Natural Disaster Management and the Road Network in Ecuador: Policy Issues and Recommendations

Scott Solberg
David Hale
Juan Benavides

Inter-American Development Bank

Washington, D. C.

Sustainable Development Department

This paper benefited from detailed comments provided by Margaret Arnold and Tova Solo (World Bank), and Rodolfo Huici, Kari Keipi and Vera Vicentini (IDB.)

April 2003

This publication can be obtained from:

IFM Publications
Mail Stop W-0508
Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577

E-mail: sds/ifm@iadb.org
Fax: 202-623-2157
Web Site: *http:www.iadb.org/sds/ifm*

Foreword

Latin American countries devote insufficient efforts to prevent the impact of earthquakes, floods, hurricanes and other natural hazards on infrastructure. The political cycle introduces the incentive for some politicians and civil works firms to profit from incoming aid and the reconstruction process. Incentives are at the heart of disaster management policy in infrastructure: every time they are misaligned, countries may end up building inadequate infrastructure that have to be totally developed or massively refurbished every few years ("reconstruction of the vulnerability"). Insurance and other risk transfer measures are necessary to handle the exposure of project debt or equity holders, but may fail to internalize the loss of value added to the society: the economy as a whole suffers because infrastructure takes time to rebuild. More fundamentally, scarce resources are endemically invested to just pull through the physical stock, when they could otherwise be invested in other sectors.

This paper analyzes the institutional and political economy landscape of disaster management in Ecuador, focused on its road network. It also provides policy recommendations, following the *IDB Action Plan in Natural Disasters* mandate to identify measures increasing the capacities of national disaster management systems. The recommendations pertain to changes in governance of the national disaster management system in issues related to transportation, as well as strengthening the Ministry of Public Works' role and skills as sector leader in all the country. The proposals, if implemented, should diminish "risk-rent" extraction and provide the context in which risk transfer makes sense.

Pietro Masci
Division Chief
Infrastructure and Financial Markets Division

Contents

Introduction

Ecuador is constantly challenged by natural hazards, including floods and landslides in coastal and Amazon regions, periodic droughts and floods caused by El Nino, earthquakes, and volcanic eruptions throughout the highlands. The resilience of physical infrastructure after severe weather, hydrological and geophysical phenomena is a function of the level of design, construction, prevention and mitigation efforts. Risk transfer (insurance and other financial instruments) hedge against damages to physical stocks, while preparedness efforts to recover network functionality help customers and firms minimize flow losses. To reach an effective balance among all of these risk management tasks is a complex endeavor for a country, and the track record of Ecuador in the road sector is modest.

This study identifies the major structural problems and constraints that impair the performance of disaster management in the road network of Ecuador. Two categories of problems are found. First, the whole system favors reactive (reconstruction and relief) efforts, and the strategic decisions are made by ad hoc organizations interfering with the due diligence of the authorities in the transport sector. Second, lack of planning and poor procurement practices for road maintenance and construction increase the reconstruction and disruption costs of extreme natural events. The possibility of redoing or overhauling the same physical asset frequently introduces perverse incentives in infrastructure procurement. Penalties for bad performance in public works contracts are not observed in real life.

As in many other countries, disaster management in Ecuador is a process in which a small group of special interests who can manage and target relief and reconstruction funds in the political arena and the procurement process. The net losers –the population directly suffering the impact of a disaster and taxpayers- are dispersed and disorganized, and ultimately bear the direct and indirect socioeconomic costs of unreliable infrastructure.

The following factors complicate the picture: (i) the separation of roles between the Ministry of Public Works (MOP; primary and secondary road system) and the regional and local governments (tertiary system); (ii) the weakness of the national planning board (ODEPLAN) to provide and enforce a long-term and nationwide disaster management policy; (iii) the existence of dual government bodies and policies for la Costa and la Sierra in infrastructure and disaster management, exemplified by COPEFEN (Corporación Para Enfrentar el Fenómeno de El Niño 1997-1998) and CORPECUADOR (Corporación Ejecutiva para la Reconstrucción de las Zonas Afectadas por el Fenómeno El Niño), which takes over the scope and initiative of the MOP in la Costa; (iv) the emphasis on weather phenomena like El Niño, in detriment of other type of natural threats (earthquakes and landslides, for example.)

The recommendations of this exploratory study include changes in governance of the national disaster management system in issues related to transportation; and strengthening of MOP's role and skills as sector leader in all the country.

In governance, the measures include: delegation of the disaster policy making and coordinating roles (including fiscal issues) to ODEPLAN; elimination of ad hoc institutions and concentration of infrastructure responsibilities at MOP and the regional and local government levels.

