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Participatory modeling as a tool for community development planning: tourism in the Northern Forest

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Tourism development planning is challenging for rural communities transitioning from dependence on resource extraction to a diversified economy including tourism. This research examines how participatory modeling can help communities improve their understanding of diverse perspectives and identify intrinsically linked components of tourism. Using a participatory process in six communities in the Northern Forest region of the northeastern United States, a dynamic computer model was developed illustrating complex relationships associated with recreation and tourism development. A user-friendly interface and step-by-step manual were distributed to facilitate application of the model by community planners. Evaluation of the model indicated that barriers limited widespread adoption of the model as a decision-making aid for planners. However, evaluation of the modeling process revealed positive impacts on community capacity including fostering dialogue, increasing understanding of different perspectives, and helping to build consensus.

Keywords: citizen participation; rural community development; tourism/recreation

Introduction

The rural economic landscape is changing throughout the United States as the loss of many manufacturing plants and the growth of industrial agriculture have severely limited small communities' options for economic development. Tourism has become an alternative source of growth and its related entrepreneurship opportunities are being recognized (Sinclair, 1998; Webster & Chappelle, 2001; Wilson, Fesenmaier, Fesenmaier & van Es, 2001). In the Northern Forest, a 26 million acre bioregion extending across northern New York and New England, efforts to promote recreation and tourism have received renewed attention in recent years. The inclusion of tourism and recreation in the economic mix is not new in the region; efforts to promote tourism date back well over 100 years. During that time period, tourism has been viewed as a mixed blessing and recreation and tourism development have led to mixed results (Albers, 2000). This remains the case today in the Northern Forest.

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Many communities have come to rely on tourism as a way to diversify incomes in resource-dependent economies, yet tourism has a reputation for being unable to support living-wage jobs, providing only minimum wages in the service sector with few opportunities for advancement. Recreation and tourism are sometimes credited with promoting environmental conservation, and often accused of contributing to environmental degradation. Tourism creates concentrated stress on natural and man-made systems that were not designed to manage large numbers of people and heavy use (e.g., water systems, roads, garbage disposal). Many cultural attractions are supported by tourism and even created for tourists, yet tourism can diminish the small-town charm and sense of place appealing to residents and tourists alike (Krannich & Petrzela, 2003).

Understanding the broad range of benefits and challenges—economic, social, and ecological—is essential for communities involved in recreation and tourism planning. Yet the amount of information and conflicting perspectives can be overwhelming. Identifying the intrinsically linked components of tourism is a first step in describing its potential as a development tool. Planning processes are needed that identify both the positive and negative aspects of tourism development and provide research-based tools for decision makers with regard to the type, size, scope, and potential of the development. The challenge is to bring communities together to create a shared vision that encompasses, but is not limited to, individual perspectives.

Participatory computer modeling is a methodology that involves a community in the process of collectively building a model about a particular situation that affects their lives. One of the most important aspects of modeling as a consensus building tool is the process of its development, setting a stage for stakeholders to work together, share world views and hopefully come to a common understanding of their shared systems. Computer modeling may be a powerful tool to reconcile contrasting points of view, increase shared understanding, and resolve conflicts (van den Belt, 2004).

This research examines how participatory computer modeling can contribute to tourism and recreation planning in rural communities. The paper begins with discussions of tourism development planning and participatory modeling. Next research methods are presented including the development of models and an evaluation of participatory modeling workshops. Findings related to both the modeling process and outcomes are presented. The paper concludes with implications for community development planning in the Northern Forest and beyond.

