



# **BUILDING REGULATION FOR RESILIENCE**

Managing Risks for Safer Cities

**Executive Summary**



**WORLD BANK GROUP**



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# Executive Summary

*This document is the executive summary of the World Bank publication Building Regulation for Resilience. The publication focuses on how the building regulation process can be enhanced in order to save lives and reduce destruction from disaster and chronic risks.*

*As part of the Sendai Framework for Disaster Reduction 2015-2030 agenda, the report calls upon the international community to act now to pursue more effective approaches to land use management and building regulation. To achieve this goal, it outlines an integrated, programmatic approach for building regulatory capacity, primarily in vulnerable low and middle-income countries.*

## Mobilizing building code regulations for risk reduction

In the past 20 years, natural disasters have affected 4.4 billion people, claimed 1.3 million lives, and caused \$2 trillion in economic losses.<sup>1</sup>

Exceptional disaster events, along with chronic events such as individual building collapse and fires, disproportionately impact the poor and the marginalized. In the last 30 years, over 80 percent<sup>2</sup> 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). There is evidence that disasters' impact on GDP is 20 times higher in developing countries than in industrial nations. These impacts pose a major threat to the World Bank Group's goals of eradicating poverty and boosting shared prosperity.

As the scale, frequency, and severity of natural hazards continue to rise, so will future expected losses in the built environment. The annual losses resulting from disasters such as earthquakes, tsunamis, cyclones, and flooding are expected to increase from roughly \$300 billion to \$415 billion by 2030.<sup>3</sup>

The international community has made significant progress in strengthening disaster preparedness, response, and early warning systems. However, it has been less successful in effectively mitigating underlying risks in the pre-disaster context, especially in low- and middle-income countries. Nor has it been successful in addressing chronic risk—indeed, governments rarely even record events such as building collapse and fires, let alone cover the loss.

Building code implementation has a crucial role to play in disaster risk reduction (DRR), one that until recently has not received adequate attention. This report focuses on how building regulation can be enhanced to save lives and reduce destruction from both disasters and chronic risks. Notably, it supports a shift in focus from managing disasters to reducing underlying risks.

Successful mechanisms of risk reduction and hazard adaptation in developed countries have relied in large part on effective and efficient building regulatory systems, which have been incrementally improved over time. In the past 10 years, high-income countries with more advanced building code systems experienced 47 percent of disasters globally, yet accounted for only 7 percent of disaster fatalities.<sup>4</sup>

A comparison between the 2003 earthquakes in Paso Robles, California, and Bam, Iran, further illustrates this pattern. The earthquakes had similar magnitudes and struck within three days of each other. However, the death toll was two in Paso Robles as opposed to more than 40,000—nearly half the city's population—in Bam.<sup>5</sup>

## Sendai Framework for Disaster Risk Reduction 2015-2030

In March 2015, the Third UN World Conference on Disaster Risk Reduction adopted the *Sendai Framework for Disaster Risk Reduction 2015-2030*, making it the first major agreement of the post-2015 development agenda. The priorities of the *Sendai Framework for Action* have ample references to building and land use regulatory development, and they consider implementation to be a key element of disaster risk reduction. This agenda is evidence of a strong international consensus to expand the full potential of effective building regulation in reducing risks. This report advocates implementing the *Sendai Framework for Action* through a bold and coordinated international effort to reduce risks in the built environment.

### Report's scope and target audience

This report is a resource to assist policy makers, governments, private sector and donor entities in leveraging good-practice building code regulation into effective strategies for reducing disaster risk and chronic risk, thereby setting disaster-prone countries on track toward effective reform. It provides practical recommendations and a review of applicable innovations for a reform agenda. Both of these components are based on a review of factors that have prevented building codes from being an effective tool for disaster and chronic risk reduction in developing countries.

The report recognizes the significant interdependency between land use management and building regulatory issues. However, its focus is on building regulation and code implementation. At the same time, the report highlights how closely land use management relates to effective building code implementation.

To move from concept to action, the report outlines a proposed Building Regulation for Resilience 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 applicable to all types of buildings. 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.

## Why building regulation has not yet reduced disaster and chronic risk in low- and middle-income countries

The process of rural-urban migration in the developing world over recent decades has taken place largely in the absence of effective building or land use regulation. Without regulatory guidance, urban development has extended to hazardous sites and resulted in the construction of unsafe, vulnerable settlements. This process

of unregulated urbanization has vastly expanded global disaster risk.

