

Learning to See a Brighter Future for Morgan County, TN

Jonah Fogel

Department of Forestry, Wildlife, and Fisheries, University of Tennessee

274 Ellington Plant Science Building, Knoxville, TN, 37996

phone: 865-974-6758 or 865-558-8055/ fax: 865-974-4714

jfogel@utk.edu

Abstract

There is a critical need to develop land planning processes that can build the capacities of local communities to address stewardship and sustainability at both the individual and collective/landscape scales. Social learning has been advocated as a process by which to build the capacity of local communities to address these issues. This paper outlines a social learning process currently being conducted to collectively develop a common mental model (or schema) of local landscape change among private forest landowners of Morgan County, Tennessee. By seeking a shared schema of landscape change landowners will elucidate and engage hidden assumptions that guide their land use decisions. This learning process is expected to increase community capacity by giving landowners a common understanding from which to make and/or support more sustainable land use decisions. The effectiveness of the social learning process is evaluated using individual cognitive mapping in a pre/post test quasi-experimental research design.

Keywords

social learning; Group Model Building; cognitive mapping; sustainable landscape change; community capacity; problem structuring

Introduction

Morgan County Tennessee is located in the Cumberland Mountains of middle Tennessee. It is an area rich in natural resources however it has long been economically depressed due to inequities in resource extraction markets. The county is heavily forested and its natural beauty and unique culture is prized by its residents. The beauty and biological integrity of the area are now facing new threats from urbanization. Residents have identified a number of hopes and fears for the county but little is understood about how economic, social, and ecological problems relate to one another. Generally, it can be said that newer residents (associated with urbanization) and long tenure residents do not share the same perspectives on the effects of landscape change. This project seeks to help the diversity of residents of Morgan County clarify how their economic and social situations are related to one another and to changes occurring across the landscape.

Group Model Building, a 'soft' systems modeling method, is used to frame the social learning process. 'Soft' system modeling methods are used to structure problems in the field of operations research (OR). 'Soft' methods are used to make sense of "complex systems of changing problems that interact with each other" (Ackoff 1979). This definition sees 'hard' systems modeling (concerned with problem solving in known contexts) as a special case of 'soft' systems modeling.

Group Model Building is being used to improve sustainable land use decision making (Purnomo et al. 2004, Mendoza and Prabhu 2003, den Exter and Specht 2003, Stave 2003). However, little empirical research has been done to bear out the hypothesis that system modeling methods do, in fact, create a shared schema among project participants (Vennix 1996 p. 185, Doyle 1997). This research addresses that deficiency.

Rationale

To make decisions that lead to a sustainable future decision makers need to learn to make wise decisions in the face of incredible uncertainty and inevitable conflict (due to competing values). Stakeholders can address these issues by engaging in a process of dialogue and social learning that can improve innovation, decision-making, and arrive at actions that work in concert towards sustainability (Gunderson 1995).

This project utilizes Group Model Building which is based on the Systems Dynamics methodology. Group Model Building (GMB) was developed to “enhance team learning, foster consensus, and to create commitment with the resulting decision” (Vennix 1996 p.3). This methodology was chosen because of its methodological emphasis on composing descriptive models of complex (‘messy’) problems where stakeholders hold differing opinions on a problem (or even if there is one), focusing largely on problem structuring and on creating consensus (Vennix 1999).

GMB interventions have been used to discover beneficial changes in organizational environments, explore policy impacts, and for assessing the fit of the method to a specific problem (Rouwette, Vennix and Mullekom 2002). GMB has been used to increase public participation in water planning and decision making (den Exter and Specht 2003). And most relevant to this project GMB has been used in collaborative planning of forest resources (Purnomo et al 2004). Therefore GMB was judged to closely match the dual purposes of this research; to foster a dialogue and a shared mental model among stakeholders.

Methods

Participants

Twelve (12) landowners will be selected for the study via a convenience sampling procedure. Established contacts in the study area will be contacted and solicited for participation. Individuals will also be asked to provide two additional names that may be interested in participating.

