

Outline of the Report of the Committee for Technical Investigation on Countermeasures for Earthquakes and Tsunami

Based on the Lessons Learned from the “2011 off the Pacific coast of Tohoku Earthquake”

Objectives

- The bitter experiences and tough lessons experienced must be permanently passed on as a testament linking the past, the present and the future, and as wisdom for the building of disaster-resilient nation and communities.
- Based on the report, the national government is expected to perform necessary revisions of Japan's overall earthquake and tsunami countermeasures and pour every effort into enhancing disaster management measures for the future, thus liberally fulfilling the fundamental government role of protecting the lives and property of the nation's citizens.

Characteristics of the earthquake and tsunami damage and principles for tsunami to be used for future hazard assumptions

Characteristics and verification of the damage caused by earthquake and tsunami

- Devastating human and material damage caused by the mega earthquake and tsunami
 - Unforeseeable magnitude 9.0 earthquake
 - Pre-disaster assumptions were far removed from the actual hazard, disaster management measures excessively dependent on coastal protection facilities, and tsunami warnings that fell below the actual tsunami height, etc.
- ⇒ **Rebuild disaster management measures in its entirety according to reflections and the lessons learnt**

Principles on selecting earthquakes and tsunamis for development of disaster management measures

- **Examine the largest-possible mega earthquakes and tsunamis from every possible angle.**
- Select earthquakes and tsunamis for hazard assumption based on scientific knowledge such as analysis of ancient documents and surveys of tsunami deposits and coastal topography.
- Enhance researches on seismology, geology, archaeology and history in a comprehensive manner.

Principles for future tsunami hazard assumptions for developing tsunami countermeasures

Future hazard assumptions will require two levels of tsunamis

- **Largest-possible tsunamis with extremely low possibility of occurrence but devastating once they occur**
 - Place protection of people's lives as the first priority and establish comprehensive tsunami countermeasures embracing every possible instrument, while placing evacuation of residents as the core.
- **Tsunamis that occur frequently but cause major damage despite the relatively low tsunami height**
 - Development of coastal protection facilities from the point of view of protecting human life and the assets of residents, stabilizing the regional economy and securing efficient industrial bases.

Future directions for earthquakes and tsunami countermeasures

Countermeasures to mitigate the tsunami damage

(1) Basic principles

- For the largest-possible tsunamis, implement structural measures, such as coastal protection facilities, and non-structural measures centering on evacuation, such as preparation of hazard maps, in accordance with a 'disaster reduction' philosophy that focuses on minimizing damage.
- The fundamental step in protecting human life from tsunamis is evacuating to higher ground without hesitation, swiftly and autonomously, as soon as a strong or extended shaking is felt.
- In communities where tsunamis arrive quickly, community development should aim to enable evacuation within around five minutes. However, in communities where topographical conditions or the state of land use make such responses difficult, it is essential that measures for tsunami evacuation are thoroughly examined with consideration to factors such as the tsunami arrival time.

(2) Preparation of a system and creation of rules for efficient evacuation

○ **Tsunami warnings and disaster management responses**

The content of tsunami warnings need to be examined from the point of view of the warnings' recipients. Disaster response activities and evacuation actions in accordance with the levels of tsunami warnings or expected tsunami height should be examined in more details in the future.

○ **Improvement and strengthening of tsunami warnings and information delivery systems**

In delivering tsunami warnings, every possible tool including local disaster management radio communication systems, J-ALERT, television, radio, mobile phones, 1-Seg, etc should be utilized, and responses to power outages across wide areas, the damage caused by the quake and tsunami to local government buildings need to be examined.

○ **Improvement and strengthening of earthquake and tsunami observation system**

Improve the accuracy of tsunami prediction by enhancing the observations system using ocean bottom seismographs, cable-type offshore hydraulic gauges and GPS wave gauges.

○ **Designation of tsunami evacuation buildings and development of evacuation sites and evacuation routes**

Development of tsunami evacuation sites, tsunami evacuation buildings, tsunami evacuation routes and stairs need to be implemented in integration with community development. With regard to tsunami evacuation buildings, the requirements for designation, and structural and location criteria need to be reviewed.