The failure of regulatory policy and implementation in low- and middle-income countries has several root causes. Poverty has been a major factor leading to urban migration and a limiting factor in the development of municipal services and regulatory capacity. This failure has been compounded by other factors as well:

**Ineffective land use systems.** Land use systems have failed to limit settlements in hazardous areas and served to exclude a large proportion of the urban population from legal land and housing markets. These factors dramatically increase urban disaster risks. Furthermore, in the absence of effective systems, cities in low-income countries have rapidly expanded into 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



Photo credit: International Organization for Migration

is the lack of funding and support for building regulation at the local level. The problem is usually 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 necessary to appropriately monitor new construction.

**Insufficient legislative foundation.** Incomplete national legislation has resulted in the failure to establish principles of regulatory implementation or designate public and private responsibilities. Building regulation often remains unconnected with the larger ecosystem of civil, commercial, and criminal law.

**Unaffordable compliance costs for the poor.** The process of designing and adopting appropriate building standards has frequently been a top-down directive that does not sufficiently consult with stakeholders, including both private building professionals and local communities. This has led countries to borrow unaffordable standards from abroad. Thus, building codes in low-income countries have often set the bar too high, creating dependency on imported building materials while stifling local innovation.

**Insufficient recognition of prevalent building practices.** Incremental construction—the gradual step-by-step process through which owner-builders append or improve building components as funding, time, or materials become available—is a widespread informal practice. However, formal systems of building codes almost never recognize this type of construction, widening the gap between the formal and informal building sectors.

Post-disaster reconstruction projects have highlighted the fact that owner-builders in low-income settings are capable of integrating risk reduction into their traditional building practices. The coping strategies they have developed should

be accepted as a contribution to resilience. For example, *dhajji dewari*, an economical and culturally accepted form of construction in Northern Pakistan, can be modified to safely withstand earthquake forces. In the aftermath of the 2005 earthquake, the region's local building code did not recognize this form of construction, which hampered official funding for *dhajji dewari*'s use in housing reconstruction.

**Dysfunctional regimes of building controls.** Permitting and inspections services in developing economies are usually expensive, overly complex, and inefficient. Compliance with codes can increase building costs, and these costs can act as a deterrent to meeting code requirements. In Mumbai, India, for example, the formal aggregate administrative fee for going through a tedious 27-step planning and construction permitting process is equivalent to 46 percent of the total construction cost. In Organisation for Economic Co-operation and Development (OECD) countries, however, the same process takes only 11 steps and accounts for 1.7 percent of the total construction cost on average.<sup>6</sup>

**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.<sup>7</sup> Regulatory capture in building code systems can considerably distort outcomes by reducing safety standards to benefit the regulated industry. Conversely, regulatory capture can also result in the increase of safety standards to unsustainable or unaffordable levels, thus excluding local owners and builders.

## The essential components of a building regulatory framework

This report identifies three basic components that form the core of any building code regulatory regime: a legal and administrative framework at the national level, a building code development and maintenance process, and a set of implementation mechanisms at the local level.

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

Important institutions specific to the building sector include accredited building professional education, professional societies and related codes of practice, accredited training institutions for the construction labor force, licensing procedures for building professionals, and quality control processes for building materials.

## A vigorous building regulatory reform agenda to support the Sendai Framework for Disaster Risk Reduction

New urban development between 2015 and 2030 will exceed all previous urban development throughout history. Of the area expected to be urbanized by 2030, 60 percent remains to be built, primarily in South Asia and Sub-Saharan Africa.<sup>8</sup>

The two key priorities of the report’s recommendations are

- i. to stop the expansion of disaster and chronic risk in the siting and construction of new settlements; and
- ii. to reduce disaster risk in vulnerable existing settlements.

New construction with appropriate design can be made disaster-resistant for a small percentage of construction cost, on the order of 5 to 10 percent.<sup>9</sup> The retrofit of existing vulnerable structures may require major expenditure, in the range of 10 to 50 percent of building value.<sup>10</sup> Establishing standards and implementation mechanisms for inspection of new construction provides a solid institutional and technical foundation from which to address the significant disaster risk of existing vulnerable settlements.

