Determinants of Michigan's Nonindustrial Private Forest Landowners' Willingness to Supply Biomass for Bioenergy

Background

Woody biomass has recently gained significant attention as a source of renewable energy in Michigan. This is driven by concerns over energy security, economic growth, and environmental health. Supportive government policies have further emphasized the importance of using wood as a source of energy. Michigan is rich in forest resources that have the potential to be used for energy production. Each year Michigan's forests accumulate approximately 385 million cubic feet of growth in excess of removals. This shows large surplus inventory. However, not all wood grown is available for conversion to energy. The availability of wood is governed by multiple factors including forestland ownership.

Nonindustrial private forest (NIPF) owners form a major forest ownership group in the state. They own approximately 49% of the state's timberlands. Hence their decisions are critical for determining wood availability for the forest products industry, including bioenergy facilities. To understand NIPF owners' opinions about wood based bioenergy and to identify the factors determining their willingness/unwillingness to supply biomass, a mail survey of landowners was conducted in November, 2010. A brief overview of the findings obtained from this study is presented in this factsheet.

Study Area

The study area included 29 counties located in the Northeastern region of Michigan (figure 1). These counties lie within 150 miles radius of a proposed cellulosic ethanol facility in Kinross, Michigan.

Survey Methods

A mail survey of 1,600 randomly selected landowners owning at least 20 acres of forest area was conducted using the Tailored Design Method. The overall response rate after taking into account the undeliverable addresses was 39%.

Analysis

Descriptive and inferential statistics was conducted to understand landowners' perception

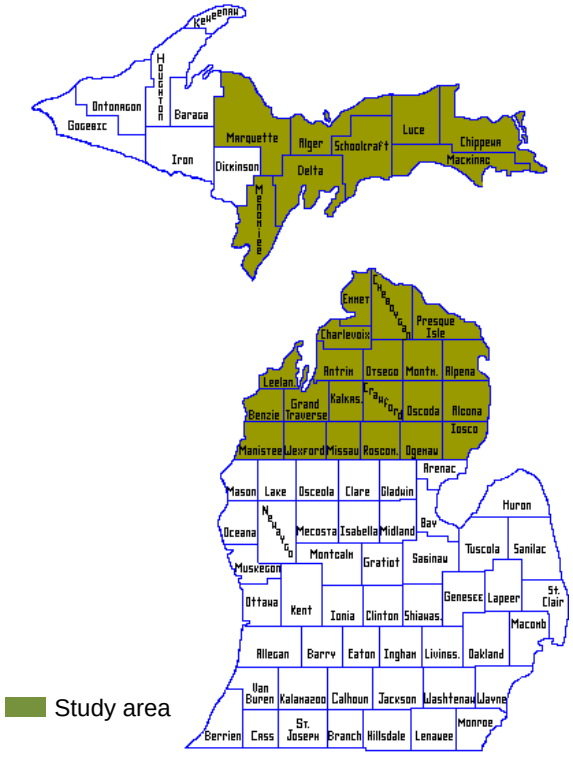

Fig1. Map of the study area

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towards bioenergy, their willingness to participate in bioenergy markets in the future, expectations from the market, and factors contributing to their reluctance for supplying biomass from their forests.

Binary logistic regression with landowners' willingness/unwillingness to supply biomass as the dependent variable and their demographic characteristics, forest management objectives, forest characteristics, forest management activity, and opinion towards wood-based bioenergy as independent variables was applied to identify the factors influencing their biomass harvesting decisions. The suite of independent variables was selected based upon the review of past literature exploring NIPF owners' harvesting behavior. Landowners' age, education, and income represented their demographic characteristics in the model. Likewise, total forest acreage, distance of landowners' residence from their forests, and duration of forest ownership represented forest characteristics. Landowners' intention to manage the forest for non-consumptive amenity benefits, financial returns in the form of wood products, recreational benefits, and legacy of passing forest land on to the next generation represented their motivations for owning the forestland, and their past harvesting experience represented forest management activity.

Results

Descriptive statistics

The majority of respondents (85%) were male with an average age of 61 years. Most of the landowners (83%) had purchased their forest property and had a median annual family income of $60,000 to $75,000. Approximately, 76% of them had at least some college education and 40% had full time jobs. Out of the total respondents 49% indicated that they were retired.

