

## INTISARI

Pengalihan aliran lumpur lapindo ke Sungai Porong mengakibatkan daya angkut sungai berkurang. Hasil pengujian kadar lumpur berdasarkan standar ASTM D4643-93, harga kadar air (w) rata-rata sebesar 41,6697%, angka tersebut merupakan perbandingan antara berat air yang dikandung lumpur dengan berat kering lumpur (Pamularno, 2013). Kandungan lumpur yang cukup tinggi dalam air menyebabkan pengendapan material di sekitar muara sungai. Sebaran konsentrasi sedimen tersuspensi di muara Sungai Porong berkisar antara 3,803mg/l–240,448mg/l (Atmodjo, 2011). Akibat pembentukan delta baru dan penyempitan saluran di muara Sungai Porong perlu dilakukan normalisasi fungsi sungai menggunakan teknologi penginderaan jauh berupa citra Landsat 7 ETM+. Penelitian ini bertujuan untuk pemetaan perubahan pola sebaran dugaan *Total Suspended Solid* (TSS) di muara Sungai Porong. Keberadaan peta tematik diharapkan membantu Dinas PU Pengairan setempat sebagai pertimbangan dalam rangka normalisasi fungsi Sungai Porong.

Pemantauan sebaran dugaan *Total Suspended Solid* menggunakan citra Landsat 7 ETM+ tahun 2006 dan tahun 2015 dilakukan di muara Sungai Porong. Pengolahan citra Landsat 7 ETM+ dilakukan dalam dua tahapan besar, yakni pra-pengolahan citra dan pengolahan citra. Pada tahapan pra-pengolahan citra meliputi (1) proses pengisian stripping atau “*gapfilling*”, yakni proses memperbaiki data yang kosong pada citra; (2) pengecekan kesalahan radiometrik; dan (3) koreksi geometrik. Sedangkan tahapan pengolahan citra, meliputi (1) penajaman kenampakan dasar perairan menggunakan Algoritma *Shallow Water Image Mapping* (SWIM) atau *Substrate Algorithm*; (2) *masking* citra; (3) klasifikasi terbimbing dengan algoritma *maximum likelihood* untuk memperoleh informasi sebaran dugaan TSS; dan (4) deteksi perubahan menggunakan metode analisis spasial, untuk mengetahui perubahan pola sebaran dugaan TSS di muara Sungai Porong.

Klasifikasi terbimbing kedua citra menggunakan metode *maximum likelihood* memberikan ketelitian klasifikasi *overall* sebesar 99,6%. Perubahan luasan sebaran sedimen dari tahun 2006 sampai tahun 2015 untuk kelas “dugaan sedimen sangat padat” mengalami penurunan seluas 461,66 ha atau sebesar 1,062% karena pada tahun tersebut (tepatnya tanggal 17 Juli 2006, sesuai tanggal perekaman) volume luapan lumpur Lapindo mencapai 100.000 m<sup>3</sup>/hari sampai 126.000 m<sup>3</sup>/hari (BPLS, 2008). Kelas “dugaan sedimen padat” mengalami peningkatan seluas 1.580,76 ha atau sebesar 4,103%. Kelas “dugaan sedimen sedang” mengalami penurunan luasan sebesar 3.937,86 ha atau sebesar 9,313%. Luas perairan jernih atau kelas “tidak ada sedimen” meningkat seluas 2.324,57 ha atau sebesar 6,302%. Kelas “dugaan sedimen sedang” merupakan objek yang mengalami perubahan paling signifikan selama rentang waktu 9 tahun, yakni sebesar 9,313%. Identifikasi perubahan pola sebaran dugaan *Total Suspended Solid* menggunakan citra Landsat 7 ETM+ *SCL-Off* tahun 2006 sampai tahun 2015 di muara Sungai Porong menunjukkan bahwa orientasi perubahan pola sebaran dominan ke arah tenggara.

**Kata kunci** : Landsat 7 ETM+, *Total Suspended Solid*, Algoritma *Shallow Water Image Mapping* (SWIM), algoritma *maximum likelihood*, deteksi perubahan

## ABSTRACT

Diversion of Lapindo mudflow into the Porong River resulted in reduced river haulage. Result of sludge level test based on the ASTM D4643-93 standard, shows the water content average value in 41.6697 %, the rate is ratios between the weight of water contained in the sludge with a dry weight of sludge (Pamularno, 2013). The sludge content in water which high enough causes sedimentation around of estuary. The concentration distribution of suspended sediment in Porong Estuary show between 3,803 mg/l–240,448 mg/l (Atmodjo, 2011). Due to new delta formation and channel's narrowing, it is necessary normalize the function of Porong Estuary using remote sensing technology Landsat 7 ETM+. This study aims to Mapping of changes in the alleged distribution pattern of *Total Suspended Solid* (TSS) in Porong Estuary using Landsat 7 ETM+ imagery in year 2006 to 2015. Thematic maps are expected to help Departement of Irrigation as consideration in the context of the normalization of the function of the Porong River.

*Total Suspended Solid* alleged distribution monitoring in Porong Estuary in this study, using Landsat 7 ETM+ in years 2006 and 2015. Image processing of Landsat 7 ETM+ is divided into two major stages, the which includes image pre-processing and image processing. At the image pre-processing stages, includes (1) *gapfilling* process, ie processing of fixing the blank data in image, (2) radiometric correction, and (3) geometric correction. While, the image processing stages including (1) Processing of *Shallow Water Image Mapping* (SWIM) Algorithm, (2) image *masking*, (3) digital classification using *maximum likelihood* method, (4) change detection using spatial analysis method, to detect the changes of TSS alleged distribution pattern in Porong Estuary

Supervised classification on both images using *maximum likelihood* method provides *overall* classification accuracy of 99,6%. Changes in the area distribution of sediment from 2006 to 2015 for “the alleged of very solid sediments” decreased area of 461,66 ha, or by 1,062%, because in that year (the exact date is July 17, 2006 , as the date of recording images) Lapindo mudflow volume of 100,000 m<sup>3</sup>/day to 126,000 m<sup>3</sup>/day ( BPLS , 2008). The alleged of solid sediments increased area of 1580,76 ha, or by 4,103%. The alleged of medium sediment decreased area of 3937,86 ha, or by 9,313%. Increased area of the clear waters or class of no sediment of 2324,57 ha, or by 6,302%. Alleged of medium sediment is the most significant class has increased. Identification of changes in the alleged distribution pattern of *Total Suspended Solid* in Porong Estuary using Landsat 7 ETM + *SCL-Off* in year 2006 to 2015 showed that the orientation of the changes in the distribution pattern of southeasterly.

Key word : Landsat 7 ETM+, *Total Suspended Solid*, *Shallow Water Image Mapping* (SWIM) algorithm, *maximum likelihood* algorithm, change detection