Individuals who agree to participate will be fit into one of four sub-groups until all slots are filled. The sub-groups are defined by two indicators parcel size and ownership tenure (Figure 2).

		Treatment Group			
		Land Tenure (Years)			
Parcel Size (Acres)	<u>Sub-Group #1</u>		<u>Sub-Group #2</u>		
	≤ 50 acres		> 50 acres		
	≤ 15 years		≤ 15 years		
		<u>Sub-Group #3</u>		<u>Sub-Group #4</u>	
≤ 50 acres		> 50 acres			
> 15 years		> 15 years			

Figure 2- Treatment Group Sampling Design

These two indicators are expected to capture a diversity of perspectives about landscape change. Landowners who have owned large parcels for long periods are expected to be qualitatively different from newer landowners with small parcels. Or, likewise, owners with small parcels and long tenure are expected to have different perspectives than recent purchasers of large parcels.

Sub-groups consist of three individuals per each sub-group. This is to minimize any idiosyncratic aspects of any individual's beliefs, values, opinions, and knowledge, offering a clearer depiction of each landowner sub-group perspective of landscape change while maximizing perspective diversity.

Participants will own forestland in the county. Where forestland is defined as three or more acres and having at least one acre with continuous tree cover. This definition is meant to exclude those people for whom decision making at a relatively large spatial scale is likely not to be an issue.

Procedures

This project is composed of a series of three workshops; an organizational meeting, a Group Model Building intervention, and finally a planning meeting (Figure 1). In addition to these workshops participants will complete pre-test and post-test cognitive mapping exercises; designed to measure the changes in individual's schema (understanding of landscape change dynamics) due to the Group Model Building intervention (Figure 1).

Cognitive Maps (or models) are made up of text statements that represent concepts a decision maker uses to describe how they perceive change occurs in a given situation. The text statements, known as constructs or nodes, are linked together to form chains of action-oriented argumentation (i.e. beliefs that form a basis for intervening in the world, explanations of why assertions hold true, expectations as a result of the assertion) (Eden and Ackerman 2004). Cognitive maps hold the reasoning schemas (mental model) used during decision making and are therefore capable of testing the

research hypothesis; Group Model Building increases similarity among participant's landscape change schema.

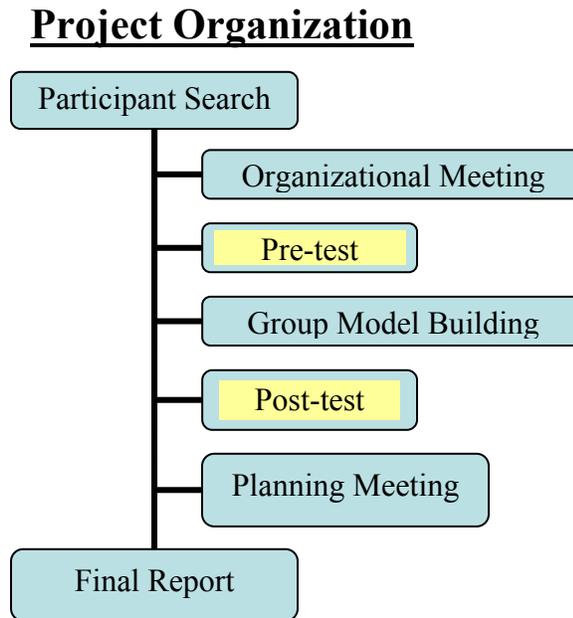


FIGURE 1- Project Organization

Organizational Meeting

The purpose of this meeting is to open the dialogue process and solicit constructs for the pre-test cognitive mapping activity. The organizational meeting is composed of a series of tasks, including: a formal welcome and introduction to the project, outlining expectations for participant behavior and interaction, an ice breaking activity (e.g. ‘Hopes and Fears’ about the project), brainstorming session (using a nominal group technique) to elicit ‘factors that are influencing changes to the landscape in Morgan County’, and a review of the day’s activities. By the end of the organizational workshop participants should grasp the diversity of perspectives about how and why the landscape is changing.

