

Built Environment

Transforming Disaster Experience into a Safer Built Environment:
The Case of Japan

Solutions Brief
JUNE 2017

Photo Credit: Balint Földesi

Japan's experience in increasing the safety of the built environment through an incremental, context-specific approach to building regulation offers key lessons for developing countries seeking to mitigate disaster risk.

The importance of building regulation in mitigating disaster risk

Building regulation has a crucial role to play in reducing disaster risk. Building codes can lessen vulnerability by specifying adequate standards for construction or retrofit, and land use plans can lessen exposure by guiding development away from the most hazard-prone areas.

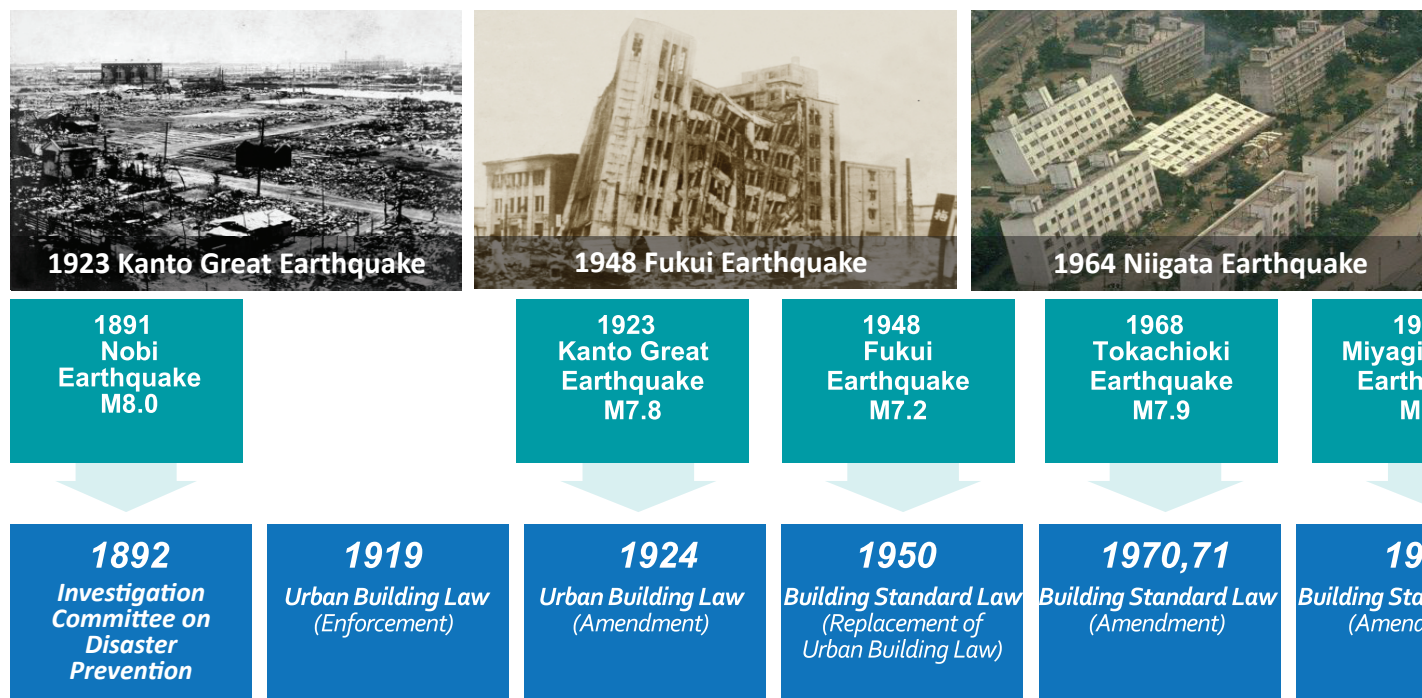
For lower-income countries, effective building regulation can offer significant benefits, since these countries suffer disaster impacts disproportionately. Between 1980 and 2012, 80 percent of lives lost in disasters were in middle- and low-income countries (UNISDR 2015). By incrementally raising building standards and working to create effective regulatory compliance mechanisms, developing countries can save lives, protect housing

and other assets, and contribute to an overall safer built environment. This proactive approach to disaster risk management—one that seeks to reduce underlying risks rather than manage disasters after they occur—is in keeping with the priorities of the Sendai Framework for Disaster Risk Reduction 2015–2030, which explicitly recognizes building regulation as a key means of mitigating disaster risk.

