Marcellus Matters: Engaging Adults in Science and Energy (EASE)

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Marcellus Matters: EASE Project

Overview

"Marcellus Matters" is a multidisciplinary initiative that is providing adults in rural Pennsylvania with opportunities to increase their knowledge of science and energy systems and engage in scientific inquiry and investigation through the lens of natural gas development.

Although resource extraction is not new to Pennsylvania, the magnitude of the Marcellus Shale natural gas industry is. Its rapid growth has created the need for science-based information and understanding as individuals and communities make decisions about leasing land for drilling or pipelines and planning for the impacts from energy development on their communities.

"Marcellus Matters" addresses that need with four complementary activities: Marcellus Community Science Volunteers, Marcellus Community-Based Performances, Marcellus Environmental Planning Workshops and the Marcellus Community Network.

Faculty and staff from the colleges of Earth and Mineral Sciences, Education, Agricultural Sciences and Arts and Architecture at Penn State University collaborate to deliver the programming.

The project's target audience is adult citizens living in rural PA communities where shale gas development is occurring. In addition, the project has created partnerships with extension educators and local government officials as well as linking with universities, a library, and a community center.

Benefits to communities include: the opportunity to build a shared knowledge base among members of communities that are facing change; an increase in knowledge of science and engineering related to energy systems, consumption, production, and policy; an opportunity to develop an appreciation for scientific inquire and investigation; and an opportunity to utilize learning to address polarized community issues through civil dialogue.

Research Questions Being Asked

- Does providing multi-week informal science and energy education classes in rural PA communities assist community members to gain the knowledge needed and the communication skills required to particpate in effective civil dialogue within their communities around contentious topics such as Marcellus Shale development?
- Can theater be an effective educational mechanism for science and energy education?
- Will a network tool that combines a traditional text-based discussion forum with an interactive map be utilitarian to participants following completion of the information education programs?
- Will a public workshop on environmental planning put information in the hands of citizens and the community that will engage them in community planning?
- Development of a model of community engagement and capacity building in science and energy that can be adapted by rural areas across the nation experiencing shale gas development and natural resource extraction.

Evaluation

Formative evaluation of the Marcellus Matters: EASE project included pilot studies of each program component, and concluded in 2012. Summative evaluation is currently underway and will involve the cumulative, comprehensive study of the project as a whole. Participants in the Marcellus Community Science Volunteer program have completed pre-and post-tests, a reflection worksheet following each class, an immediate post survey within one week of class completion, and a delayed-post survey six months after completing the classes. Instruments for the Marcellus Community-Based Performance program have included in-person interviews, a participant survey, and a team observation log. For each program, team members have utilized participant reflection data to adapt or enhance programming throughout the project. To date, the Marcellus Environmental Workshops have been evaluated through a participant post-survey, as well as observation.

In addition, a quasi-ethnographic study of team communication strategies was undertaken in February 2014 with members of both the Marcellus Matters team and community members who had participated in at least one of the Marcellus Matters four programs. Data from the study were used to inform team communication training, as well as programming itself in the final phases of the project.

Both formative and summative evaluation for the project have been undertaken by the Lifelong Learning Group. Complete evaluation reports to date are available at informalscience.org.

Challenges

- Participants who successfully completed the Marcellus Community multi-week series of classes and knowledge tests were initially to be certified as "community scientists". Penn State had concerns about potential misrepresentation and instructed the project team not to certify. As volunteers, particpants can state that they completed the Marcellus Matters EASE programming but not identify themselves as representing Penn State.
- Sustainability without funding is another challenge for two of the Marcellus Matters programs. The Marcellus Network web-based tool is primary for Community Science Volunteers to continue to communicate with one another and scientists as well as to upload information about field data they collect, for example, orphaned and abandoned well locations. Funding to support personnel to travel to cohort communities will contribute to sustaining community volunteer actions. The team is seeking ways to address these issues.
- Recruiting participants for the Community Science Volunteer program and small attendance at the theater performances have been other challenges. The project coordinator has implemented multiple marketing methods with more success in participant recruitment than theater attendance.