For the transportation sector itself, the proposals include strengthening planning of mitigation and prevention, creation of permanent disaster management units within MOP and provincial governments, prioritization of maintenance and rehabilitation efforts in the entire national road; use of incentive contracts and incorporation of the communities to the recovery of tertiary and rural roads.

Finally, the multilateral agencies may play a leading role in the transition of the EDMS if they follow a consistent approach to restrict the nature of public organizations and activities that are eligible for funding, help strengthen the enforcement skills of the Ecuadorian contracting system in public works, and propose innovative ways to fund the resources needed for optimal risk management of existing infrastructure.

Evolution of the Ecuadorian Disaster Management System

THE IMPACT OF DISASTERS IN ECUADOR

Ecuador is subject to intense and continuous geological and weather hazards that have produced large economic losses along the history of the country. Volcanic activity and earthquakes pertain to the first category of hazards. The country's location along the Pacific rim's "Ring of Fire" places 11 active volcanoes within its borders. In September 1998, the activity level of two of the country's volcanoes, Tungurahua and Guagua Pichincha, rose to a level that warranted states of yellow and at times orange alert. The ensuing eruptions - although ultimately minor- caused evacuations and damages in the provinces of Tungurahua and Chimborazo.

Ecuador's proximity to the several geological fault lines created by movements of the Nazca Oceanic and South American Continental tectonic plates creates a constant threat from earthquakes of various magnitudes. The most recent significant seismological events in the past two decades include a series of four magnitude 6.9 earthquakes that struck the provinces of Napo, Cotopaxi, Morona Santiago, and Manabí. A very powerful quake in the 1998 also destroyed much of the downtown area of Bahía de Caráquez, with a magnitude of 7.1.

GDP has taken a severe drop immediately following severe natural disasters. For example, the quake that struck the country in 1983 resulted in a drop of 2,8% of GDP. As well, the more recent quake in the province of Napo on March 5, 1987 resulted in a most serious damage with estimated financial losses of $1 billion (a decrease in GDP of 6.0% for the year.) In the latter case, much of the financial loss resulted from severe damages to a major oil pipeline located near the epicenter of the quake causing the suspension of production and exportation of oil for a six-month period.

The El Niño events have been the most severe natural phenomena to plague Ecuador. The economic losses associated with the 1997-1998 El Niño have been estimated at US$2,882 million by CEPAL (1998.) This figure is about 15% of 1997 Ecuador's GDP. Of total losses, 29% (US$846 million) were considered direct damages and 71% (US$2,036 million) indirect. According to the same CEPAL 1998 report, the 1997-1998 El Niño affected 60% of the population of Ecuador in one way or another, although the primary impacts were in the coastal and southern provinces of the country. The productive and the transport sectors suffered 53% and 28% of total damages, respectively, and GDP rate of growth for Ecuador during 1998 was reduced in about 1,2% (as compared with the projected baseline without El Niño.)

It's worth noting that 10% (US$294 million) of the losses were inflicted to the capital stock of la Costa, equivalent to 7% of the gross fixed capital formation in Ecuador in 1997. When capital losses of this type recur every time a similar hazard materializes, depreciation rates become higher than required to sustain economic growth. In a model of endogenous

growth, increased depreciation rates cause the cost of capital to rise, so that the effect is qualitatively the same as that of an increase in the interest rate. The capital/output ratio falls, as well as capital per worker and output per head (Gylfason 1999.)

While relatively minor disasters like road collapses, mudslides, and landslides do not usually cause damage on a catastrophic level, they occur with much more frequency and cause a drain on public resources and economic productivity. Notable incidents of this type over the course of the last 15 years have occurred in the areas of Chimborazo, Napo, Pichincha, Azuay, Quito, and Morona Santiago.

These stylized facts suggest the hypothesis that, in Ecuador, the maps of *hazard* (the exogenous probability of occurrence of a potentially damaging phenomenon) and *vulnerability* (the controllable degree of loss resulting from the occurrence of the phenomenon) are extremely correlated. This indicates inefficient risk management, which is more an institutional than a technical or financial problem, as discussed in the following section. There is an additional economic effect on top of those caused by accelerated depreciation of physical assets and lower productivity: the limited lending capacity of the country is "crowded out" by an inefficiently high level of funds devoted to reconstruction, deepening the fiscal problems of Ecuador and thus facilitating the appearance of a "poverty trap."

THE CONSOLIDATION OF A DISCRETIONARY APPROACH

Policy makers' attitude toward disaster management over the past 30 years has been heavily concentrated in response and relief. As a result, the study of the history of disaster management in Ecuador shows: (i) the strengthening of ad hoc solutions outside the normal public reach; (ii) poor accountability and supervision of such organizations; and (iii) the expropriation of key roles of the Ministry of Public Works (MOP) in la Costa, partly as an outcome of the struggle between regional interests.