The report’s proposed reform agenda charts closely interrelated strategic actions aimed at reinforcing the regulatory capacity of countries at various stages of development. The following are the main development priorities suggested by the report’s recommendations.

1. ***Orienting regulatory and governance reforms toward compliance advice and support rather than just police enforcement.*** Positive experiences from post-disaster reconstruction programs have demonstrated the potential of building advisory services. Through such services, building inspectors would guide builders to code-compliant and safer structures that meet essential standards of safety (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 institutionalized as general practice under normal pre-disaster conditions.

2. ***Developing the capacity of national and subnational institutions.*** A coordinated effort toward disaster risk reduction should address the need for adequate funding, staffing, and execution necessary to implement building and land use regulation at the local level. This requires specific support for training building officials as well as funding to ensure appropriate compensation. It also demands parallel efforts in the development of building and planning education, financial and insurance mechanisms for the management of risk, and public understanding of the importance of safe siting and construction practice.

3. ***Focusing 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, most people tend to disregard them, especially the poor. The benefits of a safer built environment should be accessible and affordable for the poor. An open participatory process with representation from all relevant stakeholder groups is necessary to ensure regulatory provisions that represent the values and resources of the community. Consistent with this approach, support should be given to measures that improve security of tenure and reduce the cost of entry to the legal land and housing markets.

4. ***Promoting innovations for effective building controls.*** Experience over the past 20 years suggests that administrative simplification and similar measures can reduce regulatory compliance costs. With appropriate safeguards in place, jurisdictions with high levels of disaster or chronic risk should be able to leverage private sector technical resources to expand the qualified workforce available for regulatory implementation. This approach also holds

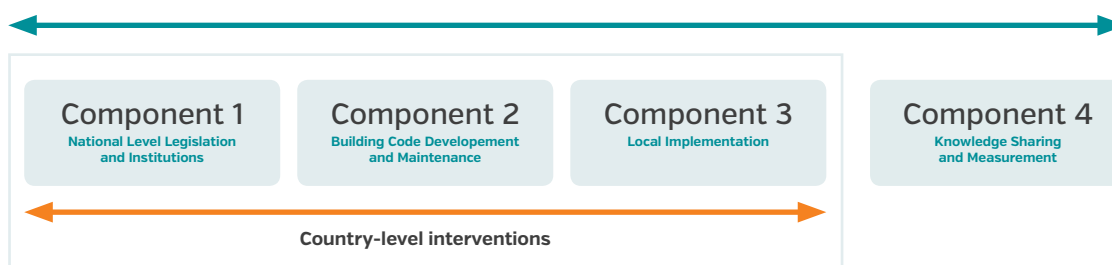
the potential of easing the burden of building permitting procedures on local governments. Modern compliance tools to facilitate this process include improved information and communications systems for risk management, building practitioners' certification, private third-party accreditation to provide review and inspection, and the use of insurance mechanisms to augment building control. Moreover, numerous experiences in the field demonstrate that transparency and procedural justice result in greater effectiveness of regulation and compliance; both can be implemented through small, incremental steps. These steps typically include measures that reduce arbitrary discretion in planning and building permit approvals. Such measures also serve to expand the disclosure of information related to technical and administrative requirements.

## A programmatic approach to catalyze investment in regulatory capacity

Priority 3 of the post-2015 *Sendai Framework for Disaster Risk Reduction* calls for a coordinated effort around rehabilitation of building codes and standards. It acknowledges the need for a localized and calibrated approach with a focus on vulnerable settlements, irrespective of the broader income category of the country.

Successfully reducing risk in the most vulnerable areas will considerably depend on how other development initiatives succeed in helping the poor access better and safer housing and essential services. The proposed Building Regulation for Resilience Program, outlined in the last chapter of this report, will create synergies with related programs. These programs include upgrading of informal settlements, affordable housing projects, housing finance, land development and land use policies, regularization initiatives, and post-disaster reconstruction programs.



**FIGURE I.1** – Building Regulation for Resilience Program

The proposed program has four components:

**Component 1 - National level legislation and institutions.** Activities under Component 1 will establish or improve national legislative frameworks responsible for mandating the construction of safe buildings and enabling the construction process to proceed efficiently. These activities will be based on locally defined priorities. Additionally, financial investment will aim to fund national hazard mapping programs and to expand the capacity of central authorities.