Japan's experience in mitigating disaster risk through building regulation

The World Bank's [Building Regulation for Resilience Program](#), with support from the [Disaster Risk Management Hub, Tokyo](#), is issuing a report that describes Japan's incremental approach to developing a policy and legal framework, as well as compliance mechanisms that ensure a high level of building safety and earthquake resilience. Japan started with similar conditions to the current situation of some developing countries (with limited technical knowledge, poor construction quality, and a large housing demand) and can, therefore, serve as a model for developing countries seeking to increase the safety of the built environment.

Figure 1. Successive Earthquakes Have Driven Incremental Improvement of Japan's Building Code



Lessons from Japan for developing countries

The report highlights 10 lessons from Japan for policy makers, building governance practitioners, and project managers in developing countries:

1. Regulation should be understood as a tool to guide and support the safety of the built environment, and should not be seen principally as a means of exerting control.

Japan's experience demonstrates that stand-alone regulation does not work. Nor does a top-down approach that loses sight of the purpose of regulation. A safe built environment cannot be achieved through regulation alone but depends on an enabling environment that facilitates compliance and that includes accessible public services, mechanisms to incentivize meeting or even exceeding existing standards, and proactive educational support for capacity development in both the private and public sectors.

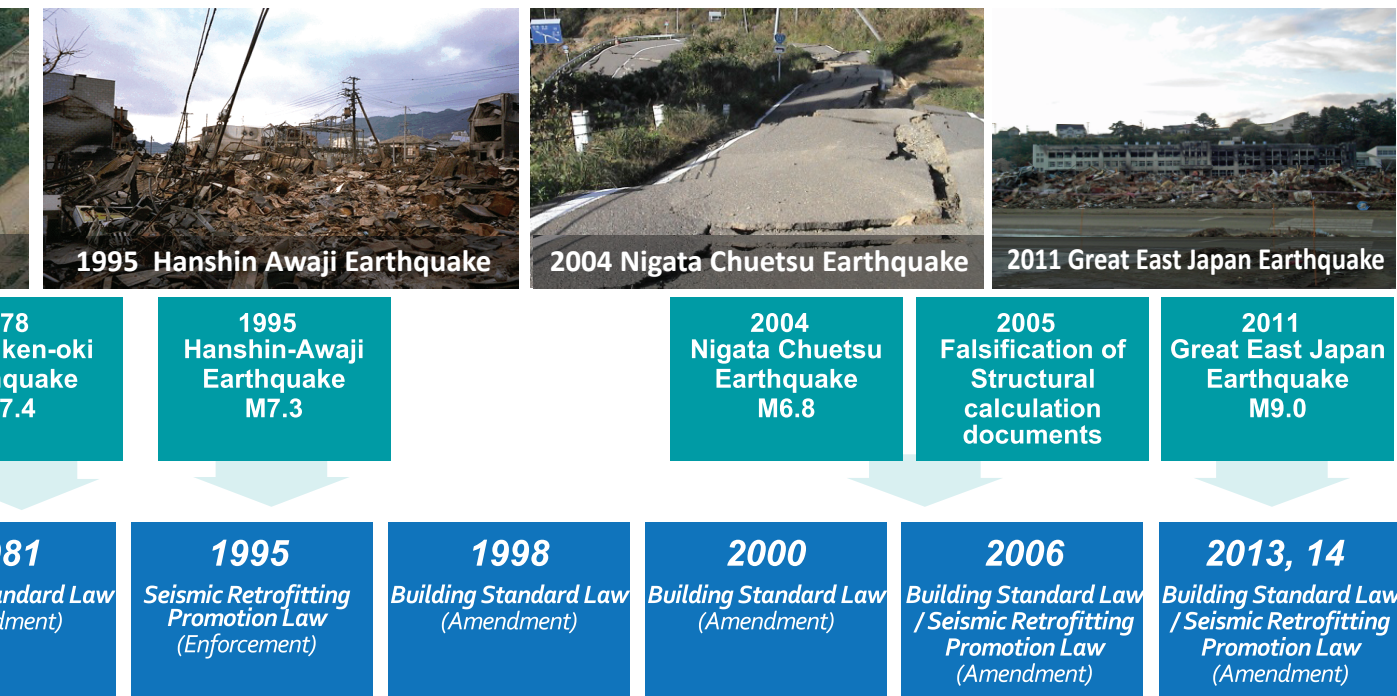
2. To develop an effective approach to building safety, countries need a clear understanding of their available human, technical, and financial capacity.

