Participatory approach used to develop a sustainability assessment tool for wood-based bioenergy industry in upper Michigan, USA

Ashma Vaidya (1) and Audrey Mayer (1,2)

(1) Department of Social Sciences, Michigan Technological University, Houghton MI, USA (avaidya@mtu.edu), (2) School of Forest Resources and Environmental Science, Michigan Technological University, Houghton MI, USA (almayer@mtu.edu)

Biofuel production has grown significantly in the past few decades as a result of global concern over energy security, climate change implications and unsustainable attributes of fossil fuels. Currently, biofuels produced from food crops (such as corn, sugarcane, soy, etc.) constitute the bulk of global biofuel production. However, purported adverse impacts of direct and indirect land-use changes (such as increased food prices, competition for agricultural land and water, and carbon emissions from land-use change) resulting from large-scale expansion of the crop-based biofuel industry have motivated many nations to further shift their attention to second-generation (non crop-based) biofuel production. Current R&D on second-generation biofuel production is largely focused on exploring prospects of using abandoned/fallow land for growing feedstock (such as Jatropha, short rotation woody coppice, Willow/Poplar species, Micanthus etc.), and on producing fuel that is cost-effective and compatible with existing infrastructures. The bulk of existing research on second-generation biofuel production concentrates on enhancing its technical feasibility and compatibility with existing infrastructure; very few have attempted to qualitatively determine and understand stakeholders' concerns and perception regarding this emergent industry. Stakeholders' decisions regarding land and resource use will play a crucial role in ensuring the social sustainability of any industry.

Our research is focused on understanding stakeholders' concerns and perceptions regarding biofuel production in the upper Michigan region, where wood-based bioenergy development is being planned and researched by businesses, government agencies, and the local university. Over a century ago, the region's economy was dependent upon mining and clear-cut logging industries, which left the area once the resources were depleted. Since that time, the region has lost significant population due to the lack of economic opportunities, but the forests have recovered to volumes prior to the logging boom. Interest in a wood-based bioenergy production industry is growing, yet whether this industry can be developed sustainably is a concern.

The main goal of our research is to incorporate stakeholders' concerns and knowledge into an expert-assisted sustainability assessment tool for a regional wood-based biofuel industry. Key stakeholders involved in the research include landowners, farmers, land management companies, bioenergy users, venture capitalists, interest groups, government organizations and NGOs. We used interviews, focus group meetings and a workshop to collect information from these stakeholders, which were then translated into social sustainability criteria. Multiple criteria analysis methods, Bayesian Belief Network and information collected from other studies were used to develop a final set of sustainability criteria and indicators. Our results provide a platform for experts and stakeholders to understand the local context relevant to sustainability, the state of the science, and will bridge the gap between scientific and non-scientific knowledge in the region. This sustainability assessment tool is intended to facilitate inclusive and sustainability-oriented decision-making for a wood-based bioenergy industry.