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BUILDING REGULATORY CAPACITY FOR EARTHQUAKE LOSS REDUCTION

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Abstract

Disaster losses have been steadily growing, particularly in urban areas and particularly in developing countries. Several factors have contributed to this growth including rural-urban migration, concentration of population in hazardous areas and increased dependence on complex urban systems. While there have been changes in hazard exposure, the most important factor has been increased vulnerability of human settlements due to unsafe location and construction practices. In the developed world building and land use practice has evolved over several centuries to protect population health, safety and welfare. In the developing world these institutions have not kept pace with rapid growth of urban populations. A recent study by the World Bank has examined the options for correcting this deficit. Poverty, ignorance and corruption have presented major obstacles to effective and efficient building and land use regulation. While key contributions are being made by the earthquake engineering community to the development of regulatory provisions and standards, without means to translate available scientific and engineering understanding to building practice disaster risk continues to expand. Regulatory institutions and practices are the critical missing link. Simple transfer of building regulatory provisions from developed to developing countries has proven unsuccessful in most cases. Effective regulatory institutions must develop in the social, economic and cultural context of the society that they serve. A recent World Bank report, "Building Regulation for Resilience", co-authored by Thomas Moullier and Frederick Krimgold, provided an analysis of building regulatory experience in a range of low and middle-income countries and identifies critical factors to be considered in efforts to create and expand effective and efficient regulation for disaster risk reduction. These principles are incorporated in a proposal for a global initiative consistent with the goals of the Sendai Framework for Action.

Keywords: Earthquake Risk Reduction; Building Regulation; Code Implementation

1. Introduction

In the past 20 years, natural disasters have affected 4.4 billion people, claimed 1.3 million lives and caused $2 trillion in damages. Earthquake disasters have accounted for a significant portion of these losses, and according to the USGS, projected earthquake fatalities range up to 2.57 million in the 21st century. While the science and engineering of earthquake safety have made dramatic progress, these accomplishments mean little if they don't reach application in improved siting and design of buildings and infrastructure. Building and land use regulation in the developed world have been the effective channel from theory to practice. In low and middle-income countries that suffer 90% of disaster fatalities, these regulatory mechanisms have been neither efficient nor effective.

Chronic health, safety risks, and exceptional disaster events disproportionally impact the poor and the marginalized. In the last 30 years, over 80 percent of the total life years lost in disasters came from low and middle income countries, typically setting back national economies by 5 to 120 percent of gross domestic product (GDP).

While the international community has made significant progress in strengthening disaster preparedness, response, and early warning systems, it has been less successful in effectively addressing the mitigation of underlying risks in the pre-disaster context, especially in low and middle income countries. There is a growing consensus that building code implementation has not received adequate attention or investment for disaster risk reduction (DRR).

Successful risk reduction and hazard adaptation in developed countries have relied in large part on effective and efficient building regulatory systems elaborated over time. Looking at the past 10 years, 47 percent of disasters occurred in high-income countries with more advanced building code systems, but accounted for only 7 percent of disaster fatalities globally.

2. Sendai Framework for Disaster Risk Reduction 2015-2030

The third World Conference on Disaster Risk Reduction held in March 2015 adopted the "Sendai Framework for Disaster Risk Reduction 2015-2030." The priorities for action have ample references to building and land use regulatory development and implementation as key elements of disaster risk reduction. Based on this agenda, there is now evidence the international consensus is strong to expand the full potential of effective building regulation in reducing risks.

With support from the World Bank and funding from the Global Facility for Disaster Reduction and Recovery (GFDRR), a new report entitled "Building Regulation for Resilience" reviewed factors that have prevented building codes from being effective tools for disaster risk reduction in developing countries. It suggests practical recommendations and takes stock of applicable innovations for a reform agenda.

Based on this review, the World Bank proposed a comprehensive "Building and Land Use Regulatory Implementation Program." This program offers a structure to involve and galvanize a wide range of partners with specific strengths and experiences to build a regulatory process. The strategic goal of the proposed program is to help reduce human and economic losses by avoiding the creation of new risks, and by reducing existing risks in the built environment.

3. Obstacles to Building Regulatory Effectiveness in Low- and Middle-Income Countries

Rural-urban migration in the developing world has taken place over recent decades largely without effective building or land use regulation. As such, urban development has extended to hazardous sites and resulted in the construction of unsafe, vulnerable settlements, leading to a vast expansion of global disaster risk.

