

## **STUDI MORFODINAMIKA DELTA WULAN AKIBAT PROSES ANGKUTAN SEDIMEN DAN HIDRODINAMIK DI DEMAK JAWA TENGAH**

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### **INTISARI**

Delta merupakan wilayah yang dinamis dan produktif. Dinamika yang terjadi di delta disebabkan oleh beberapa faktor, yaitu faktor alami dan faktor yang dipicu oleh kegiatan manusia. Delta Wulan merupakan salah satu delta yang terus mengalami perkembangan di Pulau Jawa. Berdasarkan analisis citra landsat ETM 5 dan ETM 8, pada tahun 1993-1999 Delta Wulan mengalami penambahan luasan hingga 2,5 juta m<sup>2</sup>, artinya terdapat proses sedimentasi intensif. Proses sedimentasi ini kompleks karena melibatkan hidrodinamika di muara sungai. Asupan sedimen dari DAS juga mempengaruhi proses sedimentasi. Penelitian ini bertujuan untuk (1) Mengetahui karakteristik sedimen dan muatan sedimen di DAS Serang., (2) Mengkaji proses hidrodinamik yang terjadi di Muara Sungai dan laut di sekitar Delta Wulan berdasarkan permodelan matematis, dan (3) Mengkaji morfodinamika delta dari segi spasial dan temporal.

Metode yang dilakukan adalah metode eksploratif untuk memperoleh informasi dari kejadian secara sistematis dan deskriptif. Pengumpulan data menggunakan metode kuantitatif. Pendekatan spasial digunakan dalam pengambilan data, yaitu untuk mengetahui pola sebaran sedimen, lokasi pengendapan dan asal sedimen di Delta Wulan. Pendekatan temporal digunakan dalam menentukan waktu sampling dalam pengambilan data hidrologis maupun penentuan waktu pemodelan menggunakan DELFT3D-Flow. Pengumpulan data primer dilakukan selama 2 kali pengukuran pada musim hujan (bulan Januari dan musim kemarau (bulan Juli) masing masing selama 15 hari untuk mewakili satu siklus pasang surut.

Hasil penelitian menunjukkan bahwa karakteristik debit sedimen dan histeresis bergantung pada pola aliran dan kondisi geologinya. Di DAS Serang erosi dominan pada bulan April-Juli. Kondisi hidrodinamika mempengaruhi pola sedimen dan proses pengendapan sedimen tersuspensi dan rumit karena adanya proses flokulasi di muara sungai. Ketebalan sedimen hasil model dan pola sebaran sedimen menunjukkan delta berpotensi berkembang ke arah Barat hingga Utara delta, terdapat wilayah dengan arus tenang pada zona tersebut.

Kata kunci : Delta, DELFT3D, Hidrodinamika, Morfodinamika, Transpor Sedimen

## **MORPHODYNAMICS STUDY OF WULAN DELTA BASED ON SEDIMENT TRANSPORT AND HYDRODYNAMICS IN DEMAK, CENTRAL JAVA**

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### **ABSTRACT**

Delta is a dynamic and productive area. The dynamics that occur in the delta are caused by several factors, namely natural factors and factors that are triggered by human activities. Delta Wulan is one of the deltas that continues to experience massive development in Java. Based on the analysis of Landsat ETM 5 and ETM 8 images, in 1993-1999 Delta Wulan experienced an additional area of up to 2.5 million m<sup>2</sup>, meaning that there was an intensive sedimentation process. This sedimentation process is complex because it involves hydrodynamics at river mouths. Sediment intake from the watershed also affects the sedimentation process. This study aims to (1) Determine the characteristics of sediments and sediment loads in the Serang Watershed, (2) Study the hydrodynamic processes that occur in the estuaries of the River and sea around the Wulan Delta based on mathematical modeling, and (3) Assess delta morphodynamics in spatial terms and temporal.

The method used in this research is an exploratory method to obtain information from several events systematically and descriptively. Data collection using the quantitative method. The spatial approach is used in data collection, which is to determine the pattern of sediment distribution, sedimentation location, and origin of sediments in the Wulan Delta. The temporal approach is used in determining the sampling time in taking hydrological data and determining the modeling time using DELFT3D-Flow. Primary data collection is carried out for 2 measurements in the rainy season (January and the dry season (July) each for 15 days to represent one tidal cycle.

The results showed that the characteristics of sediment discharge and hysteresis depend on flow patterns and geological conditions. In Serang watershed, erosion is dominant in April-July. Hydrodynamic conditions affect the pattern of sedimentation and the process of deposition of suspended and complicated sediments due to the flocculation process at the river mouth. The thickness of the sediment model results and the pattern of sediment distribution indicate that the delta is potentially expanding towards the West to the North part of the delta, moreover those are areas with calm currents.

Keywords : Delta, DELFT3D, Hydrodynamics, Morphodynamics, Sediment Transport