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SDEWES2013.0848 A Spatially Explicit Assessment of Forest Biomass Availability at Regional Level with Practices Management

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Abstract

The use of renewable energies is able to replace fossil fuels and reduce greenhouse gas emissions and limit climate change. Forest biomass is considered as one of the main renewable energy resources of the future due to its large potential, economic viability, and social and environmental benefits. The availability of forest biomass resources depends on biophysical characteristics of forest stand level and the human decision making and management practices. The increasing demand for this kind of resource challenges the biomass supply and management. In particular reliable methods to evaluate its availability are needed to improve the durability of forest harvesting at regional level.

This study aims at developing a generic method for a spatially explicit assessment of forest biomass availability at regional level, by mapping harvestable forest biomass.

The field data employed in this study were collected during forest management planning and harvesting by the staff of the Office National des Forêts. In particular, we have focused the analysis on data about wood production and forest regeneration practices. Data concerned 60 public forests located North-East France (Ardennes) collected from 2007 to 2011. Further data were retrieved to complete the geographical characterization of these forests: trees species, structure and surface of individual forest stand, accessibility, slope, inclusion in protected area, etc.

The study was organized in two steps. Firstly, forested areas and biomass availability were characterized using geographical information data. Secondly, classification and regression trees (CART) data-mining models were used to understand constraints and levers for the harvesting of forest biomass at the forest stand level. Using CART model we compared observed wood production with simulated total harvested stand.

The results shown that accessibility, road density and slopes are the environmental characteristics that determine the most biomass availability. In addition, the results of CART analysis provided a list of explanatory factors for the assessment of forest biomass production intensity.

In conclusion, the method we developed provides a decision support system for forest biomass exploitation for energy production purposes on an efficient and sustainable management of the forests.

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