GENERAL CONSIDERATIONS
FOR INFRASTRUCTURE
PLANNING

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INTRODUCTION

General considerations for the preparation of the infrastructure development plan, including communication, energy, transport, and water conservancy reconstruction are set out below. This note complements the more specific recommendations provided in the Urban Development note.

URBAN AND RURAL INFRASTRUCTURE RECONSTRUCTION PLANNING POLICIES

Planning for and implementation of the reconstruction of infrastructure should be based on recognizing the rapidly changing socioeconomic conditions in the province of Sichuan: (i) increasing urbanization and densification; (ii) rising income levels and social aspirations; and, (iii) unpredictable extremes in climatic and geotechnical conditions. These changes are partially offset by improved technical knowledge and understanding of possible responses and outcomes. Natural disasters are occurring more frequently; hence reconstruction planning and programs should be firmly based on policies that have disaster mitigation and response at their core.

Consideration of the following factors is of prime importance for infrastructure reconstruction planning and decision making:

- **Sociocultural values**: Communities hold a strong sense of place, history, and emotional ties vis-à-vis their immediate surroundings. Social assessment surveys are the best instrument to measure these values in the immediate aftermath of the disaster and continuously thereafter.
Disaster Risk Management in East Asia and the Pacific

- Geophysical space: Geohazard, geological, and topographical features.

- Logistics and finance: Geographical aspects and cost implications of decisions.

- Timing and sequencing of decisions.

- Social and economic sustainability: Livelihoods and the abilities of and needs for economic regeneration.

INTERNATIONAL EXPERIENCE

Earthquake in Gujarat, India

In Gujarat, India, the post-earthquake reconstruction plan adopted a build back better theme; the basic principles were as follows:

- Build the city back to higher standards by applying a policy of encouraging partial relocation and partial in situ reconstruction.

- Continue repairing and revamping the existing infrastructure, so that it is better managed and responds better to future disasters. This approach would save the government the considerable expenditure of rebuilding infrastructure in the aftermath of a future disaster.

- Improve building construction quality, incorporating earthquake-resistant technologies and adhering to regulatory norms.

- Assist people in the reconstruction process; help them understand statutory requirements in planning, build consensus, and frame projects that respond to people's concerns and needs.

- Make the planning process as participatory as possible by encouraging public-private partnerships.

Establish a process in which citizens can participate in decision making and voice their concerns. This builds public trust in the process and thereby ensures implementation.

2005 Earthquake in South Asia (Afghanistan, India, and Pakistan)

In the Azad Jammu and Kashmir region of Pakistan, post-earthquake response and reconstruction dealt with several key challenges. Poor construction was a major reason for the extensive damage to infrastructure, and the consequent loss of life. The earthquake response was hampered by: (i) the absence of census data on buildings and people living in major cities; (ii) a shortage of equipment to remove debris, clear roads, and establish temporary bridges; (iii) a lack of backup systems for electricity, telecommunications, and water supply and purification; and, (iv) difficulties securing the property of the affected population.

The following were the key lessons in Pakistan:

- Maintain accurate records of land ownership, infrastructure (e.g., communication, electricity, transport, water supply, and sewage systems) so as to provide a baseline for a sound damage and loss assessment when disaster strikes.

- Measures should be implemented to minimize the loss of communications in the event of a disaster. For example, telecommunications equipment and essential facilities should be housed in prefabricated accommodations or seismically sound buildings. Fixed-line networks should be kept to a minimum with wider use of GSM (Global System for Mobile communications) and WLL (wireless loop) technologies.

- Provisions should be made to ensure effective communications between the affected areas and those co-
ordinating the disaster response. Portable GSM setups should be maintained at the national level for speedy deployment in disaster zones. Spare equipment (e.g., switches, satellite phones, and microwave links) should be readily available to support emergency rescue and relief efforts. In emergency conditions, detailed documentation and everyday standard operating procedures should be relaxed to avoid unnecessary delays in relief operations.

The permanent disaster management authority (if one exists) should have a department dedicated to disaster communications, and a cadre of engineers and other technical personnel should be identified and trained in disaster response operations (e.g., road clearance and bridge reconstruction). Contingency plans should be made for the restoration of communications, infrastructure, and other services in the event of a disaster.

