

## Suggestions for coastal zone reconstruction based on vulnerability data obtained from the 2011 Japan tsunami

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The 2011 Great East Japan tsunami caused various kind of damage in coastal zones. This paper presents an analysis of tsunami flow depth or height against human fatality and damage on building, fishery boat and pedestrian bridge. Suggestions for the reconstruction based on the analysis of results for each topic were proposed. Human fatality ratio of the 2011 Tohoku tsunami was compared with other historical tsunamis. Fatality ratio in Sendai Plain coast is as high as in Sanriku ria coast even though the tsunami height in the Sanriku coast is much higher. This shows importance of evacuation in reducing human loss by tsunami. For building, a higher damage probability exists on the ria coast due to higher flow velocity for a given inundation depth. It is clear that RC and steel buildings performed better than wood and masonry buildings. The performance of buildings with three or more stories is particularly significant. Buildings constructed after 1981 performed slightly better than buildings constructed between 1971 and 1981. It can be concluded that damage is observed in fishery boat when tsunami height is greater than 2 m and totally damaged when the height is greater than 5-10 m depending on coastal and boat types. Fishery boats that are larger than 5 tons show higher performance. Finally, pedestrian bridge will start to be damaged by tsunami if 1) the tsunami flow depth is higher (1.5 times) than the height of bridge or 2) if the location of pedestrian bridge relative from the shoreline is 1/10 of the maximum inundation in land.

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