第Ⅱ部門 **CHARACTERISTIC OF SEDIMENT TRANSPORTATION IN TAN CHAU REACH**

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1. INTRODUCTION

The Mekong River is ranked twelfth in length and sixth in mean annual discharge, globally. It drains the area of 795,500km^2 from Himalayas, through Southwestern of China, Laos, Thailand, Cambodia and Vietnam. The Mekong delta which is located in Vietnam plays an important role in society and economic development, supporting 16 million inhabitants and contributing to over 27% of national GDP. Therefore, river change and associated bank erosion cause serious socio-economic problems. According to the results obtained by Southern Institute of Water Resource Research in Vietnam[1], after flood season 2000, there are 15 strong erosions (>10m/year), 29 medium erosions (5-10m/year) and 13 weak erosions (<5m/year) along Mekong River (Tien River) and Bassac River (Hau River) which are presented in **Fig.1**. In order to investigate such problems, field data are described to understand characteristics of sediment phenomena, such as sediment transport mode and channel shifting of Tan Chau reach. These will be a preparation of numerical simulation in next study.

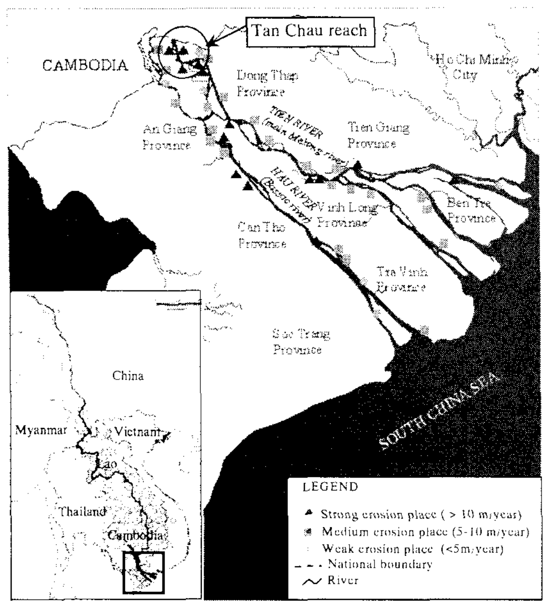

Fig.1 Distribution of erosion places along Mekong River

2. HYDROLOGICAL EFFECT

Hydrological characteristic within Mekong Delta is product of interaction between river discharge, tides, land form and configuration of delta. In recent years, it has become increasingly complex due to the human modification of natural environment such as flood-mitigation works and canal system.

Figure 2 shows seasonal change of water discharge at Neak Luong station in Cambodia, 50 km upstream from the National border. The average peak discharge from 1960 to 1974 is about 28,000m^3/s and average minimum one is 4000m^3/s, respectively. Flood duration is about 7 months in which water level is rising during 3 to 4 months and lowering during 3 months, as shown in **Fig.3**. Under such complex hydrological condition, flow velocity can be kept 2-3m/s in longtime, which is supposed to be larger than critical velocity of bank erosion.

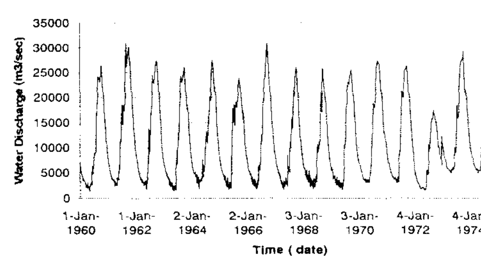

Fig.2 Seasonal water discharge at Neak-Luong

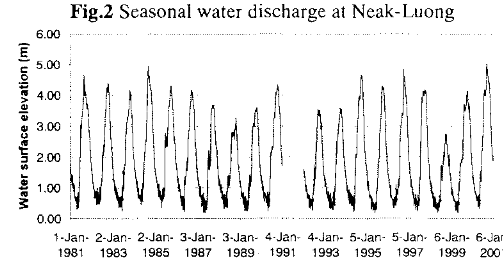

Fig.3 Seasonal water surface elevation at Tan Chau

3. SEDIMENT CHARACTERISTICS

Formation process of Mekong Delta may have been influenced for historically long time by seasonal, daily, tidal changes of hydrological quantities as well as by associated sediment transportation. In view of sediment phenomena, fine sediment transport such as suspended loads and wash loads may have dominated for long. **Figures 4, 5** and **6** show the size distribution curves for material collected at right bank, river bed and suspended load, respectively. The data were sampled in Feb., 2003, and their locations are denoted in **Fig.7**.