The National Security Law (Title III) that empowered the Civil Defense to handle all aspects of disaster management was established in 1964 under a military dictatorship. The Civil Defense was mandated to oversee all aspects of disaster management in the areas of prediction, prevention, mitigation, preparation, response, rehabilitation and reconstruction in disasters. Since the passage of this law there have been 13 legislative changes and 20 changes to the bylaws. Most of the modifications and additions have been minor adjustments, and in general have had little significant impact.

In July 1997, with the advent of a strong hit of El Niño, the Presidency declared the state of National Emergency through which the Civil Defense was given the authority (redundant in light of the decisions made in 1964´s National Security Law) to coordinate all actions to deal with the ongoing El Niño. Then, a presidential decree (# 740, October 1997) created "Unidad Coordinadora de Emergencia para Enfrentar el Fenómeno de El Niño 1997-1998," COPEFEN. This new organization was in charge of "preventing, repairing and mitigating the effects of El Niño 1997-1998 event, and rehabilitating the social and economic infrastructure." As conceived, it would function under the direct control of the Presidency

and would direct the efforts of key ministries (including MOP) and the Civil Defense. Notice also that COPEFEN was intended to be broad in powers and mission but limited in time duration. COPEFEN would be the recipient of the funds lent by the multilateral institutions for reconstructions projects.

Law 120 of 1998 created "Corporación Ejecutiva para la Reconstrucción de las Zonas Afectadas por el Fenómeno de El Niño," CORPECUADOR. This is a permanent organization devised to "plan, contract and monitor the rehabilitation works on the primary and secondary (red vial principal) road system destroyed by El Niño." Its spatial jurisdiction goes until the 1,000 meters above the sea level line. Additionally, CORPECUADOR is in charge of commissioning technical studies and designs to reconstruct roads and bridges. The tertiary and rural road systems (in charge of regional and municipal authorities, respectively), as well as the highway gave in concession to private parties by MOP are excluded from CORPECUADOR´s scope.

Delegates of the President and leaders of the construction, commerce and industrial sectors of the Coast dominate CORPECUADOR´s board of directors. CORPECUADOR funding includes (i) domestic and multilateral loans (off balance: GOE is responsible of debt repayment) that shall be allocated freely and autonomously; (ii) toll payments of rebuilt roads; (iii) donors money; (iv) 10% portion of new oil royalties receivable by GOE, (v) 25% of the net interests obtained by Fondo de Solidaridad (funded by the proceeds of asset privatization) and (vi) whatever additional transfers from the national budget that may come under the declaration of national emergency (see subsection 2.3.).

As the primary and secondary road systems are precisely the national responsibility of MOP, it is clear how its role and sector leadership is superseded by CORPECUADOR in the Coast Region. The funding arrangements for CORPECUADOR make MOP look like the poor relative in physical infrastructure. Road maintenance in charge of MOP, whose effect to mitigate future damages is quite high, has been chronically underfunded by GOE.

In 1999, a Vice Presidential decree created ODEPLAN, the National Planning Office. In the field of natural disasters, ODEPLAN has to oversee disaster management planning through PREANDINO,[1] a CAF (Corporación Andina de Fomento) supported project. ODEPLAN must conduct strategic research and develop plans to inform the national, regional and local governments on how to use resources in a more efficient manner. ODEPLAN has the "weak" (as its leadership is not established by Congress law) mandate of initiating and supporting, on the national and sectoral levels, plans to mitigate risk within the country through the creation of the necessary political, organizational and cultural changes to meet these ends.

In April 2002, presidential decree # 2549 amplified the roles of COPEFEN. Its new mandate includes coordination of planning, on a nationwide basis, of all technical, economic, administrative, financial and operative aspects of disaster management for every kind of natural disasters. While the acronym for the organization remained COPEFEN, the

[1]PREANDINO was designed to foster disaster management planning and coordination among the five Andean countries.

name was changed to reflect its new responsibilities (Unidad Coordinadora del Programa de Emergencias para Afrontar Fenómenos Naturales). Within the same decree #2549, the presidency expanded the responsibilities of CORPECUADOR. CORPECUADOR is now mandated to oversee the reconstruction process of infrastructure damaged by natural disaster throughout the country. Unplanned fiscal transfers for US$5 million to CORPECUADOR were ordered at that time.

As of August 2002, a presidential decree established a Crisis Committee (Comité de Crisis) for the forthcoming 2002-2003 El Niño, consisting of the Ministers of the "Frente Social" (Economics and Finance, Agriculture, Environment, Public Works), the Civil Defense, and legal representatives of COPEFEN, CORPECUADOR, and the national organization in charge of family and children welfare. The objective of the Crisis Committee is to coordinate actions of response following the declaration of an emergency.