Tourism development planning and participatory modeling

Different views exist as to the best way to facilitate recreation and tourism development. Free-market economics, where individuals develop businesses and let them compete, has been critiqued as narrow in scope and often inappropriate for developing sustainable tourism opportunities that enhance the vitality of rural communities (Wilson et al., 2001). Multidisciplinary, integrated approaches to recreation and tourism planning may include elements of free-market economics but are often supplemented with community planning to promote collaborative destination development and marketing (Ashley & Roe, 1998; Jamal, Borges, & Figueiredo, 2004; Jamieson, 2001). These multidimensional strategies attempt to recognize the needs of sustainable tourism by integrating related fields including ecosystem ecology, ecological economics, and global change science (Farrell &

Twining-Ward, 2004). Collaborative approaches explicitly identify trade-offs between economic growth and costs to the environment and culture (Jamal & Getz, 1995; Keogh, 1990; Murphy, 1985; Sautter & Leisen, 1999).

Participation in planning and policy

Smith, Nell and Prystupta (1997, p. 143) define public participation as “any action taken by an interested public (individual or group) to influence a decision, plan or policy beyond that of voting in an election.” In their evaluation of public participation methods, Rowe and Frewer (2000) distinguish varying levels of public involvement. Low levels of participation are typically utilized in more knowledge-based decisions and high levels of participation are more appropriate in value-based decisions (Chase, Schusler, & Decker, 2000). Evaluating the effectiveness of different participatory methods is difficult, although tools exist to help planners and managers determine appropriate participatory methods for varying contexts (Chase, Decker, & Lauber 2004; Fiorino, 1990).

While evaluating different participatory methods may be difficult and ambiguous, some argue that the need for public participation in planning and policy is clear. In discussing technical policy issues, Laird (1993, p. 341) states, “The social and economic importance of these issues create a normative requirement that they be subject to democratic scrutiny.” Keogh (1990) emphasizes the importance of participation in tourism planning and decision-making, explaining that the public often perceives the negative impacts of tourism development as being greater than the positive economic gains, potentially resulting in negative feelings of the residents towards tourists and tourism. The outcomes of these studies often call for community-oriented or participatory approaches to tourism planning to provide adequate information to everyone involved.

Participatory computer modeling

Computers have long contributed to problem solving by providing decision-making support in complex systems. Dynamic model programming software allows for the quantification of components so that alternative scenarios can be simulated (Costanza & Ruth, 1998). For example, the complex system of relationships associated with tourism in a particular community can be mapped out and quantified. Then variables can be changed to examine the effects. Simulations can be created that estimate how an increase in the number of tourists will impact different businesses, traffic patterns, land prices and other variables that can be incorporated into the model as a community sees fit.

Participatory computer modeling is a “process for involving stakeholders in the conceptualization, specification, and synthesis of their knowledge and information into dynamic computer-based simulation models” (van den Belt, 2004, p. 17). Models are developed to represent a particular situation in the participants’ lives, thus providing a stage for community members to come together, discuss the issue at hand, and hopefully come to a joint, deeper understanding. In this fashion, participatory modeling has been shown to serve as both a consensus-building tool and an aid in the understanding of complex systems (van den Belt, 2004).

Participatory modeling has been utilized for public involvement in a variety of natural resource and environmental management issues, but it has been applied to

recreation and tourism planning only in a couple of cases. The Tourism Futures Simulator, a model developed through a joint project with Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the tourism industry in Douglas Shire in North Queensland and the Cairns section of the Great Barrier Reef may be the first published example of participatory modeling of the tourism industry (Walker, Greiner, McDonald, & Lyne, 1999). Steps taken to develop this model were understanding stakeholder views, developing the concept, developing a simulation model, integrating data, building a user interface, establishing causal tracing, and developing a learning environment (Walker et al., 1999). In another case, students acted as participants and utilized participatory modeling software to develop a model representing the tourism industry in their college town. This research concluded that the participatory modeling approach may be particularly helpful in collaborative planning, destination tourism management, and as a tourism teaching tool (Jamal et al., 2004).

The fact that participatory modeling has not been used often in tourism development may be due to the complexity of the industry, but this complexity is also the reason why it may be beneficial. Farrell and Twining-Ward (2004) contend that the study of tourism is greatly lacking in its narrow, linear approach, and that capitalizing on the progresses made in multiple disciplines, such as ecosystem ecology and ecological economics, is necessary. Interactional approaches to development explicitly focus on the importance of linkages that can contribute to well-being and are often neglected in rural communities (Bridger & Alter, 2008).

