

Educational activities for urban flood damage reduction using unique facilities

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Abstract We introduce our recent educational activities for urban flood damage reduction using a real-size model and a miniature model, and discuss their effects. In underground inundation by urban flooding, people must evacuate immediately via a staircase against a swift inflow, and people caught in basements must attempt to evacuate through doors held shut by hydrostatic pressure. In evacuation from underground spaces during flooding, it is very important to understand the critical conditions of evacuation via a staircase or by opening a door. We executed evacuation experiments using real-sized models. Low-lying streets are common sites of accidents with submerged cars and severe damage, including human damage, occasionally occurs under flooding conditions. Thus, we also executed evacuation experiments from a real-sized submerged car. We obtained the critical conditions for evacuation of inundated underground spaces and submerged cars. At the same time, we found that these experiments are very effective for education for urban flood damage reduction. People can feel how severe the flow is in a staircase, and how large the hydrostatic pressure exerted on a room door or a car door is. The experience of an evacuation experiment reminds them of the strength of water and importance of prompt evacuation. As the above evacuation experiments are very effective for enhancing disaster prevention awareness, we aim to help people to experience them during university events or educational activities. In addition, we made a miniature model of an urban area with a river, which can demonstrate urban inundation by river overflow and heavy rainfall using a small pump. The miniature model includes an underground space and an underground storage pond. The former part can express the flow configuration of underground inundation, and the latter part can show the good effects of underground storage. Not only children but also adults can learn about the urban flood mechanism and its countermeasures.

Key words flood damage prevention; underground inundation; submerged car; evacuation experiments; education activities for disaster prevention