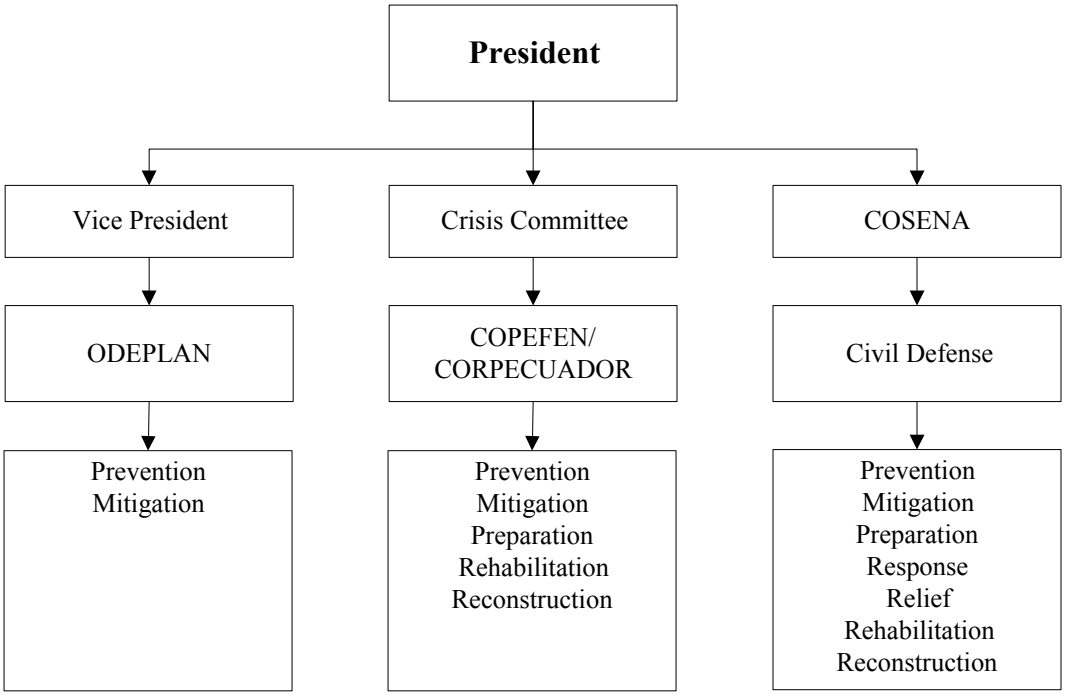
The sequence of institutional changes has displaced the center of gravity from the Civil Defense to temporary to permanent solutions outside the normal state apparatus. Two facts reinforce the system in place:

- The regional and political struggle between la Costa and la Sierra. La Costa politicians insist on the historical inadequacy of the political system to deliver the solutions and funds needed for the region progress. The claim may be sound in the sense that fiscal provisions reflect very poorly the relative economic contribution of the two regions to exports and GDP. Roughly, the Coast contributes with 60% of total country exports – mainly shrimp, fisheries and bananas-, while la Sierra and oil exports (Amazon basin) are 10% and 30%, respectively (Banco Central del Ecuador, 1997.) Of course, these shares change every year according to changes in commodity prices and output, but nowadays reflects the economic weakness of la Sierra, where the political center of the country was established since colonial times. There exists a permanent "war of attrition" between the two regions that is precisely reflected in the creation of COPEFEN and CORPECUADOR. The incentive for la Costa politicians is to capitalize any crisis in the form of ad hoc organizations for their region that circumvent and debilitate the national sector ministries. The funding of CORPECUADOR described above illustrates how newly created organizations seek to secure substantial chunks of the national rents and foreign funding. As a result, institutions such as MOP are not strengthened (nor fiscally neither technically) to incorporate the requirements that disaster management impose on maintenance, prevention, mitigation, risk transfer, preparedness and reconstruction of the national primary and secondary road systems.

- The counterparts of GOE in the reconstruction process are the construction and business groups of la Costa. These two interests groups are positively correlated between them and with the political representation. If the lack of a sound system for contract supervision and compliance is added on top of the above mentioned governance mechanism, the whole approach becomes highly unsatisfactory because it does not encourage good project selection and does not provide incentives for low cost/technically adequate delivery. In fact, rent seeking is stimulated at the project level.

Finally, it is worth mentioning the coordination drawbacks of the system (Figure 2.) In theory, each of these three shown competing branches must coordinate their activities with each national ministry on an as needed basis depending on the situation and the resources required. However, history has shown that in the event of a disaster, coordination has not been functional (problem magnified by the existence of overlapping functions.) Each organization uses and allocates its own resources and makes decisions without formal knowledge of the activities of others.

