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NEED FOR TRANSDISCIPLINARY APPROACHES TO COSTAL DISASTER RESEARCH

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Introduction

The authors present their recent research attempts and findings through the investigations in Asian vulnerable coastal cities and communities. Extensive studies have been carried out particularly in Vietnam, Indonesia, the Philippines, and Japan over the last several years. The study includes post disaster surveys, disaster risk assessment, and hard / soft countermeasures. The research approach encompasses those associated with not only coastal engineering but also ocean and estuarine science, typhoon science, disaster awareness science, geoengineering, hydrology and vegetation science, demonstrating the importance of transdisciplinary approaches to challenge multifarious coastal disaster problems. New emerging disaster risks and necessary solutions are also addressed:

Dyke-break induced tsunami: Thin coastal dykes typically found in developing countries may suddenly collapse due to rapid land subsidence, material aging, sea-level rise, high wave attack, earthquake, landslide or a collision with vessels. Such a failure could trigger a dam-break tsunami-type flooding, or dyke-break induced tsunami, a possibility which has so far been overlooked in the field of coastal disaster science and management.

Tidal - fluvial flow intensification: Strong currents induced by tidal oscillations have been overlooked in previous flood-risk assessments of the deltaic area, which is characterized by many tributaries, channels, and low-lying lands, in addition to the main stream. Such locally intensified flows can be further amplified by a high river discharge or storm surge, having potentially dangerous consequences, such as difficulties in handling ships and small ships being capsized.

Pedestrian evacuation during the peak of a storm: If it is not possible for some reason to evacuate prior to the arrival of the typhoon, those in solid houses should first consider vertical evacuation in their place, rather than courageously evacuating in an unpredictable water flow.

Limitation of coastal dykes in a rapidly subsiding coast: Actions to stop land subsidence would be the most effective countermeasure to mitigate coastal floods from the middle of the 21st century onwards, emphasizing the need to prioritize such actions among the range of countermeasures being proposed for such developing cities experiencing a rapid subsidence such as Jakarta.

Effectiveness of mangrove system: The long-term survival rates of artificial mangrove forest are generally low. Coastal floods could be effectively mitigated only if the mangrove embankment is appropriately designed to maintain an equilibrium state among sea-level rise, land subsidence, vegetation growth and sediment accretion over the long term.

Community-based coastal protection: Improvised coastal protection systems using wooden piles are often seen on beaches suffering coastal erosion. However, the effectiveness of these piles has yet to be satisfactorily proven. Its fundamental study should be encouraged further, particularly with the aim of facilitating community-based disaster management.

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