Stakeholder Engagement in Public Natural Resource Management

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Abstract: The management of public natural resources can be challenging, especially in the face of diverse stakeholders with varied interests and concerns. In most cases, decision-makers lack sufficient data from which to assess the range, intensity, and convergence of community preferences. Traditional attempts to acquire such information from public meetings frequently are constrained by a format that too often permits a few individuals to monopolize or co-opt sessions for their own purposes or agendas. Such experiences in past public meetings subsequently drive community expectations for future meetings, frequently resulting in decreased attendance and a less representative participant base. Consequently, regulators or decision-makers can come to view public meetings as a regulatory obligation of high contentiousness and little utility that must be endured, while other community stakeholders adopt a cynical perspective that assumes final decisions already have been pre-determined.

To help address these challenges, researchers at the University of Kentucky have developed an eight-step, multi-directional stakeholder engagement methodology that involves stakeholders at the very beginning of the decision process. The methodology incorporates both qualitative and quantitative methods drawing on principles from Community-Based Participatory Communication (CBPC) and Structured Public Involvement (SPI). CBPC uses interviews, focus groups, and projective techniques to identify varied community groups and to discover the value systems, risk perceptions, and preferences among these groups. SPI employs anonymous Audience Response Systems (ARS) in large-scale public meetings to identify democratic solutions to complex issues while resisting co-optation of the process by a single interest group.

This paper describes the application of the methodology to a case study identifying acceptable nutrient management strategies for a watershed near Louisville, Kentucky. The paper will elucidate key insights derived from the application of the methodology, as well as make recommendations for application of the methodology to other problems involving stakeholder input into public decisions.

Keywords: Stakeholders, Community Based Participatory Communication, Engagement

1. BACKGROUND

Attempts to involve stakeholders as active participants in public resource decision-making processes traditionally have been hampered by several factors, including the lack of effective engagement models and agency perceptions that the process is either ineffective or counter-productive. As Boholm (2009) notes, too often conflict dominates public meetings as interactions become "one long debate between conflicting social constructions…and the values at stake" (p. 344). As a result, many stakeholders have come to believe that public involvement opportunities are a waste of time, while some agencies tend to view such activities as a purely regulatory requirement or necessary evil with little or no benefit to the
overall decision-making process (Rydin and Pennington 2000; Beierle and Cayford 2002; Dieta and Stern 2008). Consequently, levels of public involvement have varied widely across project type, time, and geography.

In 1969, Sherry Arnstein illustrated the variety of public involvement activities using a "ladder of public participation" (see Figure 1). In general, the steps of the ladder can be grouped into three broad classifications: Non Participation, Tokenism, and Citizen Power, with specific rungs falling within each broad category. While most of the terms are fairly self-explanatory, Arnstein has provided specific definitions for each term (see: http://lithgow-schmidt.dk/sherry-arnstein/ladder-of-citizen-participation.html)

In previous studies that have addressed participation levels in public decision making, participants have used the ladder to rate their experiences, with many indicating involvement levels in the Tokenism section of the ladder, generally between placating and informing (Grossardt et al., 2010); however, the majority of those polled in the past desire levels of participation somewhere between partnership and delegated power in the Citizen Power section of the ladder (Bailey et al., 2006, 2011). In other words, and perhaps unexpectedly for some agencies and policymakers, most citizen stakeholders see a role for technical expertise in planning processes, while very few people feel that complete citizen control is necessary to achieve optimal outcomes.

The benefits of stakeholder involvement in public decision-making processes have been examined by several federal agencies, including the U.S. Environmental Protection Agency [USEPA]. After two decades of failing to achieve the goals of the Clean Water Act, USEPA embarked on a new comprehensive watershed management framework in the early 1990s, with a particular focus on those non-point sources of pollution that did not readily avail themselves to a purely regulatory approach but instead required the active participation and involvement of diverse stakeholders (EPA 1996). By definition, such a strategy requires effective stakeholder engagement processes (Chess et al. 2000; Watkins and Paladino 2001; Webler and Tuler 2001; Conway 2002; Johnson et al. 2002; Lu 2002; Shirey et al. 2005; Ormsbee and McAlister 2013).

