

**Adaptive management and learning how  
to manage natural resources in Chicago**

**Elizabeth McCance  
School of Natural Resources and Environment  
University of Michigan**

**Summary of research**

All communities and complementing organizations face complicated decisions about how to manage and use forests and other natural resources in ways which are beneficial to both the community and the resource. Ecosystem management is one approach to biodiversity conservation, which involves collaboration among stakeholders to work towards both ecological and social goals. Ecosystem Management occurs over a large geographical scale and often necessitates an adaptive approach to management so that learning and improvement can occur over time (Christensen et al. 1996, Cortner et al. 1998, Grumbine 1994, Haeuber 1996, Lackey 1998, Pirot et al. 2000, Slocombe 1993, Yaffee 1999).

Adaptive management or learning by doing is an essential component of ecosystem management (Christensen et al. 1996, Cortner et al. 1998, Grumbine 1994, Haeuber 1996, Pirot et al. 2000, Slocombe 1993, Yaffee 1999). In general when there is uncertainty, learning is a favorable strategy. Because the path to achieve biodiversity goals is not clear but rather complicated, organizations should learn from their strategies as they implement them so that they might improve them and increase chances of accomplishing goals.

Given that adaptive management, evaluation, and organizational learning are essential to the theory of ecosystem management, do organizations learn? And if they do learn, what factors facilitate or inhibit this learning process? This study looks at the extent to which a group of organizations have adopted ecosystem management to determine if there is evidence of learning, and investigates what organizational and individual traits might influence the learning process. Because the coalition with which I am working, Chicago Wilderness, advocates ecosystem management as its approach to conservation, I looked at the extent to which involvement in coalition activities led to adoption of ecosystem management. Having its members participate in an ecosystem management approach is a goal of the coalition leaders.

Building on previous studies, I hypothesized that a number of factors might be involved. From the organizational sociology literature, these factors include organizational type, structure, and size (Dodgson 1993, Selin and Chavez 1995). From the organizational learning literature, there are a number of theories about the extent to which some organizations are learning organizations, and therefore would be more likely to learn about and adopt new beneficial ideas and practices (Brown and Starkey 2000, Dudley and Imbach 1997, Kofman and Senge 1993, Redding and Catalanello 1994, Senge 1990, Watkins and Marsick 1993, Westrum 1994). As a community we

were interested in how much involvement in the various Chicago Wilderness activities made a difference.

Other factors obviously might pre-dispose organizations or people to be more aligned with ecosystem management principles than others. These include a variety of background factors such as year or field of study, similarity of missions of the organization to that of Chicago Wilderness (Yaffee 1998).

My community partners and I are both interested in what makes an effective collaboration and how to improve its work. Gaining insight into how the member organizations learn to adopt ecosystem management and what factors might influence this process can yield to practical recommendations for how the coalition should function.

### **Field experience and data collection**

For my study, I worked with a community know as Chicago Wilderness. Chicago Wilderness is a coalition of organizations working together to protect and restore the natural areas in northeastern Illinois, northwestern Indiana, and southeastern Wisconsin. The coalition is comprised of more than 150 not-for profit organizations, research and education institutions, and federal, state, county, and local government agencies.

As a community we wanted to know why some member organizations are more committed to ecosystem management than others and what might bring the others more into the fold. At its essence this study looks at organizational learning, and what factors promote learning and institutionalization of ecosystem management within an organization.

In order to conduct my field research, I moved to Chicago so that I could interact with Chicago Wilderness partners on a daily basis. My initial plan was to interview and interact with different working groups within the coalition to see if I could understand how the learning processes might be playing out differently in each of the groups. Members of the Chicago Wilderness coalition join forces around various topics, such as fire management, outreach to local government officials, or designing interpretives. This is one of the primary means by which the member organizations work together to achieve specific objectives. The original plan was to compare the groups to see if I could determine what might be affecting the learning processes. This plan failed (or rather became a learning opportunity) in a number of ways. First, it quickly became clear that people were ill equipped to talk about their learning processes. I was attempting to use academic jargon and the respondents were not consciously aware of how they were learning various things. Secondly, I realized that the groups did not differ in variety of ways and that more meaningful differences might be occurring between those that participate and those that do not.

