



Overall Reconstruction: Design, Implementation and Management

A. Introduction

1. This paper addresses key challenges that have been experienced in other countries during the recovery and reconstruction process, in particular relating to the organization and management of the reconstruction planning, design and implementation process.

B. Key Lessons Learned from International Experience

Management of Reconstruction

2. **Institutional Arrangements.** At the outset it needs to be recognized that the capacity at local level will have been severely affected as a result of the disaster. The central government will need to strengthen the local and regional governments affected, in order to ensure efficient management of the reconstruction process and to rebuild their capacity. The implementation of reconstruction could be managed by existing institutions either at central or local level. The management structure and the scope of authority and responsibility should be clearly defined and communicated to all involved in the reconstruction.

3. In some cases an independent agency has been set up to manage multi-sectored disaster reconstruction¹. In these instances the new agency would coordinate closely with the existing institutions/commissions, community leaders and the non-government sector, and give specific attention to programs for retrofitting and strengthening existing structures and facilities. If a standalone agency is formed, it requires a finite timeframe and an exit strategy, as ultimately disaster management and risk mitigation needs to be mainstreamed.

4. However, in other cases such as Yogyakarta & Central Java and San Francisco, earthquakes have been handled through the regular implementation channels of ministries and local governments

5. The overall plan needs to identify possible financing sources, promote sustainable urban and infrastructure planning, and show the links to the various sectors and the subsequent sector reconstruction plans. Ultimately the need for transparency and cohesion between the overall and sector plans is critical. Parties need to be able to track who is doing what. This is essential to coordinate an effective response. As examples of

¹ Following the end of emergency response phase to the Tsunami, the Indonesian government through the National Development Planning Agency (BAPPENAS) coordinated and drew up a rehabilitation and reconstruction plan for Aceh and Nias. Several institutions in cooperation with international bodies participated in the process of developing the Master Plan. The Master Plan outlined the need to establish an agency responsible for the coordination and implementation of the rehabilitation and reconstruction plan for Aceh and Nias. The agency for the Rehabilitation and Reconstruction of Aceh and Nias (BRR) was created for this purpose.



previous mechanisms of transparency and coordination, Indonesia had a regular newspaper and Pakistan had www.era.gov.pk

6. **Timing.** Planning and financing of reconstruction of the destroyed and endangered infrastructure should make realistic estimates of timing for delivery and completion. In large disasters, completion times of 7 to 10 years are realistic (Kobe, Aceh, California). Managing expectations of householders and political leaders is an important responsibility of the reconstruction management team. In addition, this long time horizon needs to be incorporated into the financing and budgetary management strategy. To realistically assess timing, classic project development steps would be followed: Decision to proceed/data collection/analysis/strategy/design/procurement/implement/commission and delivery. The difference in this case is that the data collection and analysis steps are more complicated, and social pressure and need to conclude a strategy and procure are more intense.
7. The Government should assess the damage caused by the earthquake and take a decision as soon as possible as to whether the current construction standard should be retained or reinforced based on this assessment. Without this decision, the Government and private sector cannot start reconstruction of houses and infrastructure assets. The decision on construction standard is a critical point for the implementation of the Reconstruction Plan. In the case of Kobe, the Government decided not to change the construction standard as it had been proven that the buildings which respected the latest construction standard could resist the earthquake.
8. **Logistics.** Reconstruction logistics, i.e., putting in place the people, plant and equipment to commence work, is a critical factor. Logistics during the reconstruction process and for materials delivery present a major challenge. In addition, logistics for handing post disaster debris retrieval, processing and recycling/removal will be complex. This is a highly specialized field of expertise, and the proposed reconstruction program should include specific expertise throughout implementation, saving time and reducing costs.
9. **Management Costs.** Reconstruction program management and administration costs could be as much as 100% higher than for normal infrastructure and construction management costs. In China, management costs are currently estimated at 10 to 12% of the costs of the works but for the reconstruction program, it is likely that much higher costs would be incurred.
10. **Quality assurance** for the full duration of the reconstruction process should be a core activity of all stakeholders. Reconstructions of structures with low quality and adherence to seismic standards pose a significant future risk.
11. **Reconstruction Funding** is generally derived from multiple sources. The Reconstruction Plan should include a clear financing plan. This approach would significantly improve delivery efficacy, facilitate quality control and be cost effective by



avoiding the duplication of efforts and management that inevitably occurs in large scale programs.

12. Besides the conventional budgetary funding sources, it could be recommended that the Government establish a special reconstruction fund which could provide flexibly required subsidies for housing construction and livelihood rehabilitation which cannot be financed within the existing budgetary framework and regulations

Design Parameters

13. ***Build Back Better.*** Program design should recognize that long term outcomes are being created by all strategic and policy decisions. The opportunity to “build back better” should be incorporated into planning. Short term “quick result” solutions should be avoided to allow for long term socio-economic gains. Many damaged buildings may be found to be uneconomical to reconstruct or repair. In addition, experience has found that properly engineered structures should be rebuilt at a significantly higher standard than those replaced, adding 5-30% to cost. The additional cost will mitigate the costs of further disasters.