2. FLOYDS FORK PROJECT

In 2011, USEPA initiated a nutrient management model development project for north-central Kentucky's Floyds Fork watershed, within which several streams had been identified as impaired for organic enrichment and nutrients. The Floyds Fork Watershed lies east of Louisville, KY, has a total area of 285 square miles, and drains parts of the cities of La Grange, Peewee Valley, Middletown, Jeffersontown, and Mount Washington. The watershed covers parts of six counties (Henry, Oldham, Shelby, Jefferson, Bullitt, and Spencer). Approximately 20% of the watershed is developed area, with varying degrees of intensity. Forest covers about 43% of the watershed. Pasture and cropland make up roughly 32% of the landuse. Another 4% of the watershed is grasslands or wetlands, and 1% is open water.

As part of the nutrient management initiative, the Kentucky Water Resources Research Institute (KWRRI) was asked to work with various stakeholder groups within the local community to identify acceptable best management practices for nutrient management in the watershed. To accomplish this task, the KWRRI research team first implemented Community-Based Participatory Communication (CBPC) methods, which use interviews, focus groups, and projective techniques to identify and interact with various community groups. The goal of CBPC is to discover value systems, risk perceptions, and stakeholder preferences regarding complex issues (Anyaeegbunam, Mefalopulos, & Moetsabi 2004). The team then engaged in Structured Public Involvement (SPI), a democratic process that uses visualizations and anonymous Audience Response Systems (ARS) or similar feedback methods in large-scale public meetings (Bailey
and Grossardt, 2006). In this way, SPI encourages democratic solutions to complex issues while resisting co-optation of the public meeting process by a single interest group.

In the research team's deployment of the novel CBPC-SPI integration, results from an extensive CBPC listening tour assist in generating SPI-based visualizations that are used as discussion triggers for additional CBPC-based focus group interactions. Focus group findings ultimately feed into the development of a broad-based SPI community forum protocol that quantitatively measures preferences for future outcomes as thoroughly and accurately as possible. The public engagement model ultimately involved an eight step process as illustrated in Figure 2. These steps were informed by interactions between the research team and a pilot group of local stakeholder leaders who provided insights into better tailoring protocols, activities and content for specific groups.

![Figure 2. Stakeholder Engagement Methodology](image)

### 2.1 Step One – Iterative Stakeholder Identification

After creating an initial draft guide for the integrated CBPC-SPI process, the next step was the identification of key stakeholder groups affected by and affecting Floyds Fork watershed management decisions. To fulfill this objective, the research team worked with the Kentucky Division of Water to identify as many known stakeholders as possible. This list was supplemented with data provided by participants in public meetings associated with EPA's watershed model project. The resulting stakeholder list provided a starting point for an iterative snowball sampling process in which interactions with known stakeholders generated the identification and engagement of other stakeholders, who then would identify more stakeholders, until saturation had been achieved, with no additional stakeholder categories identified (Lindlof and Taylor, 2002). Ultimately, the team was able to generate a list that included 116 specific organizations or individuals. These were subsequently assigned to 24 distinct groups that were perceived as sharing similar stakes, needs, and values. Because of logistical issues, this list was further consolidated into the following clusters:
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- Government/utilities/universities
- Farmers and agricultural organizations
- Environmental groups
- Preservation and wildlife groups
- Economic development, local businesses and builders
- Recreational organizations and golf courses
- Residents and neighborhood associations

2.2 Step Two - Listening Tour

Once stakeholder clusters had been identified, representatives from each of the stakeholder groups were interviewed as part of a listening tour that was conducted during the Fall and Winter of 2011. This listening tour better acquainted the research team with the Floyds Fork watershed’s significance to the larger region, in both the past and the present, as well as the watershed’s potential. Stakeholder interactions also pointed the researchers to a number of reports related to the watershed's future, many of which have been provided online via the project’s website: www.uky.edu/WaterResources/FF. Finally, the listening tour pointed to the existence of competing commitments and tensions among diverse stakeholder groups. It became clear that this study would need to address all of these issues. After interviewing more than 70 individuals, the research team felt they had reached a saturation point, with no new information emerging. Based on stakeholder feedback, twelve potential nutrient management strategies were identified. The research team then determined that these strategies belonged to four overarching categories: 1) wastewater management, 2) agricultural management, 3) urban management and 4) policy strategies.

