ACCESSING BIOENERGY POTENTIAL USING GIS-BASED METHODOLOGY
CASE STUDY: LOBLOLLY PINE (Pinus Taeda) BIOMASS IN VIRGINIA
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Rationale

Developing and implementing renewable energy sources has been mandated by the US government (2002 & 2008 Farm Bill, 2005 Energy Policy Act, and 2007 Energy Independence Security Act). The US has set a renewable fuel standard (RFS) of 36 billion gallons by 2022, of which 21 billion gallons must be cellulosic biofuels (RFS, 2018). Cellulosic biofuins are expected to play a dominant role in bioenergy market development in the country (Gelfand et al. 2013). The pulp and paper industry in North America has significantly declined over the past decade (Hetemäki et al., 2013). Paper companies are reducing capacity (closing mills and paper machines) and looking for alternative markets such as forest-based biofuins (FBB) for fuels, electricity, power, and chemicals along with paper, pulp and paperboard (Hetemäki et al., 2013).

Methods and Materials

Growth/Yield Model

GYST/FASTLOB is a growth and yield model for thinned and fertilized loblolly pine plantations (Virmian Tech, 2019). It requires data on:
- Tree age
- Site index (or dominant height) in Virginia
- Stand basal area and/or trees per acre
- Thinning and fertilization information

Suitable site selection

The network analysis is built on Dijkstra’s algorithm to find the single-source, shortest-path connecting a source and a destination in a weighted graph (Cormen et al., 2009).

Project framework

Potential biomass on pine residues

Analysis-Hierarchy Process (AHP) survey

Conducting a survey at Virginia Forestry Summit to define:
- Pair comparison factors
- Actual loblolly pine site locations in Virginia
- Management practices relating to thinning and fertilization
- The portion of loblolly pine in the wood supply at existing mills
- Willingness to travel for collecting woody residues

From Seedling to Stump

2019 Virginia Forestry Summit
April 30 - May 3
Sheraton Norfolk Waterside Hotel

References


Ongoing work

- Identifying criteria thresholds for fuzzy logic analysis including distances to points of interest, residue volume, and furthest distances that collectors are willing to travel for feedstock.
- Conducting AHP survey at Virginia Forestry Summit in early May.
- Incorporate socioeconomic factors such as transportation costs, feedstock prices, and forest landowner’s willingness to supply biomass for energy production.