Views from the field(Japan):What worked and what did not

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Source: Member // Rajib Shaw

Recently I took a survey in the affected areas of Iwate and Miyagi prefectures as a part of the need assessment team of a non-profit organization named SEEDS Asia. This survey was an effort by the consortium of NGOs called Japan Platform which has been active to mobilize resources in the hardest hit areas. I visited several affected towns and cities including Taro, Miyako, Yamada, Kamaishi, Ofunato, Rikuzen Takata, Kesennuma, Minami Sanriku, Ishinomaki, Sendai, Iwanuma, Watari and Yamamoto-cho in four days. The devastation is huge, and beyond any expression. After the 2004 Indian Ocean Tsunami, I surveyed Indonesia, Sri Lanka and India, but did not see this level of destruction.

First, let us look at the magnitude of the earthquake, which is once in 1,000 years event. The affected area is known for its past active seismicity, and repeated tsunami, like 15th June of 1896, 3rd March of 1933, and on 22nd May of 1960. The last one was due to Chile earthquake. Paleo-seismicity tells that in 869 AD, there was a major event, named Jogan Earthquake, where three fault sources broke simultaneously. The current earthquake is also of same nature. Therefore, the energy released was much higher compared to other recent earthquakes, causing one of the strongest tsunami Japan has experienced in last 100 years.

Apart from the magnitude of the earthquake and resulted tsunami, one of key reasons of devastation is Japan's land character. Almost 70% of the country's land is covered by mountain, which leaves a very narrow coastal belt. The devastation of tsunami was found to be the largest in two types of land areas. First is the area with a narrow opening to the sea, like that of Taro in Miyako town. The other one is the vast flat land, like Rikuzen Takada [in Iwate prefecture] or Watari, Yamamoto-cho [in Miyagi prefecture].

Taro is famous for its tsunami prevention measures. The town was affected by 1896 tsunami [known as Meiji Sanriku earthquake and tsunami], which killed more than 22,000 people. The town lost most of its

population in that disaster. In 1933, the town was again hit by another devastating tsunami, following a decision by the town leader to construct a mega dyke to protect its people. The dyke was built in several phases, resulted to 10 m, 2.5 km long structure. The current tsunami wave overflow this dyke and damaged some areas, however, it would have been more devastating without the dyke. The importance of infrastructure based disaster prevention can be highlighted here.

In Kamaishi in Iwate prefecture, an eight storey tsunami evacuation building stood undamaged very close to the shoreline. In the hazard map, distributed by the city government, this building was designated and marked as an evacuation building with clear instruction that people need to evacuate higher than fourth floor. What is more interesting is that, on March 3 [the day of 1933 earthquake and tsunami, known as Showa Sanriku earthquake and tsunami], an evacuation drill was performed with the local residents and school children. Therefore, tsunami awareness was rather fresh in their mind and people took shelter in evacuation buildings and nearby evacuation road [a pre-designated road on the nearby mountain with access stairs], immediately when they felt the earthquake. This shows the importance of evacuation drill and disaster education.

In contrast, in Rikuzen Takada, where there was rather vast land in coastal area, the tsunami wave entered as much as 4 km inland, caused extensive damage to the local government building, and made it non-operational in the immediate rescue relief phase. A distinct difference in the post disaster operation can be observed in the cities where the local government office was not affected due to its location in the higher ground. In Ofunato in Iwate prefecture or in Iwanuma, Yamamoto-cho in Miyagi prefecture, the local governments already started its preparation for the short and medium term recovery phase, including construction of temporary shelter. In contrast, in Minami Sanriku, where the three storey disaster management office was also destroyed, the relief phase is prolonged.

The effectiveness of early warning system needs a proper risk communication mechanism, which links both information provider and receiver. In March 11 disaster, the tsunami warning and tsunami advisory were issued within three minutes after the event. The warning was put in Japan Meteorological Agency [JMA] webpage, television, radio, social networking media, and also through announcement from the town and city offices. However, in several places, initially, people underestimated the height and severity of tsunami, and started evacuating after the first wave has arrived. What makes people take immediate action for evacuation? An easy to understand early warning [with information on potential tsunami height], evacuation order and repeated evacuation drill make a difference. In some cases, people had a “feel safe” mis-perception, where neighbor’s and children’s roles became important.

What is an ideal tsunami prevention measure? There is possibly not a single formula applicable to every place. It needs to be customized based on the local geographic and topographic condition. A combination of early warning system, infrastructure measures like coastal dyke, tsunami evacuation center, and awareness and education campaign like evacuation drill and disaster education is required.

Finally, I would like to emphasize that through the 400 km long survey along the coast, I have not seen the major earthquake damages. While liquefaction effects were reported in Chiba and Ibaraki prefectures due to soft soil and reclaimed land, most of the buildings in the higher ground in the worst affected areas remain undamaged. The only visible impact was the damage of the roof tiles in some areas like Natori, Watari, and Yamamoto-cho in Miyagi prefectures. The epicenter and the fault zone were located under the sea, and therefore, it may not be comparable to the Great Hanshin Awaji Earthquake, which was an inland earthquake, and the fault line passed below the devastated city. But with a magnitude 9 earthquake, and with an intensity of 7 in Japanese scale (the maximum possible intensity), a real appreciation needs to be given to the earthquake risk reduction measures Japan has practiced over years. In all the coastal towns, a sharp demarcation of affected and non-affected areas can be made through the tsunami inundation, which varies from 3 to 5 km. If there were additional damages due to earthquakes, the situation would have been worse.

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