2.3 Step Three - Creation of a Pilot Test Group

The research team recruited a 12-person pilot test group that included representation from each of the seven stakeholder clusters. This group pre-tested individual steps of the engagement process, evaluated initial trigger scenarios for clarity, and, where warranted, recommended protocol and/or scenario changes prior to community-wide implementation. Members of the pilot test group also helped to recruit additional members of their constituencies into the subsequent public engagement process.

2.4 Step Four – Stakeholder Focus Groups

A draft focus group protocol was developed, pre-tested by the pilot test group, and slightly amended. Following protocol approval by the University of Kentucky non-biomedical Institutional Review Board (IRB), a total of 49 people attended seven stakeholder-specific focus groups. These meetings were conducted over a three-month period at the Middletown Community Center in Jefferson County.

The CBPC protocol included the evaluation of several potential future nutrient management strategies identified through the listening tour, the pilot focus group, and published recommendations from various entities. To accommodate time constraints and allow ample time for group evaluations, a limited number of scenarios were selected as discussion triggers. The specific sample scenarios were chosen to provide a robust and representative sample of potential management strategies. Focus group participants discussed each specific hypothetical management strategy in relation to community values, concerns, and beliefs. Following the discussion, participants evaluated each individual sample strategy anonymously using SPI keypad technology.

Broadly, the focus group discussions painted a picture of a community attempting to balance key values related to environmental responsibility and economic stability. In every session, the issues of both economic development and environmental preservation arose, often revealing internal conflicts for individual participants, as well as resulting in differing assessments of the hypothetical scenarios. A number of knowledge gaps also emerged within the discussions, with participants identifying informational needs that would assist in making suitability determinations about specific scenarios.
Such gaps included questions about landuse percentages for the watershed, relative nutrient contributions from different sources, and technology efficiencies/costs.

2.5 Step Five: Informational Website

Based on the knowledge gaps identified through the focus group process, the research team developed a website (www.uky.edu/WaterResources/FF) to document information about both the Floyds Fork watershed and the nutrient management strategies. The website included a compilation of previous reports about the watershed, data collected within the watershed, and scientific background information about nutrients, as well as information on nutrient sources and impacts.

2.6 Step Six: Community Informational Meeting

Focus group findings indicated that the public would benefit from an informational meeting about both the watershed and the proposed nutrient best management practices (BMPs) prior to convening a public meeting for actually evaluating each BMP. As a result, the research team developed a draft public information meeting, which was reviewed and modified by the pilot group and approved by the University of Kentucky non-biomedical IRB.

Held on May 30, 2013, at the Parklands of Floyds Fork Gheens Foundation Lodge, the informational meeting used an interactive format in which multiple-choice questions were presented to the participants via a PowerPoint presentation. Meeting participants were then asked to select the answer to each question using the ARS technology, with aggregated answers from the audience displayed alongside the actual answers. This format illustrated any areas of widespread misperception within the community, alerting both participants and the research team not only of the absence of information in terms of knowledge gaps but also of specific areas where scientifically inaccurate information or assumptions dominated public perceptions. For example, prior to the meeting there was a general perception that the majority of nutrients entering the streams were coming from agriculture, when in fact, agriculture only made up 5% of the watershed. Other citizens came to the meeting advocating the shipment of wastewater flows out of the basin without recognizing that much of the recreational flows in the river during the summer were associated with such flows. Citizens were also surprised to learn that a significant amount of the nitrogen loads were associated with atmospheric deposition. Such information stimulated additional discussion and questions for the research team and subject matter experts, ultimately generating two additional management strategies that were added to the policy category: forest preservation and reduction of atmospheric deposition of nitrogen.