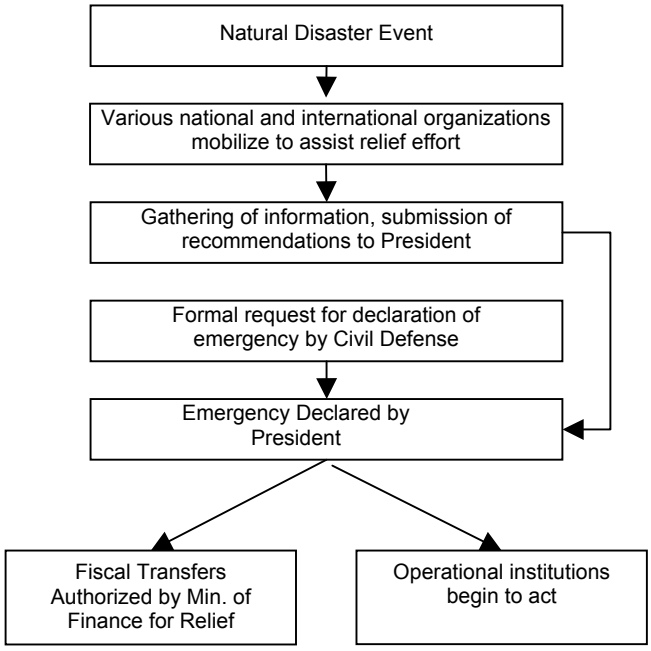
Fig. 2. Non-Ministry GOE Governmental Entities Responsible for Disaster Management Responsibilities



DISASTER DECLARATION, NATIONAL BUDGETING AND INCENTIVES TO DELIVER LOW QUALITY RECONSTRUCTION

The declaration of an emergency following a natural disaster is a decision delegated to the President by the Constitution. Immediately following a natural disaster, various national and international, governmental and non-governmental organizations mobilize to assist in relief and recovery efforts. Additionally, local and national organizations of various origins gather information and produce situation reports intended to assist the President with his decision of whether or not to declare an emergency. In the case that an emergency is declared, the President, under article # 180 of the Constitution, is empowered to ask for financial assistance from the Central Bank. When this occurs, it is the responsibility of the Finance Minister to transfer funds intended for other state purposes to assist in the relief effort (Fig. 3.)

Figure 3. State of Emergency Declaration Process



By creating a "soft budget constraint," this procedure discourages discipline in the national budgeting process and triggers off rent seeking at the highest decision level (on top of the rent seeking incentives at the project level.) Sadly, the budget of the organizations involved in disaster management will ultimately depend more on the expected level of damage inflicted by a disaster and their bargaining abilities during ongoing crises and less on the quality of prevention and mitigation measures. If captured by opportunistic interests, the result will be to keep de facto low technical standards to ensure a future stream of abundant reconstruction works.

Implications and Problems in the Transport Sector

INSTITUTIONAL CONSTRAINTS

Disaster management presents unique opportunities for individuals and organizations to obtain a mix of both economic gain and political capital. Gersen (2000) clearly explains the general nature of rent seeking in the context of disaster management:

> "Economic models of regulation highlight the propensity of firms to seek rents from government policy and institutions (Becker 1983; Peltzman 1985). Though organized interests are often noted in discussions of disaster policy, rarely are they emphasized as driving forces in the creation or maintenance of government policy. Political economists highlight the reality that different forms of government policy have implications for firms or groups trying to extract gains from the political process. Because ex post relief payments amount to a transfer from non-affected taxpayers to citizens in disaster-prone regions, disaster policy has obvious and important distributive implications. Disaster policy provides two major types of rents to organized interests. The first consists of direct or indirect financial payments. Modern disaster policy, whether in the form of ex ante subsidies for insurance and mitigation or ex post relief payments remains essentially a direct financial payment to individuals or organizations. Second, like financial payments, the allocation of risk itself is a valuable asset. What might loosely be called risk-rents can be extracted in a number of forms."

The creation of COPEFEN and CORPECUADOR show how a natural disaster event facilitates politicians to maneuver and divert funds to constituents by responding with money and assistance.[2] This rent seeking behavior is magnified by a *collective action* problem (Olson 1965): there may be a majority of losers (the lowest income tier and/or taxpayers), disperse and difficult to organize, and a minority of well-organized interests that may manipulate the process to their profit. This is not peculiar of Ecuador, neither just confined to risk management in the transportation sector.

---

[2] *The Economist* documented an analogous situation in the political arena regarding Peru's response to the effects of El Niño 1997-98: "The true artist of El Niño has been Peru's President Alberto Fujimori. His government spent $300 million in advance (not all in the right places, but at least the ones that looked right at the time); and El Niño struck as he rushed about frenetically taking personal charge of relief efforts, even rescue attempts. Too frenetically, say some critics, who claim presidential efforts are muddling those of people on the spot. Maybe, maybe not; but his poll ratings, 30% in mid-1997, now stand at 45%." *The Economist* (May 9, 1998, p. 38).