However, individuals cannot be expected to take into account all of the variables associated with recreation and tourism development and come to an adequate understanding for decision-making. Costanza and Ruth (1998) explain:

In building mental models, humans typically simplify systems in particular ways. We base most of our mental modeling on qualitative rather than quantitative relationships, we linearize the relationships among system components, disregard temporal and spatial lags, treat systems as isolated from their surroundings or limit our investigations to the system's equilibrium domain. When problems become more complex, and when quantitative relationships, nonlinearities, and time and space lags are important, we encounter limits to our ability to properly anticipate system change. In such cases our mental models need to be supplemented (p. 183).

Methods for supplementing mental models include systems thinking and systems modeling. Systems thinking involves breaking down behavior into its most basic elements or building blocks. Participatory modeling facilitates a group process of shared systems thinking within a community, allowing for the application of an interactional approach to community planning in rural areas.

This research assesses the value of participatory computer modeling for tourism and recreation planning in rural communities in the Northern Forest. The original objectives of the research were to work with six communities to develop models, compare the models in the different communities, develop a general model if sufficient commonalities existed, and create a user-friendly interface so that communities could utilize the model for decision-making. Evaluations conducted periodically assessed the value of the model to communities as well as the value of the modeling process.

Research methods

To assess the usefulness of participatory modeling for tourism development planning in rural communities, six study sites in the Northern Forest were selected using a snowball sampling method. Key representatives involved in tourism and recreation were contacted in each of the four Northern Forest states (Maine, New Hampshire, Vermont, and New York) and asked to suggest communities that would be interested in such a study and to aid researchers in making contacts. For the purposes of this research, a community was defined as any area in which local decision makers were interested in working together, regardless of scale (e.g., town, county, region, etc.) The six communities were selected based on the following criteria: population, status of tourism infrastructure, percentage of tourism revenues compared with other industries, and a community's level of interest in participating in the project. The final criterion was heavily weighted, as it was essential for voluntary participation by community members. Selected communities included: the Village of Saranac Lake, New York; the Town of Wilmington, New York; the three-county region of the Northeast Kingdom, Vermont; Franklin and Grand Isle Counties, Vermont; the Town of Colebrook, New Hampshire; and the town of Carroll, New Hampshire (Figure 1). The rural communities in the Northern Forest region represent a range among the criteria, with the exception of the required high level of interest in participating.

Key contacts were established in each community, and the researchers worked with them to identify between 10 and 20 community representatives to take part in the participatory modeling workshops. Participants included hotel and motel owners, restaurant owners, shop owners, town employees including representatives

