

SHORT TERM AND LONG TERM SHORELINE CHANGES  
IN KELANTAN DELTA

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**SHORT TERM AND LONG TERM SHORELINE CHANGES IN  
KELANTAN DELTA**

*This thesis is dedicated to my Family and My Sweetheart "KARTHA"*

**KARTHIGEYAN A/L VEERASAMY**

**Thesis Submitted in Fulfillment of the Requirement for the  
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Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu  
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NAVIDE TERM AND LONG TERM SUCCESSION CHANGES IN A MELAYAN  
PELTA

KARIMGEYAN AL-VETRIZAMY

**This thesis is dedicated to My Family and My Sweetheart "KARNAN"**

Chairperson: Professor Madya Sulung Ibrahim

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Lebuan delta is the one and only coastline that exists with delta area in Malaysia and considered as very dynamic in change for long time of period. This fact creates the need for a better understanding of coastal processes and for regular and detailed scientific studies of coastal behavior, since it may have significant effects on the population, economic activities and resource management. Comparison of the delta area of different delta, as interpreted from aerial photographs, Quick Bird images and topographic map allowed identification of the coastal changes that occurred along the Lebuan Delta and spit over the last 40 years. Long-term coastal analysis using remote sensing data to identify the changes along the coast where the shoreline position has changed. The results of accuracy rates of high-resolution remote sensing data for the shoreline position.

The Landsat Thematic Mapper image software with the image signature was utilized for all aerial photographs to achieve accuracy less than 0.1% results after calibration. Spatial resolution of 30m for Quick Bird images were resampled using interpolation algorithm. The corrected Quick Bird images and corrected Landsat TM images were then compared through a geographic information system (GIS) for delta shoreline data. The results show that the delta area has increased over the last 40 years and the delta area has increased from 1000 ha to 1500 ha.

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**OCTOBER 2007**

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Kelantan delta is the one and only coastline that exists with delta area in Malaysia and considered as very dynamic in changes for long time of period. This fact stresses the need for a better understanding of coastal processes, and for regular and detailed scientific studies of coastal behavior, since it may have significant effects on the population, economic activities and resource management. Comparison of the land area of different dates, as interpreted from aerial photograph, Quick Bird image and Topography map, allowed identification of the coastal changes that occurred along the Kelantan Delta sand spit area over the last 40 years. Long-term coastal analysis uses historical data to identify the sectors along the coast where the shoreline position has changed. The erosion or accretion rates at each location can be used to forecast future shoreline positions.

The Leica Photogrammetry Suite software with the latest algorithm was utilized for all aerial photographs to achieve accuracy less than 0.33 pixels after orthorectification processes. All rectified aerial photos images were vectorized using segmentation processes. The corrected Quickbird image was also vectorized using digitizing method.

Through a geographic information system (GIS), the derived coastline data were integrated with historical and present data to assess continental scale changes and

movement in the Kelantan delta. Beach tool extension was also employed to calculate the sand spit movement in 40 years of interval. Overall the total sand spit area in Kelantan delta measures about 7.1341ha to 7.5319ha except 1978 to 1991 period that reduced to 6.7659 ha from 1966 to 2006 of interval.

Short term changes caused by monsoon on the sea floor changes and sediment movement provided interesting data. The changes that occurred within the Kelantan River and other river mouth were resulted from fluvial/tidal erosion and depositional processes, while changes along beaches fronting the South China Sea were caused by the lateral transport and deposition of beach sediment by wave action.

This study also provides a method to estimates reliable of future gains or losses of sand along the coast will be extremely useful for planning and management decisions, especially those related to infrastructure and environmental impacts, and in the development of coastal models.

Menerusi aplikasi GIS, data tentang keluasan dan pergerakan beting pasir diperolehi walaupun dalam skala yang berbeza. Rangkaian Beach tool daripada Arcview digunakan untuk mengira peralihan kedudukan sempadan pantai dengan beting pasir. Secara keseluruhannya beting pasir di Delta Kelantan berada dalam julat 7.1341 ha hingga 7.5319 ha kecuali jangka masa antara tahun 1978 hingga 1991 di mana keluasan beting pasir berkurangan menjadi 6.7659 ha daripada jangka masa keseluruhan 1966 hingga 2006.

Analisa jangka masa pendek pula memberikan data yang menarik yang disebabkan oleh kehadiran monsoon yang menyebabkan perubahan terhadap dasar persisiran pantai dan perubahan sedimen. Perubahan sedimen sedemikian di antara Sungai Kelantan dan sungai-sungai lain adalah disebabkan perubahan dari segi hakisan dan pemendapan sedimen manakala perubahan disekitar persisiran pantai yang bertentangan dengan Laut China Selatan pula disebabkan oleh arus persisiran pantai.

Kajian ini juga telah menemukan cara yang membolehkan menjangka hakisan dan pemendapan beting pasir untuk jangka masa yang panjang. Analisa ini membantu dalam perancangan pembangunan untuk masa depan dengan mengenali kawasan yang sesuai untuk dibangunkan di sekitar kawasan Delta.