A little bit disheartened that my original research plan was not going to work, I started talking with a number of people in Chicago Wilderness. I expressed my interests in organizational learning and understanding how and why organizations were adopting ecosystem management. Coalition members expressed their interests in understanding why some members were more involved than others and how to encourage the lesser involved ones to become more active. Those working at the heart of Chicago Wilderness are firm believers in ecosystem management

and they wanted others to actively take up the cause. This was the perfect meshing of objectives, I could help Chicago Wilderness leaders better understand what leads some partner organizations to adopt ecosystem management more than others and what might they do to help some organizations along. These conversations led me to redesign the study to look at similarities and differences between the different member organizations rather than the working groups.

To get over the hurdle of people's difficulties in talking about learning processes, I instead designed a survey and asked questions using a variety of examples to try to elicit information about various learning behaviors. Chicago Wilderness employs a staff of nine people, who mainly function as facilitators to keeping the coalition members moving along in various directions. These staff members were instrumental in helping to design survey questions. As they knew the behaviors and activities that Chicago Wilderness wanted members to adopt.

Formulation of the research questions and the study design was greatly enhanced by working with the Chicago Wilderness community. Because of their input I have greater confidence that the final results will lead to useable recommendations to improve the functioning of the coalition to meet their goals. Implementation of the survey and data analysis were research steps that I took on by myself. However, I don't believe that participatory research signifies that all parties must be involved at every step of the way. In fact, I think my community partners were delighted that I was doing this work on their behalf and that they did not need to invest precious time to get the desired information.

For my sample, I called all of the Chicago Wilderness members and asked who within their organization knew about Chicago Wilderness. I did not want to mail a survey asking about Chicago Wilderness to someone who was not aware of the coalition. I sampled all the member organizations and one to six people per organization. In total, I mailed 492 surveyed and received 299 in return, a response rate of 61%. In the returned surveys, 124 of the 150 organizations were represented.

## **Preliminary findings and analysis**

### **Variables Tested**

Like most learning processes, the adoption of ecosystem management is a complex process affected by a number of variables. Both people and organizations can vary in the degree to which they believe in ecosystem management as a viable approach to biodiversity conservation. Their training, field, feelings of personal responsibility, position in organization, influence of their leaders, and or the culture of their organization might affect people's beliefs about ecosystem management. The organization's characteristics, such as type of organization, size of organization, mission, and learning behaviors may affect how its members learn about and accept ecosystem management. My study tested which of these factors play a role in the extent to which participants in Chicago Wilderness embrace ecosystem management.

Using a regression analysis, I tested which of several variables influenced variations in the ecosystem management score. All the variables were chosen for the model based on a theoretical contribution to learning or beliefs about ecosystem management. (Dodgson 1993, Morgan 1997, Selin and Chavez 1995, Yaffee 1998) argue that organizational size and type

affect an organization's ability to learn. Generally the more access participants have to information and decision making, which is found in smaller and flatter structured organizations, the more likely the participant is to learn from the actions of the organization, because s/he will be seeing them in context with their affects. While not perfect, type of organization can be a proxy for organizational structure. Often government bureaucracies tend to have more vertical structures, where as non-profits tend to have more horizontal structures (Morgan 1997).

The learning organization literature, which tends to be more applied than the organizational learning literature, argues for a number of behaviors that promote organizational learning (Brown and Starkey 2000, Dudley and Imbach 1997, Kofman and Senge 1993, Redding and Catalanello 1994, Senge 1990, Watkins and Marsick 1993, Westrum 1994). Presumably if an organization possesses these behaviors, then the organization will learn. Therefore, in the survey, I asked a number of questions about the learning behaviors found in the respondent's organization. I hypothesized that the more of these behaviors that an organization possesses the more likely it was to be a learning organization and therefore more inclined to learn about ecosystem management.