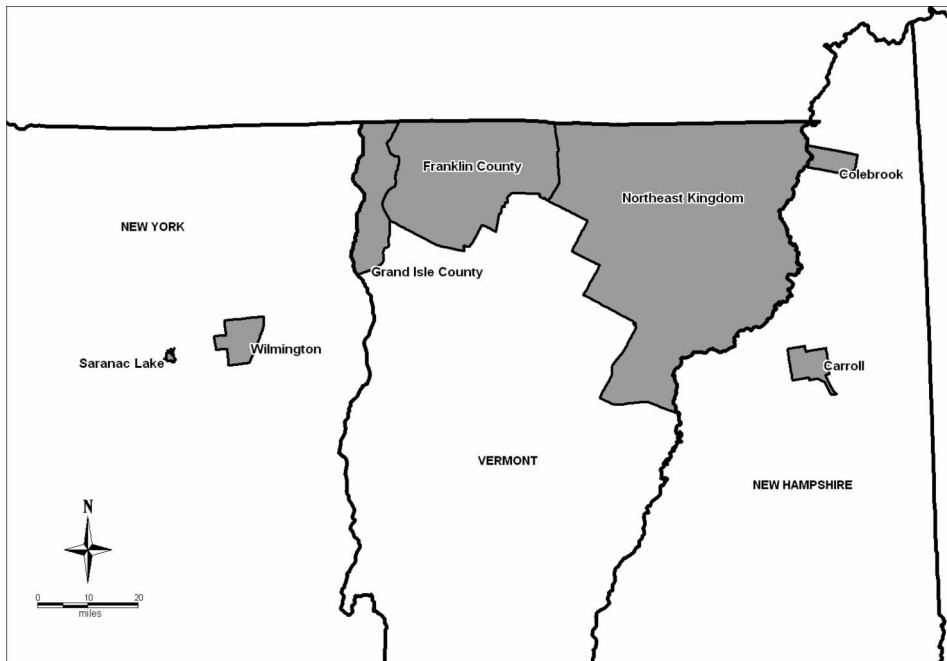


Figure 1. Study site locations.

from law enforcement and waste management, town trustees, local planning board representatives, outdoor recreation guides, members of environmental organizations, historical society members, farmers and other large landowners, as well as representatives from the Chambers of Commerce. An effort was made to include a diverse set of stakeholders at each workshop, including elected officials, business owners, and those that represented both advocates and opponents of recreation and tourism development.

After the communities and participants were selected, a one-day workshop was held in each community between October 2004 and October 2005 (Table 1). The goal of the workshop was to develop a scoping model, or visual diagram, representing the tourism and recreation industries unique to each community. The agenda for each workshop was the same. Community members were first asked to brainstorm about any and all aspects of tourism and recreation in their community. After generating lists of components and factors in the morning, ranging from septic systems and roads to concepts such as community trust, the afternoon became focused on building a model. The modeler, using STELLA software projected on a large screen for all participants to see, worked with community participants to lay out the structure of the model by taking the components identified earlier and using the conversations to create links and ties between the variables. Participants collaboratively defined relationships and connections.

After the first round of workshops was completed, a second workshop was held in the community that expressed the most interest in continuing with the participatory modeling process: Franklin and Grand Isle Counties, Vermont in December 2005. The facilitator and modeler returned to the community with revised, more developed models. Participants discussed the changes, whether or not they felt the model reflected their community, and which components that they felt were still missing from the model. The models were then revised further and a general model was developed, which was shared with Franklin and Grand Isle Counties in Vermont at a third workshop in May 2007.

As part of the model revision process, a thorough comparison of the models was conducted to assess the levels of similarity and dissimilarity between the six site-specific iterations. This led to the construction of a general model which combined the similarities while reconciling the differences of the six models. Each site-specific model had some components that were better developed and some areas that were

Table 1. Participatory modeling workshop locations and dates.

<u>First Workshops:</u>	
Northeast Kingdom, VT	14 October 2004
Saranac Lake, NY	21 October 2004
Colebrook, NH	19 January 2005
Carroll, NH	17 May 2005
Wilmington, NY	7 June 2005
Franklin County, VT	25 October 2005
<u>Second Workshops:</u>	
Wilmington, NY	13 October 2005
Franklin County, VT	6 December 2005
<u>Third Workshop:</u>	
Franklin County, VT	15 May 2007

lacking. The general model essentially pulled together the best thought out pieces of each site-specific model, and then worked to fill in the gaps. The general model was developed to define relationships, leaving blank values for variables. For example, a relationship could be defined for the amount of a structure that could be built with a given investment, but the value of the investment was left undefined. This allowed for the model to be tailored to any community by inputting the appropriate data.

Because many variables needed to be defined relative to a community, and thus by community participants, a user-friendly interface was developed to aid in this step of the process. Accompanying the interface, participants were provided with a manual to walk them through each step of the process. The manual described how to navigate the model, how to input values, how to change values, how to run the model, and how to interpret the outcome charts. The manual was designed to enable the use of the model without facilitation.