While the way disaster management in Ecuador has evolved in time can traced to the "original sins" of lack of technical capacity and the myopia of the political process, it is the case that dysfunctional systems become *conventions* after some time: they entrench. The country is facing natural hazards risk with an institutional scheme that is: (i) incomplete (with no meaningful activities in prevention or risk transfer), (ii) geographically biased toward la Costa, (iii) institutionally harmful (as it interferes with the role to be played by MOP) and (iv) lacking checks and balances and supervision (for example, CORPECUADOR´s key works become a bilateral negotiation between the executive power and the business leaders of la Costa; and CORPECUADOR directly and autonomously defines, designs, contracts and monitors the projects.) The political and organizational costs of changing this state of affairs will be high.

STRUCTURAL WEAKNESS OF THE PUBLIC TRANSPORT SECTOR

Ecuador is a country with a landmass of 276,840 sq km, covered by a road network of 43,197 km. Red Vial Principal (RVP, the backbone of the system) comprises 5,609 km of primary roads and 3,876 of secondary roads. The rest of the network is composed of the tertiary roads (11,106 km), and of rural and local roads (22,606 km.) Approximately 5,600 km are paved, 25,500 consist of gravel and "improved earth" ways, and 12,100 km are dirt roads. About 22,000 km of the road network cover la Sierra; 16,400 km la Costa, and 4,800 km the Eastern part of the country, respectively.

MOP is responsible of planning and managing the RVP. Traditionally, MOP has self-procured its maintenance works. In 1996, MOP concessioned about 700 km of RVP to the private sector, with very poor results. The concessionaires, due to legal problems, have performed no maintenance or rehabilitation works so far. The tertiary, rural and local roads are under the responsibility of the provinces and municipalities. MOP does not perform efficient works, is overstaffed and, critically for disaster mitigation and prevention, never gets the funds necessary to properly maintain the RVP. On top of that, MOP ends up backing the provinces and municipalities to maintain the tertiary, rural and local roads (regional and local governments are not only weak, but have all the incentive to reduce their effort by calling MOP's help as often as possible.)

With the support of the IDB, the government of Ecuador has started in 2001 an institutional program aimed at improving MOP's capabilities to plan and prioritize its activities. This program will strengthen the policy-making and supervisory roles of MOP, shifting the investment, rehabilitation and maintenance works to private parties. Overhaul of MOP includes decentralization efforts (its regional branches have to prepare their own plans, handle maintenance and support local governments), reducing the staff and rely on efficient outsourcing to conduct maintenance works.

This important step needs to be deepened so that MOP will be able to take full responsibility of disaster management in the primary and secondary road system, and provide support to provinces and municipalities. There is ample room for improvement in the areas of disaster preparedness and recovery, contracting, construction codes and insurance. The latter three themes require a simultaneous solution. On one way, good

contract supervision will enforce the quality needed to insure assets. On the other way, pressure from insurers will raise the quality of works. The four issues are briefly discussed below.

MOP lacks a prioritization plan to quickly reestablish the functionality of key links of Red Vial Principal after a disaster occurs. The logistics of network recovery needs to take into account the limited resources of MOP to minimize the loss of economic value added due to the interruption of transport services. Contingent contracts with private parties to recover specific road network segments are likely to have a very high "shadow" price for the economy.

Regarding contracting practice, illegal side payments –many times observable, but not easily verifiable- are unofficially part of many contractors' budget. Skimming 10%-15% off the available funds for a project can only lead to a reduction in the quality of the work done. When the contractor who offers the largest kickback wins the contract, competition on the basis of quality, price and reliability is eliminated. In turn, poor quality leads to the need for the project to be repaired or even redone, in which case even more time, public or loan money and resources are unnecessarily wasted.[3] The two cases shown below illustrate the associated problem of "capture" of the reconstruction and rehabilitation works by well-connected firms:

- Since 1970, the operation of the Trans Ecuadorian pipeline necessitated the construction of a highway from Quito to Pifo, Baeza and Lago Agrio traversing the provinces of Pichincha, Napo and Sucumbios. In one area running from Quito to La Virgin Papallacta, a section of approximately 60 km has been washed out on many occasions and made impassable on several others. The major landslide in 2000 near Cuyuga, kept the road impassable for nearly a week. According to an audit carried out by the GOE Controller's Office (Contraloría), the funds continually invested in reconstruction and rehabilitation of this roadway over many years could easily have financed construction of a high quality all-weather road between these important destinations. The problems of this road are explained by the low quality of engineering design and construction, lack of contract supervision and the incentive scheme: the same construction firm is employed year after year to carry on maintenance activities which are not conducted at all; instead, the firm gets paid to clean the landslides and keep the road open.