Certain factors, unrelated to organizational learning may affect how someone feels about ecosystem management. For example, the person's educational training could have taught or influenced the extent to which the person knew about and believed in ecosystem management as an approach to conservation before the person ever joined their organization. Therefore, I included the year of the person's degree in the model as well.

While all the members of Chicago Wilderness obviously have some interest in the natural areas in metropolitan Chicago or they would not join the coalition, some work more directly in biodiversity conservation than others. The extent to which an organization may be practicing and promoting ecosystem as an approach to biodiversity conservation irregardless of Chicago Wilderness obviously needs to be taken into account and controlled for. An organization's work or essence of being is most neatly summed up in the organization's mission. The mission of Chicago Wilderness is to protect the natural communities of the Chicago region and to restore them to long-term viability, in order to enrich the lives quality of life of its citizens. Clearly this mission reflects an interest in conserving biodiversity at the regional level, which calls for ecosystem management. To control for whether or not other organizations were practicing ecosystem management before joining Chicago Wilderness, I tested the similarity of their missions with that of Chicago Wilderness. I hypothesized that those organizations with more similar missions might be more inclined to embrace ecosystem management without any significant learning occurring than those with less similar missions. In the regression analyses, I control for this difference before testing other variables. Similarly, the extent to which an organization's leadership supports the coalition's activities may have a bearing on the extent to which the member organization engages in Chicago Wilderness and or supports ecosystem management.

On an individual level, one is more likely to experiment and learn if one feels personally responsible for finding solutions. Some people work in conservation because it is a job; others feel passionately motivated to help the environment. The spectrum of these levels of personal

responsibility and investment may make a difference in the extent to which one learns about conservation and in my case, adopts ecosystem management.

While all these factors may influence the extent to which someone learns about and adopts ecosystem management, the primary aim of my study was to look at how an individual and organization's involvement in Chicago Wilderness influenced their attitudes and beliefs about ecosystem management. Participation in Chicago Wilderness was measured in a variety of ways from frequency of various actions, such as attending meetings, to alignment of organizational priorities.

## Results

In my study, it turns out that five of the variables explained above have an impact on the extent to which a respondent agreed with ecosystem management as a good approach to biodiversity conservation. The following variables: the similarity of the organization's mission to that of Chicago Wilderness, the person's position in the organization, the organization's type, the respondent's level of personal responsibility, and level of participation in Chicago Wilderness significantly impact the ecosystem management score. Collectively, they explain 23% of the variation, which is significant ( $p=.001$ ).

### Model of ecosystem management

Embracement of ecosystem management =  $13.929 + (0.201)$  similarity of mission +  $(-0.198)$  position in organization +  $(0.260)$  personal responsibility +  $(-0.152)$  county government +  $(-0.154)$  state government +  $(.278)$  participation

Adjusted r squared = 0.231;  $p=0.001$

An unexpected result was that the position in the organization has a negative coefficient in the regression model, which means that the higher the person ranks in the organization the lower the degree to which they have embraced ecosystem management. Why would this be true? From the data, it appears that this is a side affect of age and training. The year that the respondent received their degree, which informs (to some extent) about the person's age and about the nature of their training, determines both the person's position in the organization and their likelihood for participating in Chicago Wilderness activities. The more recently the person received their degree the more likely they are to participate in Chicago Wilderness (perhaps they have been trained in the benefits of collaboration) and the less likely they are to have reached a higher level position in their organization.

Because I was most interested in the affects of participation, I entered it last into the regression model. In this way, any shared variance with other variables is explained by the other variables, making a conservative estimate of the effect of the participation variable. In my model, the r squared change for participation is .088, signifying that participation explains about 9% of the variation in the ecosystem management score.