Project Team:

Chuck Anderson, Earth & Environmental Systems Institute, Penn State; Andrew Belser, Theatre, Penn State; Brian Bills, Center for Environmental Informatics, Penn State; Seth Blumsack, Energy Policy and Economics, Penn State; Kathryn Brasier, Rural Sociology, Penn State; William Doan, Theatre, Penn State; Barbara Korner, Theatre, Penn State; Douglas Miller, Center for Environmental Informatics, Penn State; Tim Murtha, Landscape Architecture, Penn State; Brian Orland, Landscape Architecture, Penn State; Esther Prins, Adult Education, Penn State, Penn State; Eliza Richardson, Geosciences, Penn State; Susan Russell, Theatre, Penn State; David Yoxtheimer, Marcellus Center for Outreach and Research, Penn State.

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Marcellus Community Science Volunteer Program:

Training Volunteers to Create Local Expertise

The Marcellus Community Science Volunteer program is a series of 8-10 multi-week science education classes that explore the natural and social sciences through the context of the Marcellus Shale. A total of 85 adult citizens in five rural PA communities have successfullly completed the classes.

The instructional format emphasizes discourse with participants who engage with presenters through hands-on activities, questions and answers, field trips and visits to drilling sites. Many of the in-class exercises are designed to develop participants' critical reading and thinking skills.

Class topics included: energy resources for PA and the U.S., geology and seismic testing, shale development engineering, managing water resources, understanding the scientific process, community impacts and institutional trust, economic impacts, land use planning, constructive conversations.

An example of a successul outcome occurred when Marcellus Matters programming entered a rural pristine PA county where tourism is a destination and where there is no legacy of resource development except for timber just as Marcellus Shale development was beginning.

Approximately 60 community members comprised of landowners and non-landowners, local government officials, and business persons particpated in various learning and engagement activities through the four programs of this project. A significant outcome of this programming was the creation of an ongoing citizens group committed to providing scientific information about shale development, organizing events, and acting as an informational resource. This group periodically publishes local news articles and holds public events on Marcellus Shale development issues.

Community Based Performance Program:

Community Conversations
Living with Risk, Reward and Uncertainty

Community-based theater performances that explore perceptions of risk, reward and uncertainty associated with energy resources development have occurred in four PA rural communities. These short plays provide a context for audience members to engage each other in dialogue and exchange through a "talk back" following the performance. Using theater to present science-based information offers a window into how the arts and sciences can collaborate to build effective models for the creation of new knowledge. Performances are written by theatre faculty and vetted/reviewed by scientists. Scientists attend performances to participate in the audience "talk back" and are available to answer technical questions.

Given the importance of dialogue to the program, audience members were asked if they agreed with the series of statements related to participation in dialogue around gas drilling and the Marcellus Shale. Responses to these items, along with variation in other data points related to interest areas, suggested that local context and audience makeup were critical considerations when planning for each event.

In general, audience feedback supported the structure of the program. Audience members noted, and had positive reactions to, the multiple elements of the event and how they worked in combination. Comments also suggested that the audience members valued the interplay of art, science and dialogue. The former was seen as a novel way of creating safe space for the latter, while the presence of "real scientist" lent the event credibility as a source of factural information about complex issues.

Audience Perspective Items

Please share the degree to which you agree with the following statements about your own views on natural gas drilling and the Marcellus Shale gas play. Circling 1 (one) means "not at all" and 7 (seven) means "completely."

