

## **PART - I**

### **A. INTRODUCTION**

1. This report provides an assessment of damages and needs resulting from the tsunami that struck the eastern and southwestern coast of India as well as the Andaman and Nicobar Islands on December 26, 2004. It provides a preliminary estimate of the total cost of damages, identifies the needs for reconstruction and outlines some strategic considerations and guiding principles for implementing a reconstruction program and strengthening disaster risk management as part of a medium term development process.

2. The report was prepared in response to the request of the Government of India (GOI), and was undertaken jointly by the Asian Development Bank (ADB), the United Nations (UN), and the World Bank. The three institutions put together a team and organized a joint assessment mission (JAM) to the affected areas in the mainland part of India. As advised by the GOI, the Andaman and Nicobar Islands were not part of the scope of the assessment.

3. The JAM (joint assessment mission) team comprised experts and specialists from different sectors and disciplines from all three institutions in order to be able to produce a comprehensive, multi-sectoral assessment of both damage and losses, as well as evaluating requirements for recovery and reconstruction. The team was organized jointly by the Asian Development Bank (ADB) and the United Nations, under the coordination of the UNDP; team membership included representatives from several agencies (such as ILO, UNDP/BCPR, UNDP/GEF and UNICEF), and the World Bank. The assessment of damage and losses was done with technical support on assessment methodology from the United Nations Economic Commission for Latin America and the Caribbean (UN/ECLAC).

4. The team leaders were: Arjun Goswami (ADB), Pascal Girot (UN/UNDP), and Shyamal Sarkar (World Bank). The ADB team comprised: Tyrrell Duncan, Madhumita Gupta, Alex Jorgensen, Takeshi Nakazaki, Ashok Sharma, Tamotsu Tamura, and Kenichi Yokoyama, and technical support staff from the ADB India Resident Mission. The United Nations group included Periasamy Amudha, Sultana Bashir, Kamal Kishore, and Jayasankar Krishnamurthy as well as support from staff of UN agencies in the respective states. Team members from the World Bank included: M. Balasubramanian, Robert Buckley, Mayank Choudhary, T. Moth-Poulsen, Meena Munshi, Mario Pedini, Bilal Rahill, Laura Vecvagare, Farah Zahir, and Ricardo Zapata. Technical comments and editorial support were provided by Sumir Lal, Tom Blinkhorn, Charles Delfieux, Mamata Baruah, and Lilian MacArthur.

5. The JAM team met with various stakeholders representing the government, members of academia and locally based non governmental organizations (NGOs) involved in the emergency relief and reconstruction. In addition to discussions with state governments in Chennai, Thiruvananthapuram, Hyderabad and Pondicherry, the JAM also participated in field visits to the districts of Cuddalore, Nagapattinam, Kanniyakumari and Chennai in Tamil Nadu; the districts

of Kollam and Alappuzha in Kerala; the districts of Nellore and Prakasam in Andhra Pradesh; and the Karaikal region in Pondicherry.

6. The JAM expresses its appreciation to the national and state authorities for their support and assistance in terms of information access and availability for discussion of the results. Meetings were held with the Chief Secretaries in each state and their teams and relevant line department officials. Particular thanks are expressed to the district collectors visited and their teams for organizing the appropriate visits and meetings not only with their staff - who in many instances accompanied and guided the JAM team members - but also with the relevant civil society organizations and NGOs.

7. The findings of the joint assessment, which was conducted from February 1-15, 2005, are presented in this report. The team's analysis is based on discussions with the central, state, and local governments, and relies on information available at the time of the mission. Since many assessments, surveys and specific sectoral analyses are still ongoing, the figures should be considered as the best estimate possible given incomplete data and time constraints.

8. The needs assessment is derived from figures provided by the state governments adjusted by the mission on the basis of direct observations, expert opinions and feasibility considerations, given the resource availability and other implementation considerations. Project formulation and project needs will be predicated on pending policy decisions and surveys as well as consultation and participation of the affected population.

9. The report was presented to the GOI on March 3, 2005.

## B. THE DECEMBER 2004 TSUNAMI

### The Disasters

10. For the first time in half a century, India experienced the devastating effects of a tsunami, caused by a series of earthquakes in the Bay of Bengal<sup>2</sup>. The first and strongest earthquake occurred off the west coast of northern Sumatra, Indonesia at 6.29 AM Indian Standard Time on December 26, 2004 (magnitude and intensity 9.0 USGS), followed by one 81 kilometers (km) west of Pulo Kunji Great Nicobar, India (7.3 USGS) some three hours later. 115 aftershocks were reported, of which the magnitude of 103 tremors was between 5.0 and 6.0 USGS and 12 were over 6.0 on the Richter scale. The earthquakes set off giant tsunami tidal waves of 3 to 10 meters in height, which hit the southern and eastern coastal areas of India and penetrated inland up to 3 kms, causing extensive damage in the Union Territory (UT) of the Andaman & Nicobar Islands, and the coastal districts of Andhra Pradesh, Kerala and Tamil Nadu and the UT of Pondicherry. Approximately 2,260 km of the coastal area besides the Andaman & Nicobar Islands were affected.

### Human Toll<sup>3</sup>

11. **All India.** According to Government reports 10,881 people in India lost their lives and 5,792<sup>4</sup> persons were reported missing with 6,913 injured.

12. **Tamil Nadu.** In Tamil Nadu over 7,983 deaths were reported. Of the 13 coastal districts<sup>5</sup> affected in Tamil Nadu, Nagapattinam, where 6,051 people died, was the worst affected. Over 824 died in Kanniyakumari and 612 were reported dead in Cuddalore district.

13. **Kerala.** In Kerala 171 deaths were reported. Of the four affected districts of Kannur, Ernakulam, Alappuzha and Kollam, Kollam district accounted for the highest death toll of 131 followed by Alappuzha with 35 and Ernakulam with 5.

14. **Andhra Pradesh.** In Andhra Pradesh 105 deaths were reported and 11 people were reported to be missing. Of the affected districts<sup>6</sup>, Krishna and Prakasam were reported to be the worst affected in terms of human toll with 27 and 35 deaths respectively.

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<sup>2</sup> The last time a tsunami hit the coast of India was in 1945. The other Asian countries affected are Indonesia, Maldives, Myanmar, Sri Lanka and Thailand. Several countries in East Africa have also been affected.

<sup>3</sup> The human toll data are taken from the United Nations Disaster Management Team (UNDMT) Situation Report dated February 11, 2005 which is based on Government reports.

<sup>4</sup> The most recent reports indicate that 2,812 people out of the 5,792 reported missing are dead.

<sup>5</sup> The affected districts in Tamil Nadu are Thiruvallur, Chennai, Kancheepuram, Viluppuram, Cuddalore, Thanjavur, Nagapattinam, Pudukkotai, Ramanathapuram, Toothukudi, Tirunelveli, Thiruvarur and Kanniyakumari.

<sup>6</sup> The affected districts in Andhra Pradesh are Visakhapattanam, East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore.