

PEMETAAN DINAMIKA SIMPANAN KARBON DENGAN PENGINDERAAN JAUH DAN SISTEM INFORMASI GEOGRAFIS DI SUB DAS CIMANUK HULU

Intisari

Alih fungsi dan penggunaan lahan menyebabkan perubahan luas penutupan vegetasi serta simpanan karbon. Dinamika karbon sebagai hilangnya karbon akibat degradasi lahan serta penambahan karbon akibat pertumbuhan dan regenerasi tumbuhan perlu dihitung karena berkaitan dengan perubahan simpanan karbon pada lahan. Tujuan penelitian untuk mengetahui dinamika penutupan lahan dan simpanan karbon di sebagian wilayah Sub DAS Cimanuk Hulu pada rentang waktu tahun 2003 sampai 2014 menggunakan Penginderaan Jauh dan Sistem Informasi Geografis.

Metode penelitian terdiri atas interpretasi Citra Landsat, transformasi indeks vegetasi, serta pengambilan data biomassa dari empat *carbon pools* (pohon, tumbuhan bawah, necromass, dan serasah). Model penduga simpanan karbon disusun sebagai hubungan antara nilai transformasi indeks vegetasi dengan nilai simpanan karbon menggunakan analisis regresi. Plot sampel berukuran 30 meter persegi sesuai ukuran resolusi piksel, menggunakan metode terstratifikasi berdasarkan tipe penutupan lahan dan dipilih secara purposive.

Dinamika penutupan lahan di lokasi penelitian pada rentang waktu tahun 2003 sampai 2014, yaitu hutan lahan kering sekunder bertambah 66,2 ha/tahun, hutan tanaman berkurang 24,4 ha/tahun, lahan terbuka berkurang 7,4 ha/tahun, perkebunan bertambah 131,9 ha/tahun, permukiman bertambah 164,0 ha/tahun, pertanian lahan kering berkurang 156,57 ha/tahun, pertanian lahan kering campur semak berkurang 15,7 ha/tahun, sawah berkurang 23,7 ha/tahun, dan semak belukar berkurang 134,3 ha/tahun. Model penduga simpanan karbon di lokasi penelitian yaitu $\text{LnNilai karbon} = 9,767 + 9,421 \text{ LnNDVI}$, koefisien determinasi 0,7224 dan SE 0,5268. Tanaman rehabilitasi berkontribusi atas naiknya simpanan karbon di lokasi penelitian sebesar 21,19%, dihitung antara tahun 2010 sampai 2014. Simpanan karbon di setiap tipe penutupan lahan yaitu hutan lahan kering sekunder 79,67 ton C/ha, hutan tanaman 76,24 ton C/ha, lahan terbuka 0,12 ton C/ha, perkebunan 126,13 ton C/ha, pertanian lahan kering 64,17 ton C/ha, pertanian lahan kering campur semak 50,52 ton C/ha, sawah 11,43 ton C/ha, dan semak belukar 42,78 ton C/ha. Jumlah total simpanan karbon di lokasi penelitian tahun 2014 sebesar 2.106.215,89 ton.

Kata kunci : Penutupan lahan, Biomassa, Simpanan Karbon, Indeks vegetasi, Penggunaan Lahan

THE MAPPING OF CARBON STOCK DYNAMICS BY USING REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM IN CIMANUK UPSTREAM SUB-WATERSHED

Abstract

Land conversion and land use are the primary cause of the amount of vegetation and carbon stock. The dynamics of carbon stock as the result of the carbon release due to land degradation and the increase amount of carbon stock due to plant growth and regeneration are essential as it is associated to the changes in land carbon stock. The study was aimed to determine the dynamic of land cover and carbon stock in the area of Cimanuk upstream sub-watershed in the period of 2003 to 2014 by using Remote Sensing and Geographic Information System.

The method consisted of interpretation of Landsat satellite imagery, vegetation index transformation, and field measurement of biomass in 4 (four) carbon pools (tree, understorey, necromas, and litter). Modeling of carbon stock estimation was conducted as the relation between vegetation index transformation value and carbon stock value by using the regression analysis. Sample plots were 30 square meters in size in accordance to pixel resolution, stratified method was used based on land cover type and purposively selected.

The dynamic of land cover at the study site in the period of 2003 to 2014: secondary dry forest increased by 66.2 ha/year, plantation decreased by 24.4 ha/year, open field decreased by 7.4 ha/year, tree crop plantation increased by 131.9 ha/year, settlement increased by 164.0 ha/year, dryland agriculture decreased by 156.57 ha/year, mixed dryland agriculture decreased by 15.7 ha/year, paddy field decreased by 23.7 ha/year, and shrub decreased by 134.3 ha/year. The model of carbon stock estimation in the study site was $\text{LnCarbon value} = 9.767 + 9.421 \text{ LnNDVI}$, determination coefficient of 0.6226 and SE of 0.5268. Rehabilitation plant was evidenced to contribute to the augmentation of carbon stock in the study site by 21.19%, measured in the period of 2010 to 2014. Carbon stock in each land cover were: secondary dry forest of 79.67 ton C/ha, plantation of 76.24 ton C/ha, open land of 0.12 tons C/ha, tree crop plantation of 126.13 tons C/ha, dryland agriculture of 64.17 tons C/ha, mixed dryland agriculture of 50.52 ton C/ha, paddy field of 11.43 ton C/ha, and shrub of 42.78 ton C/ha. Total carbon stock in the study site was 2,106,215.89 ton.

Keywords: Land cover, Biomass, Carbon stock, Vegetation index, Land use