Spatial Modelling and Scenario Analysis to Monitor Aboveground Forest Biomass in Cambodia Using High Resolution SAR Data

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Abstract

Forest cover change is an important factor in global environmental change because of rapid deforestation in tropical areas. Deforestation activities are driven by both anthropogenic activities and natural phenomena that adversely impacts biodiversity and ecosystem services. In 2008, United Nations Reducing Emissions from Deforestation and forest Degradation (REDD+) programme were launched to curb deforestation and forest degradation in tropical countries. Recent COP-21 Paris agreement highlighted "encouragement for Parties to implement existing frameworks for REDD+ mechanism". For effective implementation of REDD+ mechanism, a robust cost effective Measurement, Reporting and Verification (MRV) system should be developed. Geospatial data has been a key for the implementation of REDD+ MRV system. Launch of L-band Synthetic Aperture Radar (SAR) sensor by Japan Aerospace Exploration Agency (JAXA) has opened a wide opportunities in forestry sector to accurately monitor various biophysical parameters of tropical forest such as forest cover, deforestation, forest biomass etc. without limitations of clouds. This study is focused on monitoring of forest cover and forest biomass in Cambodia from 2007 – 2015 using PALSAR (Phased Array L-band Synthetic Aperture Radar) data. Furthermore, spatial modeling techniques have been used to visualize and quantify the future variation in forest cover and forest biomass. Future trends of biomass and forest cover depends on past processes of deforestation and represents a consolidation of relationships between time, space, and various driving factors. Logically developed spatial model has been used to extrapolate the likelihoods of various forest spatial patterns into the future scenario. These models are useful to offer a means to examine future change in the forest scenarios with the implementation of various policies and can be used to predict the usefulness of various policies at national to regional level. Moreover, this will allow appropriate measures to control deforestation at different time scale. Monitoring and future projection of variation in forest cover and biomass in Cambodia has been done while considering different forest policy frameworks. Spatial modeling tools have been used to model present scenario and future scenario considering Business as Usual (BAU), changes in concession land, community forestry and protected areas. Based on the BAU scenario, the current aboveground biomass could decrease significantly. Other scenarios such as concession land, community forestry and conservation suggest less risk of decrease in forest biomass.

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