

The Threats of Deforestation, Forest Fire and CO2 Emission toward Giam Siak Kecil Bukit Batu Biosphere Reserve in Riau, Indonesia

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Abstract : A biosphere reserve is developed to create harmony amongst economic development, community development, and environmental protection, through partnership between human and nature. Giam Siak Kecil Bukit Batu Biosphere Reserve (GSKBB BR) in Riau Province, Indonesia, is unique in that it has peat soil dominating the area, many springs essential for human livelihood, high biodiversity. Furthermore, it is the only biosphere reserve covering privately managed production forest areas. The annual occurrences of deforestation and forest fire pose a threat toward such unique biosphere reserve. Forest fire produced smokes that along with mass airflow reached neighboring countries, particularly Singapore and Malaysia. In this research, we aimed at analyzing the threat of deforestation and forest fire, and the potential of CO2 emission at GSKBB BR. We used Landsat image, arcView software, and ERDAS IMAGINE 8.5 Software to conduct spatial analysis of land cover and land use changes, calculated CO2 emission based on emission potential from each land cover and land use type, and exercised simple linear regression to demonstrate the relation between CO2 emission potential and deforestation. The result showed that, beside in the buffer zone and transition area, deforestation also occurred in the core area. Spatial analysis of land cover and land use changes from years 2010, 2012, and 2014 revealed that there were changes of land cover and land use from natural forest and industrial plantation forest to other land use types, such as garden, mixed garden, settlement, paddy fields, burnt areas, and dry agricultural land. Deforestation in core area, particularly at the Giam Siak Kecil Wildlife Reserve and Bukit Batu Wildlife Reserve, occurred in the form of changes from natural forest in to garden, mixed garden, shrubs, swamp shrubs, dry agricultural land, open area, and burnt area. In the buffer zone and transition area, changes also happened, what once swamp forest changed into garden, mixed garden, open area, shrubs, swamp shrubs, and dry agricultural land. Spatial analysis on land cover and land use changes indicated that deforestation rate in the biosphere reserve from 2010 to 2014 had reached 16 119 ha/year. Beside deforestation, threat toward the biosphere reserve area also came from forest fire. The occurrence of forest fire in 2014 had burned 101 723 ha of the area, in which 9 355 ha of core area, and 92 368 ha of buffer zone and transition area. Deforestation and forest fire had increased CO2 emission as much as 24 903 855 ton/year.

Keywords : biosphere reserve, CO2 emission, deforestation, forest fire

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