	May 2012 mean (n=15)	October 2012 Mean (n=18)	June 2013 Mean (n=13)	November 2013 mean (n=12)	May 2014 mean (n=6)
I can see where people with different points of view are coming from.	5.73	5.44	5.85	4.58	7
I want to hear what other people have to say.	6.07	6.28	6.08	5.17	4.67
I am clear about my own point of view.	4.79	5.39	5.46	5.58	.50
There are multiple valid points of view.	5.60	5.78	5.23	4.91	6.20
I want to share my opinions with others.	4.93	5.56	4.46	4.55	4.25
I believe I could learn from what other people have to say.	6.40	6.50	6.15	5.17	6.50

Marcellus Environmental Planning Workshops:

Planning and Designing for Energy Development

The Marcellus Environmental Planning Workshops seek to put usable scientific and technical knowledge about planning and design in the hands of individual citizen landowners and their communities and empower them to participate in shaping the landscape that is emerging around them.

Tools developed for the workshops project the land use changes resulting from gas development operations, access roads and pipelines, and are communicated via photo-renderings and GIS-based informational graphics. Changes in forest cover, pathways for invasive species, impacts on water quality and downstream flooding and changes in visual quality are outcomes the tools display. These tools are being used in land-use planning workshops for the Community Science Volunteers and in the Environmental Planning Workshops for the public.

Key Questions:

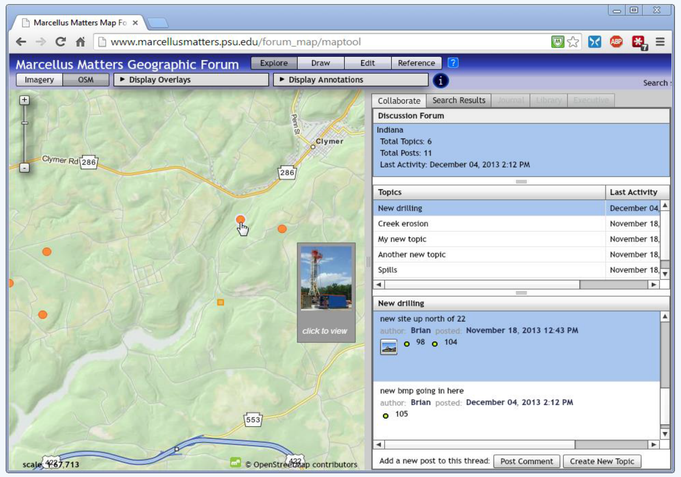
- Do citizens know what they want and expect from the gas boom, and the questions they need to ask about the future?
- Do they know as much as they need to engage sophisticated and well-funded industry and public representatives?
- Do they know what is possible in shaping their future, and do they feel motivated and empowered to ensure that their future is the one that happens?
- How can any planning effort circumvent community feelings of alienation?

This work has been evaluated in a pilot study where participants' responses helped in adapting materials and activities to ensure the training was collaborative and community-based. Pre-and post-training surveys were administered to assess gains in subject matter literacy, facility with the skills and practice of scientific inquiry, and articulation of scientific concepts. Workshop participants identified issues explored as "important," "relevant," "valuable" and "interesting."

Their responses indicated an over-arching realization of the role that landowners have in determining future development, whether by direct involvement or by their engagement of local government officials and industry representatives. These planning workshops can bring more discursive, context-appropriate and interactive discussion of issues to small groups of committed community members.

Marcellus Community Network:

Using Data to Connect Communities



We developed a map-based Web application to promote ongoing collaboration and engagement among Marcellus Matters participants beyond the classroom. Geographic place provides valuable context and organization to discussions regarding ecological and human dimensions of shale resource development across the landscape. Consequently, the application was designed to combine a traditional text-based discussion forum with an interactive map. Geographic context is established through relevant reference maps (e.g. aerial imagery, terrain, street/atlas) and a shared means to mark these maps with annotations (e.g. "pins" of locations). Discussion topics and threads can be associated with map annotations. As a result, participants can talk about a particular place, enter points and designate areas, or find places where certain discussions/ activities are happening. For example, participants interested in plants can start a discussion about invasive species along pipeline corridors. They share observations (including specific locations) of invasive occurrences noted during recreational hikes and begin to see a spatial pattern emerging with regards to spread.