報告番号	甲　第　12506号

主　論　文　の　要　旨

論文題目　Integrated Flood Risk Management and Evacuation Strategy in the Upper and Middle Reach of Chao Phraya River Basin, Thailand
(タイ国チャオプラヤ川中・上流域における統合型洪水管理と避難戦略に関する研究)

氏　名　JAMRUSSRI　Sarawut

論　文　内　容　の　要　旨

The Chao Phraya River Basin (CPRB), Thailand is similar to flood disasters occurring every year. Haft of natural disasters have experienced in Thailand is flood disaster. Owing to fertile floodplain of CPRB, almost all of community areas are located along the CPRB such as Bangkok, the capital of Thailand. However, the CPRB is a flood-prone area because of its topographical characteristics and the strong influence of seasonal monsoon rainfalls. The CPRB suffered from various flood events but the remarkable flood damages occurred in 1995, 2006 and 2011 that caused huge damages and losses. In 2011, water-gates and levees in the lower CPRB broke due to very high water level of the Chao Phraya River and eventually floodwaters submerged the seven industrial parks and the western part of Bangkok. The total cost of the damage and losses amounted to US$ 46.5 billion that is highest in term of flood damages in Thailand's recent history.

It remarks that the existing flood countermeasures and flood risk management in Thailand are not effective enough to control large magnitude and long duration like 2011 flood. As the important role of runoff station C.2 to monitor flood management actions in CPRB, this study tries to control and keep the flood discharge of 1995, 2006, and 2011 flood events at this station lower than 3,500 m^3/s. After remarkable flood

disaster in 2011, many studies have focused on lower part of CPRB due to high economic activity and single application of flood countermeasures such as dam operations and using paddy fields as flood storage; while study on the integrated flood countermeasures in the upper and middle CPRB is limited. Besides, this study focuses on the upper and middle CPRB to combine and assess all possible flood countermeasures in this basin to overcome severe flooding in 1995, 2006, and 2011. In addition, this study also provides the information of economics analysis through benefit-cost analysis to determine the feasibility of alternative flood countermeasures strategies as decision making tool for flood management.

The risk map can represent in the geographical aspect of flood information and management options which is helpful to make decision on various aspects of integrated management of floods. However, there is no detailed flood risk assessment in the middle CPRB and the results of flood risk assessment in Thailand were rarely shared among citizens. This information upholds the need for CPRB to assess and develop flood risk. In this study, flood risk is fundamentally a combination of flood hazard and social vulnerability. Flood risk maps from this research could provide the data on flood risk reduction after implementing various flood countermeasures in CPRB and also present the high frequency and common flood risk areas to develop measures to lessen the vulnerability of people.

The most used strategy to reduce risk on people is evacuation. The successful evacuation management not only saves lives but also facilitates community to fast and smoothly regain their functionality. The comprehensively planned evacuation and under-equipped evacuation shelters may cause loss of life owing to flooding. Besides, this study develops the three-step approach for the emergency flood evacuation in low-lying areas of the middle CPRB. The first step, flood evacuation zones were classified and the starting time for evacuation was specified by considering flood characteristics of 1995, 2006, and 2011 flood. In the next step, the designed safe areas for flood shelters were determined. In the last step, this study calculates the evacuation travel time which considers a physical status of evacuees (elderly and preschool citizens), safe evacuation condition, the shortest time evacuation, and flood shelter and road capacity.