The failure of regulatory policy and implementation in low- and middle-income countries may be traced to several causes. Poverty has been a major factor leading to urban migration and a limiting factor in the development of municipal services and regulatory capacity.

Elements compounding this failure were:

- Ineffective land use management systems that failed to limit settlements in hazardous areas, dramatically increasing urban disaster risks. Cities in low-income countries have rapidly expanded on to hazardous territory without clear title or critically needed infrastructure.
- Weaknesses in building code administration and institutional capacity. A fundamental problem in low- and middle-income countries is the lack of funding and support for building regulation at the local level. The problem usually is rooted in deeper challenges linked to income levels and authority over taxation, as well as in constitutional and administrative structures. Many local governments do not have adequate staff with technical skills to monitor new construction appropriately.
- Insufficient legislative foundation. Incomplete national legislation often has resulted in a failure to establish ways to implement regulations and to designate public and private responsibilities. There is often a failure to connect building regulation with the larger systems of civil, commercial and criminal law.
- Unaffordable Compliance Costs for the Poor. Designing and setting the standards too high in low-income countries often results in depending on imported building materials, stifling local innovation.
- Limited Recognition of Prevalent Building Practices. The widespread practice of "incremental housing" (the gradual process of adding or improving building components as funding, time and/or materials become available) rarely follows formal building codes, widening the gap between formal and informal building sectors.
- Dysfunctional Regimes of Building Controls. Aside from the possible added building costs required to comply with codes, permitting and inspections services in developing economies often are expensive, overly complex and inefficient. This can be a deterrent to meeting code requirements.
- Corruption and Regulatory Capture. Corruption in building code enforcement has been associated with extensive building failure and loss of life in disasters. Recent statistical evidence shows that 83 percent of all deaths from earthquakes in the past three decades have occurred in countries considered most corrupt by Transparency International. Regulatory capture in building code systems can considerably distort outcomes by reducing safety standards to benefit the regulated industry. It also can achieve the reverse: excluding local owners and builders by increasing safety standards to unsustainable or unaffordable levels.

4. Essential Components of a Building Regulatory Framework

Three basic components form the core of any building regulatory regime: a legal and administrative framework at the national or sub-national level; a building code development and maintenance process; and a set of implementation mechanisms at the local level.

However, these core components do not function in a vacuum. In the developed world, regulatory capacity evolved parallel to a complex mix, or "ecology," of supporting institutions. They have provided legal and financial mechanisms, as well as the certified technical competence required for achieving regulatory compliance. Key elements of this regulatory ecology include the general conditions for commercial development, the rule of law, security of tenure, functioning building finance and insurance mechanisms.

Important institutions specific to the building sector include: accredited building professional education; professional societies and related codes; accredited construction training institutions; licensing procedures for building professionals; and quality control processes for building materials.

5. A Vigorous Building Regulatory Reform Agenda to Support the Sendai Framework for DRR

New urban development between 2015 and 2030 will exceed all previous urban development. Sixty percent of the area expected to be urbanized by 2030 is vacant, particularly in South-East Asia and Sub-Saharan Africa.

Therefore, our first priority is to stop the expansion of added disaster risk in the siting and construction of new settlements. New construction can be made disaster-resistant for a small additional cost, while retrofitting existing vulnerable structures often requires major expenditure. Establishing standards and implementation mechanisms for new construction provides a solid institutional and technical foundation from which to address the more problematic disaster risk of existing vulnerable settlements.

The proposed reform agenda recommends closely inter-related strategies to reinforce the regulatory capacity of countries at various stages of development. We recommend the following development priorities:

- Use advice and support, not just police enforcement, to help comply with regulations. Integrating a building advisory service with building inspectors to help builders provide code-compliant and safer homes has shown to work in post-disaster rebuilding, such as in Central Java, Indonesia, after the 2006 earthquake, or Pakistan after the 2005 earthquake. This supportive and advisory role, coupled with rigorous inspection, should be required during "pre-disaster" conditions as well.

- Develop the capacity of national and subnational institutions. A coordinated effort should address the specific need for adequate funding, staffing and execution to implement local building and land use regulations. This requires specific support for training building officials and funding to ensure appropriate compensation. It also demands parallel efforts in developing building and planning education, financial and insurance mechanisms for the management of risk, and public understanding of the importance of safe siting and construction.

