

Floods and Their Social and Environmental Impacts in the Surrounding Area of the Suvarnabhumi-Second Bangkok International Airport

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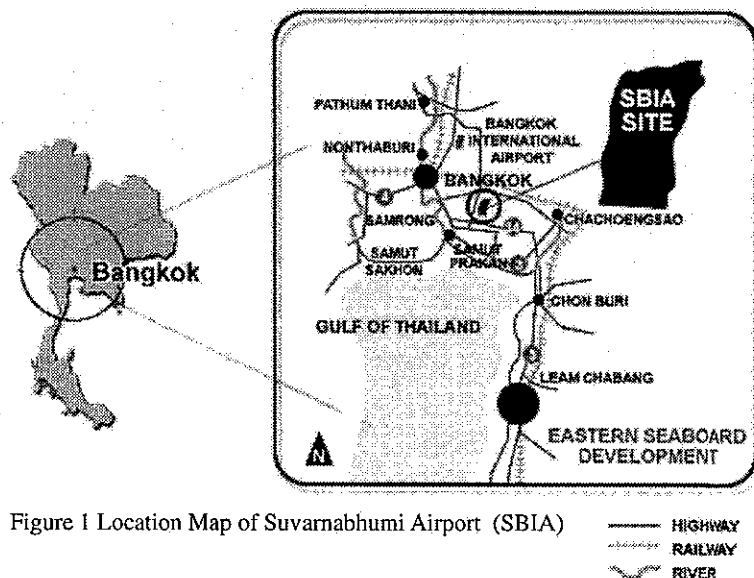
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INTRODUCTION

The construction of the Second Bangkok International Airport or the Suvarna Bhumi International airport (SBIA), which is one of the large scale construction projects has now been completed and inaugurated in September 2006. The existence of the Second Bangkok International Airport will lead to rapid expansion of urban infrastructure and other construction works. Land value will be increased drastically; land use pattern will be changed from agricultural to industrial, business and thence urbanization. Flooding, if occur, will cost more significant losses and inundation over a long period of time if a flood drainage system is not sufficiently provided, especially in the surrounding area of the airport (JICA, 1998). The objective of the study is to find the most suitable flood control and drainage alternative that can drain flood water from the airport and its surrounding area effectively with minimum impact to social and living conditions of the people living in the area.

FLOOD PROBLEMS

Causes of flooding in eastern part of the Lower Chao Phraya River Delta in the vicinity of SBIA are mostly due to heavy local rainfall in the area, storm runoff from surrounding areas and limited flood drainage capacity. The limitation of flood drainage capacity is due to 1) general reduction of canal capacities due to sediment deposition, vegetation and encroachment by human activities; 2) insufficient drainage openings of the east-west highways particularly Bang Na-Trad highway; 3) insufficient drainage canals in north-south direction from Klong Samrong canal to the Gulf of Thailand ; and 4) local land depression due to over abstraction of groundwater which results in bowl-shaped like depression area which occurred in the surrounding areas of the newly constructed SBIA that does not allow



drainage to occur by gravity flow. Runoff from surrounding areas is induced into the depression area causing prolonged flooding and considerable damages. The overall study area covers an area of 624 sq.km in the east of Bangkok. The presence of the airport reduces the flood storage and drainage capacity of the study area hence induces more adverse effect to the flooding situation. Because of the limited drainage capacity into the Gulf of Thailand, during heavy rainfall flood inundation occurs inside the area for a certain period of time.

FLOOD CONTROL METHODS

Previous studies concerning the flood control and drainage in the study area including three alternatives of flood control and drainage system namely, open channel, underground tunnel, and elevated water flume were considered. The drainage channel proposed by Royal Irrigation Department in 1998 was found to face problem in implementation. The land area proposed for construction of flood control and drainage system is now fully occupied by people and communities; industrial factories and public facilities. This totally obstructs the land acquisition and thus the implementation of the previously proposed flood drainage project. Other flood control and drainage alternatives which include an underground tunnel or an elevated water flume are found to have practical limitations due to sedimentation problem or with high operation and maintenance cost. The three alternatives of flood control and drainage system namely, open channel, underground tunnel, and elevated water flume are brought to the attention of the concerned authorities, stakeholders, communities and people concerned. In this study, it is planned that the new flood control and drainage system should be able to drain flood water from the airport and the surrounding area effectively to the sea with minimum impact on social and environment

Following the advice of H.M. King Bhumibol of Thailand, the Thai government assigned the Royal Irrigation Department to take responsibility to protect and mitigate the flooding of the surrounding area of the airport including study, design, construction and operation of flood control and drainage system.

