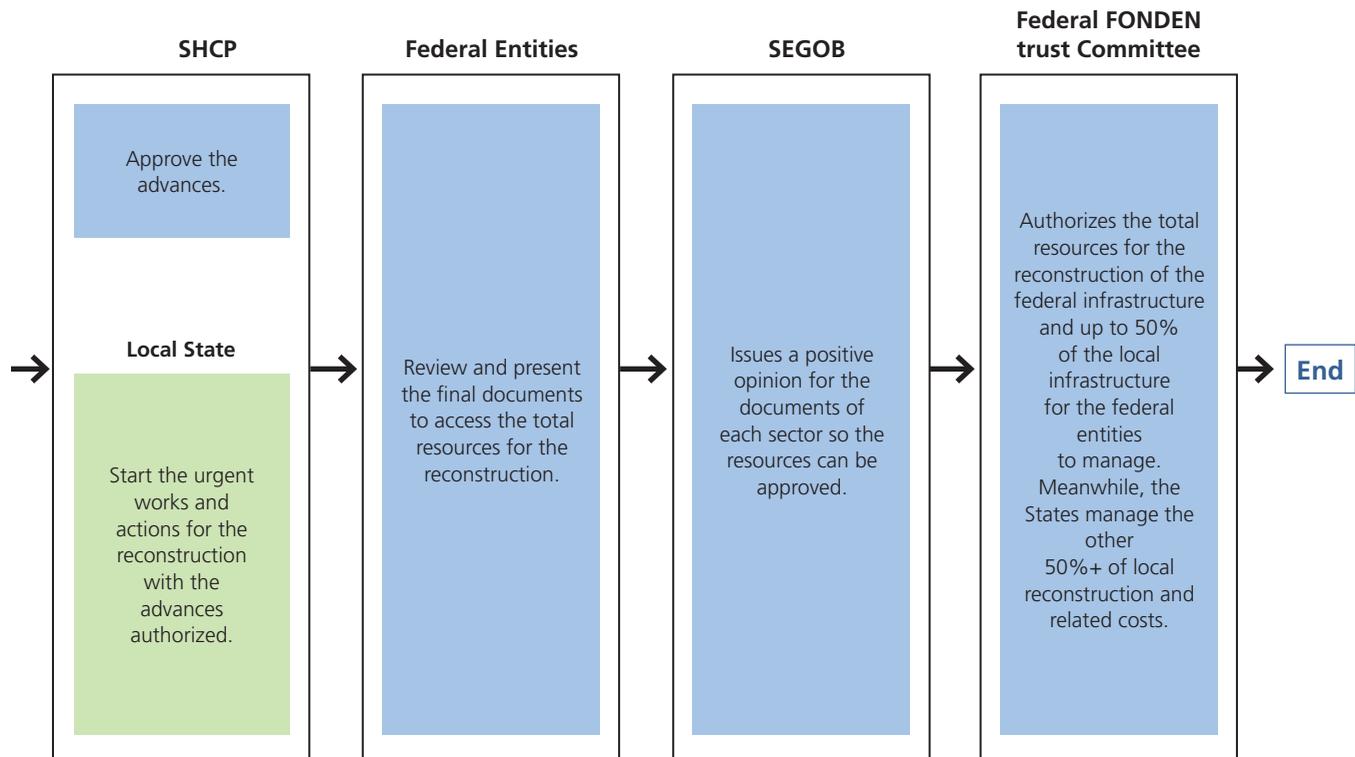
ANNEX 5: FONDEN's Fund Allocation Process before 2011



Source: FONDEN (2011).

ANNEX 6: Overview of FONDEN's New Procedures from 2011





Source: FONDEN (2011).

ANNEX 7: Illustrative Examples of Disaster Events and Access to FONDEN Resources in 2010

Disaster Occurrence: Earthquake in Baja California (April 4, 2010)