- Focus on creating building standards appropriate to the poor and vulnerable. Low-income and lower middle-income countries have the least capacity to cope with disaster losses. Where regulations are unknown, unenforceable or excessive, they tend to be disregarded by most, especially the poor. The benefits of a safer built environment should be accessible and affordable to the poor. An open participatory process with representation from all relevant stakeholders is necessary to ensure regulatory provisions that represent the values and resources of the community. Consistent with this approach, we should support measures to improve security of tenure and reduce the cost of entry to the legal land and housing markets.

- Promote innovations for effective building controls. Experience during the past 20 years points to promising efforts in administrative simplification and to reduce regulatory compliance costs. With appropriate safeguards, using private sector technical resources to boost regulatory implementation should be extended to disaster risk-prone jurisdictions. This approach also could ease the burden of building permitting procedures on local governments. Modern compliance tools include improved information and communications systems for risk management, building practitioners' certification, private third-party accreditation to provide review and inspection, and using insurance mechanisms to augment building control. Numerous experiences in the field demonstrate transparency and procedural justice result in greater effectiveness and compliance. This can be implemented through small incremental steps. Building on global experience, these steps can typically include measures that reduce arbitrary discretion in planning and building permit approvals, and expand disclosure of information related to technical and administrative requirements.

Priority 3 of the post-2015 Sendai Framework for Disaster Risk Reduction calls for a coordinated effort to rehabilitate building codes and standards. It acknowledges the need for a localized and calibrated approach, focusing on vulnerable settlements, irrespective of the country's broader income category.

Achieving risk reduction in the most vulnerable areas will depend considerably on how other development initiatives succeed in helping the poor access better and safe housing, and essential services. The proposed "Building and Land Use Regulatory Implementation Program" initiated by the World Bank will build synergies with related programs. These programs include upgrading informal settlements, affordable housing projects, housing finance, land development and land use policies and regularization initiatives, as well as post-disaster reconstruction programs.

The program will offer the structure to involve and galvanize a wide range of partners with specific strengths and experiences in building a regulatory process.