It is interesting to note which variables were not included in the model. Variables were dropped from the regression model if they were not significant in explaining any of the variation. In other words the respondent's score on the dropped variables did not significantly correlated with the ecosystem management score so one could not be used to predict the other. The variables which did not influence the ecosystem management score in my study were: organization size, extent of

learning behaviors, leadership support, year of degree, and number of people per organization involved with Chicago Wilderness. As we have seen however, with year of degree, some of these variables have an indirect relationship with the ecosystem management score.

### **What determines the level of organization's participation in Chicago Wilderness?**

From a theoretical standpoint, it is nice to know that participation is key to adopting a principle like ecosystem management, although this is not earth-shattering news. Certainly if people do not participate in the collaborative process, then there is no way to learn through them. From an applied standpoint, the next and more important question is what determines level of participation? Why are some organizations and people more involved in Chicago Wilderness than others? Such information can inform coalition leaders on how to structure activities.

Four variables significantly impact the level of an organization's participation in Chicago Wilderness. These variables are: level of individual involvement, the number of people within the organization who are active in Chicago Wilderness, the level of leadership support, degree of open decision making processes, and feelings of personal responsibility for finding solutions to biodiversity conservation challenges.

#### **Model of organizational participation in Chicago Wilderness**

Participation =  $-.674 + (0.153)$  individual involvement +  $(0.328)$  leadership support +  $(.286)$  open decision-making processes +  $(0.14)$  # of people from organization involved in Chicago Wilderness +  $(.059)$  personal responsibility for finding solutions.

Adjusted r squared = 0.471; p=0.000

The level of an organization's participation was measured by asking members the extent to which they thought that their organization participated. Thus, if an individual within an organization participated to a great extent in Chicago Wilderness, it is logical that he perceived his own organization as participating. Likewise, if several from one organization are involved with Chicago Wilderness it is likely that they are at least aware of one another and perhaps discuss Chicago Wilderness with one another, thereby increasing the perception that the organization is more involved. Of course the more involved staff of an organization are in Chicago Wilderness, the more involved the organization is.

Leaders of an organization set the tone of the organization and design the strategies or methods that the organization utilizes. It follows that if an organization's top directors believe in and support the work of the Chicago Wilderness coalition, than the organization is likely to have parallel strategies to that of the coalition and take part in the coalition's activities. This finding is similar to the results of the Michigan study on determinants of success of ecosystem management (Yaffee 1996a, Yaffee 1996b, Yaffee 1998, Yaffee and Wondolleck 1997). It is curious, however, that the extent to which the organization's mission was similar to that of Chicago Wilderness did not come out as a significant variable in the model. Something about the support of the organization's leaders for Chicago Wilderness empowers or otherwise motivates the participants and therefore organization to get involved with coalition activities, even if the organization's primary mission is not biodiversity conservation.

Based on the literature, I thought some other variables might play a role in determining extent of organizational participation that ended up not being a factor in this study. For example, organizational size and type are thought to affect an organization's involvement in collaborative activities (Selin and Chavez 1995, Yaffee 1998), but did not prove to be factors in this instance.

In summary, a number of factors explain the extent to which members of Chicago Wilderness have adopted ecosystem management, including the person's position in the organizations, their feelings of personal responsibility, the type of organization they belong to, and the mission of that organization. Importantly for this study and for the benefit of the community, participation in Chicago Wilderness activities was the largest predictor of adoption of ecosystem management. The more one participates the more one embraces ecosystem management. So the next questions, then becomes how does Chicago Wilderness increase participation. While several factors determine participation, including personal feelings of responsibility for finding solutions and the extent of open decision making processes, it turns out that leadership support for the coalition is the primary driver.

### **Benefits to the community**

Chicago Wilderness is a community of dedicated organizations and individuals to improving the health of the natural areas in the region. Recognizing that to achieve their vision would require a massive and well-coordinated approach they formed the Chicago Wilderness coalition to integrate the work of the many players. As anyone who has been involved with a collaborative project knows, while collaborations can yield major accomplishments they require significant nurturing with dedicated participation from all the stakeholders. Any information that helps the coalition leaders understand what is currently keeping the members together and how participation in the work might be increases is welcomed.