This understanding ensures that initial standards are realistic and appropriate and also facilitates targeting of institutions for capacity building and raising of standards over time. By taking capacity into account

at every stage of reform, Japan was able to ensure that a given standard could be implemented and complied with. Its quality assurance efforts began at the municipal level; the first national building code was piloted in only six cities (with relatively high capacity in both the public and private sectors) and then expanded to targeted areas as capacity was simultaneously increased. Likewise, legal provisions started from minimum requirements for specific goals, such as hygiene and fire safety, and then grew into a framework that addresses all relevant issues in the entire institutional ecosystem. Japan also targeted specific types of public buildings for standard enhancement (e.g. schools) as an entry point for applying the standard more broadly.

3. Effective regulation takes place within an enabling environment that includes education, financial incentives, and other mechanisms designed to proactively support compliance.

After World War II, Japan shifted from a permitting system for building approval, which was based on top-down command and control, to a confirmation system, which requires only that certain predefined criteria be met. This step was part of a larger movement toward a more enabling regulatory environment designed to proactively support compliance rather than coercion. Japan also introduced training and licensing of building professionals and set up loan programs offering tax breaks and other incentives for houses that exceeded the



mandatory minimum standard. This type of environment makes complying with codes easier and attractive, hence increases compliance—and overall safety.

4. The regulatory ecosystem must make professional expertise and technical services available to all who wish them.

A well-functioning regulatory system ensures that technical knowledge and services are available to and utilized by all segments of the population. In Japan, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has established systems to train, qualify, and continually educate authorities involved in building

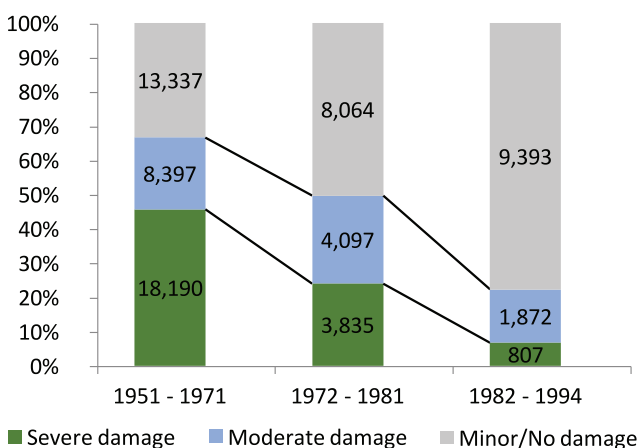
quality assurance (including special trainings to ensure authorities stay current with technological advances or changes in the code), as well as training to private sector designers and builders.

5. Formal regulatory systems should recognize prevalent construction practices, including non-engineered construction, and the risks associated with them.