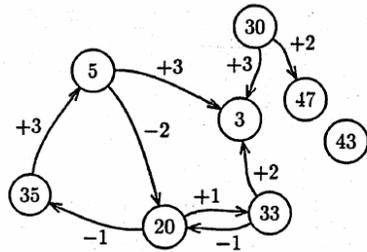
Pre-test

This project uses a pre-/post-test quasi-experimental design. Data will be collected about landowner's landscape change schema using cognitive mapping. The following section defines cognitive mapping (and cause mapping) and describes the procedure for eliciting the cognitive maps from individual project participants.

Cognitive and Cause Mapping

The term Cognitive Mapping describes mapping a person's thoughts (beliefs) about a problem or issue (Eden 2004). The maps are composed of nodes (or constructs) and arrows. Constructs are text statements that describe conceptual ideas important in the description of some phenomena's behavior. Arrows are used to connect constructs into a network, where the direction of the arrow implies believed causality (i.e. concept A causes concept B).

Two additional attributes sometimes used in Cognitive Mapping are the 'influence' of a causal relationship and the 'strengths' of those relationships. Influence relationships are depicted by either a plus (+) sign or a negative (-) sign. Plus signs (+) indicate a positive correlation (if A increases (decreases) then B will increase (decrease)). Or, if the sign is negative (–) then the causality is oppositional (as A increases (decreases) then B decreases (increases)). 'Strengths' of those relationships can be assigned as weak, moderate, or strong; sometimes written as 1, 2, and 3 respectively (Figure 3).



- 3 Vision and strategic direction 5 Market share
- 20 Competition in market 30 Leadership in organization
- 33 Knowledge of market needs 35 Brand recognition
- 43 Bank connections 47 Efficiency/productivity

Figure 1. Diagrammatic Presentation of Causal Map

	30	47	3	5	33	43	20	35
30	0	2	3	0	0	0	0	0
47	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
5	0	0	3	0	0	0	0	0
33	0	0	2	0	0	0	-1	0
43	0	0	0	0	0	0	0	0
20	0	0	0	-2	1	0	0	-1
35	0	0	0	3	0	0	0	0

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Figure 2. Association Matrix Presentation of Causal Map

Figure 3: Example cognitive (cause) maps. Taken from Markóczy and Goldberg 1995

For participants to build models that can be compared to one another (e.g. pre/ post tests) a consistent administration of the technique must be followed. The method developed by Markóczy and Goldberg (1995) will be adapted for this project. With this method participants build their models from a pre-determined list of constructs. These constructs are elicited during the organizational meeting. The master list (created in the organizational meeting) will be paired down by identifying near duplicate and ambiguous constructs. The final list will be 40-50 constructs (Markóczy and Goldberg 1995) and will be used to administer the pre tests. The pre-test is administered following the organizational meeting.

The individual cognitive mapping will be conducted in the following manner. Participants will individually be presented with the final construct list and asked to choose the 10 constructs that they feel most influence landscape change in Morgan County. Constructs not chosen during this process cannot be considered a non-belief of the participant but rather it can only be said that there were other more influential factors.

Once a participant has chosen their 10 constructs they will be written on index cards and laid out in front of the individual. Next, constructs will be presented to the participant in pairs and asked whether they influence each other, positively or negatively, and how strong the association is (1. weak, 2. moderate, or 3. strong). Pairs of constructs will be presented until all combinations have been examined. All answers will be tabulated in a matrix format. From this information it will be possible to make consistent comparisons between Cognitive Maps between the group's members. Maps will be analyzed using a specialized computer program to determine schema similarity. One basic measure is needed to answer the research hypothesis; distance ratios.

Distance ratios measure how different individual models are from one another. Differences that can occur between maps are identified as three kinds; 1) differences in the strength of commonly held beliefs, 2) the existence (or absence) of arrows between commonly held constructs, and 3) differences due to a map having a unique construct.

