

Extracting Triggers of Design Flood Revisions to Capture Feedbacks between Physical and Social Processes in Technological Society

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In the era of the emergent Anthropocene, it is important to capture the feedbacks between physical and social processes [Savenije et al., 2014; Sivapalan, 2015]. In technological society [Di Baldassarre et al. 2015], flood mitigations and managements in a river basin are conducted based on a design flood (m^3/s) set by hydrological technologies: observations and modeling so on, and river structures (levees, dam reservoirs etc.) are designed based on the design flood.

In Japan, one of the typical technological society, modern hydrological technologies were imported by Dutch engineers in Meiji era (1868-1912), and modern flood prevention projects were started. The design floods of these projects were set based on the observed historical floods discharge, and the return periods of the design floods were about 20-30 years. However, after the era, the design floods have been revised many times and increased, and the flood prevention projects were also enhanced with increasing levees height and constructing dam reservoirs. Now, the return periods of design flood in Japanese main rivers are set as 150-200 years. The increasing tendency of design floods and enhancements of flood preventions have caused "levee effects" [Montz and Tobin, 2008]: enhancement of land use changes (increasing vulnerability for flooding), and increasing flood intensity [Takahashi, 1964].

As described above history, we hypothesize that the feedbacks in the technological society have been caused via design flood revisions, and conduct a survey for historical sources related Japanese flood prevention plans and design floods to extract the triggers of design flood revisions [Nakamura, S. and T. Oki, 2011]. In this presentation, we show a classification and historical transition of triggers of design flood revisions in Japan, in addition, discuss the mechanism of design flood revisions to capture feedbacks between physical and social processes in technological societies based on the survey result and other socio-hydrological data.

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