- For many years now, the City Council of Guayas has hired contractors to construct contention walls on the banks of the Bulu Bulu River to prevent further erosion during the rainy season and to prevent flooding in the event of high water resulting from El Niño. Based on interviews conducted in this study of auditors and construction professionals, contention walls and dikes were constructed without technical studies, risk assessments of the area or adequate technical supervision. During times of heavy rainfall, the poorly constructed walls have failed, causing flood destruction, particularly

[3]One interviewee relayed a situation he had learned of recently in a coastal province. A request for proposals was held for a small roads project. The contract was awarded to the cousin of the public official making the final decision on the project. The road was built poorly and needed rehabilitation on a frequent basis. Each time repairs were needed the official's cousin again won the contract.

to the agricultural sector throughout the province, and the need to continually rehabilitate the contention walls. Construction firms that are periodically awarded contracts for construction benefit from efforts that are carried out with substandard materials or procedures.

In the institutional context of natural disasters in Ecuador, formal procurement changes (introduction of new contracting and supervision schemes) may be insufficient to deliver unless the overall incentive framework in place is dismantled. The entrenchment of interests discussed above implies that a reform of the national disaster management system will need considerable spending of political capital and continued efforts for procurement changes to endure.

Ecuador lacks area-specific construction codes for the purpose of mitigating possible infrastructure damage resulting from a natural disaster. Although construction codes exist, they are reportedly a compilation and assimilation of codes from other nations or regions including the United States, Mexico and Europe. Each region in Ecuador has unique characteristics and vulnerability to different types of natural phenomena, which makes area-specific codes an imperative. A structure in the rain prone coastal city of Guayaquil that is susceptible to the effects of El Niño requires different construction codes than a structure in Quito, located high in the Andes and more susceptible to earthquakes and volcanic eruptions. The lack of enforcement of the codes that do exist, however limited they may or may not be, is a critical issue as well. Construction firms that seek to cut costs by ignoring codes or utilizing substandard material are not only jeopardizing the integrity of a structure but also the lives of those who deploy the assets.

By law, all airports, seaports, electric facilities, water treatment plants, and oil pipelines must be insured. The law only requires blanket coverage on specific types of assets without considering their relative value and the financial constraints of repair or reconstruction. The extent of coverage is often not comprehensive and the policies lack clarity, allowing for different interpretations from each party in the event of a claim. The rules and regulations regarding Private and Public Asset insurance in Ecuador lack enforcement. Those facilities that are covered may be paying an unnecessarily high premium. According to several sources within the insurance industry, the lack of good prevention and mitigation practices as well as unclear mapping of high risk areas, hinder insurance firms' abilities to accurately asses a facility's risk. The insurance firms anticipate that some of these facilities could be time bombs as it is common knowledge that they are not built to withstand the types of disasters they might face. With all this uncertainty, high premium are set and many times they cannot provide complete coverage. The higher costs are invariably passed on to the unknowing public.

Basic infrastructure works such as roads and highways, bridges and publicly owned buildings are not included in the list of facilities to be insured. As a result, some structures damaged or destroyed by natural disasters are left unusable for years or longer. In 1999, a major road from the north-central part of Quito to the eastern residential area of Tumbaco, was closed when a landslide covered and caused the collapse of a significant portion of the highway. This damage cut off one of the two major commuter routes between the two

principle cities. Because it was not insured, the road remains closed to this day, over three years later, causing significant traffic problems and commuter delays for the workforce.[4]

In general, insurance and other risk transfer measures are necessary to handle the exposure of project debt or equity holders, but may fail to protect society against the economic losses generated by interruption of the flow of infrastructure services. This can be viewed as a reduction of capital stock efficiency that reduces economic growth and technological progress in turn (Gylfason 1999.) The efficiency of road infrastructures subject to natural hazards is mostly a matter of resilient construction, good maintenance and timely recovery.

NATIONAL DISASTER PROGRAMS AND SECTOR FUNDING

Ecuador does not have a national, comprehensive national plan to direct the resources and efforts in the area of natural disasters. Without clear direction, uninformed actors have been left to make decisions in what has often been a vacuum. When a disaster occurs, public interest is piqued, politicians spring into action, money is diverted from other budgets, and NGOs and foreign governments provide funds and assistance. The tangible cause and effect relationship between response efforts and a reduction in the immediate suffering of individuals and communities tends to overshadow the importance of other areas of attention.

Funding policies for governmental organizations involved in disaster management efforts are reportedly insufficient and inconsistent and can vary from year to year depending on available funds and political priorities. The lack of pre-approved relief funds manifests itself in how the government has responded financially to larger disasters. As mentioned above, in the event of a disaster the President instructs the Minister of Finance to transfer funds from the budgets of other governmental organizations. These unexpected fiscal transfers can have a crippling effect on the functioning of the unlucky organizations that are picked to be the unwilling donors.

