

## INTISARI

Eceng gondok adalah tumbuhan invasif berbahaya yang telah mengganggu ekosistem akuatik di DAS Maro, Merauke, Papua. Upaya pengendalian eceng gondok secara hayati sudah dilakukan dengan melepas kumbang penggerek *Neochetina bruchi* dan *N. eichhorniae* oleh WWF pada bulan Agustus 1995. Namun aksesibilitas untuk pemantauan hasil pengendalian relatif sulit dilakukan, sehingga penggunaan pendekatan penginderaan jauh khususnya data satelit Landsat TM dan ETM sangat diperlukan. Tujuan penelitian adalah mempelajari perbedaan respon spektral antara eceng gondok sehat dan sakit, berdasarkan nilai kecerahan (*Brightness Value*) citra Landsat TM dan ETM. Selain itu menentukan luas penutupan populasi eceng gondok yang terbesar diantara ekosistem sungai, rawa dan danau tapal kuda serta mengkaji pola penyebaran populasi eceng gondok dengan menggunakan Landsat TM & ETM.

Fokus area penelitian adalah ekosistem sungai, *oxbow lake* dan rawa di DAS Maro. Bahan penelitian yang digunakan meliputi data digital Landsat TM tanggal 10 November 1990 dan 26 Januari 1998, serta Landsat ETM 25 Oktober 2001. Kajian terhadap bahan penelitian meliputi analisis pola spektral penutupan eceng gondok yang sehat dan sakit. Menentukan luas penutupan populasi eceng gondok dan penentuan zonasi prioritas pemantauan dan pengendalian dengan pendekatan pembobotan. Uji hasil interpretasi di lapangan dan sekaligus pengukuran parameter variabel fisik yaitu salinitas, arus, beda tinggi muka air, pH, suhu dengan cara *stratified proportional random sampling*. Koleksi data lapangan akuatik makropita dominan disetiap lokasi cuplikan.

Hasil penelitian menunjukkan adanya perubahan pantulan nilai spektral eceng gondok pada data citra sebelum tahun 1995 yaitu 120,1 (*oxbow lake*) dan 103,1 (sungai) citra Landsat TM 1990, sedangkan data citra sesudah tahun 1995 di *oxbow lake* dan sungai berturut-turut adalah 77,15 dan 49,47 citra Landsat TM 1998; 100,45 dan 74,12 citra Landsat ETM 2001. Ini berarti kondisi eceng gondok pada tahun 1990 lebih sehat dan menjadi sakit setelah adanya kumbang penggerek, sedangkan luas penutupan populasi eceng gondok sehat pada tahun 1990 di ekosistem *oxbow* dan sungai adalah 0,6795 km<sup>2</sup> dan 1,0580 km<sup>2</sup>. Penutupan eceng gondok sehat, terinfeksi dan sakit setelah tahun 1995 di ekosistem *oxbow* adalah 1.736.550 m<sup>2</sup>, 637.650 m<sup>2</sup>, 100.800 m<sup>2</sup> (1998) dan 7.357,56 m<sup>2</sup>, 474.385,17 m<sup>2</sup>, 946.323,58 m<sup>2</sup> (2001), sedangkan di ekosistem sungai 207.427 m<sup>2</sup>, 416.250 m<sup>2</sup>, 334.800 m<sup>2</sup> (1998) dan 230,52 m<sup>2</sup>, 15.322,06 m<sup>2</sup>, 192.109,04 m<sup>2</sup> (2001). Ini berarti serangan kumbang penggerek lebih efektif seiring dengan pertambahan waktu setelah dilepas tahun 1995. Pada ekosistem rawa tidak ditemui eceng gondok, tetapi terdapat *Hydrilla* sp yang dominan. Faktor salinitas, arus, fluktuasi beda tinggi muka air (faktor pembatas daya dukung "K") memiliki pengaruh yang jelas terhadap perkembangan dan penyebaran populasi eceng. Pola penyebaran eceng gondok di daerah penelitian adalah berkelompok tak beraturan. Berdasarkan hasil skoring ekosistem *oxbow lake* merupakan habitat akuatik utama bagi prioritas pemantauan dan pengendalian hayati eceng gondok.

Kata kunci : *Neochetina*, eceng gondok, nilai kecerahan Landsat, spesies invasive, pengendalian hayati, pemantauan.

### Abstract

Water hyacinth is a dangerous invasive plant disturbing aquatic ecosystem at Maro cathment in Merauke, Papua. The biological control efforts on this plant have been conducted by WWF with released *Neochetina bruchi* and *Neochetina eichhorniae* weevils on August 1995. The water hyacinth monitoring result was insufficient to get information because the limited accessibility, however, was so relatively difficult to perform that remote sensing approach, especially Landsat TM and ETM satellite, was mostly required. The research purpose was to 1) identify different spectral responses between healthy and sick water hyacinths based on brightness values of Landsat TM and ETM images, 2) verified the widest of area that water hyacinth population covered among river, swamp and oxbow lake ecosystem and examined distribution of water hyacinth population using Landsat TM and ETM.

The research area was focused on the river area, swamp and oxbow lake of Maro cathment. The satellite image data that used are Landsat TM on 10 November 1990, 26 January 1998 and Landsat ETM on 25 October 2001. The data examination included analysis on spectral pattern of between healthy and sick water hyacinths. To verify the widest area that water hyacinth population covered and priority zoning was performed with the use of scoring approach. Testing on interpretation of field result and measurement on physical variable parameters, i.e. salinity, surface current, water level fluctuation, pH, temperature were conducted using stratified proportional random sampling method. Macrophyta aquatic field data collected were dominant in individual location sampled.

The results show that water hyacinth spectral value on satellite image data has been changed before and after 1995, i.e. 120.1 (oxbow lake) and of 103.1 (river) from 1990 Landsat TM image, while image data after 1995 for oxbow lake and river were 77.15 and 49.47 from 1998 Landsat TM; 100.45 and 74.12 from 2001 Landsat ETM Image, respectively. It meant that water hyacinth of 1990 was in healthy condition and became sick after the weevils were released. Then, in 1990 healthy water hyacinth population covered the area of oxbow lake and river ecosystem of 0.6795 km<sup>2</sup> and 1.0590 km<sup>2</sup>, respectively. After 1995, healthy, infected, and sick water hyacinth population covered the oxbow lake ecosystem area of 1,736,550 m<sup>2</sup>, 637,650 m<sup>2</sup>, 100,800 m<sup>2</sup> (1998) and 7,357.56 m<sup>2</sup>, 474,385.17 m<sup>2</sup>, 946,323.58 m<sup>2</sup> (2001), respectively. They covered river ecosystem area of 207,427 m<sup>2</sup>, 416,250 m<sup>2</sup>, 334,800 m<sup>2</sup> (1998) and 230,52 m<sup>2</sup>, 15,322.06 m<sup>2</sup>, 192,109.94 m<sup>2</sup> (2001), respectively. It meant that the weevils effectively attacked that water hyacinth population with the longer time after their release in 1995. In swamp ecosystem, no water hyacinth was detected, but *Hydrilla* sp was dominantly found. Salinity, current, water level fluctuation (limiting factor of caring capacity "K") factors provide significant effect on growth and distribution of water hyacinth population. In the research area, the distribution pattern of water hyacinth was irregularly grouped. Based on scoring result, the oxbow ecosystem became main aquatic habitat for priority monitoring and biologically controlling on water hyacinth.

Key words: *Neochetina*, water hyacinth, Landsat brightness value, invasive species, biological control