14. At the outset the government should clarify the vision of the recovery program for the Wenchuan Earthquake (as was done in Aceh, Kobe, Honduras, Maldives, etc.) It should consider the question: “What do we want when we are finished?” Through defining and communicating the recovery vision it will focus all the stakeholders on the goals and objectives.

Procurement

15. ***Accountability.*** Clear accountability and delegated powers of decision making and authority are essential for effective reconstruction management. It may be necessary to designate this thru a ministerial decree.

16. ***Procurement methods.*** Adopting emergency procurement procedures for reconstruction presents significant time benefits, while presenting accountability and economic efficiency challenges. Economic efficiency problems are dealt with through limited bidding procedures. Accountability challenges can be dealt through improved financial management systems. The duration for validity of these procedures should be defined, recognizing that comprehensive infrastructure reconstruction takes time.

17. ***Materials selection and sourcing.*** This presents a major challenge, in terms of availability, logistics, environment impact, suitability for use in high hazard areas, artisan skill level and workmanship, quality assurance and costs. These factors are especially relevant for reconstruction programs in remote areas. Environment and sustainability considerations with respect to deforestation (timber), landscape degradation (sand and gravel for concrete), and farmland reduction (needed for settlement relocation and housing) and all have an impact on reconstruction strategies. Options for off-site manufacture, large-scale procurement of key materials, and the logistics of construction



materials purchase and distribution need to be optimized as part of program design. Materials and design choice would also be based on a realistic assessment of likely available local equipment and skill levels, and sustainability factors.

Priority Data Sets and Analyses

18. Planning should be based on setting clear objectives. The objectives need to be based on verified data and rigorous analysis. Processing of these data sets would be done through a series of digital data overlays, to enable rapid and least-risk decision making, taking socio-cultural preferences as important parameters. The principal data sets, parameters and analyses are:

- Geological and seismic conditions, requiring an immediate update of current geology, seismology and prediction of future conditions. Specific site investigation, drilling and testing may be required.
- Land availability & “ownership” or land use rights, ensuring proposals are realistic, trading the benefits between rural and urban land right and responsibility.
- Topographical Mapping and weathering analyses. Including base mapping, combining satellite imagery, orthophotos/maps, ground truthing, and efficient contour intervals. Detailed mapping would be required of the principal reconstruction areas, once selected through the hazard and risk mapping.
- Hazard & Risk Mapping should follow from the above, drawing also on the topographical mapping data, eliminating ultra-high risk areas, and dictating design parameters for all retrofitting and new construction.
- Environment and Ecosystems. Delineating and addressing these features is vital at this time for scoping, exploring options and planning. The aim is to minimize reconstruction impact and maximize ecosystem protection.

Investments in Mapping and Database:

19. Strategic investments by Government in current mapping and data bases has been found to be a vital input for the reconstruction process. It is important that unified base mapping are created or updated, including topographical, cadastral and thematic information. All agencies should work using the same base mapping. Satellite imagery is needed for initial assessments and useful for concept review and initial decision making. Digital orthophoto mapping (scale 1:1000 with 25 cm contours intervals) should be arranged immediately.

20. Geological, soils, hazard mapping and environmental and ecosystem data should be overlaid on this base mapping. (Scale will vary depending on typology requirement). All mapping should be quickly published in hard and electronic copies to enhance public awareness and ensure availability of these tools. The cost of adequate mapping is often



seen as too expensive, whereas the future costs of planning infrastructure without adequate information is often overlooked.

Quality Assurance (QA)

21. Achieving quality assurance is one of the main reconstruction challenges and the methodology selected will have an impact on the QA outcomes. Hence care is also needed during the design phase to reflect practicality of on the ground/site conditions.

22. Specific challenges to manage QA and meet acceptable quality assurance during the construction phase occur due to the dispersed nature of reconstruction activities, variable quality of materials, and unpredictable skill sets. Meeting construction safety standards and acceptable practices also presents unpredictable challenges.

23. ***Incorporation of Quality Assurance and Awareness Training.*** Disaster awareness parameters are generally not incorporated into general professional (engineers, architects, administrators) training, contractor business methods and local construction artisan and laborer engagement practices. Non-engineered buildings such as rural housing will likely be built back to original quality unless owners are educated and designers, builders and artisans are trained.

24. The training of planners, designers, construction managers and especially local level artisans and construction workers should be incorporated into all phases of reconstruction. Moreover, training should also be incorporated in the reconstruction program for the asset and building owners, financiers and local communities, since they are all beneficiaries of and dependant on the infrastructure. Budget provision for these inputs should be realistic, considering the post-disaster conditions and capacity, and the potential impact of substandard quality. Indicative estimates for example of site supervision costs should be double normal provisions.

Exit Strategy

25. Specific plans should be made for long term ownership and management of the newly created assets, ensuring that adequate financing will be available for their completion, legal ownership, operation and maintenance. This capacity should be created as part of the Reconstruction Plan. Moreover, strengthening China's National Strategy and future Disaster Risk Management arrangements, focusing on "Mitigation & Preparation" should be part of the exit strategy.