This research aims to explain who is involved in Chicago Wilderness and why are they involved. What characteristics lead to increased participation and what are some leverage points that Chicago Wilderness might use to increase the involvement of their member organizations? Increasing the participation of the member organizations has been a concern of the steering committee and the staff for several years now. In 2001, the staff drafted (and then the steering committee adopted) an idealized staffing structure. This structure included a membership outreach coordinator whose primary responsibility would be to reach out to and work with members to increased their participation in coalition activities. It was not until 2003 that the coalition was able to secure a grant to fund this position. The membership outreach coordinator was brought on board in May 2003. Therefore, this research is timely in that the issues are of concern to Chicago Wilderness and that staff is in place to implement the resulting recommendations.

In attempts at efficiency and cost-savings, the Chicago Wilderness staff had asked each member organization to select one person as the point of contact for the coalition. All correspondence would be sent to the contact person in hopes that they would then distribute to their colleagues as appropriate. This research shows that the more people within an organization directly involved with Chicago Wilderness the more the organization will both participate in coalition activities

and adopt ecosystem management. Therefore a recommendation to Chicago Wilderness is to design means for getting more than one person per organization involved in various activities.

The research also clearly shows the important of leadership support for both getting involved in various efforts but also in implementing ecosystem management in the region. I recommend that the leaders of member organizations who are already fully dedicated to the work of Chicago Wilderness should reach out and court other leaders. Getting buy in from an organization's directors goes a long way in bring that organization and its participants into the collective work needed to conserve biodiversity in the region.

## **Lessons learned**

In some respects this process has raised more questions about participatory research than answers. The literature provides a number of definitions of participatory research (Cornwall and Jewkes 1995, Kemmis and McTaggart 2000, Park 1993), but how well do these apply to my research and that of colleagues in the program. For example, narrow definitions focus on the underprivileged nature of the research participants. Certainly participatory research and other similar methods have shifted the field of research away from its bleak phase of treating people without the proper respect and dignity they deserve. While this humaneness should be central to any type of research, it does bring into question who are the participants in participatory research? Must the target population be disadvantaged for a study to qualify as participatory research? If this were the case, then my study would not qualify. I study a group of movers and shakers who established an unprecedented collaboration for conservation that now serves a model for other communities world –wide – hardly a group of people unable to speak for themselves.

A second question raised during my fellowship, is just how involved do community members need to be for a study to qualify as participatory. Many of my colleagues in this program stressed the involvement of their community at every stage of the research. Is this necessary or an unwise use of human resources? Again, my experience did not fit the norms. While members of Chicago Wilderness were and are involved at key stages of the research, certainly not everyone is involved in all aspects. Specifically, I conducted the data collection, entry, and statistical analyses on my own. Certainly, I had extensive input into the design of the survey, but is this participatory research or rather good survey methodology?

While I have trouble fitting my research into some definitions of participatory research, I believe that my research fits the spirit or the goal of participatory research very well – to ask questions and find information that will enable the community to reach its goals. But this then raises another question in my mind. What is the difference between participatory research and applied research? Both should be of use to the participants, in other words the participants should be the end users. Participatory research specifically spells out that the participants should be involved in designing the research questions, but I would argue that for applied research to be truly useful to the end user then the stakeholders must be the ones to determine the information needs, the research questions.