Dates	Events / Activities
April 4	Earthquake occurrence in Baja California with a magnitude of 7.2 located at 32.259°N, 115.287°W4 with a depth of 10 kilometers.
April 5	The Government of the State of Baja California asked the National Center for Disaster Prevention (CENAPRED) for a technical opinion regarding the occurrence of an earthquake on April 4 in the state.
April 5	CENAPRED issued its opinion, confirming the occurrence of a strong earthquake on April 4, 2010, affecting the municipalities of Mexicali and Tecate.
April 6	The Damage Assessment Committee was installed. The State Government requested resources for immediate partial support (APIN) to execute priority works and emergency actions arising as a consequence of the event. The State Government applied for a declaration of natural disaster. Due to technical challenges in assessing the damage, an extension was requested to deliver the assessment results within an additional 10 days.
April 7	APIN resources were approved to support federal and state emergency actions and priority works in the road, hydraulic and educational sectors.
April 12	The Natural Disaster Declaration was published in the Official Journal of the Mexican Federation.
April 29	APIN resources were approved for federal support of the education sector.
May 3	The results of the damage assessment were verified at a meeting of the Damage Assessment Committee and preliminary diagnoses of required infrastructure repair and reconstruction works and action presented by the affected sectors. At the same meeting, the Federal Government requested bank advances for the necessary resources to initiate urgent reconstruction activities.
May 10-12, May 18	A series of fund advances were authorized to carry out urgent reconstruction activities in support of a variety of sectors, including housing, urban infrastructure, roads, hydraulic infrastructure, education, culture, sport and health.
June 7	Following receipt of the final diagnoses and respective resource requests for FONDEN support, the requests were submitted for consideration by the Technical Committee of the Federal Trust Fund. This Committee held its 110 th Special Session and approved the requested resources by an agreement recorded as SE.116.01. All requested resources were authorized.
June 10	At the 13 th Special Meeting of the Technical Committee of the Baja California State Trust Fund, implementation schedules for FONDEN-supported reconstruction works and actions were approved. The Committee also approved the schedule of contributions from the State Government of Baja California, covering contributions over the period May 2010 to July 2011.
July 27	At the 118 th Special Session of the Technical Committee of the Federal Trust Fund, a second tranche of funding was authorized for federal support for hydraulic infrastructure reconstruction. ⁵ This step concluded FONDEN resource authorizations for this particular disaster occurrence.

Disaster Occurrence: Hurricane Alex in Nuevo León (June 20 – July 2, 2010)

July 2	The Government of the State of Nuevo León asked the National Water Commission (CONAGUA) for its technical opinion on the occurrence of severe rainfall, flooding and strong winds generated by Hurricane “Alex” over the period of June 20 to July 2, 2010 in Nuevo León.
July 5	The National Water Commission issued its opinion and confirmed the occurrence on July 1, 2010 in the municipalities of Anahuac, Apodaca, Cadereyta Jimenez, Cerralvo, China, Cienega de Flores, Ph.D. Coss, General Escobedo, General Treviño, Guadalupe, Hualahuis, Linares, Los Aldamas, The Ramones, Melchor Ocampo, Montemorelos, Monterrey, San Nicolas de los Garza, San Pedro Garza García, Santa Catarina, and Santiago.
July 5	The Damage Assessment Committee was installed and the Government of the State of Nuevo León requested resources for immediate partial support (APIN) to execute urgent works and priority actions arising as a consequence of the disaster. The State Government applied for the issue of a declaration of natural disaster and also requested an extension of up to a further 10 days to complete the damage assessment due to technical limitations.
July 6	Immediate partial support resources (APIN) were authorized for the road, hydraulic, urban, health and housing sectors.
July 9	The Declaration of Natural Disaster was published in the Official Journal of the Mexican Federation. The State Government made its second request for additional immediate partial support (APIN).
July 12	The second APIN application was approved for additional support to the road, urban and educational sectors.
July 22	The State Government issued a third request for immediate partial support resources (APIN). This request was authorized for the affected sectors, including the road, hydraulic, education, urban and housing sectors.
August 4	The results of the damage assessment were verified at a meeting of the Damage Assessment Committee and preliminary diagnoses of required infrastructure repair and reconstruction works and action presented by the affected sectors. At the same meeting, the Federal Government also requested bank advances for the necessary resources to initiate urgent reconstruction activities.
August 6	Resources were authorized as advances to carry out urgent reconstruction activities in the housing sector.
September 3	Following receipt of the final diagnoses and the respective resource requests for FONDEN support, the requests were submitted for consideration by the Technical Committee of the Federal Trust Fund. This Committee held its 121st Special Session and approved the requests by an agreement recorded as SE.121.01. Resources were authorized for the repair of damage in the hydraulic, health, educational and environmental sectors.
September 21-22	At the 18 th Special Session of the Technical Committee of Nuevo León’s State Trust Fund, implementation schedules for FONDEN-supported reconstruction works and actions were approved. The Committee also approved the schedule of contributions from the State Government of Nuevo León, covering contributions over the period October 2010 to December 2011.
September 29	At the 122 nd Special Session of the Technical Committee of the Federal Trust Fund, additional funds were authorized for the repair of damage in two remaining sectors: federal highways and sport facilities. Full authorization was provided for these two sectors.
October 28	The 123 rd Special Session of the Technical Committee of the Federal Trust Fund authorized a third block of resources to support the reconstruction of state infrastructure in some sectors that were slow completing their requests, including roads, urban, housing and hydrologic infrastructure. This concluded the authorization of FONDEN resources.
November 4	Based on the earlier approval of State resources, the 22 nd Second Special Session of the Technical Committee of Nuevo León State Trust Fund approved the implementation schedules of works and reconstruction measures for the affected sectors, including roads, urban and housing infrastructure.

Source: FONDEN (2011).

ANNEX 8: Examples of Authorized Resources for Disaster Declarations in 2011

DESASTRES 2011 AUTORIZADOS EN 2011															
No.	Status	Estado	Evento	Municipios y Delegaciones Políticas Afectadas	Solicitud de Declaratoria	Fecha publicación DOF	Acuerdo Comité Técnico	Sectores Afectados	*Apoyos Parciales Inmediatos APIN	*Anticipos	Acciones de Restauración	Aportación FONDEN (Pesos)	Aportación Estatal (Pesos)	Aportación Dependencia Federal (Pesos)	Aportación Total (Pesos)
1	Autorizado	Campeche	Inundación Fluvial 01 al 21 de Octubre de 2011	1	26-oct-11	01-nov-11	SE.133.01 16-Dic-2011	Carretero - Estatal Hidráulico - Estatal Deportivo - Estatal Hidráulico - Federal Carretero - Federal	173,000		16 11 3 5 6	71,059,400 3,742,856 471,913 84,222,208 179,428,080	78,104,000 4,015,502 1,329,513		149,163,400 7,758,358 1,801,426 84,222,208 179,428,080
1	Subtotal Campeche (Autorizados)			1					173,000	0	41	338,924,457	83,449,015	0	422,373,472
1	TOTAL CAMPECHE 2011			1					173,000	0	41	338,924,457	83,449,015	0	422,373,472
1	Autorizado	Chiapas	Lluvia Severa 5 de septiembre de 2011 Tuxtla Gutierrez	1	14-nov-11	21-nov-11	SE.133.03 16-Dic-2011	Hidráulico - Es Educativo - Estatal Urbano Vivienda Carretero - Federal Hidráulico - Federal	5,648,433		33 1 2 2 4 11	8,776,369 347,303 21,022,560 146,032 22,389,477 321,913,890	16,677,489 354,373 22,064,016 146,088	2,518,145	25,453,858 701,676 43,086,576 292,120 24,907,622 321,913,890
1	Subtotal Chiapas (Autorizados)			1					5,648,433	0	53	374,595,631	39,241,966	2,518,145	416,355,742
1	TOTAL CHIAPAS 2011			1					5,648,433	0	53	374,595,631	39,241,966	2,518,145	416,355,742
1	Autorizado	Coahuila	Incendio Forestal a partir del 17-marzo-11	3	31-mar-11	06-abr-11	SE.130.26 28-Jul-2011	Forestal - Federal	240,955,250		58	204,114,991	0	0	204,114,991
1	Subtotal Coahuila (Autorizados)			3					240,955,250	0	58	204,114,991	0	0	204,114,991
1	TOTAL COAHUILA 2011			3					240,955,250	0	58	204,114,991	0	0	204,114,991
1	Autorizado	Estado de México	Lluvia Severa 28 de Agosto 2011	4	02-sep-11	8-Sep-11	SE.132.01 28-Oct-2011	Hidráulico - Es Urbano Total Estado de Mé	3,819,528		19 10 29	6,098,618 19,820,209 25,918,827	9,679,056 22,905,707	0	15,777,674 42,725,916 58,503,590
1	Subtotal EDOMEX (Autorizados)			4					3,819,528	0	29	25,918,827	32,584,763	0	58,503,590
1	TOTAL EDOMEX 2011			4					3,819,528	0	29	25,918,827	32,584,763	0	58,503,590
1	Autorizado	Hidalgo	Lluvia Severa del 29 de junio al 1 de julio 2011 Tormenta Tropical "Adane"	54	08-jul-11	14-Jul-11	SE.131.01 27-Sept-2011	Carretero - Estatal Vivienda Hidráulico - Estatal Salud - Estatal Carretero - Federal	13,957,516		513 80 15 3 8	877,486,389 2,356,067 3,432,425 5,927,134 212,520,122	1,180,238,143 2,429,760 5,138,545 5,927,134	15,254,625	2,057,724,532 4,785,827 8,570,970 11,854,268 227,774,747