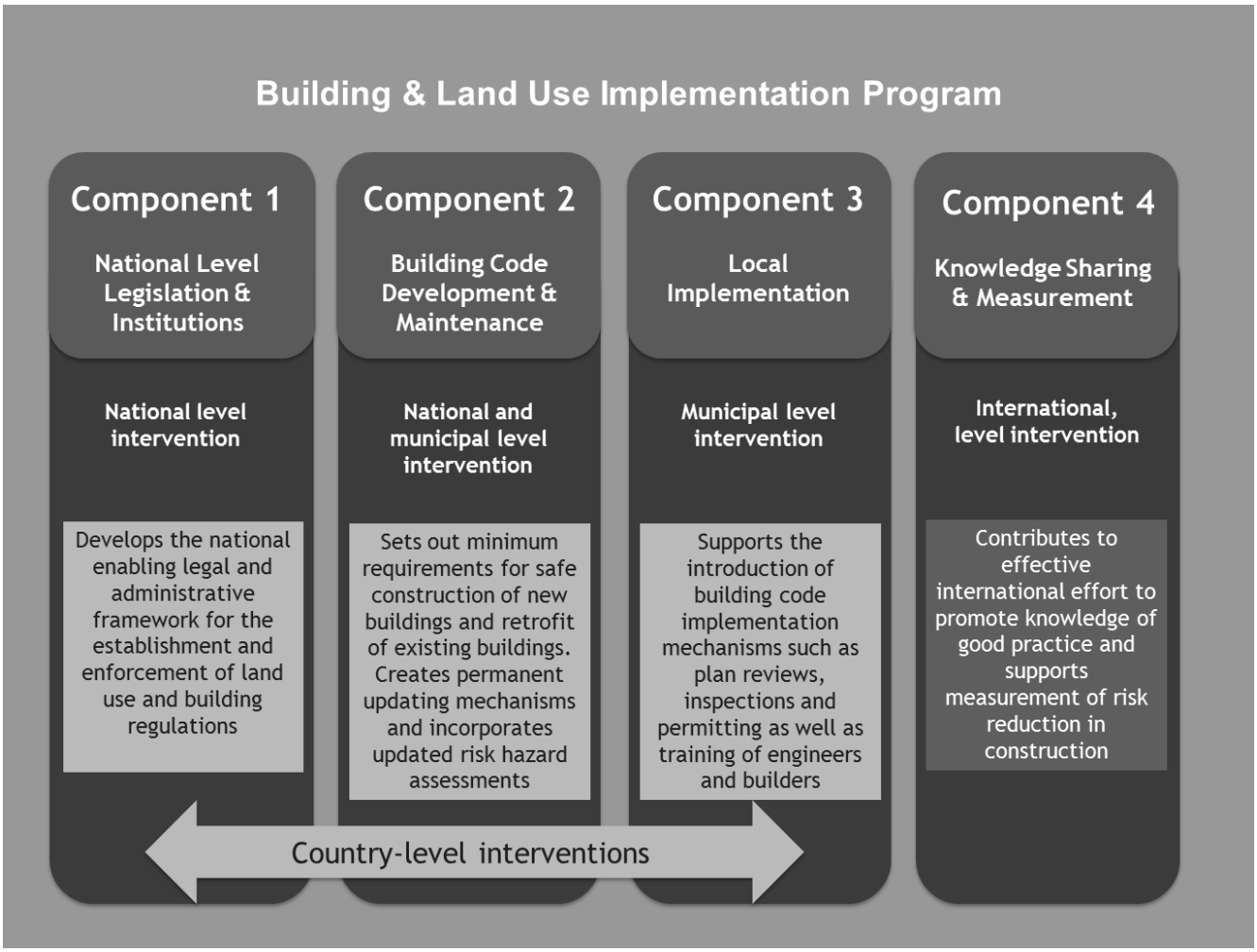

Fig. 1: Building and Land Use Implementation Program

- Component 1 - National Level Legislation and Institutions: Based on locally-defined priorities, activities will establish or improve the national legislative framework that can mandate the construction of safe buildings and enable the construction process to proceed efficiently. Financial investment would aim to fund national hazard mapping programs and to expand the capacity of central authorities.

- Component 2- Building Code Development and Maintenance: Help support the introduction of locally feasible building codes. Activities will help establish the basic institutional capacity to develop, adapt and update appropriate construction standards through interactive, transparent processes at the national sub-national levels. Direct investment will involve funding materials testing facilities and equipment, staff training and funding accreditation programs for product testing laboratories. This component will support the broad dissemination of regulatory documentation and the delivery of educational and training programs based on code-compliant practices for all elements of the building sector.
- Component 3- Local Implementation: Activities will focus on practical administration of the local building department. This will include managing the core functions of building technical assistance, plan review, site inspection, permitting, and enforcement to facilitate voluntary code compliance. Advisory activities will focus on providing outreach services to "informal" sector builders to expand access to the benefits of the building safety/regulatory process. Direct investment in local and municipal building departments will fund building department staff and inspectors training, specialized equipment for plan review and inspection data management, ICT applications to facilitate efficient communication with clients, and training for external building practitioners.
- Component 4 – Knowledge Sharing and Measurement: This will provide an international focal point for exchanging experience and innovation related to building regulatory implementation. Common tools for the assessment of regulatory capacity, effectiveness and efficiency will be developed and maintained. This component will carry out diagnostics, risk audits and evaluation of regulatory systems capacity. It will offer specialized, standardized evaluation and rating tools. In turn, these evaluations will help track progress at the country and local levels. Using these will help document good practices and identify opportunities for assistance. This component will provide global resources and information to help guide building and land use regulations for disaster risk reduction.

6. Conclusion

The world will witness the construction of 1 billion new dwelling units by 2050. Much of this growth will take place in cities with weak capacity to ensure risk-sensitive urban development. The international community must act now to pursue more effective approaches to land use management and building regulation.

Regulatory capacity development in disaster-prone countries and municipalities can ensure that future construction and urban expansion will be located on safer sites and built to protect population health and safety. Building regulations can help make sure structures are safe and secure, and worth the investment.

The proposed Building and Land Use Regulatory Implementation Program can accelerate the application of current science and engineering understanding to a safer built environment through building regulation implementation and active compliance support.

Building and land use regulation have proven the most effective tools for disaster risk reduction in the developed world. For a variety of reasons, these tools have not been used successfully in many low- and middle-income countries. With the initiation of the Sendai Framework for Action, there is now an opportunity to act armed with extensive experience and new innovative approaches. The Global Earthquake Engineering community has led the way in the development of ever more sophisticated and effective seismic building codes. It is now time to work equally effectively for the broad implementation of available knowledge and the creation of a safer built environment.

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