2.7 Step Seven – Community Scoring Meetings

Following the public informational meeting, three separate community meetings were held on August 23rd (Middletown, KY); August 26th, (LaGrange, KY); and September 9th, (Shepherdsville, KY) Prior to implementation, the meeting protocol was approved by the University of Kentucky non-biomedical IRB. A total of 57 individuals attended the three meetings, where they provided feedback on the various nutrient management strategies. Quantitative metrics for public preferences were achieved by having the meeting participants use handheld ARS to score each BMP using a Likert scale on which a score of 1 indicated least preferable and 9 indicated most preferable. It is important to note that each BMP was scored independently on its own merits and not in comparison to the other BMPs. Additional demographic data were also collected from the participants, which allowed the researchers to break out results based on gender, age, use of the watershed, county of residence, and stakeholder interest.

Based on the feedback received from the focus groups, the pilot group, and the public information meeting, the original list of nutrient management strategies was expanded from 12 to 20 BMPs, with many of the new BMPs representing an expanded version of the original twelve. The final list of BMPs along with their associated scores are shown in Table 1. The average score from each of the focus group meetings (FG) is also shown in the table. In the later case, those scores associated with a composite
category are shown in bold italics. As an example, during the focus group meetings, fertilizer management and crop rotation were presented as examples of a broader category of crop management.

Table 1. Nutrient Management BMPs and associated Likert Scale Scores (1-9)

<table>
<thead>
<tr>
<th>Number of Participants</th>
<th>PM</th>
<th>Web</th>
<th>PM&amp;Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>W Eliminate failing septic systems</td>
<td>7.8</td>
<td>6.3</td>
<td>6.4 6.8</td>
</tr>
<tr>
<td>W Reduce stormwater inflows</td>
<td>7.5</td>
<td>7.1</td>
<td>7.2</td>
</tr>
<tr>
<td>W Expand sewer line infrastructure</td>
<td>7.5</td>
<td>5.8</td>
<td>5.7 6.3</td>
</tr>
<tr>
<td>W Regionalization</td>
<td>6.2</td>
<td>5.3</td>
<td>6.1</td>
</tr>
<tr>
<td>W Improve nutrient treatment technologies</td>
<td>7.4</td>
<td>6.5</td>
<td>6.8 6.9</td>
</tr>
<tr>
<td>A Fertilizer management</td>
<td>7.9</td>
<td>6.2</td>
<td>6.8 6.9</td>
</tr>
<tr>
<td>A Crop management</td>
<td>7.9</td>
<td>6.4</td>
<td>7.0</td>
</tr>
<tr>
<td>A Erosion management</td>
<td>8.1</td>
<td>7.2</td>
<td>6.9 7.4</td>
</tr>
<tr>
<td>A Wetlands</td>
<td>8.1</td>
<td>4.9</td>
<td>5.5 5.2</td>
</tr>
<tr>
<td>A Livestock management</td>
<td>7.1</td>
<td>5.5</td>
<td>5.3 5.9</td>
</tr>
<tr>
<td>A Manure management</td>
<td>7.1</td>
<td>6.1</td>
<td>6.4</td>
</tr>
<tr>
<td>U Educational programs</td>
<td>7.3</td>
<td>7.0</td>
<td>6.5 6.9</td>
</tr>
<tr>
<td>U Reduce runoff through traditional infrastructure</td>
<td>5.8</td>
<td>6.3 6.9</td>
<td></td>
</tr>
<tr>
<td>U Reduce runoff through green infrastructure</td>
<td>7.3</td>
<td>7.8</td>
<td>6.6 7.3</td>
</tr>
<tr>
<td>U Treat runoff through retention basins and urban wetlands</td>
<td>6.8</td>
<td>6.3</td>
<td>5.9 6.3</td>
</tr>
<tr>
<td>P Development review overlays</td>
<td>7.0</td>
<td>6.2</td>
<td>5.2 6.1</td>
</tr>
<tr>
<td>P Conservation subdivisions</td>
<td>7.0</td>
<td>6.8</td>
<td>5.7 6.5</td>
</tr>
<tr>
<td>P Pollution trading</td>
<td>3.2</td>
<td>3.4</td>
<td>3.2 3.3</td>
</tr>
<tr>
<td>P Forest preservation</td>
<td>6.5</td>
<td>4.8</td>
<td>5.7</td>
</tr>
<tr>
<td>P Reduce atmospheric deposition</td>
<td>6.0</td>
<td>5.0</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Where: FG = focus group, PM = public meeting, Web = website, W = wastewater strategies, A = agricultural strategies, U = urban strategies, and P = policy strategies

2.8 Step Eight: Web-based Scoring

Following the public scoring meetings, additional opportunities for public input on the BMPs were provided through an online survey on the project’s website: www.uky.edu/WaterResources/FF. The online survey adapted the community scoring meeting protocol for an online environment. The online results are also shown in Table 1.

3.0 RESULTS

Both quantitative and qualitative results were obtained for each management scenario. Qualitative results emerged primarily from focus group meetings using CBPC protocols, while the quantitative results emerged from the public meetings using SPI scoring protocols. The qualitative results help inform and interpret the quantitative results. The composite results from each of the meetings are provided in Table 1. Examples of qualitative findings related to participants’ struggles to balance competing issues are provided in Table 2. In addition to the BMP scores, participants were also asked to evaluate the engagement process using both the Arnstien ladder and a simple Likert scale. In general, each focus group characterized their previous meeting experiences somewhere between rungs 3 and 4 (placation and informing), while they deemed their experience with this process somewhere between rungs 5 and 6 (consultation and partnership). The average Likert scale evaluation of the focus group meetings was 7.9 on a 1-9 scale, with 1 = very negative and 9 = very positive. In general, participants at the public
meetings gave similar Arnstein scores for previous meeting experiences as the focus group participants (3-4), with the actual meeting scores only slightly better (4-5). Their average Likert scale score, (6.1), was also slightly less than the associated scores at the focus group meetings. Likert scores from the online participants averaged 7.0.

Table 2. Example of Qualitative Comments on Regionalization Strategies for Wastewater

- "Problems with this strategy include a lack of risk diversification. Just like what we do with our investments. We don't put everything all in one thing because if it fails then it is catastrophic. So it seems to me if we go to one large facility we would have to have great confidence in our knowledge today, but we know there are always things that come along that we didn't anticipate where failures can happen. I just think the risk is really much greater than if we have multiple facilities."

- "There is an economy of scale when you talk about doing one large plant compared to several small plants. There is a concentrated point of impact on the water quality and on the watershed itself. In one case a large plant is better, has more approved treatment ability, and can get it to a higher level of treatment when you have more wastewater to deal with."

5. SUMMARY AND CONCLUSIONS

In general, the mean scenario scores in Table 1 did not reveal a significant amount of information. Although it was clear that an overwhelming majority of the participants did not favor pollution trading, no clear preferences emerged for the remaining BMPs. Much more information, however, was derived by looking at the actual distributions of these scores or by looking at the scoring distributions associated with particular stakeholder groups. In many cases, the former tended to exhibit a strongly bi-modal distribution, where many participants either strongly favored a particular BMP or strongly opposed the BMP. In some cases, the distributions also included a third peak in the middle of the distribution indicating either indifference or a lack of confidence in providing a score. Such information was deemed important to the Division of Water in determining what potential management scenarios might lead to polarizing results among the community. Ideally, those solutions which were found less polarizing were deemed preferable.

An evaluation of results by stakeholder group also revealed some interesting results. For example, some members of stakeholder groups tended to provide low scores for those scenarios that might be perceived to impose and additional hardships or costs to them. Thus some who identified themselves with the agricultural community tended to score the agriculture BMPs lower than others. Likewise, some who identified themselves with the development community tended to score the wastewater or urban BMPs lower than others. Thus in many cases, individuals tended to evaluate the different scenarios based on their own personal opportunity costs versus a more general community good.

Ultimately, community values identified through the KWRRI stakeholder engagement project support a balance between economic development and environmental stewardship. While local citizens clearly were very concerned about the potential economic impact of potential nutrient management decisions, they also were concerned that future development should not adversely impact the watershed. Some citizens stated that their values and opinions had not been adequately considered in past decisions, despite more recent attempts by USEPA to improve levels of community involvement. However, this study supports a shift from the historical unidirectional, informative paradigm of community relations toward a multi-level engagement paradigm that includes the public as a collaborator in identifying and developing solutions for admittedly complex problems. When organizations and communities join together in dialogue to identify both broad values and specific preferences, the impacted community becomes an important decision-making partner for developing solutions that seek to achieve the greatest good.
5.0 REFERENCES