## Literature Cited

- Brown, A. D., and K. Starkey. 2000. Organizational identity and learning: A psychodynamic perspective. *Academy of Management Review* **25**(1): 102-120.
- Christensen, N. L., A. M. Bartuska, J. H. Brown, S. Carpenter, C. D'Antonio, R. Francis, J. F. Franklin, J. A. MacMahon, R. F. Noss, D. J. Parsons, C. H. Peterson, M. G. Turner, and R. G. Woodmansee. 1996. The report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management. *Ecological Applications* **6**(3): 665-691.
- Cornwall, A., and R. Jewkes. 1995. What is participatory research? *Social Science and Medicine* **41**: 1667-1676.
- Cortner, H., M. Wallace, S. Burkew, and M. Moote. 1998. Institutions matter: the need to address the institutional challenges of ecosystem management. *Landscape and Urban Planning* **40**: 159-166.
- Dodgson, M. 1993. Organizational learning: A review of some literatures. *Organization Studies* **14**(3): 375-394.
- Dudley, E., and A. Imbach. 1997. *Reflective Institutions - Eight Characteristics of Institutions that Encourage and Respond to Learning by Doing*. IUCN, Gland, Switzerland.
- Grumbine, E. 1994. What is ecosystem management? *Conservation Biology* **8**(1): 27-38.
- Haeuber, R. 1996. Setting the environmental policy agenda: The case of ecosystem management. *Natural Resources Journal* **36**(1): 1-28.
- Kemmis, S., and R. McTaggart. 2000. Participatory Action Research. Pages 567-605 in Denzin and Lincoln, eds. *Handbook of Qualitative Research, Second Edition*. Sage Publications, Thousand Oaks, CA.
- Kofman, F., and P. Senge. 1993. Communities of commitment: The heart of learning organizations. *Organizational Dynamics* **22**(2): 5-23.
- Lackey, R. T. 1998. Seven pillars of ecosystem management. *Landscape and Urban Planning* **40**: 21-30.
- Morgan, G. 1997. *Images of Organizations*. SAGE Publications, Thousand Oaks, CA.
- Park, P. 1993. What is Participatory Research? A Theoretical and Methodological Perspective. Pages 2-19 in P. Park, ed. *Voices of Change: Participatory Research in the United States and Canada*. Bergin and Garvey, Westport, CT.
- Pirot, J. Y., P. J. Meynell, and D. Elder. 2000. *Ecosystem Management: Lessons from Around the World. A guide for Development and Conservation Practitioners*. IUCN, Gland, Switzerland.
- Redding, J. G., and R. F. Catalanello. 1994. *Strategic Readiness: The making of the learning organization*. Jossey-Bass, San Francisco, CA.
- Selin, S., and D. Chavez. 1995. Developing a collaborative model for environmental planning and management. *Environmental Management* **19**(2): 189-195.
- Senge, P. 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*. Doubleday, New York.
- Slocombe, D. S. 1993. Environmental planning, ecosystem science, and ecosystem approaches for integrating environment and development. *Environmental Management* **17**(3): 289-303.
- Watkins, K. E., and V. J. Marsick. 1993. *Sculpting the Learning Organization: Lessons in the art and science of systemic changes*. Jossey-Bass Publishers, San Francisco, CA.

- Westrum, R. 1994. An organizational perspective: Designing recovery teams from the inside out. Pages 327-349 in T. W. Clark, R. P. Reading, and A. L. Clarke, eds. *Endangered Species Recovery: Finding the Lessons, Improving the Process*. Island Press, Washington, DC.
- Yaffee, S. L. 1996a. Ecosystem management in practice: The importance of human institutions. *Ecological Applications* **6**(3): 724-727.
- Yaffee, S. L., Ali F. Phillips, Irene C. Frentz, Paul Hardy, Susanne Maleki, and Barbara E. Thorpe. 1996b. *Ecosystem Management in the United States: An Assessment of Current Experience*. Island Press, Washington, DC.
- Yaffee, S. L. 1998. Cooperation: A strategy for achieving stewardship across boundaries. Pages 299-324 in R. L. knight and P. B. Landres, eds. *Stewardship Across Boundaries*. Island Press, Washington, DC.
- Yaffee, S. L. 1999. Three faces of ecosystem management. *Conservation Biology* **13**(4): 713-725.
- Yaffee, S. L., and J. Wondolleck. 1997. Building bridges across agency boundaries. Pages 381-396 in K. A. Kohm and J. F. Franklin, eds. *Creating a Forestry for the 21st Century: The Science of Ecosystem Management*. Island Press, Washington, DC.