SEDIMENT TRANSPORT IN KULIM RIVER, MALAYSIA

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Effect of rapid urbanization has accelerated impact on the catchment hydrology and geomorphology. This development which takes place in river catchment areas will cause dramatic increase in the surface runoff and resulting in higher sediment yield. When this happens, it not only affects river morphology but cause instability in the river channel and serious damage to hydraulic structures along the river by reduces the channel capacity to convey the flood to downstream. Besides, it has also become the main cause for serious flooding in urban areas. Therefore, it is necessary to predict and evaluate the river channel stability due to the existing and future development. This study proceeds at Kulim River in Kedah state, Malaysia, by analyses and evaluation on sediment transport using newly observed data in 2004 attempted to give an overview of the channel changes and sediment transport phenomena which cause problems with river bank and bed stability in Kulim River.

Kulim River catchment is located in the southern part of the state of Kedah in the northwestern corner of Peninsular Malaysia. Kulim River catchment consists of 15 subcatchments, with the total catchment area of 130km^2. Slopes at the central area of the river catchment are steep and the channel elevation drops from 100m down to 18m average mean sea level. Currently, the catchment area is undergoing rapid urban development with oil palm and rubber plantation being replaced by rapid urbanization and this will result in discharge and bed erosion increment or scouring and deposition.

Frequently floods that occur in Kulim River Catchment has caused extensive damage and inconvenience to the community especially floods event in October 2003 which exceeds 100 year ARI. Hence, previous studies for Kulim River (DID 1996, Yahaya 1999, Lee 2001, Ibrahim 2002, Koey 2003) were conducted to determine the river behavior and the effectiveness of the flood mitigation projects due to the rapid urbanization development. However, the data for the study including river survey geometry data, sediment data and hydrology data were limited and up to year 1999.

The result from the present study showed the sediment size and cross section in Kulim River went through significant changes. The channel bed profile has gradually reduced within 13 years period in a 15km study reach. The average mean sediment size (d_{50}) at CH

1000 change from very fine gravel (3.60mm) to fine sand (0.70mm) over 4 years time. Urbanization and the sand mining activities in Kulim River catchment may have affected the river equilibrium and caused variation in sediment distribution along the river. Hence, the results from the present study using newly data up to 2004 which will be calibrated and validated with the present condition may predict river stability for future development.

In general the Kulim River is in equilibrium or slightly degrading, that is, being deepened by erosion. Therefore, it is necessary to predict the river channel stability that will happen due to the existing and future development in Kulim River catchments area. As a result, a design for stable channel for Kulim River based on the long-term simulation by using FLUVIAL-12 and InfoWorks RS model will be developed and tested with field data up to year 2004 to study the changes in channel cross section, increased or decreased sediment carrying capacity, erosion and deposition along the channel, which affect bank stability and even morphology changes. The result of present study using newly data up to 2004 will be calibrated and validated with the present condition and used to predict river stability for future development.

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