At the end of each workshop, participants were asked to fill out a written evaluation regarding their reactions to the modeling process and to the model itself, assessing the usefulness of each. The evaluations for the first two workshops were similar. Participants were asked open-ended questions about the most and least valuable aspects of the workshop and the best ways to follow-up after the workshops. Participants were also asked to rate their knowledge prior to attending the workshop and once the workshop was over using a scale of 1 to 5, where 1 = no knowledge and 5 = extremely knowledgeable. Topics included systems modeling, the big picture of tourism and recreation in their community, practical ideas for improving tourism and recreation, and perspectives of other participants. Participants also were asked how likely they were to use the model on their own or with others in the future on a scale of 1 to 5, where 1 = no chance and 5 = highly probable. The evaluation form for the third workshop included similar questions to the previous evaluation forms but also additional questions about their likelihood of utilizing the model as a decision making tool and utilizing information obtained in the participatory modeling *process* to inform community decision-making. Participants also were asked whether they felt the participatory modeling *process* had been a useful method for fostering dialogue between participants, gaining new perspectives, and contributing to consensus-building. In these questions about building community capital, participants were instructed to circle the most appropriate number from 1 to 5, where 1 = strongly disagree and 5 = strongly agree. These evaluations, completed anonymously, were analyzed to assess the potential of the model and the modeling process to aid in informing decision-making processes (see Appendix for evaluation forms for the three workshops in Franklin and Grand Isle Counties, Vermont).

Results

The general model was developed with three main components contributing services to the local economy (Figure 2). These sections were identified as Cultural Outlooks, Cultural Resources, and Natural Resources, which together produce services identified by the participants including Social gatherings, Public services, Natural amenities, Summer recreation, Winter recreation, Spring recreation, Fall recreation, Housing, and Dining and lodging. The Quality of Life estimate is based on the level at which these services are available and in demand. For example, investment in Cultural Resources can increase the contribution of Homes, Rentals, Churches,

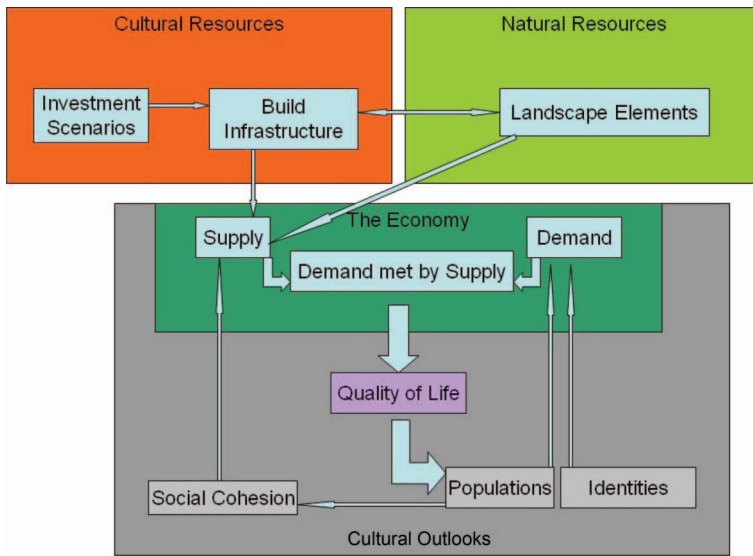


Figure 2. General model developed with three main components contributing services to the local economy.

Public info centers, Public education facilities, Public infrastructure, and Private sector businesses to the available services, while decreasing the contributions available from Natural Resources (e.g., Water, Wetlands, Grasslands, Forests, Croplands, and Mountains) (Morse, 2007).

The post-workshop evaluations asked questions about the usefulness of the participatory modeling process as well as the model itself. Three groupings of responses were considered. The first group of responses was the full set of 70 participant evaluations collected after the first round of workshops in all six communities. The second group of responses was the five evaluations collected after the second round workshop held in Franklin and Grand Isle Counties, Vermont. The last group of responses considered was the five evaluations collected after the third workshop in Franklin and Grand Isle Counties. These five participants were all present at the first workshop in Franklin and Grand Isle Counties, and three were present at the second workshop, although there is no way to isolate their particular responses. While the sample size is small and cannot be used for inferential statistics, it can be useful to assess the experience of the participants in this example.