○ **Development of rules of conducts for guiding residents for evacuation and disaster management measures**

Exhaustive research and analysis need to be made regarding evacuation action and evacuation situations.

Rules of conducts will be stipulated with regard to disaster management measures and guiding residents for evacuation within the timeframe of the tsunami arrival.

(3) Development of communities resilient to earthquakes and tsunamis

○ **Multi-layer protection and construction of facilities**

In order to mitigate tsunami inundation damage and extend the lead times for evacuation, highly resilient coastal protection facilities and multi-layer protection incorporating secondary barriers utilizing transportation infrastructure such as raised roads to prevent tsunami waves to penetrate further inland will be developed.

○ **Governmental and welfare facilities will be constructed in places with low flooding risks**

In order to maintain governmental and social functions even in the event of a largest-possible tsunami, the government-related facilities, evacuation sites, welfare facilities, hospitals, etc need to be constructed in areas with a low risk of inundation.

○ **Organic coordination between local disaster management plans for municipalities and city planning**

Local disaster management plans for municipalities and city planning need to be organically coordinated, and promote safe community development safe from a long-term perspective. In doing so, the participation of disaster management experts will be requested where necessary.

(4) Raising disaster awareness about tsunamis

○ **Improving hazard maps**

Since there are limits to raising the residents' awareness merely by handing out hazard maps, systems and mechanisms need to be developed to get across the message of hazard maps thoroughly.

○ **Thoroughness in the principle of evacuation on foot, and education about the importance of evacuation**

Evacuation should in principle be on foot. In the light of the fact that many of the survivors of the recent disaster escaped from tsunami by cars, measures to ensure people to evacuate safely using cars will be examined.

○ **Implementation of disaster education and improvement of community disaster management capabilities**

Continuous and enriched disaster education regarding local characteristics, the danger of earthquakes and tsunami, historical tsunami damages, and the lessons learnt from tsunamis in the past need to be implemented throughout Japan, and efforts to share this knowledge among residents need to be strengthened.

Damage scenarios

○ **Review of damage scenario methods and the factors considered based on the Great East Japan Earthquake**

The damage of the Great East Japan Earthquake will be adequately investigated and analyzed, and improvements will be made. In addition, methods will be examined for quantitatively assessing the effectiveness of promoting disaster management measures.

○ **Develop several scenarios including a worst-case scenario that assumes the maximum damage**

Several scenarios will be developed including a worst-case scenario in which the maximum damage occurs, by assuming different circumstances such as time of the year, time of the day or meteorological conditions.

Measures to reduce damage caused by shaking

○ **Systematic efforts to make buildings resistant to earthquakes and strengthening of awareness raising activities**

Systematic efforts to be made to improve the earthquake resistance of buildings, promote such measures as prevention of ceiling collapse and securely anchoring furniture and strengthen awareness raising activities.

○ **Countermeasures against long-period ground motion and liquefaction**

Countermeasures against long-period ground motion and liquefaction will be steadily promoted.

Towards the future

Preparing for large-scale earthquakes in the future

- Full preparation need to be made against earthquakes and tsunamis since earthquakes can occur anywhere in Japan.
- Countermeasures against a mega ocean trench earthquake in the Nankai Trough require a perspective of the national grand design.
- Attention must also be paid not only to the simultaneous occurrence of Tokai, Tonankai and Nankai earthquakes, but also to composite disasters comprising of staggered earthquakes, inland earthquakes and typhoons.
- In order to prevent economic stagnation due to damage to key industries, business continuity plans (BCP) for disaster response will be formulated.
- Countermeasures for Tokyo Inland Earthquakes will need to examine the earthquake hazard of the size of the 1923 Great Kanto earthquake.

Future disaster management measures

- The coverage of tsunami countermeasures in the Basic Disaster Management Plan need to be greatly improved.
- Guidelines for municipal governments will be adequately examined and reviewed.
- The legislative and institutional systems for disaster management will be examined.

Preservation of records of the Great East Japan Earthquake and information dissemination on future disaster management measures

- Records will be passed on to the next generation, and the knowledge and experience be widely disseminated internationally.