1	Subtotal Hidalgo (Autorizados)			54					13,957,516	0	619	1,101,722,137	1,193,733,582	15,254,625	2,310,710,344
1	TOTAL HIDALGO 2011			54					13,957,516	0	619	1,101,722,137	1,193,733,582	15,254,625	2,310,710,344
1	Autorizado	Oaxaca	Lluvia Severa de Laderas, los días 27, 28 y 31 de Agosto y 1,2,3,4, 7 y 8 de septiembre 2011	4	19-sep-11	23-09-11	SO.42.18 Nov-2011	Carretero - Estatal Hidráulico - Estatal Vivienda Carretero - Federal			18 5 303 5	43,295,200 1,539,882 44,183,320 61,772,988	57,491,200 1,577,390 44,208,000	0	100,786,400 3,117,272 88,391,320 61,772,988
1	Subtotal Oaxaca (Autorizados)			4					0	0	331	150,791,390	103,276,590	0	254,067,980
1	TOTAL ESTADO DE OAXACA 2011			4					0	0	331	150,791,390	103,276,590	0	254,067,980
1	Autorizado	Puebla	Lluvia severa los días 22 y 23 agosto 2011	29	13-Sep-11	20-Sep-11	SO.42.20 18-Nov-2011	Carretero - Estatal Vivienda Carretero - Federal			81 19 3	341,492,716 2,214,000 15,860,000	341,492,716 2,460,000	2,860,000	682,985,432 4,674,000 18,720,000
1	Subtotal Puebla (Autorizados)			29					0	0	103	359,566,716	343,952,716	2,860,000	706,379,432
1	TOTAL PUEBLA 2011			29					0	0	103	359,566,716	343,952,716	2,860,000	706,379,432
1	Autorizado	San Luis Potosí	Inundación Fluvial y Pluvial	19	03-ago-11	09-08-11	SE.131.03 27-Sept-2011	Carretero - Estatal Total San Luis Pot			68	46,868,947	68,919,970	0	115,788,917
1	Subtotal San Luis (Autorizados)			19					0	0	68	46,868,947	68,919,970	0	115,788,917
1	TOTAL SAN LUIS POTOSÍ 2011			19					0	0	68	46,868,947	68,919,970	0	115,788,917
1	Autorizado	Sinaloa	Lluvia Severa 24 - Agosto - 11 Escuinapa y Rosario	2	02-sep-11	08-Sep-11	SE.132.05 28-Oct-2011 SE.133.10 16-Dic-2011	Hidráulico - Es Carretero - Estatal Educativo - Estatal			24 25 8	2,097,680 14,471,178	2,098,169 29,366,047		4,195,849 43,837,225
1	Subtotal Sinaloa (Autorizados)			2					0	0	57	19,058,249	35,234,991	0	54,293,240
1	TOTAL SINALOA 2011			2					0	0	57	19,058,249	35,234,991	0	54,293,240
1	Autorizado	Tamaulipas	Lluvias Severas los días del 30 de junio al 2 de julio 2011	5	8-Jul-11	14-Jul-11	S.O. 40.17 26-Ago-2011	Vivienda Hidráulico - Estatal Carretero - Estatal			259 63 17	737,880 13,189,280 12,874,206	743,600 13,328,640		1,481,480 26,517,920 38,308,926
1	Subtotal Tamaulipas (Autorizados)			5					1,200,000	0	339	26,801,366	39,506,960	0	66,308,326
1	TOTAL TAMAULIPAS 2011			5					1,200,000	0	339	26,801,366	39,506,960	0	66,308,326
10			Municipios 11	122				Acciones y Recursos autorizadas del 2011	265,753,727	0	1,698	2,648,362,710	1,939,900,553	20,632,770	4,608,896,033

Source: FONDEN (2011).