Most valuable aspects

In the evaluation following the first round of workshops, participants were asked to comment on what they found most valuable about the workshop. Sorting of general comment types revealed eight different categories into which the open-ended comments were grouped. These categories, in order of comment frequency, are: (1) discussion and exchange of new ideas; (2) learning about STELLA and the potential for modeling; (3) discussion specific to tourism; (4) cooperation and interaction; (5) networking and meeting new people; (6) better understanding of community and its issues; (7) new information; and (8) outside input from the university (Figure 3).

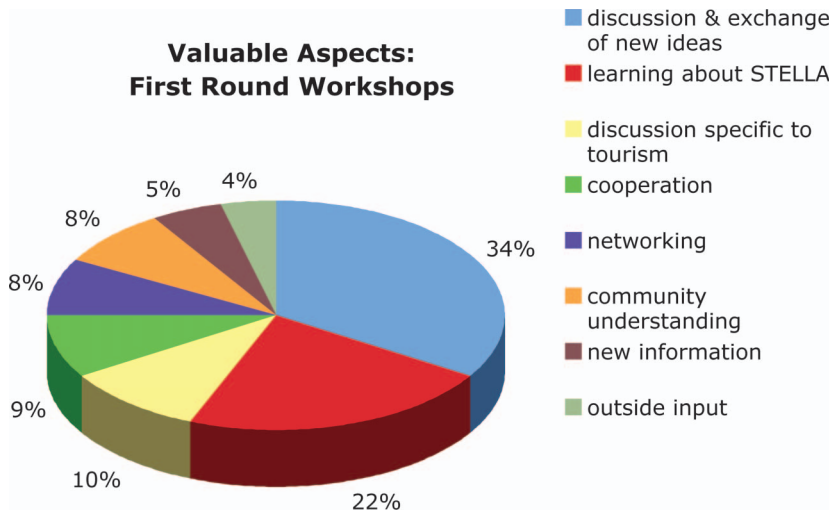


Figure 3. Valuable aspects specified in evaluation of first round of workshops.

Discussion and exchange of new ideas was the most frequently provided comment type, making up 34% of all comments to this question. Second most frequent with 22% was the category of comments pertaining to learning about STELLA and modeling.

Participants were asked this same question regarding the most valuable aspects of the workshop after the second workshop for Franklin and Grand Isle Counties. The respondents' comments were: (1) networking and reconnecting with UVM representatives and community members; (2) further development of understanding the capabilities of a model; (3) coming to an understanding of how STELLA really applies; (4) the discussion about what went into the model and how it might be used; and (5) to see how the information we gave at the last meeting impacted the model. Categorizing revealed that 4 of the 5 comments (80%) pertained to learning about the STELLA model and the potential for modeling. The last comment valued networking and reconnecting with community members.

Similar to the question asked in the evaluations after the first and second round of workshops, in the evaluation following the third workshop in Franklin and Grand Isle Counties, participants were asked, "What did you find most valuable about the workshop today? If you participated in previous workshops, does this differ from what you found most valuable about the overall participatory modeling process? Please comment." The six comments received (one respondent provided two comments) regarding what the participants found most valuable about the third workshop were: 1) another step closer to understanding; 2) a step in the right direction; 3) group discussions about the participatory modeling process itself; 4) understanding of where other community members are coming from; 5) a vision of how the model could work; and 6) the model demonstration and how it helped to understand the complexity of the process. Categorizing revealed the most frequent comment type to be gaining a better understanding of the community and the complexity of issues with 50% of the comments falling into this group. Next was learning about the STELLA model and the potential for modeling with two of the

six comments. The last comment valued the discussion of the overall modeling process.