It is desired to have the project decision making involve the government, the people, the community and other stakeholders with public participation. Public hearings were organized to allow these concerned sectors to express their opinion and suggestions on the project in particular to initial socio-environmental impact assessment (Tingsanhchali and Keokhumcheng,2005; Tingsanchali, Khameglud and Prajumwong, 2006). After considerations, it was determined that a canal of capacity of 100 m³/sec with a pumping station is required to cope with the drainage capacity of a flood of 100 years return period. A flood drainage channel of capacity of 100 m³/sec is designed and will be constructed to drain flood from Klong Samrong through this canal to Klong Chaitalae (Royal Irrigation Department, 2003). The channel has a trapezoidal cross-section with a bottom width of 48m, a side slope of 1:3.5, a depth of 3.36m and a bottom slope of 1:25,000. A pumping station of 100 m³/sec is to be installed at the downstream end of the drainage channel to pump flood water from this canal to the sea.

DISCUSSIONS AND CONCLUSIONS

It is found from flood simulation study that dredging the new main canal to drain flood water from the surrounding area of the airport with improvement of existing drainage channels will significantly improve the flood condition and will help to mitigate water pollution and water weeds in that area.

The research project is a governmental project executed by the Royal Irrigation Department of Thailand. The project's study was commissioned to Asian Institute of Technology (AIT), Kasetsart University (KU) and the Thammasat University (TU). Apart from technical investigations, the project study also considers initial assessment of environmental impact and social impact based on the people and community in the project area. The outcome of the study yields the most suitable alternative of the flood control and drainage system for the surrounding area of the Suvarnabhumi airport.

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CURRICULUM VITAE OF PROF. TAWATCHAI TINGSANCHALI

Born on 2 February 1947, Thai national.

Academic Qualifications: Doctoral degree in water resources engineering from Asian Institute of Technology in 1975

Positions:

- 1988-present: Full professor of Water Engineering and Management, School of Engineering and Technology, Asian Institute of Technology, Pathumthani, Thailand, 12120.
- 1983-1984: Received Alexander von Humboldt research fellowship at Univ. of Karlsruhe, Germany.
- 2003-2005: Chairman of Academic Senate AIT,
- 1988-2003: Chair of Forum of School of Civil Engineering,
- 2000-2001: Chairman of Academic and Development and Review Committee,
- 1985-1987: Chairman of Water Resources Division, AIT,
- 1978-present: Principal investigators/Investigators of 33 research projects

Specialization: Flood Control Engineering, Flood Forecasting, Warning and Flood Disaster Management; River Engineering and Sediment Transport and Hydropower and Water Resources System Optimization.

Major Awards:

- 1980 Outstanding Research Award, National Research Council of Thailand ,
- 1983 Alexander von Humboldt Foundation Award, University of Karlsruhe, Germany,
- 2001 Top Honor Award and Honorary Life Fellowship, Indian Assoc. for Hydrologists, Roorkee
- 2001 Outstanding Researcher Award in Engineering and Industry of Thailand.
- 2003 Royal Decoration: Companion (Fourth Class) of the Most Admirable Order of the Direkgunabhorn from H.M. King Bhumibol of Thailand.
- 2004 Distinguished Honorary ASEAN Engineer and Honorary Life Fellowship Award.

Publications: 53 papers in journals, 158 papers in conference proceedings, 4 papers in workshops/seminars, 46 research project reports, 36 invited and keynote lectures, 6 books and monographs, 8 chapters in books and monographs,

Board/Editorial Board Member: 5 international professional organizations

Fellows: ASCE, International Water Resources Association, Engineering Institute of Thailand, Indian Institute of Hydrologists, ASEAN Federation of Engineering Organization (AFEO).