**Component 2 - Building code development and maintenance.** Component 2 will support the introduction of locally implementable building codes, including the adaptation of national model codes. It will help to establish the basic institutional capacity to develop, adapt, and update appropriate standards of construction through participative and transparent processes at the national level. The criteria for evaluating and improving vulnerable existing buildings will be a particular focus. Direct investment will involve the funding of materials testing facilities and equipment, training of staff, research into safer local construction methods, and funding of programs to accredit product-testing laboratories. Finally, this component will support the broad dissemination of regulatory documentation and the delivery of educational and training programs,

which will be based on code-compliant practices, for all elements of the building sector.

**Component 3 - Local implementation.**

Activities under Component 3 will focus on the 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, with the goal of facilitating voluntary code compliance. Advisory activities will give priority to providing outreach services to informal sector builders in order to expand access to the benefits of the building safety and regulatory processes. Direct investment in local and municipal building departments will fund building department staff and inspector training, specialized equipment for plan review and inspection, data management, information and communication technology (ICT) applications to facilitate efficient communication with clients, and training of external building practitioners.

**Component 4 - Knowledge sharing and measurement.**

Component 4 will provide an international focal point for exchanging experience and innovation related to building regulatory implementation. This component will develop and maintain common tools for assessing regulatory capacity, effectiveness, and efficiency; carry out diagnostics, risk audits, and evaluation of

regulatory system capacity; and develop specialized standardized tools for assessment and rating purposes. The evaluations carried out under this component will track progress at the country and local levels. They will also serve as the basis for documenting good practices and identifying opportunities for assistive intervention. Overall, this component will serve as a center for global resources and documentation on the topics of building and land use regulation for disaster and chronic risk reduction.

## A call for action

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 countries and municipalities with high levels of risk can ensure that future construction and urban expansion will be located on safer sites and will be built to protect population health and safety. Building regulation can work as a catalyst to leverage the total investment in building and infrastructure toward greater safety and security. By implementing building regulation and supporting active compliance, the proposed Building Regulation for Resilience Program can accelerate the application of current scientific and engineering understanding to a safer built environment.

Building and land use regulations have proven the most effective tools for risk reduction in the developed world. For a range of reasons, many low- and middle-income countries have not successfully employed these tools. With the initiation of the *Sendai Framework for Disaster Risk Reduction 2015-2030*, there is now an opportunity to act, armed with extensive experience and new approaches.

## Endnotes

<sup>1</sup> UNISDR 2012.

<sup>2</sup> UNISDR 2015.

<sup>3</sup> UNISDR 2015.

<sup>4</sup> Munich Re, NatCat Service, 2013, <http://www.munichre.com/en/reinsurance/business/non-life/georisks/natcatservice/default.aspx>.

<sup>5</sup> Kenny 2009.

<sup>6</sup> World Bank 2014.

<sup>7</sup> Bilham and Ambraseys 2011.

<sup>8</sup> UNISDR 2015.

<sup>9</sup> Yanev 2010.

<sup>10</sup> World Bank 2013.

A complete list of references may be found in the *Building Regulation for Resilience* report.





Over the past two centuries, effective building and land use regulation have dramatically reduced incidences of urban conflagration and epidemic disease. In the developed world, such regulation has resulted in successful risk reduction and hazard response adaptation. However, disaster risk reduction strategies for low- and middle-income countries have largely ignored building and land use regulation. Furthermore, experience has demonstrated that the simple transfer of building codes from highly developed to developing countries is often counterproductive. A review and analysis of regulatory experience must be better applied to the creation of regulatory capacity in developing countries. Knowledge must be appropriately adapted to local conditions and incorporated into methods of sustainable regulatory implementation.

This publication provides an analysis of available evidence to identify practical measures for increasing the effectiveness of building code implementation. Focusing on low- and middle-income countries, the authors argue for increased investment in functional building regulatory and governance systems for disaster risk reduction, while advocating a practical reform agenda for global collaboration.

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The Global Facility for Disaster Reduction and Recovery (GFDRR) is a global partnership that helps developing countries better understand and reduce their vulnerabilities to natural hazards and adapt to climate change. Working with over 400 local, national, regional, and international partners, GFDRR provides grant financing, technical assistance, training and knowledge sharing activities to mainstream disaster and climate risk management in policies and strategies. Managed by the World Bank, GFDRR is supported by 34 countries and 9 international organizations.

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