A comparison of these responses provided after each workshop illustrate how participants' perceptions of the workshops changed over time. Participants started out by valuing coming together, meeting each other, and discussing their community. As the process progressed, the focus seemed to shift more on the model and its potential. By the end of the third workshop, participants seemed less focused on the model itself, and more interested in the overall knowledge gained through the process.

Likelihood of using the model in the future

In the evaluations given after each workshop, participants were asked: "How likely are you to use the STELLA model (on your own or with others) in the future? Circle the most appropriate number from 1 to 5, where 1 = no chance and 5 = highly probable." In the first round of workshop evaluations, the mode response was 3 (Figure 4). The average, however, was slightly higher at 3.19, perhaps indicating a slightly more positive response. One interesting note regarding the responses obtained to this question is that 10 out of 70 participants indicated a "highly probable" likelihood of using the STELLA model in the future, while only two participants indicated a "no chance" likelihood of using the model.

To develop a better basis for comparison between the first, second and third workshops, it was useful to isolate the 12 participants from the first round of workshops that were specifically in the Franklin and Grand Isle Counties workshop (Figure 5). Considering these participants, the mode response to the question regarding using the STELLA model in the future was 3. The average in this case though, was a bit higher at 3.75. In this group's responses no participants indicated a value less than 3 and 25% responded with a "highly probable" likelihood of using the STELLA model in the future. After the second workshop, the mode response was 4 and the mean was 4.2. Again, no respondent indicated a value less than 3, and

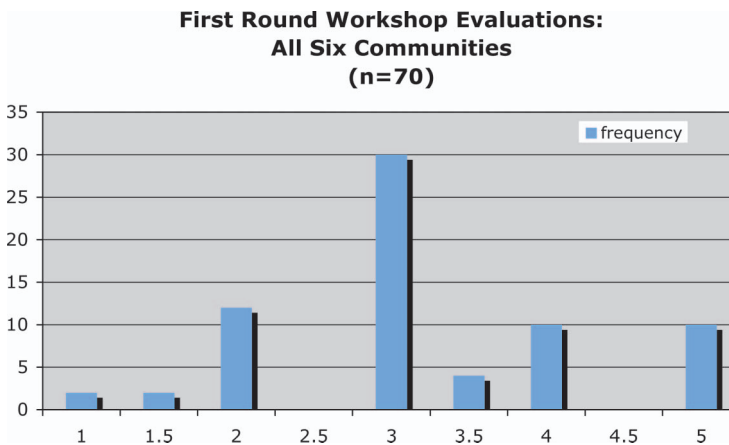


Figure 4. Likelihood of using STELLA model in the future specified in the first round of workshops.

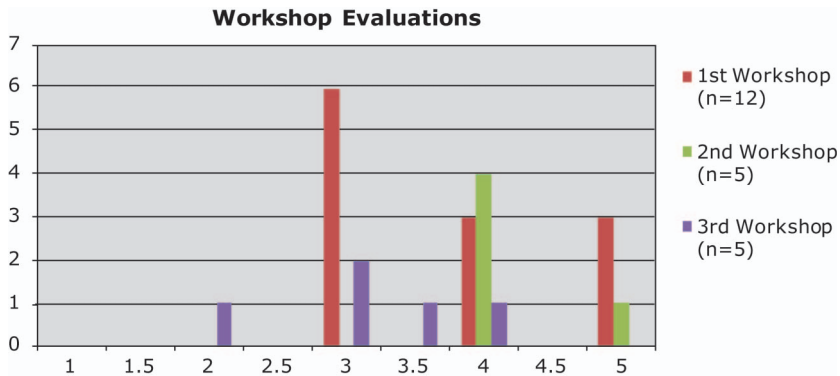


Figure 5. Likelihood of using STELLA model in the future for first, second, and third workshops in Franklin and Grand Isle Counties, Vermont.

after this workshop, one respondent indicated a “highly probable” likelihood of using the STELLA model in the future.