The distance ratio score is given from zero (0) to one (1). A score of 0 indicates that the two models being compared are identical. A score of 1 indicates maximum dissimilarity. "The general idea of the formula is to sum up (construct by construct and arrow by arrow) all the little differences between the maps...and then divide that sum by the greatest difference possible by the given number of constructs in each map and the number of constructs common to the maps." (Markóczy and Goldberg 1995).

After distance ratios are calculated for each individual's cognitive map they can be compared to one another. Comparing individual pre-test distance ratios to post-test distance ratios it must be possible to determine whose models were changed by the GMB

intervention and what exactly changed. In this way patterns among participants can be identified.

To measure if a shared mental model was created individual distance ratios will be normalized between members to get a group score for both the pre- and post- tests. Then the normalized scores will be compared to one another. If the post-test score is less than the pre-test score then it can be said that the group's landscape change schema became more similar due to the GMB intervention.

Group Modeling Building (GMB)

The Group Model Building (GMB) intervention is a process that results in a group causal model (a cognitive map formulated at the group level) being built that describes a consensus view of the process of landscape change in Morgan County. Consensus will be attained via group dialogue about model constructs, the relationships between constructs, and construct and model behavior through time. The dialogue process will discover points of dissonance and agreement between group members interpretation of the 'facts' as they see them. Resolving the dissonance through dialogue will result in a shared schema of landscape change in Morgan County among the participants. The Group Modeling intervention is composed of a series of activities including: an introductory presentation of system dynamics, presentation of an aggregate map assembled from participant's individual level cognitive maps, a group model building exercise using the Oval Mapping Technique (Eden and Ackermann 1998), and a review and refinement of the group model.

Post-test

Following the same method used in the pre-test participants build their post-test models from a pre-determined list of constructs. The list of constructs used for the post-test is a refined list based on the original (pre-test) final list of constructs and additional (new) constructs elicited during the Group Model Building intervention. The pre-test's final list (created from the organizational meeting) will be paired down by identifying near duplicate constructs and constructs not chosen by anyone during the pre-test. The final post-test list will be 40-50 constructs (Markóczy and Goldberg 1995) and will be used to administer the post tests. Post-tests will be administered as soon as possible following the conclusion of the Group Model Building intervention to minimize loss of treatment effects over time, within three weeks following the workshop.

Revisions to the pre-test list will not affect the pre-test comparability to the post-tests since the measure being taken is the similarity of individuals to other individuals within the group. Post-test comparability is stated as having increased or decreased from a pre-test group schema similarity score. Or restated, as a group, individual's schemas are more or less similar to one another as a result of the Group Model Building intervention.

Planning Meeting

The planning meeting is a chance for the group of landowners to talk about future actions that could relieve their fears or embolden their hopes. Given the creation of the group model causal structures can be examined to propose ways to induce improvements. The points in the causal structures where participants propose activities are called leverage points. Since the model being created for this project is qualitative any action proposed at a leverage point can be analyzed on qualitative grounds only. No

formal policy analysis can be done. However, using the model as a tool will help the group to retain the lessons learned in the Group Model Building intervention and serve to build support for the model itself. The meeting lasts only half a day, as opposed to the day long workshops for the organizational and group model building meetings. The planning meeting will be an informal discussion of possible future actions for the group. Important causal pathways (as determined by centrality) will be shared with the group to focus the discussion.

Conclusions and Implications

While this research is currently being conducted and does not, as of yet, have any results this research is expected to add to the following knowledge base in the following ways:

- Provide empirical evidence of the claim that Group Model Building increases the similarity among the participants schema, a measure of group effectiveness.
- Provide supplemental information about the possible correlations between knowledge and behaviors of non-industrial private forest owners
- Provide a foundation for further study of systems models to support community decision making and more realistic quantitative landscape change models
- Provide insights that could lead to possible leverage points for affecting system improvements
- Provide information about ecological misperceptions (Spies et al. 2004) landowners may have, including; scale, system structure, system boundaries, etc.

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