ANNEX 9: Examples of Funds Approved for Immediate Partial Support in 2011

DIRECCIÓN GENERAL DEL FONDO DE DESASTRES NATURALES							
APOYOS PARCIALES INMEDIATOS SOLICITADOS Y AUTORIZADOS DURANTE EL 2011							
No.	Estado No. Municipios Evento	Sectores	APIN Solicitado (Pesos)	No. Acciones solicitadas	Autorizados SHCP	No. Acciones apoyadas	Fecha de Autorización SHCP
1	Inundación Fluvial 01 al 21 de Octubre de 2011 (1) Municipio Campeche	Carretero Federal	30,161,362	2			
		Educativo Federal	4,900,925	52	4,900,925	52	07/11/2011
		Carretero Estatal	173,000	1	173,000	1	07/11/2011
		Urbano	259,223	1	129,611	1	07/11/2011
		Residuos Sólidos- Estatal	45,268,293				
		Total	80,762,803	56	5,203,536	54	
2	Incedio Forestal (3) Municipios Coahuila a partir del 17-Mar-11	Forestal-Federal	103,305,250	9	103,305,250	9	11/04/2011
		Forestal-Federal*	137,650,000	11	137,650,000	11	19/04/2011
		Total	240,955,250	20	240,955,250	20	
3	Huracán "Jova" (10) Municipios Colima 11-octubre-2011	Hidráulico-Estatal	15,015,259	79	7,507,630	79	25/10/2011
		Salud-Estatal	495,372	8	247,686	8	25/10/2011
		Carretero-Estatal	1,568,800	10	784,400	10	25/10/2011
		Residuos Sólidos- Estatal	486,600	3	243,300	3	25/10/2011
		Urbano	5,315,054	22	2,657,527	22	25/10/2011
		Carretero-Estatal	3,762,480	8	1,881,240	8	26/10/2011
		Educativo-Estatal	325,000	3	162,500	3	26/10/2011
		Deportivo-Estatal	324,727	10	162,363	10	26/10/2011
		Urbano	7,144,954	15	3,572,477	15	26/10/2011
		Educativo Federal	3,312,924				
		Total	37,751,169	158	17,219,123	158	
4	Lluvias Severas 05 de septiembre de 2011 (1) Municipio Chiapas	Hidráulico-Estatal	11,296,866	12	5,648,433	12	26/09/2011
		Total	11,296,866	12	5,648,433	12	
		Total	11,296,866	12	5,648,433	12	
5	Lluvia Severa 1 julio 2011 (2) Municipios Estado de México	Hidráulico-Federal	46,300,000	7	46,300,000	7	04/07/2011
		Hidráulico-Estatal	11,431,000	7	5,715,500	7	13/07/2011
		Hidráulico-Federal 2a Solicitud	54,550,000	9	54,550,000	9	14/07/2011
		Carretero-Estatal *	2,000,000	1			EXTEMPORANEO
Total	114,281,000	24	106,565,500	23			
6	Lluvia Severa 3 Septiembre 2011 (2) Municipios Estado de México	Hidráulico-Federal	50,000,000	3	25,000,000	3	15/09/2011
		Total	50,000,000	3	25,000,000	3	
		Total	50,000,000	3	25,000,000	3	
7	Lluvia Severa 28 Agosto 2011 (4) Municipios Estado de México	Hidráulico-Estatal	7,639,056	14	3,819,528	14	15/09/2011
		Total	7,639,056	14	3,819,528	14	
		Total	171,920,056	41	135,385,028	40	
8	Lluvia Severa del 29 de junio al 1 de julio 2011 Tormenta Tropical "Arlene" (54) Municipios Hidalgo	Carretero-Estatal.	17,814,511	27	13,957,516	27	13/07/2011
		Total	17,814,511	27	13,957,516	27	
		Total	17,814,511	27	13,957,516	27	
		Total	17,814,511	27	13,957,516	27	
9	Lluvia Intensa 25-junio-11 (1) Municipio Jalisco	Hidráulico-Federal	2,000,000	1			PENDIENTE
		Total	2,000,000	1	0	0	
		Total	2,000,000	1	0	0	
10	Lluvias Severa del 14 al 15 de julio-11 (6) Municipios Oaxaca.	Carretero-Estatal.	10,556,322	16	10,556,322	16	16/08/2011
		Total	10,556,322	16	10,556,322	16	
		Total	10,556,322	16	10,556,322	16	

Source: FONDEN (2011).