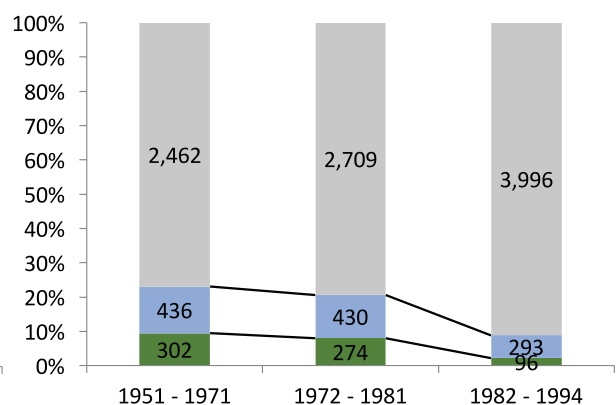
In Japan, the wooden housing structures characteristic of the country—originally non-engineered—have grown gradually safer and more earthquake-resilient (figure 2). These improvements stem from the decision to establish

Figure 2: The Difference in Damage to Building Structures in the Great Hanshin-Awaji Earthquake, by Period of Construction

a. Wooden Houses in Nishinomiya City (n = 67,992)



b. Reinforced Concrete Buildings in Nishinomiya City (n = 10,998)



Source: Yamaguchi and Yamasaki 2000

standards for these structures, to include such standards in the formal building code, to incrementally increase the standards, and to train carpenters and engineer-architects who specialize in wooden construction. These experiences show that formal recognition of prevalent construction types can drive significantly improved resilience through targeted guidance.

6. An effective regulatory regime is based on science and requires the participation of academia.

Japan's ongoing improvement of its building standards has depended in part on continuing technological research, which is carried out by scientists and engineers in academia working collaboratively with government and industry to solve technical problems related to building safety. This approach ensures that any changes to regulations are based on an accurate scientific assessment of post-disaster building behavior and damage. The involvement of academia in building regulation was especially important in Japan during periods of limited government and private sector capacity. Today, Japan's policy making is informed by government research institutions and by continued close ties to the universities.

7. Governments can strengthen their regulatory regimes by coordinating action with the building industry.

This coordinated approach has allowed Japan to scale up enforcement of building regulations (through effective supply of materials of standardized quality, for example), has encouraged healthy private sector competition, and has ensured that regulations reflect current social and economic demands from the consumers (such as demands for certain construction materials or services). This approach has also helped to promote transparency and fairness. When considering a change in regulation, for example, the Japanese government invites public comment from local governments and private sector stakeholders, and addresses these concerns in a series of discussions before finally amending the rule.

8. The private sector can play an important role in effective enforcement of building regulation,

but only where mechanisms for oversight, fairness, and conflict resolution are robust.

The private sector can offer governments additional capacity, yet, the experience in Japan shows that there must be clarity and agreement about the roles and responsibilities of private sector personnel; that their quality must be assured through credentialing and ongoing training; and that their actions must be subject to careful oversight, with punitive measures for malpractice.

9. Financial incentives can play a key role in promoting safety and overall quality in the built environment.

Since 1950, Japan relied on the Government Housing Loan Corporation (now the Japanese Housing Finance Agency (JHF)) for meeting its housing goals. The various programs JHF offers consumers include financial incentives to comply with building standards in excess of the mandatory standard. These programs have made an enormous contribution to building safety in Japan. Analysis of damage following the Great Hanshin-Awaji Earthquake in 1995 showed that JHF-financed houses performed significantly better than privately financed houses, and that this difference was due to JHF's requirements for design and construction supervision.

10. An incremental, context-specific approach—one in which policies are based on analysis of data accumulated over many years and events—is the path to a safer built environment.

Japan's experience demonstrates that where effective building regulation is concerned, reform is not a destination but a journey. Notwithstanding the significant gains made over the last century, Japan continues its efforts to increase building resilience through regulation. The incremental approach requires establishing and continuing to develop a base of technical knowledge and data as well as an institutional system to assess disaster damages and translate into practice the lessons learned from each disaster. It also requires an enabling environment that facilitates periodic amendment of regulations to ensure that they meet current socioeconomic requirements.

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