2004 Tsunami in Aceh, Indonesia
In Aceh, pressure to rapidly reconstruct housing mainly through community-based methods achieved significant and fast core house completions. However, completion of the infrastructure services lagged behind the housing. The challenge to make up the service deficits required unexpected additional resources and caused delays in house occupancy and livelihood improvement.

The lack of coordination between the infrastructure sectors, specifically the reconstruction of major road networks and housing, led to some residents remaining in temporary housing for years. In other cases, newly built houses had to be destroyed in order to construct roads.

LESSONS LEARNED
A review of 10 post-earthquake reconstruction cases and other scholarly papers and reports identified the following key issues for planning infrastructure reconstruction:

- Differentiate between urban and rural reconstruction policy.
- Consider the (i) types of communities affected, (ii) degree of self-reliance within the affected communities, and (iii) public expectation of living standards.
- Enable clear delineation of authority to make executive decisions to guide the recovery program.
- Carrying out a comprehensive damage and loss assessment and planning for recovery require many months or years: The required time is often underestimated by the authorities, and delays have negative consequences. Delays often create uncertainty, reduce the psychological momentum for reconstruction, and slow down the all-important economic recovery.
- Timely and publicized launch of the reconstruction plan, combined with visible signs of progress, raises public awareness and diminishes further uncertainty among communities.
Repair and restoration of urban services (e.g., cables, power lines, transformer stations, roads, bridges, pipe-work, communications, water supply, and sewerage systems) as a first priority.

Reconstruction provides the opportunity for new urban design. With new urban design, intertwine complexities of land ownership and emotional ties by considering the “re-creation” of familiar locales in the community.

Relocation is very difficult and requires careful consideration of the public’s willingness to move or stay. It is easier for an urban planner to create a completely new city; however, this may not be the most socially acceptable solution.

Use existing master plans, and elements thereof, to the extent possible.

Engage local stakeholders in the planning process to make the plan acceptable, implementable, and sustainable.

Take disaster mitigation measures into account in the reconstruction plan.

Calculate for negative effects of inflation on actual implementation of the reconstruction plan.

Anticipate a surge in rent prices, and elucidate the government to its social and economic impact.

RECOMMENDATIONS

Based on international experience, it is recommended that the following challenges be reconciled in post-disaster reconstruction.

**Speed:** The importance of moving people into permanent settlements as soon as possible, thereby reducing emotional and interim financial costs of support for the homeless and for temporary housing, has to be balanced with a concern about the speed of decisions for reconstruction. Reconciling the need to act quickly in reconstruction with allowing sufficient time for planning and consultation with those affected is a difficult task. An iterative process
of assessment, which allows continuing discussion with affected populations, is one possible solution.

**Opportunity to introduce improvements in infrastructure and civic amenities:** If the proposed new housing developments lie outside existing city boundaries, additional costs would be incurred, in particular associated with infrastructure development. (See Land Management note.) Specific attention should be given to incorporate updated seismic design codes and design practices, planning for retrofitting key infrastructure facilities and public buildings, and providing guidance on the application of the updated design codes and construction practices to the general public.

**Generating private investment and economic activity:** Reconstruction plans can include the provision for construction of facilities for small businesses, which are vital for livelihood regeneration.

**Human resource capacity and training needs:** A major issue of reconstruction is the adequate availability of trained professional technical and managerial staff. Implementing urban planning standards and building codes requires experienced human resources and adequate financial resources.

**Retrofitting and mitigation of existing facilities:** A key issue in relation to mitigation is the strengthening of existing buildings, in particular public buildings, to withstand future earthquakes or other natural disasters, with costs being a major consideration. The willingness to pay is not necessarily linked to perceived risks; the public needs to be convinced of the merits of a disaster preparedness approach. Incentives for mitigation measures should be included in the reconstruction plan. Specific retrofitting plans and budget provisions should be made and included in the overall reconstruction program, including support (technical, and if possible, financial) to the non-government sector.

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Special thanks to the partners who support GFDRR's work to protect livelihoods and improve lives: Australia, Canada, Denmark, European Commission, Finland, France, Germany, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, UN International Strategy for Disaster Reduction, USAID Office of Foreign Disaster Assistance, and the World Bank.