

Wannaporn Pannual 2015: Above-ground Carbon Stock and Carbon Loss Assessment of Trees in Khuan Khaeng Swamp Forest after severe Burning in 2012 using Satellite Imagery. Master of Science (Forest Resource Management), Major Field: Forest Resource Management, Department of Forest Management. Thesis Advisor: Assistant Professor Kankhajane Chuchip, Dr.rer.nat. 107 pages.

This study aimed to assess the above-ground carbon stock and carbon loss of trees in Khuan Khaeng swamp forest after severe burning in 2012. Firstly, the swamp area was classified into different land use and land cover types affected by forest fire using the supervised classification of Thaichote image. Then, ground truth and accuracy assessment have been done. Consequently, the classified image was improved quality through the post-classification technique. The classified image data was then transformed into GIS layers. A number of 30x30 meter sample plots was randomly established in each forest class. The total height and DBH of trees in the plots were measured as variables for calculating the above-ground biomass based on appropriate allometric equations. Some dead trees found in the study area were also sampled to measure dry weight in order to perform specific allometric equations, and to find the percentage of carbon concentration. The linear relationship between the data of carbon stock per unit area derived from allometric calculation and Landsat 8 (OLI) image data were analyzed to find a best fit regression model. Finally, the amount of above-ground carbon stock and carbon loss for the whole area of Khuan Khaeng swamp forest were spatially estimated using the derived regression modal.

The results showed that the overall accuracy of satellite image classification was 73.02% (Kappa coefficient = 0.64). The best-suited allometric equation for estimating the above-ground biomass of the dead swamp tea-tree (*Melaleuca cajuputi*), dominant species in this area, was $W = 0.0381(D^2H)^{0.8952}$ ($R^2 = 0.93$) ($W = \text{Biomass}$). The concentration of carbon by dry weight was about 48.21%. The total above-ground biomass of the Khuan Khaeng swamp forest was 37.92 ton per hectare and 17.83 ton-carbon per hectare, averagely. Based on the conventional method that relied on field data measurement and allometric analysis, the total amount of above-ground carbon stock of the whole study area was 161,488.27 tons. The average above-ground carbon loss of the swamp forest was 19.14 ton-carbon per hectare and 2.92 ton-carbon per hectare for degraded forest. The average above-ground carbon loss was about 11.03 ton-carbon per hectare. The total loss of above-ground carbon of the whole study area was 13,180.19 tons. The best regression equation for estimating the spatial above-ground carbon stock per unit area from Landsat 8 (OLI) image data for this site was $CS = 0.0323 (G-R) - 6.5495$ ($R^2 = 0.2126$) ($CS = \text{Above-ground carbon stock}$). Using this model, the total above-ground carbon stock for the study area was 158,137.14 tons. The average above-ground carbon loss of the swamp forest was 5.85 ton-carbon per hectare and 1.34 ton-carbon per hectare for degraded forest. The average above-ground carbon loss was 3.60 ton-carbon per hectare. The total above-ground carbon loss for the study area was 4,295.81 tons.

Student's signature

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