In addition to competing for political backing, responsibility and respect, ODEPLAN, Civil Defense, COPEFEN, MOP and CORPECUADOR are also all competing for funds. Potential donors, both within the national government and international community are left to decide which, if any, is most worthy of these resources. Each organization is spending more time and internal resources competing for funds than is necessary. Without high-level leadership to insist on prevention and mitigation activities within each sector, lending organizations may be discouraged from giving for rehabilitation and reconstruction. It is natural to think of ODEPLAN in its national planning capacities to be such leader.

[4]One insurance executive pointed out that the collapse of the Guapollo–Tumbaco route is a microcosm of the problems with the country's infrastructure and disaster management practices. First, although the road was needed, it never should have been built prior to conducting the necessary geo-technical and topographical studies. Second, if the studies suggested moving ahead with the construction, they would have mandated the complementary mitigation measures to ensure adequate drainage, water channeling, soil stabilization and ongoing maintenance. The president of the College of Civil Engineers of Pichincha estimates that for an average of 2% of the costs of constructing a road, the basic geological and technical studies can be carried out.

Recommendations

The recommendations of this study pertain to rationalization of the EDMS governance, strengthening of MOP and regional and local governments and focalization of the multilateral agencies efforts. Sustained efforts are required to lead and implement the proposed measures, as well as support to crack the current incentive structure.

GOVERNANCE

- Empower ODEPLAN to lead the reform of Ecuador's disaster management system. ODEPLAN should prepare, coordinate, enforce and evaluate a national comprehensive "Risk Prevention and Disaster Management Program."
- Eliminate ad hoc organizations (COPEFEN and CORPECUADOR.)
- Fully internalize risk management and budget of the road network at MOP and the regional and local governments. Establish long-term roles at local, regional and national levels for each institutional player.
- Prevent awarding/giving funds directly without norms, controls, planning and supervision. Operational Procurement Procedures need to be developed for the entire spectrum of risk management activities. These procedures must clearly define the organizations and activities that are eligible for funding; mechanisms for transfer, contracting rules based on transparency and accountability, and stipulate the obligation of independent auditing.
- De-couple selection of professionals to manage risk prevention and disaster response from the political cycle.

STRENGTHENING OF PREVENTION AND MITIGATION

- Create/empower and strengthen the technical skills of permanent units within MOP and provincial governments to define and execute disaster management plans. Though it might be unlikely to create such units in small municipalities, they should produce and implement simple contingent disaster plans.
- Prioritize maintenance and establish a contingent plan to recover the functionality of the backbone network.
- Implement incentive contracts and competition for civil works. Incorporate the communities to manage tertiary and rural network recovery. Organize a system of pre-negotiated, "retainer contracts" with private firms to speed recovery of Red Vial Principal.
- Introduce region specific construction code standards for project design, maintenance and rehabilitation, and link to supervision and enforcement.

THE ROLE OF MULTILATERAL AGENCIES

- International donors and multilateral agencies should not provide funds that support a disjointed system or extend the life of ad hoc organizations.

- Loans or technical cooperation operations requests for ex post activities should be processed through ODEPLAN. External funds may be administered by MOP and regional and local governments.
- Funding for disaster management should be contingent upon evidence (measured against benchmarks) that national and sector plans are in development or fully developed. Funds from the multilaterals should include a mandatory evaluation component to assess if planned prevention and mitigation measures were in place, their efficacy, and to provide feedback to ongoing plans.
- Purely domestic funding for disaster management is well below what could be considered a bare minimum level. Even if the available money were used in the most efficient way, it is likely that it would not suffice to properly cover the necessary mitigation and prevention measures for existing facilities. Novel approaches (matching donations, for example) to raise infrastructure quality need to be explored by multilateral banks and donors.

SOME IMPLEMENTATION ISSUES

- The National Security Law must be updated to clearly articulate roles, responsibilities and mandates of each key organization.
  - Presidential and Vice Presidential Decrees must be rewritten to coincide with and operationalize the new law.
- Complementary measures such as land use management and human settlement plans must be developed at provincial and municipal levels.

References

CEPAL. 1998. Ecuador: Evaluación de los efectos socioeconómicos del Fenómeno El Niño en 1997-98. México, julio de 1998.

Gersen, J. E. 2000. "Disasters, Delegation and Institutional Design," memo, Department of Political Science, University of Chicago.

Gylfason, T. 1999. *Principles of Economic Growth*. Oxford, UK: Oxford University Press.

Olson, M. 1965. *The Logic of Collective Action*. Cambridge, MA: Harvard University Press.