Forty-six percent of the landowners had conducted a timber harvest on their property within the past 10 years. When asked if they were aware of bioenergy production from woody biomass, 77% indicated that they knew about it and 60% thought that alternative energy production from woody biomass could create economic opportunities for them in the future. On average, 42% of the landowners were willing to produce and sell timber from their forests for bioenergy purposes if markets existed for it. Likewise, 33% were willing to establish energy plantations on their land and 8% were willing to lease their property for the same. The price of timber and low investment costs were identified by a large number of landowners who were willing to supply biomass from their forests (66% and 50% respectively) as the most important factors contributing to their willingness. Lack of interest in harvesting, the perception that income might not be worth the effort, and concern about the ecological impact of harvesting timber for energy were the major reasons expressed by landowners (34%, 30% and 29%

respectively) for their reluctance to supply biomass from their forests. When asked to indicate the price they deemed appropriate for harvesting biomass from their forests, 32% of the respondents indicated that they were unsure about it, 26% thought that it should be the same as that for sawtimber and 24% indicated that it should be the same as that for pulpwood. Twenty percent of the respondents chose to express their own price with the mean price being $42/cord. Only 18% of the landowners were willing to supply biomass from their forests at the current market price of pulpwood, which is estimated to be $24/cord. This number increased to 52% when the price was doubled. Approximately 15% of the respondents said that they would not harvest biomass from their forests irrespective of the price offered.

Findings of the logistic regression model

The overall model was significant at 1% alpha level and it correctly predicted 88.6% of the observations. The model revealed that active forest managers who have conducted timber harvest in the past, those that have large forest acreage, and manage their forests with commercial motivation are the ones that are more likely to harvest biomass from their forests. Similarly, landowners having a positive attitude towards ethanol production from woody biomass are more willing to harvest biomass for bioenergy purposes. The landowners who resided closer to their forests (within 50 miles of their forested parcel), had relatively low family income (less than $40,000/year), those that gave high priority to amenity benefits associated with their forests, and those that intended to pass forestland to their successors as a legacy were less likely to harvest biomass from their forests. A landowner's age and education had no significant impact on their biomass harvesting decisions.

Discussion and conclusion

The results obtained from this study indicate awareness of and positive attitudes among a majority of Michigan NIPF owners towards wood-based bioenergy. While this is encouraging for the future of bioenergy sector within the state, many landowners seem to have unrealistic expectations about bioenergy markets. It is, therefore, essential to inform landowners about the types and quality of wood that can be used for bioenergy generation as well as the probable market values that these materials are likely to fetch. The landowners in general were more likely to accept high price levels for supplying biomass from their forests representing their profit maximizing nature. The price of timber and low investment costs were reported as the most important factors contributing to landowner's willingness to produce and harvest biomass. Attractive biomass markets along with financial incentive programs

targeted at NIPF owners could, therefore, help increase their participation in bioenergy generation in the future.

Based upon the results obtained from logistic regression model, landowners having large forest acreage, those managing their forests with commercial motivations, and those who have conducted timber harvest in the past are more willing to supply biomass from their forests. Hence, these landowners could become the preferable choice of bioenergy industries and logging contractors for obtaining wood in the future. Similarly, those with a positive attitude towards ethanol production from woody biomass were more willing to harvest biomass from their forests. Given this information, outreach efforts aimed at enhancing landowners' awareness regarding beneficial economic and ecological impacts of using woody biomass for energy could help promote their participation in bioenergy markets in the future.

The results revealed negative association between landowner's willingness to harvest biomass and their motivation for bequeathing forestland on to their heirs. A similar association was observed between a landowner's willingness to harvest biomass and their resident status as well as motivation for managing the forests for amenity purposes. Given this information, educational programs designed specifically to inform landowners how they can meet their forest management goals and improve the aesthetic value of their forest while carrying out management activities could be a beneficial approach for promoting their involvement in bioenergy production in the future. Low family income was found to have a negative association with landowners' willingness to harvest biomass. Since low income can limit landowners from practicing active forest management on their property, financial aid in the form of cost share or tax incentive programs could promote their involvement in forest management in the future. Also landowners concern about the ecological impact of harvesting biomass was found to hinder their willingness to supply biomass. Given this skepticism, landowners need to be made aware about the biomass harvesting guidelines and beneficial impacts of sustainable biomass harvesting on the health of their forests and the biodiversity as a whole. They should, however, also be informed about the negative consequences of unsustainable biomass harvesting such as loss of biodiversity, nutrient leaching, soil erosion etc. Third party forest certification and the use of certified raw materials by bioenergy industries could help address this concern to a large extent.

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