After the third workshop in Franklin and Grand Isle County, this same question was evaluated again to analyze a potential change in participants’ perceived likelihood of using the STELLA model. The mode response dropped back down to a value of 3 and the average dropped to 3.1. This time, one participant indicated a value less than 3 regarding the likelihood of using the model in the future. Another interesting observation of these results is that not one participant responded with a value of 5. These results are potentially indicative of the difficulty encountered when attempting to utilize the model. This was the first time participants were actually asked to run the model themselves. Perhaps initial optimism regarding the model was slightly diminished due to the difficulty encountered. Where the model started out as the primary focus, this faded as participants delved deeper into discussions. The model seemed to shift from being the main goal to being seen as facilitating the goal of developing a better understanding of the issues discussed.

Overall process

In the evaluation given after the third workshop in Franklin and Grand Isle Counties, participants were also asked a series of questions considering the participatory modeling *process* as a whole. Regarding fostering dialogue between participants, the mean value reported was 4.4, with three respondents indicating a value of 4, and two respondents answering 5. A mean value of 4 was obtained regarding gaining new perspectives, with three participants choosing a value of 4, one participant indicating a value of 3 and one a value of 5. Pertaining to consensus-building, a mean value of 3.8 was obtained from four respondents indicating a value of 4 and one indicating a value of 3. Participants were also asked, “How likely are you to utilize information obtained in the participatory modeling *process* to inform community decision-making? Circle the most appropriate number from 1 to 5, where 1 = no chance and 5 = highly probable.” For this question, a mean value of 3.5 was obtained with responses varying from 2 to 4.5. Of all of the responses to all four questions (20 responses in total) pertaining to the value or usefulness of the participatory modeling *process*, only one response fell below a value of 3, and only three values of 3 were

reported. The mode response of 4 here indicates that participants' impressions of the participatory modeling *process* were generally positive and that they see this as a useful method for fostering dialogue, gaining new perspectives, and consensus-building.

Conclusions

Participants' evaluation responses indicated a generally positive response regarding intentions to use the STELLA model in the future, however observations from the third workshop revealed barriers to application. In the third workshop in Franklin and Grand Isle Counties, participants attempted to utilize the model without the help of a facilitator to assess its usefulness as a tool in and of itself. Participants had difficulty understanding the variables and determining how to assign values for them, and they frequently asked questions of the facilitator and modeler. Participants realized that confidence in the output obtained from the STELLA model was greatly dependent on the level of confidence in the values they were inputting, which was oftentimes very low. While participants may want to utilize the STELLA model as a decision making tool, this would require more work on the model in terms of data collection and calibration, as well as more assistance in facilitating the use of it. This is not an unrealistic goal, and with continued community interest and further research and modeling time, the STELLA model holds potential as a decision making tool. However the time investment and lack of data inputs are barriers that need to be addressed.

The participatory modeling process, however, seems to have had more immediate positive results. The form of the model suggests that participants developed a deeper understanding of the linkages of recreation and tourism with rural community development. What started out as a brainstorming activity to generate all aspects and components of recreation and tourism became a discussion of quality of life in all six workshops. During the discussions, participants had difficulty isolating recreation and tourism components; these issues pervaded all aspects of their lives. This idea was reflected in the shape of the model, which became centered around quality of life, with the economy and tourism and recreation industries being one part of a much bigger picture. Enabling community members to come to this realization jointly illustrated the power of a participatory process as a method for understanding the interactional effects of recreation and tourism.

Not only did the participants develop a deeper understanding of the impacts of recreation and tourism development, but the environment in which they did this seemed to enhance community vitality. As recognized by respondents in the evaluations, participants saw the process as a useful method for fostering dialogue, gaining new perspectives, and building consensus. These findings in Franklin and Grand Isle Counties, Vermont are likely relevant elsewhere in the Northern Forest and may extend to other rural communities throughout the US.

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