As shown in these figures, medium size of bank material is from 0.01mm to 0.08mm and composed of particles ranging from clay to find sand. The medium size of bed material ranges 0.15mm to 0.6mm, and no meaningful quantity of sediment finer than 0.1mm is included. Whereas, almost suspended sediment is finer than 0.1mm. Such difference in sediment size between river banks, bed and suspended loads suggests that when fine sediment, i.e. finer than 0.1mm in diameter, included in side banks is released once into flow, it will be transported far as wash load, as shown in **Fig.6**, and that sediment coarser than 0.1mm deposits onto bed and is transported as bed loads as shown in **Fig5**. This suggestion is supported by curves of size distribution of suspended sediment in flood plain and in the canal which are partly shown in **Fig.6**. However, because of stagnation of water in flood plain and small canal due to vegetations, flood-mitigation..., flow velocity is slower than velocity in the river, and hence triggers deposition of suspended sediment. Only very fine sediment can be transport as wash load into the canal and rice field.

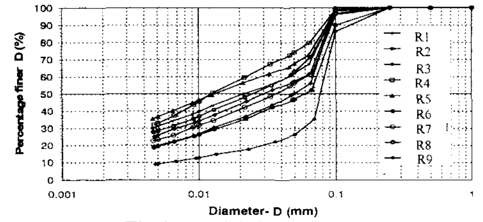

Fig.4 Material size at right bank

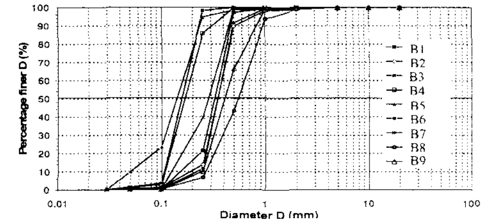

Fig.5 Bed material size

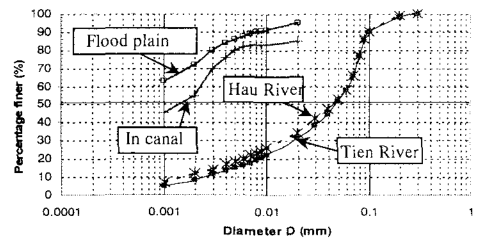

Fig.6 Size distribution of suspended sediment

4. CHANNEL CHANGE AND ASSOCIATED BANK EROSION

In **Fig. 7**, shore lines of study reach are shown including bank lines and islands. The lines denoted by 1970 and 1988 are obtained by map analysis provided by National Institute of Survey in Vietnam. The line of 2003 is determined by authors' direct measurement. According to the results, two representative characteristics can be distinguished for channel shifting as follows. The bank lines in upstream reach where a large island (sand bar) is formed in 2003 have been shifting in accordance with movement of sand bars. In this circumstance, sand bars migrate and merge, resulting in a developed bar.

In comparison to such changes, the curved reach spreading upstream from Tan Chau and Thuong Phuoc shows a dramatic change that is caused possibly by curved flow, sharp meander-bend morphology, the presence like a stationary point, sand dredging operations, artificial bank protection works and several urbanizing performances. In fact, the both of left and right banks shifted over 1km at the upstream reach of Tan Chau between 1970 and 2003, although an area like a stationary point was formed between Tan Chau and Thuong Phuoc. In addition, river bed is expected to be scoured deeply along the right bank in Tan Chau because of curved flow as well as of narrow reach.

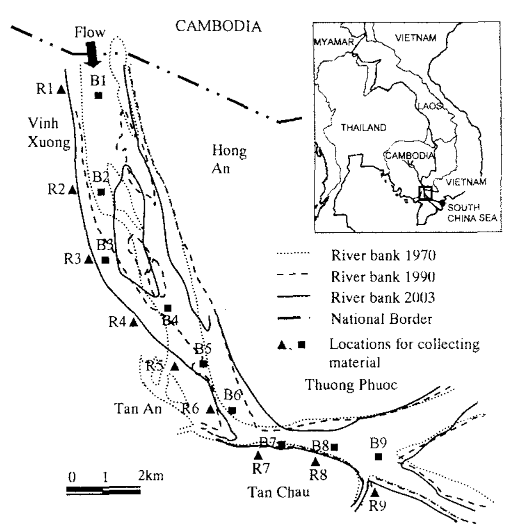

Fig.7 Comparison of shore lines at Tan Chau reach

5. CONCLUSION

Data of bed, bank and suspended material are provided to study the river change which is probably influenced by the co-presence of non- and cohesive sediment. The data analysis suggests that bed and suspended material can be produced due to bank erosions. Channel change and associated bank erosion have been controlled by large bar, channel plane form and several artificial performances in addition to the sediment characteristics and hydrological quantities. These data will be useful for developing a numerical method to predict sediment transportation and associated river change.

REFERENCES

1) Southern Institute of Water Resource Research - River Training Center: Study on predictive shoreline erosion of Mekong River, 2001