

ESTIMATION OF FOREST CARBON STOCK USING REMOTE SENSING TECHNIQUE

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ABSTRACT

Forest carbon stock plays an important role because it yields the greatest potential for reducing greenhouse gas emissions. This study focuses on applying remote sensing to estimate carbon stock of Nanzhuang national forest in Taiwan based on SPOT vegetation indices. The research processes include the calculation of vegetation indices (i.e., Normalized Difference Vegetation Index and Simple Ratio Vegetation Index) from SPOT image, the establishment of regression model based on vegetation indices and forest stocks of field permanent plots, and finally the estimation of forest carbon stock according to the forest stock calculated by the established regression model. Meanwhile, the effect of image shadow and seasonal image (dry and wet seasons) on the estimation of forest carbon stock is also investigated when applying SPOT vegetation indices. The result is as follows. Under three shadow processes (i.e., no shadow process, shadow removal, and shadow linear-correction) on dry-season image, carbon stock per hectare is 124.05 ton, 129.34 ton, and 127.05 ton, respectively. As for wet-season image, carbon stock per hectare is 128.80 ton, 125.89 ton, and 128.98 ton. When compared with forest carbon stock of field permanent plots (i.e., 129.20 tons per hectare), the result obtained from SPOT vegetation indices seems acceptable although slight difference exist. But it varies with shadow process and seasonal image. From the result, it can be concluded that remote sensing technique is a timely, effective, feasible, and large scale approach to estimate forest carbon stock. However, the effect of image shadow and seasonal image should be taken into consideration when applying SPOT vegetation indices to estimate forest carbon stock.

Keywords: forest stock, forest carbon stock, remote sensing, vegetation indices